CHAPTER VI

ORGANIZATIONAL STRUCTURES OF TRANSNATIONAL CORPORATIONS

As strategies of transnational corporations (TNCs) change, so do their organizational structures. The traditional structure is based on stand-alone strategies involving affiliates linked to their parent firms via ownership and the supply of technology. The flow of resources and the functional links between parents and affiliates are limited. Decision-making lies mainly with the managers of each affiliate. Reporting arrangements are hierarchical: the top manager in each affiliate is in charge of operations and reports to the head of an international division and/or product division of the parent firm.

Simple integration strategies already imply more elaborate organizational forms. With simple integration, substantial coordination usually takes place between headquarters and foreign affiliates or subcontracting firms for some activities. The production of parts, for example, requires parts producers to match the design and quality requirements of the assembler, the parent firm. Alternatively, by improving the design of the component, the affiliate or subcontractor can influence the production of the final product. The process of contact and communication is therefore essentially two-way, although most decision-making authority still lies at the headquarters and reporting arrangements are essentially hierarchical.

Complex strategies, by contrast, typically involve multi-directional linkages and information flows between parent firms and affiliates, among affiliates (intra-firm), or with unrelated firms (inter-firm). A firm is organized so that almost any activity can, in principle, be located in an affiliate or in an unaffiliated firm. The combination of intra- and inter-firm structures creates a network, a structure in which the flow of resources and information, as well as reporting arrangements, are both hierarchical and lateral. Within a corporate system, decision-making authority is usually centralized, though not necessarily at the parent firm. Affiliates may have considerable autonomy in coordinating a particular function corporation-wide. Decision-making among TNCs engaging in

value-adding partnerships for a specified period (e.g., strategic alliances for research and development) is shared among the firms involved.

Although organizational structures are supposed to help carry out strategies, they can actually be a hindrance. When the strategy changes, quite often the organization does not. Attitudes, too, may be resistant to change, especially if managers have got used to securing a particular market or group of markets. For instance, Monsanto (United States) moved the headquarters for its resins business to Belgium—near its largest and fastest growing market—because it felt that the home-country bias in the parent firm's headquarters was a barrier to developing a global approach to the business.[1] Moreover, establishing new structures can cause disruptions which may themselves lead to long-term inefficiencies. Linking strategies and structures is a complex task that is not always managed successfully.

A. Structures of transnational corporations under complex strategies

Complex integration strategies frequently require complex organizational structures. The very nature of complex integration strategies involving greater dispersion of activities than is dictated by stand-alone or simple integration strategies necessitates structures that are themselves complex. Complex structures are fluid and adaptable to changing conditions and facilitate the intra- and inter-firm flow of information and resources. With international production occurring throughout a firm's value chain, a hierarchical structure (stand-alone or simple integration) may not provide enough flexibility to deal with conditions that may change rapidly at one point of the value chain, but not at others. Similarly, basic corporate-wide functions, such as research and development, strategic planning, and marketing and finance, may be required in different amounts at different points in the value chain.

1. Intra-firm structures

Complex strategies often require intra-firm structures that foster greater functional specialization. This implies that corporate divisions in the parent firm are often organized by functions for a particular product. In other words, a point in the value chain may be located in an affiliate outside the home country, which is responsible for carrying out an activity for the TNC either world-wide or for a given region.

Under complex structures, reporting arrangements often follow a matrix form. Affiliates may report separately to different divisions of the parent firm involved in a particular activity, thus multiplying linkages within the firm. In spite of the greater geographical dispersion of activities, there is usually a high degree of centralization of decision-making, though not always in the parent firm. Decisions may also be taken in those affiliates that have corporate-wide mandates for particular functions.

In pursuing complex strategies and in adopting structures associated with them, some TNCs with substantial operations abroad have established headquarters outside their home countries to manage affiliates on the basis of a region, a product or a function (table VI.1).

Transnational corporations establish *product-line headquarters*, either regionally or globally, for important products. Those headquarters are responsible for coordinating all functions of the TNC that relate to a particular product line. Some TNCs, such as IBM, AT&T and Hewlett-Packard, have recently moved their headquarters for some leading products from the United States to Europe.

Regional headquarters are responsible for coordinating and supporting all activities of all affiliates in a region (Aoki and Tachiki, 1992). Regional headquarters are sometimes established in response to regional integration schemes. The number of Japanese TNCs that has established regional headquarters in Europe, for example, has risen in recent years (Aoki and Tachiki, 1992, p. 30) in response to the need to coordinate operations of affiliates that were established there in anticipation of the Single Market. Similarly, more United States TNCs are setting up regional headquarters in Europe in response to the unification of the European Community, with the choice of location being influenced by costs and infrastructure considerations. They can be seen as a mechanism for giving greater autonomy to the regional operations of a TNC. For instance, General Electric (United States) has recently established a regional headquarters in Asia (excluding Japan and the Republic of Korea) for its main product lines—power generation, aircraft engines and plastics—responsible for all its activities in that region. The Asian headquarters represents General Electric's first step away from a strict product-line division of operations towards a geographically-based organization of its activities for all main products.[2] Both General Motors and Ford have set up regional headquarters in Europe; these have evolved from the multi-domestic strategies pursued by them and the need to manage complex production networks covering several models of automobiles (Dicken, 1992, pp. 298-303).

Corporate units in charge of a particular function—what might be termed *functional headquarters*—are responsible for a specific activity for a TNC, which would otherwise be undertaken separately in home and host countries. An international procurement office, an affiliate that coordinates sales and marketing internationally or an affiliate in charge of providing after-sales services, are examples of functional headquarters. Often, corporate units in charge of a function cut across both regions and products. Establishing functional headquarters outside the home country for particular functions reduces the scope of responsibility that the headquarters at home assumes and allows it to focus on the overall coordination of the various dispersed functions, while retaining some key functions, such as strategic planning or finance. In turn, each headquarters in charge of a specific function regionally or globally bears the responsibility for performing that function and reports directly to the top level of management in the home country. The dispersion of activities requires that the parent firm monitors closely its functional headquarters. To achieve this, the configuration of a TNC's activities and the flow of information requires matrix forms with vertical and horizontal reporting arrangements.

Several TNCs have established functional headquarters outside their home countries, which specialize in carrying out a function for all affiliates in a specific region. The NEC Corporation (Japan), for example, has a regional headquarters in Singapore which, among other things, is in charge of research-and-development support for all affiliates in the members of the Association of South-East Asian Nations (ASEAN) through its facilities for the development of software and the design of integrated circuits (Wu, 1991, pp. 113-114). Similarly, the

Table VI.1. Selected transnational corporations with regional, product-line or functional headquarters

Parent firm	*Home country*	*Type of headquarters*	*Country/territory of location of headquarters*
		Regional headquarters	
Asea Brown Boveri	Switzerland	Asia and the Pacific North America	Hong Kong United States
British Petroleum	United Kingdom	North America Asia and the Pacific, Middle East Europe	United States Singapore Belgium
Ford Motor Company	United States	Asia and the Pacific Europe	Japan United Kingdom
General Motors	United States	Asia and the Pacific Europe	Singapore Switzerland
Hitachi	Japan	Asia Europe	Singapore United Kingdom
Nissan	Japan	North America Europe	United States Netherlands
Sony	Japan	North America Europe	United States Germany
Toshiba	Japan	North America Europe Asia and the Pacific (including Australia and New Zealand)	United States United Kingdom Japan
		Product-line headquarters	
Asea Brown Boveri	Switzerland	Power transformers	Germany
AT&T	United States	Corded telephones	France
Du Point	United States	Electronics Agricultural products, elements of fibres and polymers Lycra	Japan Switzerland Switzerland
Hewlett-Packard	United States	Desktop personal computers	France
Hyundai	Republic of Korea	Personal computers	United States
IBM	United States	Networking systems	United Kingdom
Philips Electronics	Netherlands	Lighting	United States
Siemens	Germany	Air-traffic management systems Nuclear medicine and medical equipment	United Kingdom United States

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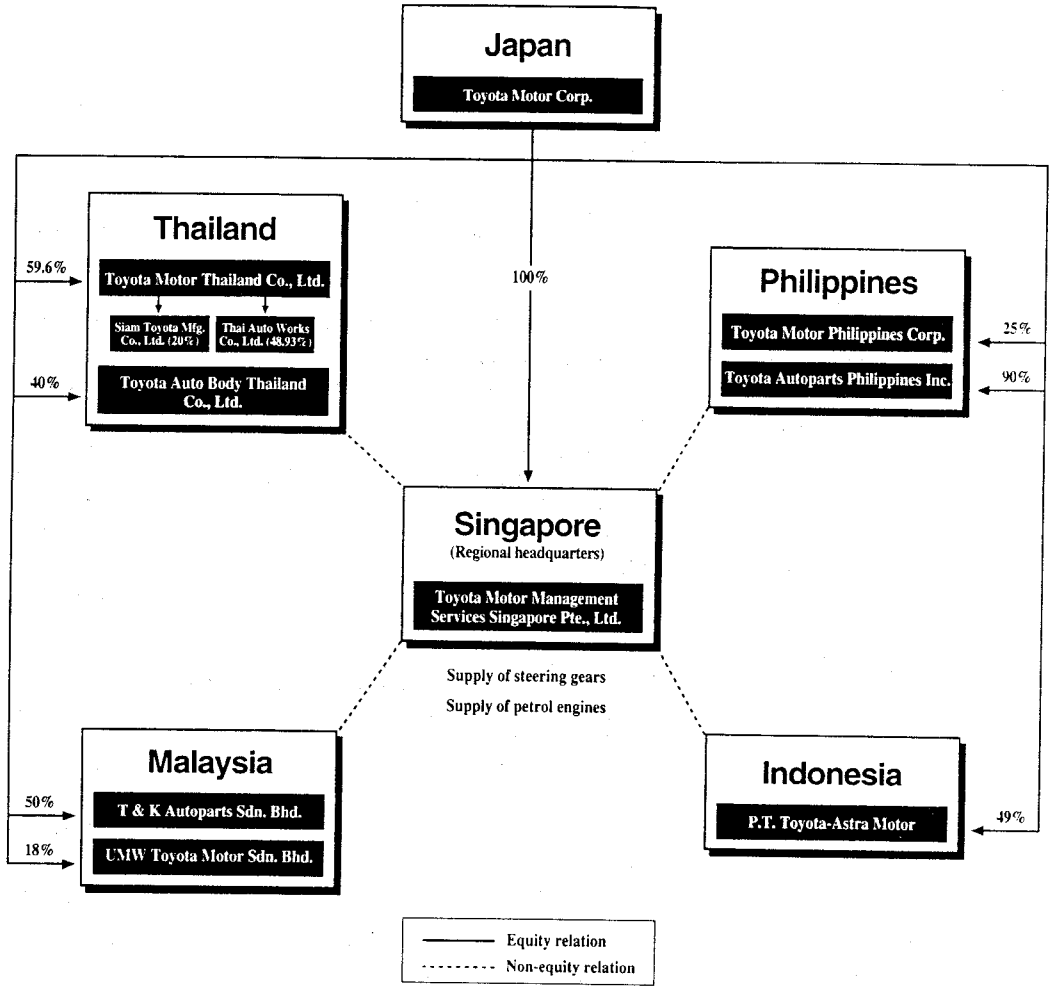
(Table VI.1, cont'd.)

Parent firm	*Home country*	*Type of headquarters*	*Country/territory of location of headquarters*
		Functional headquarters	
Sony	Japan	***Local procurement/after sales-services***	
		Sony International	Singapore (Asia)
Ford Motor	United States	***Procurement***	
		Mid-size car product development in Europe	Europe
ITT World Directories	United States	***Procurement/local purchasing***	
		Global purchasing headquarters	Belgium
IBM	United States	***Marketing and services***	
		Asia and the Pacific	Japan
		North America and the Caribbean, United States	United States
		Europe, Middle East, Africa	France
		Latin America	United States
Hewlett Packard	United States	***Marketing***	
		Personal computers	Singapore
		Peripherals	Singapore
Mobil	United States	***Exploration and producing operations***	
		North America, Latin America and the Caribbean	United States
		Europe, Africa, Commonwealth of Independent States	United States
		Asia and the Pacific, Middle East	Singapore
		Business development	
		Asia and the Pacific	Singapore
Hewlett Packard	United States	***Manufacturing***	
		Peripherals manufacturing	Singapore

Source: UNCTAD, Programme on Transnational Corporations, based on various sources.

Union Carbide Chemicals and Plastics Technical Center conducts their training programmes for the company's staff in the Asia-Pacific region (Wu, 1991, p. 114). Toyota Motor Management Services Singapore, a wholly owned affiliate of Toyota Motor Corporation (Japan), was established to coordinate transactions in components between Toyota's affiliates in several Asian countries (figure VI.1). It reports directly to the company's headquarters in Japan. Other TNCs pursuing similar strategies include the Ford Motor Company (United States): research and development for the Mondeo and its North American counterpart was carried out by Ford of Europe (an umbrella company for Ford's affiliates in Europe), involving affiliates in Europe and North America and leading to a product that will be sold by Ford on a world-wide basis.

Figure VI.1. The structure of Toyota's arrangements for auto-parts reporting in Asia



Source: Toyo Keizai Shimpo, 1991.

The main objective of product-line, regional and functional headquarters is to provide coordination more efficiently than can be done from a headquarters at home or one situated in a host country. In practice, the demarcation lines between the three types of headquarters are often not clear. It is not uncommon for TNCs to establish headquarters abroad on the basis of more than one category: IBM (United States), for example, has a regional headquarters in Europe for networking systems, one of its products. While it may be possible to organize TNCs on the basis of the lines of conventional regional or product headquarters when pursuing complex integration strategies, functional headquarters represent a new development in the organizational structure of TNCs that seems to be particularly suitable to these strategies.

The location of a product-line, regional or functional headquarters within a region is determined by a variety of factors, including telecommunication and transportation facilities, the quality of human resources, local operating expenses and fiscal benefits. Since the activities of headquarters often involve a high level of managerial skill and expertise and can have considerable spillover effects on the local economy, Governments are eager to attract them (box VI.1).

Box VI.1. The role of the State in attracting headquarters of transnational corporations: the example of Singapore

Exploiting its sophisticated technological and institutional-support infrastructure, Singapore is actively seeking to attract regional, product-line and functional headquarters of TNCs with activities in Asia and the Pacific. To that end, Singapore is re-adjusting policy measures to address issues, such as resource and credit availability, the development of human resources and the upgrading of infrastructure. In addition, Singapore offers a wide spectrum of services and incentives to TNCs that want to establish headquarters there.

The geographical position and established transportation linkages of Singapore with the rest of the world provide a ready ground for headquarters of TNCs. Having been a major hub for passenger, as well as air-and-sea cargo traffic in South-East Asia, the Government of Singapore has consistently invested in transport infrastructure to maintain its lead as a world-class transportation hub. A second air terminal was completed in late 1990 and the civil aviation authorities plan to build two more terminals at Changi airport increasing the total passenger-handling capacity to 50 million a year and the air cargo capacity to 2.5 million tons. To keep up with a growing regional demand for sea transportation services, the Government has committed $1.1 billion for the expansion of container terminals to expand their capacity to over 15 million twenty-foot equivalent units.

To attract functional headquarters of TNCs for research and development, the Ministry of Trade and Industry of Singapore has recently set up the National Science and Technology Board. Its objective is to oversee the development of research-and-development infrastructure for new industries, such as agro-technology, biotechnology, robotics and automation. Singapore has also established several Government-supported research centres, such as the Singapore Science Park, the Institute of Molecular and Cell Biology, the Institute of Systems Science and the Information Technology Institute. In addition, Singapore inaugurated a new university in mid-1991 with special emphasis on science and technology, thus doubling the national research-and-development expenditure to over half a billion dollars. Singapore has also instituted stricter intellectual property protection for TNCs.

With the inception of the Asian Dollar Market and the Singapore International Monetary Exchange (SIMEX), Asia's first financial futures exchange, Singapore has become a leading financial centre for TNCs in the region. State-of-the-art telecommunications technology allows TNCs to trade in financial centres through the world. In addition, Singapore's location in a time zone that overlaps with that of both European and Asian financial markets allows TNCs to trade in those regions during regular working hours. In order to encourage TNCs to locate their regional or global finance headquarters in Singapore, several fiscal incentives have been introduced. The Finance and Treasury Centre announced in March 1990 a concessionary tax rate of 10 per cent on income received from the provision of treasury and financing services in foreign currencies to affiliates. In addition, dividends from foreign affiliates to the parent firms are exempted from taxes.

The Operational Headquarters initiative, administered by the Economic Development Board of Singapore, grants operational-headquarters status to foreign affiliates that manage related firms outside Singapore. The Government currently offers a concessionary tax rate of 10 per cent (instead of the usual 31 per cent) to income of foreign affiliates arising from the performance of services related to their status of operational headquarters. Some affiliates awarded operational-headquarters status in Singapore are in charge of particular functions for the Asian region and typically engage in planning, procurement, technical assistance, marketing and sales promotion, training, finance and accounting. Through those measures, Singapore seeks to become a business centre for headquarters of TNCs.

Source: Singapore International Chamber of Commerce (1993).

Partly in response to easier regulations for the listing of foreign companies in stock exchanges, TNCs use international capital markets to raise equity. This facilitates a dilution of their ownership by bringing in stockholders world-wide. Thus, the potential for a TNC to be owned by foreign entities increases when it is listed on stock exchanges outside the home country. For the ten largest TNCs (in terms of their foreign assets—see table I.10), the number of foreign countries in which their stock is listed has increased from 58 to 70 over the past decade (table VI.2). Of a sample of the largest United States manufacturing TNCs, 50 per cent were listed on

Table VI.2. Foreign countries in which the stock of the ten largest transnational corporations is listed, 1983 and 1993[a]

Parent firm	*Home country*	*1983*	*1993*
Royal Dutch Shell[b]	The Netherlands and the United Kingdom	Austria, Belgium, France, Germany, Federal Republic of, Luxembourg, Switzerland, United States	Austria, Belgium, France, Germany, Luxembourg, Switzerland, United States
Ford	United States	Belgium, Canada, France, Germany, Federal Republic of, Switzerland, United Kingdom	Belgium, Canada, France, Germany, Japan, Switzerland, United Kingdom
General Motors	United States	Belgium, Canada, France, Germany, Federal Republic of, Japan, United Kingdom	Belgium, Canada, France, Germany, United Kingdom
Exxon	United States	Belgium, France, Germany, Federal Republic of, The Netherlands, Switzerland	Belgium, France, Germany, Japan, The Netherlands, Switzerland, United Kingdom
International Business Machines	United States	Austria, Belgium, Canada, France, Germany, Federal Republic of, Japan, The Netherlands, Switzerland, United Kingdom	Austria, Belgium, Canada, France, Germany, Japan, The Netherlands, Switzerland, United Kingdom
British Petroleum	United Kingdom	France, Germany, Federal Republic of, The Netherlands, Switzerland, United States	Canada, France, Germany, Japan, The Netherlands, Switzerland, United States
Nestlé	Switzerland	Austria, France, Germany, Federal Republic of, The Netherlands	Austria, Belgium, France, Germany, Japan, The Netherlands, United Kingdom
Asea Brown Boveri[c]	Sweden and Switzerland	United Kingdom, United States	Austria, Denmark, Finland, Germany, United Kingdom, United States
Philips Electronics	The Netherlands	Austria, Belgium, France, Germany, Federal Republic of, Luxembourg, Switzerland, United Kingdom, United States	Austria, Belgium, France, Germany, Luxembourg, Switzerland, United Kingdom, United States
Mobil	United States	Canada, France, Germany, Federal Republic of, The Netherlands, Switzerland, United Kingdom	Canada, France, Germany, Japan, The Netherlands, Switzerland, United Kingdom
Total number of countries in which the stock of parent firms is listed		58	70

Source: UNCTAD, Programme on Transnational Corporations, based on company information.

a Largest TNCs ranked by the size of their foreign assets (see table I.10). American Depository Receipts are included.
b Consists of listings of Royal Dutch (the Netherlands) and Shell Transport (United Kingdom) outside of the Netherlands and the United Kingdom.
c Consists of Brown Boveri (Switzerland) listings and ASEA (Sweden) listings outside of Switzerland and Sweden.

stock exchanges outside the United States, of which more than 25 per cent had listed their stocks in more than four countries (Raghunathan, 1992).

Legal ownership structures—especially with the proliferation of layers of ownership—do not necessarily correspond to managerial structures and reporting arrangements within a TNC (box VI.2). Second-tier or third-tier affiliates, for example, may report directly to the parent firm. Nevertheless, as the ownership structure of TNCs becomes more complex, so do questions of coordination, decision-making and reporting. The same goes for policies based on the nationality of a firm (for example, national treatment, investment incentives and performance requirements), an issue discussed in Part Three.

Box VI.2. Multi-tier ownership structures of transnational corporations

Many TNCs now have multi-tiered ownership, with parent firms owning foreign (and domestic) affiliates that are themselves owners of additional affiliates (see also Hedlund, 1993). The first tier consists of affiliates owned by the ultimate parent, the second tier by affiliates owned by first-tier affiliates, and so on. In each tier, minority equity participation by external investors may also be involved.

A 1991 sample of the largest United States manufacturing TNCs shows an average of 2.4 tiers in the structure of ownership of their affiliates, with 46 per cent of those companies having three or more tiers of affiliates abroad (table 1). For example, Mattel, a United States toy producer, has 39 affiliates around the world, 26 of which are directly owned (first-tier affiliates), 11 second-tier affiliates and 2 third-tier affiliates (table 2). Multi-tiered ownership structures are common among mature TNCs. Affiliates that, over time, have acquired the necessary ownership advantages, skills, technology and international experience etc., become parent firms themselves by establishing foreign as well as domestic affiliates.

Indirect ownership of affiliates is sometimes the result of a decision by the parent firm to become more dispersed geographically while retaining control of its affiliates. For example, Nestlé (Switzerland) has more than 95 per cent of its assets abroad in nearly every region of the world, and some 30 per cent of its affiliates are in the second, third and fourth tiers.[a] Mergers and acquisitions may themselves create additional tiers in ownership structures, since they often involve one parent firm taking over another parent firm, which then becomes a first-tier affiliate of the acquirer. The wave of cross-border mergers and acquisitions during the 1980s may therefore have been a factor in the proliferation of multi-tier ownership structures (UNCTAD, 1993f).

Table 1. Multi-tiered ownership structures of United States transnational corporations, 1991[a]

Number of tiers of affiliates		*Percentage of TNCs*
	1	32
	2	22
	3	28
	4	12
	5	6
Average	2.4	100

Source: Raghunathan, 1992.

a The data are based on a survey of 318 of the largest United States manufacturing TNCs with at least 5 per cent of their total assets or sales abroad and at least $50 million in sales. Of that universe, a total of 51 TNCs responded in full. Those TNCs showed no bias when compared to the universe of 318 TNCs.

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(Box VI.2, cont'd.)

Table 2. The multi-tier ownership structure of Mattel, 1991

Parent firm / *Tier of affiliate*	*Mattel Inc. (United States)*										
	8 United States affiliates, of which:						*18 foreign affiliates, of which:*				
1st-tier affiliates	Mattel G. Inc.	Mattel I. Inc.			Mattel Overseas Inc.		Auritel S.A. (Mexico)	Mattel Toys (HK) Ltd. (Hong Kong)	Mattel France S.A. (France)	Mattel Holdings Ltd. (Canada)	
2nd-tier affiliates	Mattel GmbH (Germany)	Mattel Toys S.R.L. (Italy)	Mattel A.E.B.E. (Greece)	Mattel A.G. (Switzer-land)	Mattel Toys Vendor Operations Limited (Hong Kong)	Mattel Pty. Limited (Australia)	Aurimat S.A. de C.V. (Mexico)	Mattel T Company Ltd. (Hong Kong)	Corolle S.A. (France)	Mattel Canada Inc. (Canada)	Mattel United Kingdom Limited (United Kingdom)
3rd-tier affiliates				Mattel Manufac-turing Europe, S.R.L. (Italy)							

Source: United States, Securities and Exchange Commission, 10-K reports.

In addition to multi-tier ownership structures, affiliates often form what might be termed internal joint ventures, in which the parent and one or two affiliates set up a new company (indirectly owned by the parent). Of the sample of the largest United States TNCs surveyed, only 14 per cent of the parents owned all their affiliates 100 per cent, and 68 per cent had internal and/or external joint ventures in their ownership structure.[b] IBM's Pan-European services affiliate in France, IBM Eurocoordination, is one such example. That affiliate is owned by affiliates of IBM from 15 European countries, each holding a stake roughly in proportion to the size of its operations.[c] The ownership structure highlights the role that the affiliate plays in such areas as marketing, sales, distribution and training in the operations in Europe.

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a Dun and Bradstreet International, 1992; "Nestlé: a giant in a hurry", *Business Week*, 22 March 1993, pp. 50-51, 54.

b Raghunathan, 1992.

c United States, Securities and Exchange Commission. IBM Eurocoordination is owned by affiliates located in France, Germany, Italy, and the United Kingdom (about 14 per cent each) and by affiliates located in Austria, Belgium, Denmark, Finland, Ireland, The Netherlands, Norway, Portugal, Spain, Sweden and Switzerland (about 4 per cent each); 10-K reports.

2. Inter-firm structures: strategic partnerships

Complex integration covers cross-border transactions not only between companies under common ownership, but also between unrelated firms. International strategic partnerships or alliances, essentially cooperative arrangements mainly between TNCs headquartered in different countries, have become increasingly popular.

Those partnerships are a form of organizing corporate activities across borders so that a TNC, while retaining its core firm-specific advantages, links with other firms to develop new advantages, spread risks and capture economies of synergy. Such relationships typically involve non-equity forms that allow firms to share control over a specific project or activity, but can be accompanied by cross shareholdings.

International strategic partnerships or alliances can occur at various points of the value chain, ranging from research and development to after-sales services. Strategic technology partnerships, estimated to have exceeded 4,000 between 1980 and 1989 (Hagedoorn and Schakenraad, 1991), have become particularly prevalent. For example, IBM (United States) has alliances with Thomson-CSF (France) to market microprocessor chips, with Toshiba (Japan) to cooperate in the development of static random access memory chips, with Siemens (Germany) for work on advanced dynamic random access memory chips, and with Toshiba and Siemens to develop a new 256 megabyte chip (box VI.3). Renault (France) and Volvo (Sweden) have an alliance to produce automobiles and trucks. Nestlé (Switzerland) and Coca-Cola (United States) are cooperating to distribute canned hot drinks through vending machines.[3] An alliance between Sanofi (an affiliate of Elf Aquitaine, France) and Eastman Kodak (United States) was formed to share each other's distribution network.[4] Recently, AT&T announced its plans to form alliances with several major communications companies world-wide (including companies in Europe, Japan, Australia and Singapore), as part of a plan to build a global telecommunications network.[5]

Box VI.3. Functional integration through international strategic alliances in semiconductors: IBM, Toshiba and Siemens

The semiconductor industry is characterized by heavy research and continuous development of new products, a short product life cycle, a high rate of process innovation, the proprietary nature of key technologies and significant economies of scale. The industry comprises highly competitive firms, with new entrants from the Republic of Korea and Taiwan Province of China.

Despite—and, perhaps, because of—the intense competition in the industry, alliances have been formed among rival firms to share the costs and risks involved in developing new products and processes. The alliance between IBM (United States), Siemens (Germany) and Toshiba (Japan) in 1992 to develop a 256 megabyte chip to be introduced by the end of this century is one such example. The trio's objective is to share the huge costs involved in designing the new chip and its fabrication process (estimated at $1 billion) and the risk associated with it.

For the product and fabrication-process design, teams from IBM, Siemens and Toshiba work together to develop sub-products under the supervision of managers from one of the three corporations. Similarly, the three are represented in working groups formed to find solutions to particular problems arising during the design process. Overall, a team of 200 engineers from all three companies work together in IBM's Advanced Semiconductor Technology Center, reporting to a manager from Toshiba. All basic inputs used in developing the 256 megabyte chip are provided by IBM, which then issues invoices to Siemens and Toshiba. Billing and costing are controlled by staff from each company, who are located in the other two, at IBM's Technology Center and at the United States headquarters of Siemens and Toshiba.

In addition to the closely connected functions of product and process design, the three firms are planning to cooperate in production itself.They have plans to build factories and to produce jointly the 256 megabyte chip. At the pre-production phase, they are designing and making the equipment needed for final production. At the same time, they have agreed that the technology they develop jointly can be shared with Motorola (United States), a TNC with which Toshiba has a separate alliance.

Sources: "Talk about your dream team", *Business Week*, 27 July 1992; Siemens, *Annual Report 1992*, Munich: Siemens, 1993.

In advanced-technology industries (for example, biotechnology, information and new materials technology), firms go into partnerships for technological complementarity, to speed up the innovation period and to lower costs and share risks. In other industries, such as automobiles, chemicals, food and beverages and consumer electronics, access to markets appears to be the main motive for partnerships. In services industries, for example, some alliances are aimed at obtaining market access through linking computerized reservation systems (box VI.4). In natural resource industries, cost considerations and risk-sharing have encouraged the formation of alliances among TNCs. The same is true of capital-intensive industries, such as aviation, heavy electrical equipment and telecommunication systems (Hagedoorn and Schakenraad, 1991a). Transnational corporations are increasingly aware that alliances offer access to high value-added resources, such as technology, complex manufacturing processes, skilled labour, marketing and distribution networks and after-sales services. On the other hand, TNCs seldom engage in alliances in areas that they consider to be their core strengths.

Strategic alliances create relationships that are often blurred in terms of authority, with each party expecting to boost the profitability of its own assets or to generate new ones. Such relationships also can blur the traditional boundaries of a firm, creating problems for aspects of national regulatory policy. For example, alliances in high-technology products have made the application of national security guidelines more difficult, and are forcing some Governments to re-evaluate their policies (Graham and Krugman, 1991, pp. 149-155).

3. The emergence of networks

Network structures are matrix relationships along a TNC's value chain combined with horizontal relationships (strategic partnerships or alliances) with other TNCs at a single point in the value chain. Networks combine intra- and inter-firm organizational structures. They are a departure from the hierarchical structures typically found in stand-alone and simple corporate strategies. They involve complex combinations of horizontal and vertical linkages among the firms comprising the network, based on shared authority, goals, expertise, responsibility, accountability, recognition and reward. Information technologies are crucial in managing those links across time zones and countries, and in the need to respond rapidly to changing conditions in a competitive environment.

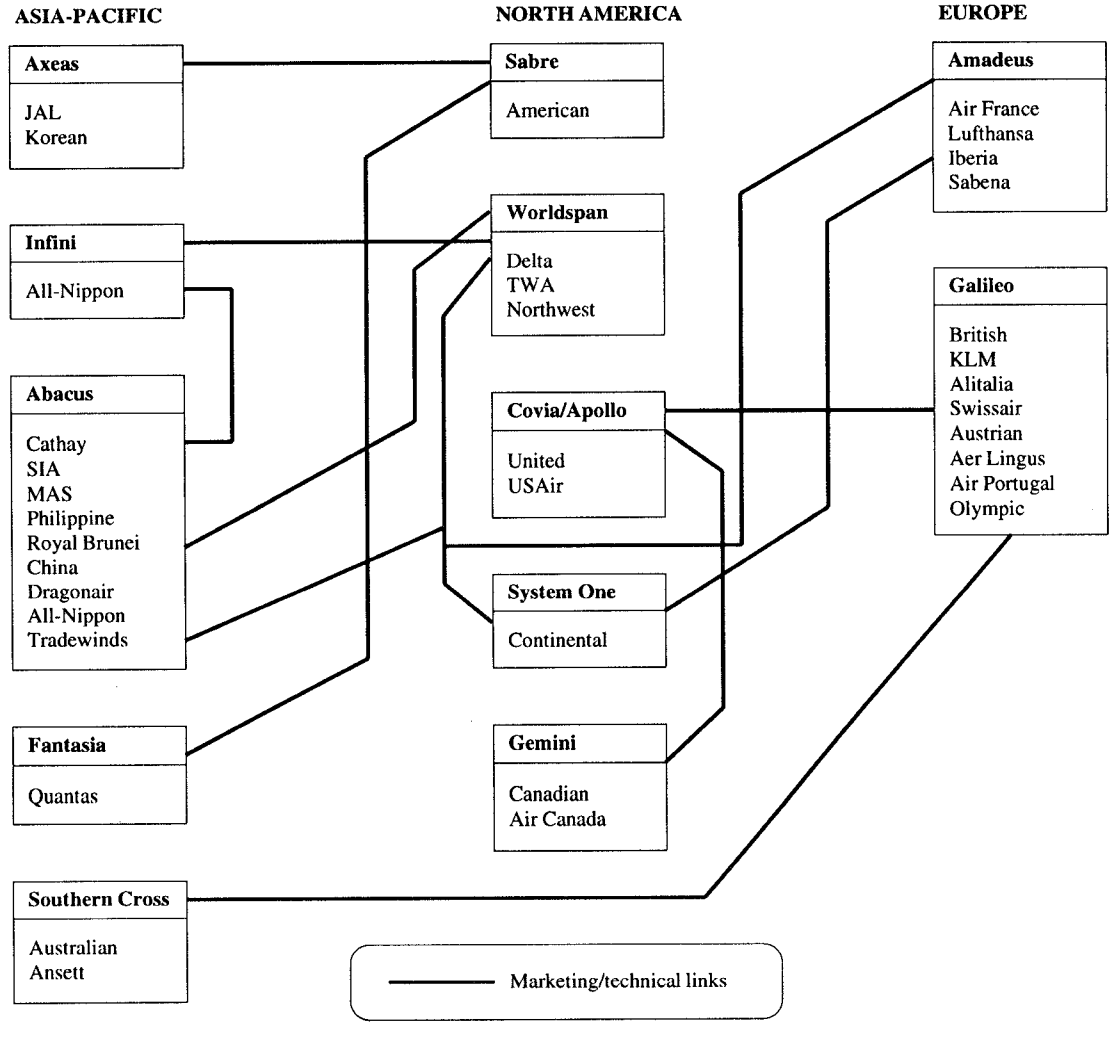
Networks involve changes in reporting arrangements, flows of information and incentives within the firm away from conventional practices. Information usually flows outside the traditional vertical routes. Monsanto (United States), for example, has tried to foster horizontal lines of communication to offset the "silo" effect, where information flows up one division to its head, and is then passed to the head of a separate division before it flows down to an operational level.

For some corporate-wide functions of a network, decision-making can be centralized. In the case of the Japanese *keiretsu*—a domestically-based network involving parent firms, affiliates, subcontractors, suppliers, financial institutions, wholesale and retail trading companies etc.—the production of components by affiliates or unrelated firms has to comply with standards set by the "core" firm, which coordinates activities so as to ensure compatibility. This is also the way that Toyota and other Japanese automobile TNCs in Asia organize their production networks. The core firm is responsible for transmitting technological advances and innovations to the

Box VI.4. Towards a global distribution system: alliances among airline computer reservation systems

Computer reservation systems (CRS) have radically altered marketing techniques and distribution arrangements in the airline industry. Those systems control the way in which travel is packaged, priced, marketed, sold and delivered to passengers around the world. They play a catalytic role in the gradual integration of the airline industry that is taking place in response to the changing economic environment and regulatory framework. In order to cope with the heightened international competition, and in response to the widespread use of CRS by the major carriers, most large international airlines intend either to join one of these systems through alliances with airlines that own a CRS, or to form regional ownership consortia and turn to a CRS based in the United States for much of the technology. The formation of alliances is therefore becoming increasingly complex in terms of ownership, marketing and technical links, and regional networking (figure 1).

Figure 1. Airlines and their computer reservation systems: marketing and technical links



Source: Verchere (1992), based on SRI International.

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(Box VI.4, cont'd.)

Capitalizing on technological advances for computing capacity and the transmission of data, CRS enable airlines to store and change their inventory of products and prices, display them in any market-place served by modern telecommunications, process seat reservations or sales and deliver travel documents. Apart from the products of its owner(s), the more advanced CRS contain the changing schedules and tariffs of hundreds of airlines, as well as information on hotels, car hire, restaurants and cultural events.

Linking the central database to travel agencies or corporate offices has created an electronic distribution network through which airlines can communicate their offers, and agents can obtain information (using microcomputers plugged into local area networks) and then communicate their bookings. For example, in 1991, Sabre (the largest CRS in the United States, wholly owned by American Airlines) served 14,000 locations of subscribing travel agencies in the United States operating through 69,000 terminals; 1,600 agencies in Canada with 5,400 terminals; 2,600 agencies in Europe; and 2,900 agencies in Asia and the Pacific.

Given the cost of establishing and operating such systems and providing the related services, an increasing number of airlines pool their resources and engage in CRS-alliances. These are often cemented by equity stakes from the partner airlines. International airlines establish technical assistance links, code-sharing and other forms of commercial alliances mainly for some complementary strategies: to get access to foreign markets through the marketing and distribution networks of their partners; to capitalize CRS software and services; and to adopt/adapt advanced technology in order to reduce the development time and cost involved in changing their own computer networks.

In early 1993, an alliance was formed between the two largest CRS that include travel information networks, Galileo and Covia-Apollo. Galileo International, the first global CRS group, will have a combined 30 per cent share of the world CRS market and will be jointly owned by airlines from Europe and North America. Each regional group will control 50 per cent of the equity, with shares as follows: American Airlines (38 per cent), British Airways (14.7 per cent), Swissair (13.2 per cent), KLM (12.1 per cent), US Air (11 per cent), Alitalia (8.7 per cent), Air Canada (1 per cent), Olympic Airways (1 per cent), and Aer Lingus, TAP Air Portugal and Austrian Airlines (each with 0.1 per cent). The group will be based in Chicago with offices in Swindon, United Kingdom, and Denver, Colorado, United States. The consolidated data-processing centre will be in Denver. It will use Apollo's principal data complex, which has eight mainframe computer processors handling 1,200 transactions per second and supporting 60,000 terminals.

Sources: Verchere, 1992; Archdale, 1992; Paul Betts, "Biggest airline reservation systems merge", *Financial Times*, 2 February 1993; Stephen Wheatcroft and Geoffrey Lipman, *European Liberalisation and World Air Transport*, The Economist Intelligence Unit, Special Report No. 2015 (May 1990); Feldman, 1992; Anonymous, "Amadeus—tribulation of a political CRS", *Avmark Aviation Economist*, 9, 1 (January 1992), pp. 4-6.

other firms in the network, and the non-core firms are encouraged to improve their performance and contribute new processes and products to the network as a whole.

Decentralized networks of firms may be viewed as value-adding partnerships with information flowing among them (Langlois and Robertson, 1992), in which each firm has a degree of autonomy and independence. In a decentralized network, an innovation can be adopted quickly as long as it is compatible with existing standards. Decentralized network structures can be quite flexible in absorbing technological advances and in fostering initiative and the advancement of entrepreneurship. The NEC Corporation (Japan) is moving in the direction of adopting a decentralized network structure; it has announced plans to integrate the company globally in a decentralized manner, rather than exert control over the firms in the network from its global headquarters in Japan (McGrath and Hoole, 1992).

Many TNCs seem to be moving towards network structures, often alongside more traditional hierarchical structures. The effectiveness of networks, however, continues to depend on the type of activity: research and development, for example, may lend itself more easily to network structures than personnel management, since research and development can generate positive externalities within the network from freer information flows.

B. Integrated international production at the firm level

The complex strategies pursued by TNCs and the structures adopted to carry them out are related to major changes in the world economy and to government policies (chapter V). Heightened competitive pressures, shorter product cycles and the further opening up of the world economy have led TNCs to adopt strategies that involve growing integration both across the functions performed by firms and across a wider geographical area. That combination of greater functional and geographical integration is changing the way that TNCs organize the international production of goods and services, both within the firm and across separate firms in wider organizational networks. A prominent example is Ford Motor Company (United States), which is integrating its operations in Western Europe, establishing strategic alliances and moving towards global strategies.

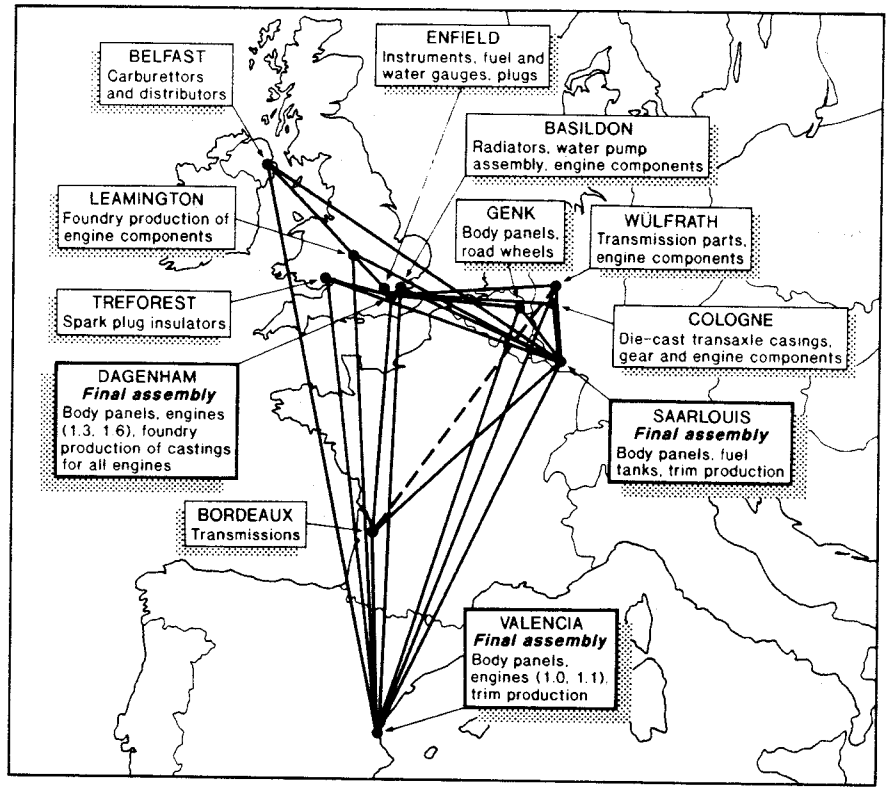
1. Ford's Western European operations

The Ford Motor Company (United States) was one of the first manufacturing firms to obtain significant competitive advantages through mass production. Because of high transport costs and trade barriers, Ford entered the Western Europe market not through exporting from the United States but via greenfield FDI, in 1911 (United Kingdom) and 1913 (France), and expanded into Germany in the 1920s (Dicken, 1992, p. 248). Ford's affiliates in Western Europe operated on a stand-alone, multi-domestic basis, as trade barriers expanded and nationalist pressures remained high in an era dominated by two major wars and the Great Depression. After the Second World War, Ford's multi-domestic operations extended throughout Western Europe, with the largest facilities in the Federal Republic of Germany and the United Kingdom.

After the establishment of the European Community, Ford began to reorganize its production within Western Europe. A multi-domestic strategy was replaced by a Western Europe-wide strategy. Ford of Europe was established in 1967 as a regional affiliate, and began to integrate the operations of the previously stand-alone national affiliates. Product development, especially between companies in the Federal Republic of Germany and the United Kingdom, was integrated through design and development of the first Europe-wide model, the Capri, in 1969. Falling trade barriers, especially within the European Community, allowed for growing cross-border movements in components and final products. Product development, component manufacturing and final assembly became more integrated throughout Western Europe during the 1970s and 1980s. Ford established multiple assembly plants and both multiple and single-source component plants, to take advantage of specialization and plant-level scale economies, as well as reduced transport and communications costs. Those plants were also supposed to be capable of meeting demand shifts and offsetting work stoppages throughout Western Europe (figure VI.2). In the 1970s, after the demise of the Bretton Woods system, regional integration also provided a hedge against adverse exchange rate movements. Ford's European operations also included subcontractors and suppliers linked across borders.

Ford's models were specific to Western Europe, and Ford of Europe enjoyed considerable autonomy, carrying out its own research and development, marketing, financial management etc. The operation as a whole, therefore, approximated to a regional (intra-Europe) stand-alone structure. During the 1970s and 1980s, as the

Figure VI.2. The Ford Fiesta production network in Western Europe



Source: Dicken, 1992, p. 300.

parent corporation was under increasing competitive pressures, the European operations maintained their market position and contributed strongly to firm-wide revenues and profits. The recent experience with developing the Mondeo, discussed below, shows that Ford of Europe has become a source of firm-wide advantages in research and development, coordination and manufacturing technology.

2. The Ford-Mazda strategic alliance

In 1979, Ford acquired a 25 per cent interest in Mazda (Japan). Despite the equity link, the Ford-Mazda relationship has been more like a strategic alliance than an equity relationship, with the two firms collaborating on some projects, but still remaining competitors and maintaining separate management structures. The link has become a strategic alliance that has allowed both parties to achieve valuable strategic and organizational changes (Haigh, 1992).[6]

Part of the arrangement between the two companies is that each produces models for the other to sell in key markets. Several Mazda models are sold under Ford nameplates in Japan and other Asian countries, and Ford has begun producing models for Mazda in the United States. This arrangement has helped Ford become the largest selling foreign automotive nameplate in Japan. As of 1992, several Ford and Mazda models had benefited from the joint efforts of the two firms. Even closer collaboration has occurred in other areas. For example, the two companies linked their expertise in styling (Ford) and engineering (Mazda) which resulted in an updated Escort model for the North American market.[7] Ford styled the exterior and provided components, including the engine (which enabled it to achieve a local content of more than 75 per cent and to continue to use the relatively fuel-efficient Escort to meet government standards on fuel efficiency) and Mazda provided basic engineering. For the Escort, the two companies linked product design and manufacturing expertise at different points on the value chain of each company.

Ford and Mazda also joined forces on the construction and layout of an assembly and stamping plant in Hermosillo, Mexico, using highly efficient team production techniques to produce the Mercury Tracer for the United States market. The Tracer's original design was largely adapted from an existing Mazda model. Ford equipped the plant and designed the production system, drawing heavily upon Mazda practices in Japan. Mazda was involved in training Ford Mexico managers and workers in Mexico and Japan, with additional training conducted by Ford in Belgium, Spain and at headquarters in the United States. Ford and Mazda collaborated on timing and scheduling, although Mazda engineers took the lead as Ford wanted to gain experience with Mazda's scheduling philosophy. Similarly, Ford's legal department took the lead in negotiating contractual arrangements for the project. The result of that collaboration is widely considered to be a success; the Hermosillo plant has been ranked as one of the most efficient in the world (Womack, Jones and Roos, 1991, p. 87).

Despite the success of the Hermosillo alliance and other joint projects, Ford and Mazda were unable to reach agreement on a joint project for the European market and recently agreed to discontinue those discussions. Both companies cited the inability to achieve adequate financial benefits, especially in the deteriorating business environment in Europe. [8] In addition, the Ford-Mazda North American collaboration is limited. For example, Ford provides Mazda with only a two-door version of the Ford-designed and built four-wheel drive, sport-utility Explorer vehicle, sold by Mazda as the Navajo; and Mazda has not shared with Ford its successful sports car, the Miata.

Ford also has limited joint arrangements with other automobile TNCs, largely in research, assembly and marketing. In 1986, Ford and Volkswagen combined their separate operations in Argentina and Brazil into a single joint venture, Autolatina. With the establishment of the four-nation common market, Mercosur (which consists of Argentina, Brazil, Paraguay and Uruguay), Autolatina is well positioned to serve a growing market. Ford and Volkswagen also jointly own a company in Portugal which will produce a multi-purpose people carrier. In addition, Ford is building a minivan for Nissan for the North American market and Nissan is building an off-road vehicle for Ford in Europe.[9]

3. Towards global integration: Ford's world car

Recently, Ford announced plans to revive the notion of a "world car"—a single model, sourced, assembled and sold globally.[11] Ford's world car, to be introduced under the name Ford Mondeo in Europe in 1993 and under the names Ford Contour and Mercury Mystique in North America in 1994 (and, subsequently, to be sold globally), will be assembled at plants in both regions. The main components, including engines and transmissions, will be built in a single location for world-wide needs in either Europe or the United States, with other components from common suppliers either owned by Ford or linked through non-equity arrangements. The world car, under development since the mid-1980s, is a response to the high fixed costs and excess capacity plaguing the industry world-wide and is similar to what other motor manufacturers are doing (box VI.5). It is designed to spread development costs over a larger potential market and to take advantage of flexible production technologies, improvements in transportation and communications, convergence of consumer tastes, safety and emissions regulations, and regional economic arrangements (the United States assembly plant will be supplied from an engine factory in Mexico). Ford's European facilities are producing the world car, the Mondeo, for sale within Western Europe and for export to Eastern Europe, Japan and other countries. Output of the world car from Ford's United States factories located in Kansas City will be aimed primarily at the United States and Canadian markets.

Ford's previous attempt at a world car, the Escort, designed in the 1970s and introduced in 1981, did not succeed, partly because Ford did not establish a single organizational structure for product development and it did not link its European and United States design groups. Although the Escort name was used in both Western Europe and North America, the two cars were different (Dicken, 1992, pp. 298-302).[12]

The design and production of the world car has been led by Ford of Europe—an example of a regional headquarters assuming functional responsibility for a product for the TNC as a whole. The Product Development Group is located in the United Kingdom and in Germany owing to the fact that affiliates in Europe have gained a considerable amount of expertise in developing middle-size automobiles like the Mondeo (e.g., the Capri model); in principle, the group could be located anywhere in the world. The role of the product development group is essentially one of coordinating and having the final say with respect to the development of the car. Specific tasks in design and development have been carried out at different locations in both Europe and North America (figure VI.3). Power steering was developed in North America, the four-cylinder engine in Europe, the six-cylinder engine in North America, the automatic transmission in North America (although the in-vehicle installation was done in Europe), the manual transmission and the body engineering in Europe etc. The vehicle was designed at four separate design facilities in the two regions before the final choice was made.

Ford has developed a communications network for the world car—including extensive use of facsimile, modem and video-conferencing technology—to integrate the work of its research-and-development staff world-wide and to ensure that the project remained truly global. On research and development, staff in Germany and the United Kingdom communicated almost as if they were working side by side. A common system, called world-wide releasing system, has been developed to coordinate engineering development and releases. The system is a complex computerized network with direct online access to engineers and manufacturing activities throughout the world that are involved in the world car programme. With a touch of a button, the staff at Ford's Research and Development Center can communicate with their counterparts around the world—for example, in

Mexico, where some components and the I-4 engine for the United States market are manufactured. All the engineers involved in developing the product release their bits—do the drawings and manufacturing to certain specifications—through that system.

Box VI.5. Is the world car the wave of the future? Strategies of transnational corporations from Japan and Germany

Ford is not the only TNC in the automobile industry to seek wider integration. Japanese TNCs, especially Honda, Nissan and Toyota, have established core networks in each of the three legs of the Triad (UNCTC, 1991a, pp. 44-53). Those networks have integrated many aspects of the manufacture, assembly and distribution of automobiles within their regions. Until recently, models produced for North America and Western Europe were virtually identical to those created for the home market. As the regional affiliates have matured and proved themselves capable of meeting the efficiency and quality standards of the parent firms, they have begun to build upon regional attributes and contribute firm-wide strategies. In the United States, for example, the Japanese TNCs have set up research and design centres to be close to this key market and draw upon its skills. One result was the Mazda Miata, a successful sports car designed in the United States for the North American market.

The Japanese TNCs are now using their foreign affiliates in a more globally integrated fashion.[a] Honda wants its affiliates to increase their specialization so that each can supply its own region and be the primary source of a particular model for the rest of the world. Thus, Honda Accords built in the United States are being exported to Japan, while other models built in Japan are sold in North America. For the Accord, Honda is expanding the role of its United States-based research and design centres. Honda estimates that 80 per cent of the development work on the new version of the Accord station wagon, and 30 per cent of work on the four-door sedan, was done in the United States, compared with 50 per cent and 10 per cent for the earlier versions.[b] Toyota is carrying integration even further. As the originator of "lean production" methods, it has achieved great efficiency in its United States operations. It is now able to balance production between Japan and the United States so that all plants can maintain efficient rates of operations and produce for both markets. Thus, as the United States dollar has fallen against the Japanese yen, Toyota has increased its exports of United States-built Camry's, produced with right-hand drive, to Japan.[c] Both Honda and Toyota expect to extend those aspects of global integration to include operations in Western Europe.

In the case of TNCs from Germany, two firms, BMW and Daimler-Benz, are establishing factories in the United States, and Volkswagen is rumoured to be planning something similar for its Audi division.[d] These firms are responding to several factors: high production costs in Germany, loss of market share in North America, the decline of the dollar, the success of Japanese affiliates with their North American operations, the growth of an extensive supply network of United States, Japanese and European companies located in North America and the benefits of being more closely involved in a critically important market. Both BMW and Daimler-Benz aim for substantial integration of functions between Germany and North America, and across locations within the three-nations covered by the North American Free Trade Agreement. In the case of Daimler-Benz, its United States factory is crucial to a new strategy to move into lower-priced parts of the automobile market. It will produce a sport-utility vehicle which, though initially aimed at North America, is intended to be a major export item as well. Similarly, BMW will produce a new vehicle designed primarily for North America, but including a large export market.[e]

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a Krystal Miller and Jacqueline Mitchell, "After years of growth in U.S. car market, Japanese surge is over", *The Wall Street Journal*, 4 March 1993; and Jane Perlez, "Japanese mix and match auto plans and markets", *The New York Times*, 26 March 1993.

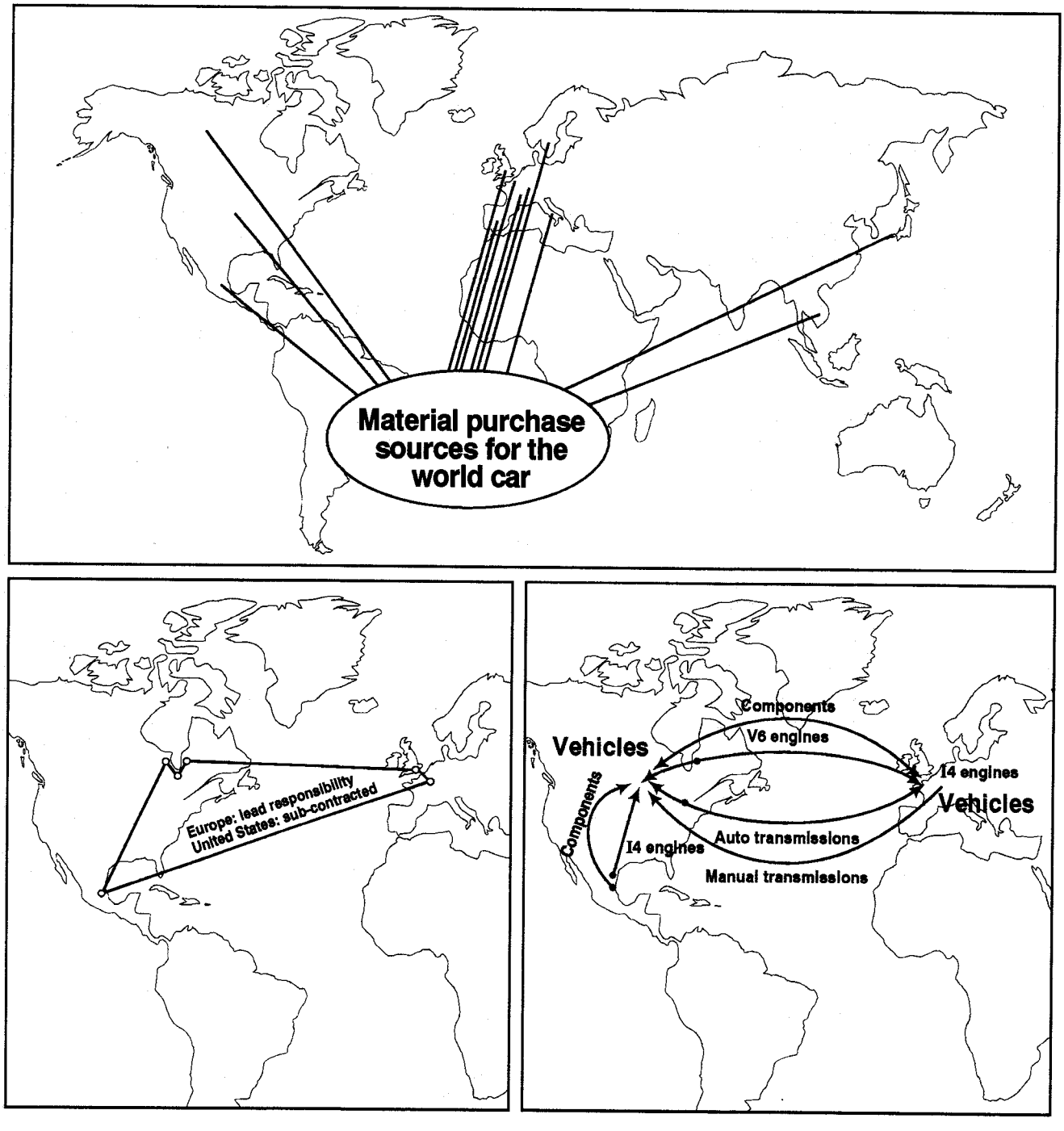
b Karen Lowry Miller and Larry Armstrong, "Overhaul in Japan", *Business Week*, 21 December 1992.

c See Perlez, op. cit.

d Krystal Miller, "Mercedes-Benz gears for wider market with sports vehicle to be built in U.S.", *The Wall Street Journal*, 6 April 1993; and Doron Levin, "What BMW sees in South Caroline", *The New York Times*, 11 April 1993.

e Martin Dickson, "Settling down to small talk, *Financial Times*, 24 March 1993.

Figure VI.3. Ford's world car: linkages for purchase of materials, product development and manufacturing



Source: Research and Engineering Division, Ford of Europe Limited.

The design that eventually emerged has been put into production at Ford's assembly plant in Genk, Belgium, early in 1993. Engineers from Genk will help to train staff and design the assembly plant in the United States for a 1994 production start-up. Ford has standardized the manufacturing process, down to minute details, in an attempt to have common processes wherever possible. However, it will bring in some variations in styling and configuration to meet particular market niches. Large components are being manufactured in both Europe and North America (figure VI.3). Similar integration existed earlier, but was confined to Europe. Many components are supplied by affiliates and subcontractors in both regions, while others are single-sourced for both regions. For example, a wiring loom is being sourced in Thailand for both the European and North American assembly operations; and certain electrical components are supplied by a Bosch (Germany) affiliate in the United States for North American assembly and from Bosch in Germany for the Belgian facility (figure VI.3). Sourcing decisions for both regions were being coordinated by Ford of Europe, with the actual procurement being managed by both supply organizations. Sales and marketing responsibilities will remain decentralized, with country affiliates managing their own activities.

The marketing function has largely been kept separate in each of the 15 national markets within Europe, in spite of the integration of production activities. The reason is the flexibility required to respond to differences in language, culture, government regulations etc. among national economies, which requires marketing to be tailored to the specific characteristics of individual markets. Mondeo has in fact been adopted with minor modifications to different markets.

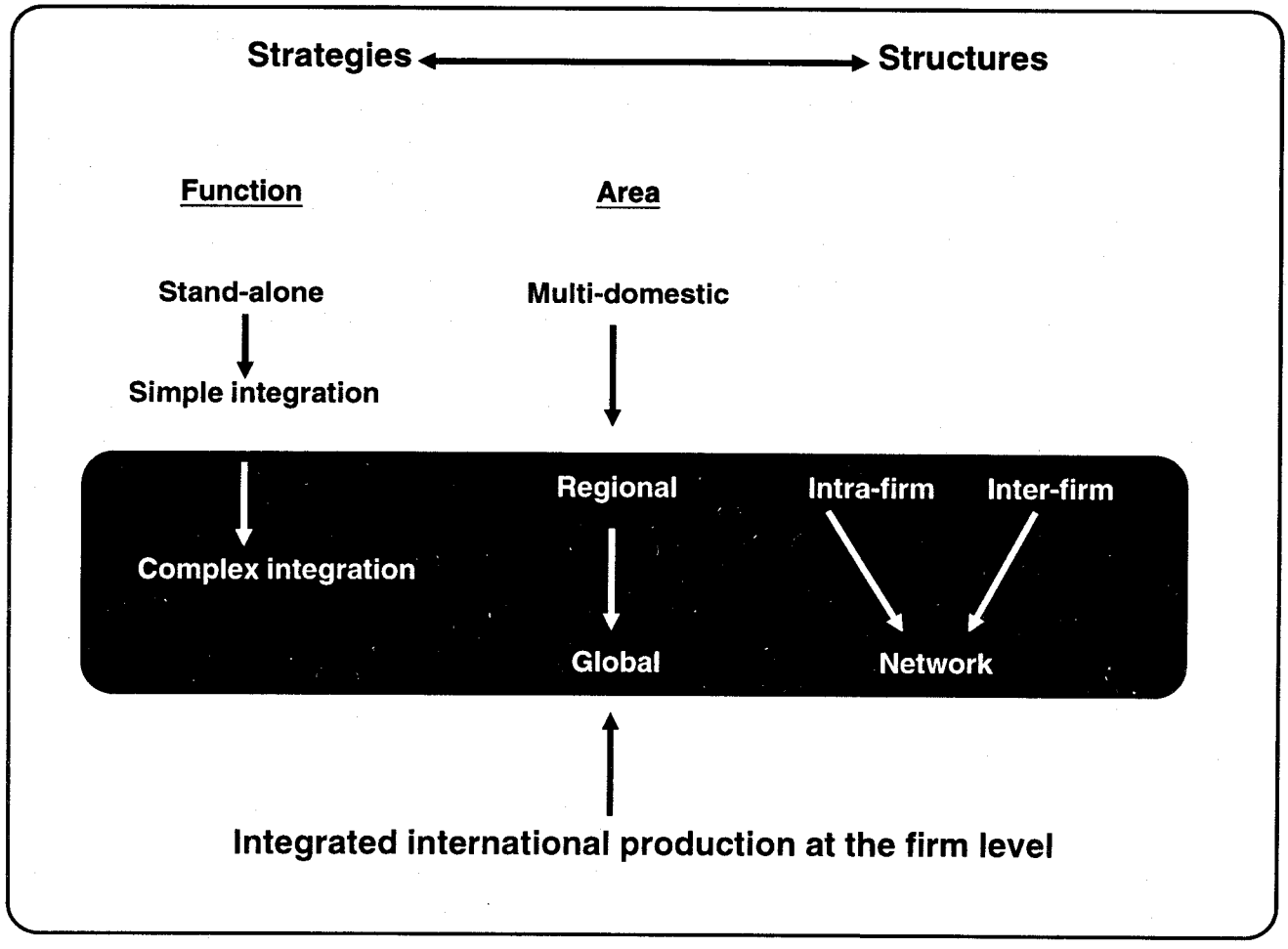
If the Mondeo succeeds, it will be a big step towards greater integration of Ford's work. Ford feels that the project has already borne fruit in terms of achieving engineering efficiencies and economies of scale. Future "world car" projects may depend less on the ability to manage such projects and more on whether cross-national and cross-regional convergence of consumer demands and governmental regulations continues to widen the market for individual models.

As in the past, the extent of future integration of manufacturing activities will be driven by competition and customer convergence of demand. Customer preferences in Europe and North America are still somewhat apart, but are rapidly converging.The demand for fuel-efficient smaller-size cars is still widespread in the former, whereas larger, more comfortable cars are preferred in the latter. In the field of small to middle-size cars, however, there are increasing opportunities for common products and for interregionally integrated production.

C. Conclusions

The combination of complex strategies and greater integration of activities along the value chain, as exemplified by the production of the Ford's Mondeo in Europe, describes integrated international production at the corporate level (figure VI.4). As illustrated by the case of Ford, integrated international production involves several activities in the value chain spread over a wide geographical area. This type of production may be more advanced for some functions and products than for others, although, potentially, every corporate function of a TNC may be carried out that way. Situating different functions in different locations leads to a dispersion of

Figure VI.4. The evolution of corporate strategies and structures towards integrated international production at the firm level



authority and responsibility along the value chain and can make the distinction between parent firms and affiliates increasingly blurred.

Integrated international production allows TNCs to reap the benefits of economies of scale and scope from an increased internal functional specialization and international division of labour. Functional specialization also allows TNCs to make better choices about where to locate a particular function. By finding the lowest-cost site that satisfies its requirements, and by linking the activity carried out there to the rest of its production structure, a TNC can reduce costs and raise the efficiency of its operations. This, in turn, makes this approach to the international organization of production a benchmark for other firms. Competitive pressures are therefore exerted

on TNCs to follow the example of those firms that have successfully organized production in an internationally integrated manner. Just as most automobile companies have adopted the lean production methods used by Japanese auto-makers, including just-in-time parts delivery and total quality control, companies may well have to pursue complex integration strategies to remain competitive. In that case, more and more TNCs will follow a course similar to that of Ford in Europe and of other TNCs which are already ahead in terms of integrating individual functions internationally.

As new strategies and structures evolve, the nature of international production changes. Locational advantages become more complex and interrelated, and Governments of host countries, especially in developing countries, need to adapt their FDI regimes. In addition, organizational innovations by firms can alter how they are managed, and raise issues of governance for national and international public policy frameworks. The combination of the growing role of TNCs and the spread of their integrated international production strategies is leading to the emergence of an integrated international production system (chapter VII).

Notes

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2 "GE's new Asia chief sees growth potential in region", *The Asian Wall Street Journal Weekly*, 16 November 1992.

3 Guy de Jonquieres, "Growing taste for alliances in the food industry", *Financial Times*, 22 January 1993.

4 "Managing in an age of anxiety", *The Economist*, 19 January 1991, pp. 59-60.

5 John J. Keller, "AT&T planning to unveil alliances creating a global telephone network", *The Wall Street Journal*, 25 May 1993; "AT&T's global calling-card", *The Economist*, 29 May 1993, p. 66.

6 James B. Treece and Karen Miller, "The Partners: Surprise! Ford and Mazda have built a stray team. Here's How" *Business Week*, 10 February 1992, Issue 3251, pp. 102-107.

7 James B. Treece, "Can Detroit hold its lead in safety", *Business Week*, Issue 3189, pp. 127-130.

8 Michael Williams and Masayuki Kanabayashi, "Mazda and Ford drop proposal to build cars together in Europe", *The Wall Street Journal*, 4 March 1993.

9 See Treece and Miller, op. cit.

10 Oscar Suris, "Big three win joint patent, marking a first", *The Wall Street Journal*, 3 April 1993.

11 Kevin Done, "A model to smash the world", *Financial Times*, 24 March 1993; Richard A. Melcher, "Meet Ford's brand new world car", *Business Week*, 18 January 1993.

12 Robert L. Simison and Neal Templin, "Ford is turning heads with $6 billion cost to design 'world car'", *The Wall Street Journal*, 23 March 1993.