

4 Strategic technology partnering and international corporate strategies

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4.1 Introduction

In this chapter we address a number of issues pertinent to the internationalisation of the economy, related corporate strategies and in particular the extent to which (international) strategic technology alliances are applied by companies from Europe, Japan and the USA. In order to achieve a better understanding of the international setting of strategic technology alliances we will first broaden the picture of our analysis before we come to the main question of our present contribution, i.e., to what extent European companies differ from their major competitors in their strategic technology partnering behaviour as a major force in corporate internationalisation strategies. In that context we will understand strategic technology partnerships as those inter-firm agreements aimed at the long-term perspective of the product-market position of at least one partner through a joint effort of which common innovative activities are at least part of the agreement.

In the next section we will consider the general background for the issue of internationalisation through a brief discussion of key aspects of phenomena such as the international catching-up strategies of Europe and Japan after the Second World War through foreign direct investment, the changes in international trade, the transformations in the international market structure and the internationalisation of technology flows. Section 3 presents some descriptive information on general trends in strategic technology alliances during the eighties and the sectoral breakdown of these agreements and in section 4 we will analyse trends in the internationalisation of strategic technology partnering. The analysis is based on material from the MERIT-CATI databank which contains information on thousands of strategic technology partnerships (see appendix 1). A major question will be to what extent strategic technology alliances have become more internationally or even globally oriented. If

the economy at large has become more internationally oriented and if there is a trend towards global competition, as so often stressed in the literature, it seems interesting to find out whether this is also reflected in the pattern of (international) strategic technology partnering. In section 4 we also enter into the question whether European companies follow a pattern of internationalisation in their strategic technology alliances that is different from their main competitors from the USA and Japan. Finally, section 5 briefly discusses the consequences of our findings for understanding global competition and the competitive positioning of European companies.

4.2 The growing internationalisation of the economy

A number of economic developments taking place during the seventies and eighties changed the international economic system considerably. Although some of these developments had already taken off during the preceding years, it was during the past two decades in particular that a growing internationalisation of the economy became more and more apparent. These changes in the economy in terms of a growing internationalisation are extensively reported in a large number of economic studies (see for instance Cantwell, 1989; Chandler, 1986; Chesnais, 1988; Dunning, 1988a,b; Franko, 1989; Soete, 1991; UNCTC, 1988), which enables us to introduce briefly only some of the major developments.

During the fifties and sixties when the world economy was still largely dominated by US companies, European and Japanese firms began to increase their efforts to catch up with their US competitors. In this catching-up strategy European and Japanese firms initially used exports as the major source of their endeavour to improve their international competitive position, whereas US companies concentrated in particular on foreign direct investment. In general this catching-up strategy by Europe and Japan has to a large extent been successful as, during the sixties and seventies, the international economy gradually changed with a declining share of US companies and an increasing share of European and Japanese companies in international markets.

In the seventies and eighties the international distribution of foreign direct investment also changed considerably (see figure 4.1). The USA transformed from a major home country for foreign direct investment to a major host country. This transformation was mainly caused by the growth of investments in the USA made by European and Japanese multinationals. For the EC we notice the enormous increase in outward foreign direct investment during the eighties, which well exceeds the inflow. In the same period Japanese companies also began to increase

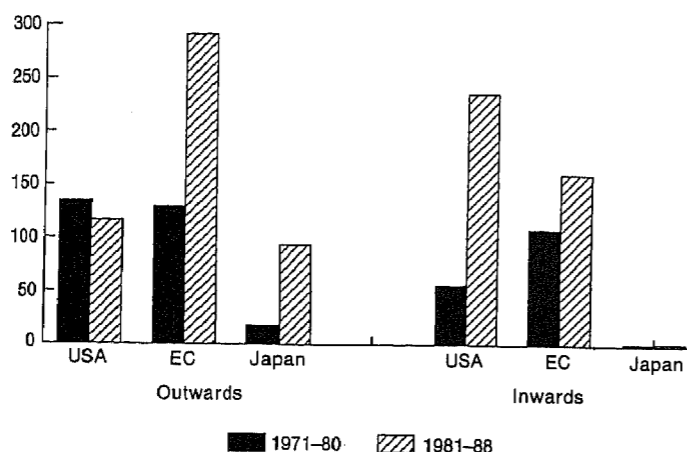


Figure 4.1 Cumulative foreign direct investment flows (inwards and outwards) for the USA, the EC and Japan, 1971-80 and 1981-88 (in millions of current dollars).

Source: OECD, 1990.

their foreign direct investment towards both the USA and Europe. If we compare Japan with the other economic blocs it is striking that its outward flows of foreign direct investment have increased substantially, whereas its inward flows remain almost non-existent.

Changes in the direction of foreign direct investment, and the pattern of internationalisation that follow from them, did not only affect fixed assets in manufacturing and property: although still at a low level in absolute terms, the international distribution of foreign direct investment in R&D activities is changing as well. During the eighties many European companies increased their investments in R&D in the USA, whereas many US companies also enlarged their R&D investments in Europe and Japan. In recent years we have also witnessed an increase of this particular category of foreign direct investment by Japanese companies in both the USA and Europe (see Chesnais, 1988).

Apart from a growth in international trade, which after a period of rapid increase actually decreased again during the eighties, and an expansion of foreign direct investment, the internationalisation of the economy is also apparent in changes in the international market structure. If the international distribution of the group of the world's largest companies is considered, one can observe a drastic change during the past three decades (see Glickman and Woodward, 1990). For instance, the dominance of US companies in the group of the fifty worldwide largest

companies has disappeared within thirty years. At the end of the fifties nearly 90 per cent of these world's largest companies were US-based, with only six European enterprises among them. In recent years 'only' twenty companies on the list of largest companies are US-based, which equals the number of European firms. At present Japan has six companies on the list whereas it had none at the end of the fifties. These changes do not strictly imply a process of internationalisation because the composition of the group of the world's largest companies might have changed due to growth of companies within their home markets. However, as this redistribution of, and changes in, economic strength in favour of non-US companies took place in a period of increased international competition, it reveals some fundamental changes in the international market structure.

To a certain extent the explanation for this growing role of Japanese and European companies and the increasing significance of their foreign investments in recent years can be found in the large financial surpluses that were located in Japan, the FRG and some other European countries. These current account surpluses and the excess of domestic saving over domestic investment have provided at least part of a solid financial basis for the international expansion of companies from Japan and Europe.

It is worth mentioning that this internationalisation of the economy is not only attributable to the behaviour of the world's largest companies, suggesting a 'tight' international oligopoly. On the contrary, recent research (UNCTC, 1988) suggests that the international role played by the group of largest multinational companies, in terms of their foreign sales, has remained unchanged or even declined during the past decade. This stagnation in the activities of the group of largest companies, however, has been more than compensated by the group of smaller multinational companies that appear to account for a rising share of the growth of internationalisation in recent years.

Taking a look at the evolution of the world economy at large, and the industrialised world in particular, it is clear that this internationalisation appears to stand out amongst many economic developments and European companies do appear to play a substantial role in this process. The following trends represent a general characterisation of this process:

- an increase of exports and imports of goods and services;
- growing outward and inward flows of direct investment;
- an internationalisation of technology flows;
- the internationalisation of monetary and financial systems.

It is against this general background of internationalisation and growing interrelatedness of economic systems that we have to understand the economic rationale for internationalisation from the perspective of individual firms. This general evolution is both an objective development

facing companies and a result of their individual and collective behaviour. Consequently, internationally operating companies are not to be seen as 'passive reactors' but much more as active participants setting the scene for many international and often oligopolistic markets. Due to recent technological changes, and in particular the speed and complexity of technological development which are so extensively discussed in the literature, many of these international markets have become more complex. In that particular context we have to view (international) strategic technology inter-firm partnering as part of the process of internationalisation and growing complexity of economic systems where companies create alliances to monitor new developments, enter foreign and/or new markets, and jointly develop new complex technologies; see Hagedoorn and Schakenraad (1990b,c) for more extensive discussion of motives for strategic technology partnering.

4.3 General trends in strategic technology alliances during the eighties

Various studies demonstrate that the number of strategic alliances has increased significantly during the 1980s (see for instance Chesnais, 1988; Contractor and Lorange, 1988; Haklisch, 1986; Hergert and Morris, 1988; Hladik, 1985; OECD, 1986). In some of our previous contributions we reported on general trends in strategic technology alliances in core technologies since the early seventies (see Hagedoorn and Schakenraad, 1990a,b). For core technologies such as information technologies, biotechnology and new materials we found that during the seventies strategic technology partnering was at a relatively low level in information technology and almost non-existent in new materials and biotechnology. However, the first half of the eighties marks a short period of rapid increase, followed by a period of stabilisation in the growth of new agreements, with a tendency towards levelling off during the late 1980s.

In the present chapter we are able to give an overview of the growth of strategic technology alliances in a larger number of sectors other than core technologies. We will restrict our analysis to the eighties, but we expect the general pattern of the pre-eighties period with a low level of strategic technology partnering, as found in our previous analyses, to prevail in virtually every industrial sector or field of technology. As shown in figure 4.2 the general historical pattern of newly established strategic technology alliances in our databank demonstrates that the first years of the eighties are characterised by a somewhat stable increase of new agreements, followed by a sharp increase during the mid-eighties, which is followed by a slower rate of increase during the final years of the eighties. However, in those later years the annual number of newly established

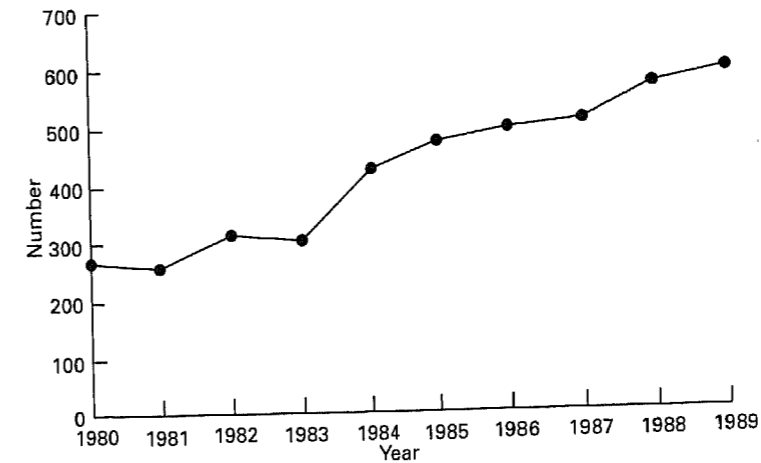


Figure 4.2 Growth of newly established strategic technology alliances in all fields, 1980-89.

Source: MERIT-CATI.

strategic technology alliances is still over twice the number found in the early eighties. If one compares the first half of the decade with the second half it is found that over 60 per cent of all alliances have been made since 1985.

Within this population of newly established strategic technology alliances some fields clearly take a more dominant position than others. As shown in figure 4.3 information technology is the largest field of strategic alliances with 41.2 per cent from a total of almost 4,200 strategic technology alliances in our databank. It is followed by biotechnology with 20.2 per cent, new materials with 10.3 per cent, chemicals 9.8 per cent, and automotive and aviation/defence approximately 5 per cent each. In other words, core technologies such as information technology, biotechnology and new materials take a combined share of more than 70 per cent of all strategic technology alliances established during the eighties. Other fields of technology or industry appear to play a role of minor importance in strategic technology partnering. Apparently the emergence of so-called new 'technological paradigms' related to core technologies have come to affect a growing number of companies through strategic technology partnerships in the first place.

In figures 4.4 and 4.5 we present the historical development of inter-firm cooperation at a less aggregated level. In figure 4.4 it is shown that both biotechnology and new materials demonstrate a pattern of general

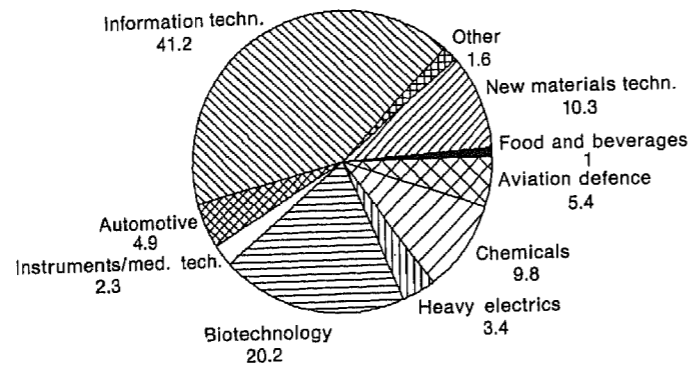


Figure 4.3 Distribution of strategic technology alliances in sectors, 1980-89 by percentage.
Source: MERIT-CATI.

growth in the number of new agreements up to 1987-8 after which there is a relative decrease in numbers of new strategic technology alliances. In information technology, by far the largest field in these core technologies, we see a long-term growth in strategic alliances, with a relatively steep rise during the first half of the eighties, followed by a short period of stabilisation after which the number of new alliances increases again. It seems that for the other fields where strategic technology partnering occurs, the growth in new agreements took place during the final years of the decade, after the number of new agreements had been quite stable throughout the other years of the period.

An explanation for these different growth patterns is somewhat difficult to offer. A disaggregated analysis of trends in strategic alliances in information technology presented elsewhere (Hagedoorn and Schakenraad, 1992), reveals that in most subfields the growth in technology partnering has stabilised with the exception of one major field of growth in inter-firm partnering - software. This particular growth pattern can to a large extent be attributed to the crucial role and increasing importance of software in linking different subfields such as computers, telecommunications, industrial automation and microelectronics. As far as the relative stagnation in strategic technology alliances in new materials is concerned we find it difficult to provide a clear explanation, apart from the general observation that, in this field as in so many other sectors, costs and problems related to the management of alliances might have created a more careful attitude from companies (see also Hagedoorn and Schakenraad, 1991a). For biotechnology the recent decline in new alliances can be explained through particular market structural aspects of inter-firm alli-

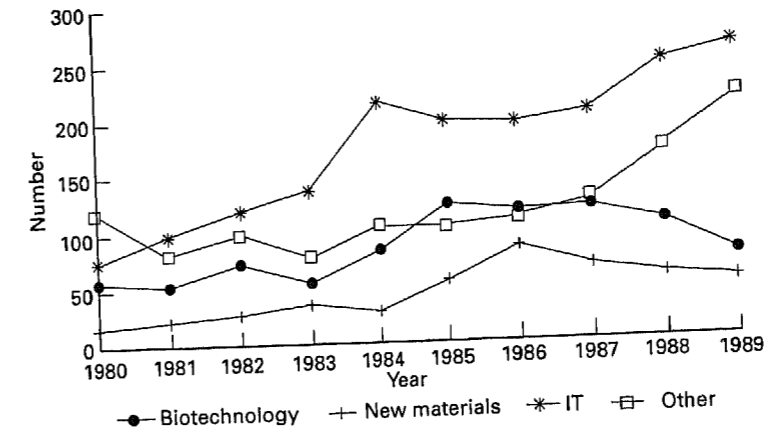


Figure 4.4 Growth of newly established strategic technology alliances in core technologies and other fields, 1980-89.
Source: MERIT-CATI.

ances in that field and a related decline in the number of certain modes of cooperation. Until the later years of the eighties a substantial part of strategic technology alliances in biotechnology was constituted of agreements made between large, multinational companies and relatively small, specialised R&D intensive firms (Hagedoorn and Schakenraad, 1990b). Minority shareholding, research contracts, or a combination of both, were major modes of cooperation between these groups of companies. However, the number of these agreements has decreased substantially in recent years. Many of the small, R&D intensive firms have been taken over by their former partners, have gone bankrupt, or are in serious economic difficulty. Consequently, a number of major cooperating companies have disappeared from the scene leading to a smaller number of potential partnerships, in particular for the modes of cooperation mentioned above.

In figure 4.4 we have already seen that non-core technologies or 'other fields of industry' show an increase in newly established strategic alliances during the second half of the eighties. This increase is in particular due to new strategic technology alliances in chemicals and, to a lesser degree, the automotive industry. In figure 4.5 both these fields first show a rather shallow curve, indicating a constant growth of new alliances, followed by a sharp increase, particularly for chemicals, during the later years of the decade. Also in aviation and defence we see a stable growth pattern with some additional growth since 1986. In heavy electrical equipment, food and beverages, and instrumentation and medical technology the general

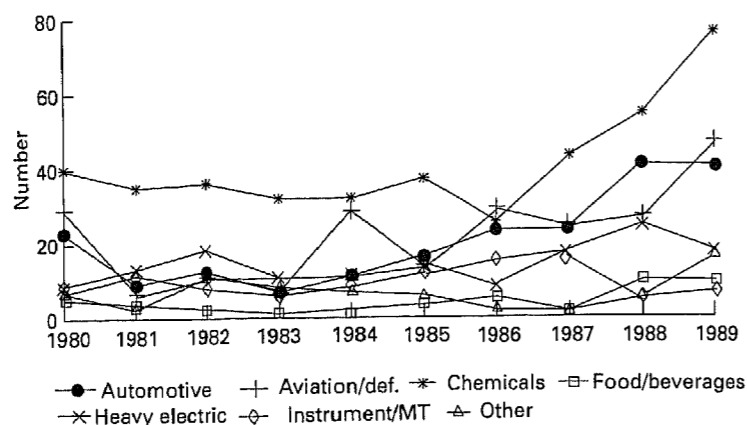


Figure 4.5 Growth of newly established strategic technology alliances in several fields of technology, 1980-89.
Source: MERIT-CATI.

pattern is one of gradual growth with a few ups and downs. The upsurge of strategic technology partnerships in chemicals, in terms of an almost doubling of the number of new agreements made in 1989 compared with the numbers of alliances made annually during the first half of the eighties, can largely be explained through post-restructuring developments in the international chemical industry. In recent years we see a growth in the number of research joint ventures and joint R&D agreements in chemicals, examples of offensive strategic agreements, which take the place of the purely defensive excess capacity-cutting agreements which characterised so much of inter-firm cooperation in chemicals during the seventies and the first half of the eighties.

So far the general pattern and trends in strategic technology partnering show that this phenomenon has become more popular in the past decade. We found that over 70 per cent of these partnerships were made in three major new core technologies, information technology, biotechnology and new materials. Although inter-sectoral differences do occur, the period of the eighties is characterised by a rapid increase of new alliances followed by a gradual decrease in the growth rate during the second half of the decade.

4.4 International and global aspects of strategic technology alliances

A number of contributions from both the management literature (see Ohmae, 1985; 1990; de Woot, 1990) and industrial (international)

economics (see Cantwell, 1989; Chesnais, 1988; Contractor and Lorange, 1988; Dunning, 1988a,b; Mytelka, 1991) stress the role that strategic technology partnering plays in the internationalisation strategies of companies. If one accepts that the economy at large is becoming more internationalised one could expect a growth in international strategic technology alliances as well. In that context Ohmae (1985, 1990) emphasises the dominant role that companies from the Triad (USA, Japan and Europe) play in these international strategic technology partnerships.

In figure 4.6 we present the international distribution of strategic alliances during the first and second halves of the eighties in the three Triad regions (i.e., Europe (EC and EFTA countries), Japan and the USA) and non-Triad countries. We are aware that this 'unification' of Europe abstracts from many differences among countries regarding their economic structure. However, as far as economic key variables are concerned, variation in performance is relatively high for almost any entity whether one studies countries, regions, sectors or even individual firms. Also this does not only affect Europe; a similar degree of variation can be expected for the USA and even in Japan. Furthermore, attention in the present debate is indeed concentrated on competition among these three major blocs and related issues such as international strategic alliances.

Regarding the issue of the possible dominance of the Triad it is clear that, in the international scene for strategic technology partnering, the share of alliances with and between companies from non-Triad countries is limited to less than 10 per cent of the total number of alliances. Furthermore, this share even decreased during the second half of the eighties and a closer analysis reveals that the majority of these non-Triad alliances are related to a relatively small number of newly industrialised countries from South-East Asia.

If we look at the possible growth of the international strategic technology alliances, we will find that on the one hand there is a clear growth in absolute numbers (see appendix 2), but on the other hand, due to an overall growth, their relative share has not increased. It is obvious from figure 4.6 that intra-US cooperation takes the largest share in both periods (with 23 and 25.3 per cent), it is followed by European-US technology partnering (approximately 22 per cent), intra-European cooperation (17 and 20 per cent) and strategic alliances between companies from the USA and Japan with 11 and 14 per cent. Technology alliances between Europe and Japan, intra-Japanese cooperation and non-Triad partnering take on average a share of between 5 and 10 per cent. Although the importance of international strategic technology partnering should not be denied, it is indisputable that the share of international alliances has not increased. During the second half of the

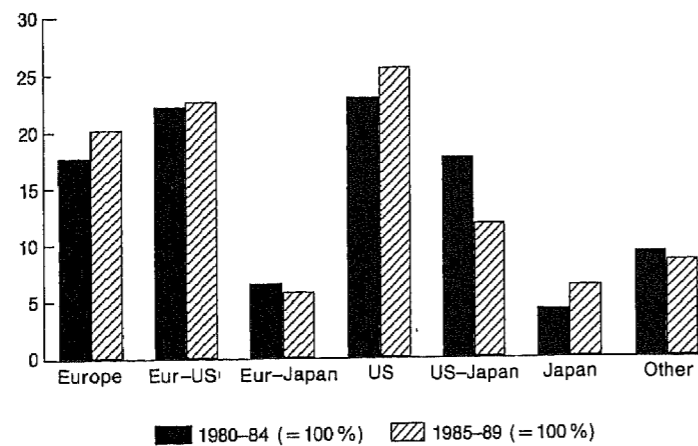


Figure 4.6 International distribution of strategic technology alliances, 1980-84 and 1985-89 by percentage.
Source: MERIT-CATI.

eighties, intra-bloc partnering, i.e., intra-European, intra-US and intra-Japanese technology alliances, has raised its proportion in all new alliances. The proportion of 'international' alliances, i.e., between companies from two international regions, has decreased with the exception of European-US technology partnering which has remained almost stable with an insignificant increase from 22.1 to 22.5 per cent.

It is not that surprising that this distribution and the general trends differ for separate fields of technology and/or industries. The exact figures regarding the international distribution of strategic technology alliances for a large number of industries and fields of technology are given in appendix 2. The main differences and peculiarities with regard to sectoral differences and changes during the eighties are presented in table 4.1. As we can see in this table the largest area of technology partnering, i.e., intra-US cooperation, is dominating the most important core technologies, i.e., information technology and biotechnology, whereas its share in new materials, chemicals, food and beverages and heavy electrical equipment is below average. Alliances between European and US companies are well represented in information technology and in instrumentation and medical technology; the share of their strategic alliances in food and beverages and in the automotive industry is clearly below average. In intra-European cooperation more 'traditional' sectors such as aviation and defence, food and beverages, and heavy electrical equipment stand out as major fields of alliances; the share of European alliances is rather

Table 4.1. Specific features of the international distribution of strategic technology alliances

	Large share or increase	Small share or decrease
Intra-USA (average 24%)	information technology from 22 to 30% biotech 36%	new materials 16% automotive 10% chemicals 13% food and beverages on average but decrease from 28 to 14% heavy electr. eq. 12%
Europe-USA (average 22%)	instr. and med. techn. 30%	food and beverages 16% automotive 17%
Intra-Europe (average 19%)	information technology from 13 to 20% aviation/defence 34% food and beverages 26% heavy electr. eq. 35%	automotive from 29 to 12%
USA-Japan (average 14%)	automotive 24% instr. and med. techn. 23%	aviation/defence 4% food and beverages 5% heavy electr. eq. from 15 to 5% information technology from 20 to 12%
Europe-Japan (average 6%)	automotive 11%	information technology from 9 to 5% biotech 3% aviation/defence non-existent
Intra-Japan (average 5%)	new materials from 5 to 23%	
Others, non-Triad (average 9%)	chemicals 21% automotive 17%	

Source: MERIT-CATI, see also appendix 2.

small in automotive technology. In recent years intra-European strategic technology alliances in information technology have increased. Our present material does not include alliances made in the context of European programmes such as Esprit and Eureka, but it is beyond doubt that intra-European technology cooperation in information technology has increased significantly in an attempt to counter the deteriorating competitive position of European companies vis-à-vis their US, and in particular their Japanese, competitors. In the collaboration between European and Japanese firms, which is but a small area compared to other (inter)-national combinations, only automotive stands out as a fairly relevant

field of collaboration. In industrial automation European-Japanese strategic technology alliances have decreased from 21 per cent during the first half of the eighties to 6 per cent during the second half. In biotechnology, and in aviation and defence these European-Japanese partnerships are almost non-existent or very small. Strategic technology partnering between the USA and Japan is concentrated in fields such as automotive technology and instrumentation and medical technology. The share of US-Japanese alliances in information technology has dropped from 21 per cent in the first half of the eighties to a mere 12 per cent during the second half of the decade. US-Japanese cooperation is underrepresented in fields such as aviation, food and beverages, and heavy electrical equipment. Intra-Japanese strategic technology partnering is relatively small with the exception of cooperation in new materials where the share of Japanese strategic technology alliances has risen from 5 per cent to over 23 per cent in the second half of the eighties. As already pointed out above, strategic technology partnering is dominated by the Triad: Europe, USA and Japan; non-Triad alliances play only a limited role with the exception of strategic technology partnering in chemicals and automotive technology.

From the perspective of corporate behaviour we can understand (international) strategic technology partnering in the light of the internationalisation of innovative capabilities of companies. We can follow a wide range of contributions, such as those made by Cantwell, 1989; Casson, 1987; Dunning, 1988a,b; and Teece, 1986, in their understanding of multinational companies capitalising on both their market entry capabilities and their internationalisation of innovation and production. Internationalisation enables companies to use local sources of supply through externalisation in the sense of outsourcing part of their vertically related activities to local suppliers as well as engaging in market entry arrangements. For research activities internationalisation allows multinational companies to tap into local scientific and technological sources either through internalisation and investment or through contractual arrangements. Until recently, international companies would undertake research only close to or within their home countries. As indicated at the end of section 2, and as demonstrated by leading multinationals establishing research laboratories in several countries, an increasing number of firms are gradually spreading their R&D, in particular their development activities, internationally. However, economies of scale and economies of scope for research activities can limit the spread of such facilities. Therefore we can expect that the internationalisation of R&D through international strategic technology alliances will still be at a moderate level compared with partnerships which are more

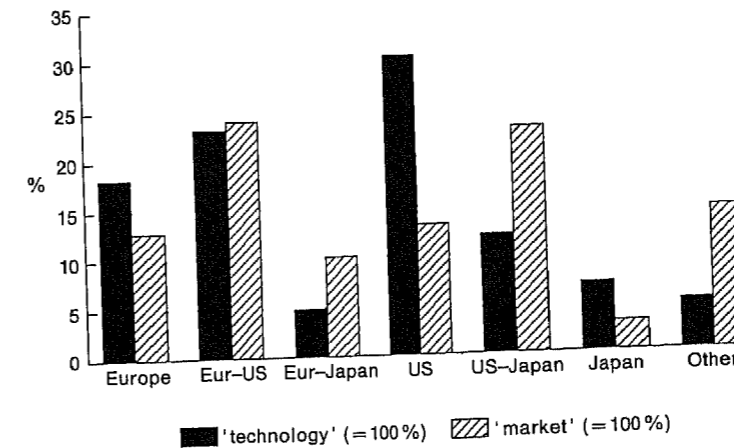


Figure 4.7 International distribution of technology and market-dominated strategic technology alliances 1980-89 by percentage.
Source: MERIT-CATI.

directly related to commercial activities such as market entry arrangements.

Our data enable us to differentiate strategic technology partnerships into alliances that are primarily related to R&D, which we label as technology dominated alliances, and strategic alliances for which market access, despite their technology content, is still more important. Such an analysis can teach us for instance whether strategic alliances of a more R&D oriented nature are more internationally focused or concentrated within each region of the Triad. The relevant distribution is given in figure 4.7; the outcomes for subperiods did not show very large differences, which allows us to present only the distribution for the period of the eighties as a whole. Our background statistical material as presented in appendix 3 shows that the share of market related alliances decreased slightly from 34 to 31 per cent, the share of R&D dominated technology alliances increased from 51 per cent during the first half of the decade to 63 per cent during the second half.

In figure 4.7 we can see that R&D centred technology alliances are most apparent in intra-US alliances and in partnering between European and US companies, and intra-European alliances. In general it can be stated that, with the exception of European-US agreements, intra-bloc partnering is inclined to be of a more 'pure' technology dominated character, whereas market related strategic technology alliances are more internationally oriented. (Additional material not presented in this chapter

shows that this holds for practically all fields of technology or sectors of industry.)

So, confirming the implicit hypothesis discussed above, R&D driven alliances tend to be less international and still closer to the original home bases of companies. Apparently, the international character of strategic technology partnering is more apparent when companies use these alliances for their international market access activities.

In the next step in our analysis we will take a closer look at the pattern of internationalisation of strategic technology alliances from the perspective of companies. In the management and business-studies literature in particular, a debate has emerged about the direction and character of the internationalisation of corporate behaviour (see Bartlett, 1986; Ghoshal, 1987; Kogut, 1989; Ohmae, 1985; Porter, 1986, 1990). If this debate is related to corporate behaviour regarding strategic technology partnering the main question is then: does the share of international and global alliances of companies engaged in strategic technology partnering gradually increase? In other words, we will have to find out whether a possible globalisation of the economy and a globalisation of corporate strategies do show up in the international pattern of collaborating firms. A first impression of this relationship is given in figure 4.8. Contrary to the previous empirical material the object of study is not the alliances as such but the companies involved.

In order to analyse the international character of collaborative corporate strategies we have made a distinction between companies with a regional technology partnering strategy, an international strategy and a global technology partnering strategy:

Companies that follow a regional strategy are those of which over 60 per cent of their alliances are made with partners from their own international region, i.e., within Europe, Japan, the USA or, for non-Triad companies, their own country.

An international strategy refers to those remaining companies whose non-regional alliances are over 60 per cent found in one other international region.

Companies with global technology partnering strategies constitute the 'residual' of companies with a relatively large share of strategic technology alliances in a number of international regions.

As we can see in appendix 4, the number of internationally and globally partnering companies in our databank has increased by approximately 50 per cent if we compare the first half of the eighties with the second half. However, as the total number of collaborating companies has also increased, little has changed in relative terms (see figure 4.8). During the first half of the eighties more than 50 per cent of the

Technology partnering and corporate strategies

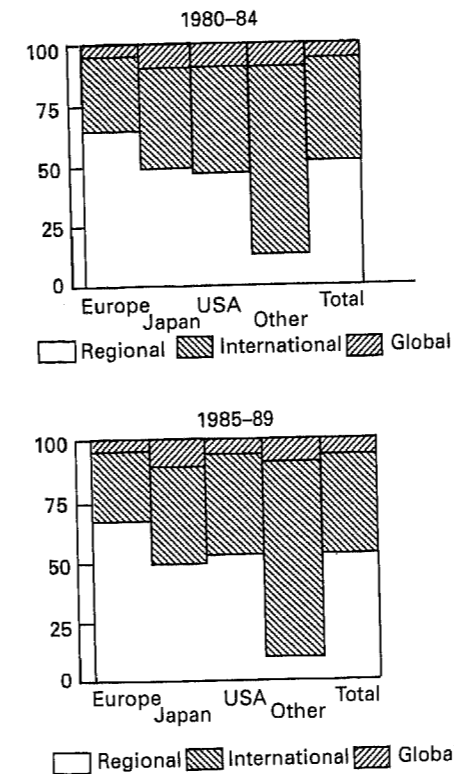


Figure 4.8 International distribution of companies with regional, international and global technology partnering strategies, 1980-84 and 1985-89 by percentage. Source: MERIT-CATI.

collaborating firms followed a regional strategy, over 40 per cent can be characterised as having an international strategy, whereas only 6.5 per cent of the companies appear to follow a global technology partnering strategy. By and large very little seems to have changed in the relative position of each of these strategies during the second half of the eighties.

If we look at the distribution of strategies according to region, we notice that some differences do occur; one has to be somewhat careful with this comparison because Europe, i.e., EC and EFTA countries, is the world's largest market and a comparison of the three regions in terms of the pattern of internationalisation is certainly not in favour of Europe. It is obvious that in both periods European companies have on average a partnering strategy which is most 'regionally' and least globally oriented.

Two-thirds of the European companies in our databank follow a regional strategy in their technology alliances, only about half of the Japanese and US companies are that clearly focused on their own region. Approximately 30 per cent of the European companies and 40 per cent of the Japanese and US companies have a technology partnering strategy that we can characterise as international. In particular Japanese companies appear to follow a global strategy with a share that has increased from nearly 9 per cent during the first half of the eighties to 10.5 per cent during the second half. They are followed by US companies of which the proportion of companies with a global partnering strategy has decreased from 8.1 to 7.3 per cent. Finally, although their share has slightly increased during the second half of the eighties, only 3.6 per cent of the European companies follow a global partnering strategy.

4.5 Some concluding remarks

In this chapter we have made an attempt to understand strategic technology alliances in the context of the process of internationalisation that characterises economic development in the postwar period. Major changes in that period are the growth of European and Japanese foreign direct investment, partly replacing international trade, the internationalisation of R&D and technology flows and, as a part of all this, the growing role being played by Japanese and European firms.

Against this general background of increased international competition one has to understand the policy of leading international companies with respect to corporate flexibility which is seen as compulsory for their successful operation. Strategic alliances can play a major role in achieving this flexibility through the choice of a variety of partners in a number of activities of an internationally operating firm. For strategic technology alliances we have made a distinction between several internationally oriented strategies, with global strategy characterised by a more or less balanced distribution of worldwide technology alliances.

If we look at our empirical findings we have to conclude that strategic technology alliances in the eighties probably did play a role in the process of internationalisation of the economy but their importance should not be overstated. In absolute numbers strategic technology alliances related to international and global presence have increased during the eighties, but so have more regionally and domestically related alliances. During the eighties there has been no increase of the share of inter-regional or international alliances in strategic technology partnerships. Furthermore, for R&D related strategic technology alliances we found that intra-

regional partnering i.e., cooperation within Europe, the USA or Japan, has gained even more importance. As far as the technology partnering strategies of companies are concerned, only in 6 per cent of the companies that we studied did we find a true global partnering strategy. In particular European companies were found to be least globally oriented in their strategic technology alliances compared to their main competitors i.e., Japanese and US companies.

The consequences of these findings for the competitive positioning of European companies vis-à-vis their global competitors are at present not that obvious. The economic effects of strategic technology partnering on companies are difficult to disentangle and such a complicated issue is beyond the scope of our present contribution (see Hagedoorn and Schakenraad, 1991b). It is obvious that there are dangers in inter-firm cooperation both internationally and domestically. There are examples of true joint efforts where companies build real alliances and where we will see a win-win situation. However, there are also many examples of strategic technology alliances where one of the partners attempts to extract technology or to gain market access on the account of the other(s). Despite these dangers strategic technology partnering can enhance the flexibility of a company through partnering as a monitoring device and also through incorporating a wider variety of technological sources than its intrinsic ones. In particular for those companies that have not achieved the position of market leader but which are still relevant players, strategic technology alliances with competent partners can improve their competitive position.

However, as we have seen, US and Japanese companies tend to be more internationally and globally oriented in their technology alliances than their European competitors. The latter are, on average, more 'regional' in their collaborative strategy, which is not a major problem for those fields of technology where Europe plays a leading role. For those sectors where European companies are in general not at the leading edge of technological development, and many studies suggest that this is the case in quite a number of sectors, a very strong emphasis on intra-European technology partnering could, in the long run, be a dangerous strategy for those European companies that are forced to compete in global markets. Many European companies have improved their international competitive position during the seventies and eighties. For a further improvement in particular in global markets an intelligent utilisation of strategic alliances could very well be beneficial. It has to be stressed that these partnerships are not to be seen as panaceas as even a very rational and intelligent application of them can only partly contribute to the improvement of the competitive positioning of European companies.

Appendix 1 The cooperative agreements and technology indicators (CATI) information system

The CATI databank is a relational database which contains separate data files that can be linked to each other and provide (dis)aggregate and combined information from several files. So far information on nearly 10,000 cooperative agreements involving some 3,500 different parent companies has been collected.

Systematic collection of inter-firm alliances started in 1986. If available, many sources from earlier years were consulted enabling us to take a retrospective view. In order to collect inter-firm alliances we consulted various sources, of which the most important are newspaper and journal articles, books dealing with the subject, and in particular specialist journals which report on business events. Company annual reports, the *Financial Times Industrial Companies Yearbook* and Dun & Bradstreet's *Who Owns Whom* provide information about dissolved equity ventures and investments, as well as ventures that we did not register when surveying alliances.

This method of information gathering which we might call 'literature-based alliance counting' has its drawbacks and limitations:

In general we have only come to know those arrangements that are made public by the companies themselves.

Newspaper and journal reports are likely to be incomplete, especially when they are historical and/or regard firms from countries outside the scope of the journal. Furthermore, in earlier years some journals simply did not exist whereas existing periodicals might grasp the collaboration subject less thoroughly.

A low profile of small firms without well-established names is likely to have their collaborative links excluded.

Some journals emphasise fashionable items, such as superconductivity or HDTV, while interest in 'outdated' topics such as solar and wind energy seems to fade away.

The fact that we read mainly articles written in English probably causes some bias and distortion as well.

Another problem is that information about the dissolution of agreements is not systematically published. This is in particular true for licensing and customer-supplier relationships. On the other hand, research contracts and joint product developments have often disclosed time schedules. Equity joint venture and dissolutions of investments are published rather systematically in specialist journals.

One final problem is that the number of customer-supplier relations and licensing agreements is subject to a fierce underestimation due to

the fact that these more casual agreements are little reported publicly, even in the professional literature.

All together, these handicaps in the first place lead to a skewed distribution of modes of cooperation, followed by some geographic – i.e., Anglo-Saxon – bias. Next, we have to reckon with a possible underestimation of certain technological fields and finally, there is some overrepresentation of large firms.

Despite these shortcomings, which are largely unsolvable even in a situation of extensive and large-scale data collection, we think we have been able to produce a clear picture of the joint efforts of many companies. This enables us to perform empirical research which goes beyond case studies or general statements. Some of the weaknesses of the database can easily be avoided by focusing on the more reliable parts, such as strategic alliances.

The databank contains information on each agreement and some information on companies participating in these agreements. The first entity is the inter-firm cooperative agreement. We define cooperative agreements as common interests between independent (industrial) partners which are not connected through (majority) ownership. In the CATI database only those inter-firm agreements that contain some arrangements for transferring technology or joint research are being collected. Joint research pacts, second-sourcing and licensing agreements are clear-cut examples. We also collect information on joint ventures in which new technology is received from at least one of the partners, or joint ventures having some R&D programme. Mere production or marketing joint ventures are excluded. In other words, our analysis is primarily related to technology cooperation. We are discussing those forms of cooperation and agreements for which a combined innovative activity or an exchange of technology is at least part of the agreement. Consequently, partnerships are omitted that regulate no more than the sharing of production facilities, the setting of standards, collusive behaviour in price-setting and raising entry barriers – although all of these may be side effects of inter-firm cooperation as we define it.

We regard as a relevant input of information for each alliance: the number of companies involved; names of companies (or important subsidiaries); year of establishment, time-horizon, duration and year of dissolution; capital investments and involvement of banks and research institutes or universities; field(s) of technology; modes of cooperation; and some comment or available information about progress. Depending on the very form of cooperation we collect information on the operational context; the name of the agreement or project; equity sharing; the direction of capital or technology flows; the degree of participation in case of

minority holdings; some information about motives underlying the alliance; the character of cooperation, such as basic research, applied research, or product development possibly associated with production and/or marketing arrangements. In some cases we also indicate who has benefited most.

Appendix 2 Distribution of strategic technology alliances within and between economic blocs, 1980-1984 and 1985-1989

Table 4A.1. *Distribution of strategic technology alliances within and between economic blocs, for biotechnology, new materials, IT, and other technologies, 1980-84 and 1985-89*

Biotechnology	New materials			Information technology			Other technologies			Total																				
	80-84	85-89	total	80-84	85-89	total	80-84	85-89	total	80-84	85-89	total																		
Europe	47	14.8	142	16.8	29	23.4	44	14.4	73	17.0	85	13.3	217	19.9	302	17.5	115	24.1	173	24.4	288	24.3	276	17.7	529	20.1	805	19.2		
Europe	58	18.2	124	23.5	182	21.5	32	25.8	52	17.0	84	19.5	138	24.6	256	23.5	414	23.9	97	20.3	161	22.7	258	21.7	345	22.1	593	22.5	938	22.4
-USA	5	1.6	20	3.8	25	3.0	15	12.1	23	7.5	38	8.8	57	8.9	57	5.2	114	6.6	24	5.0	50	7.0	74	6.2	101	6.5	150	5.7	251	6.0
-Japan	125	39.3	179	33.9	304	35.9	16	12.9	54	17.6	70	16.3	142	22.2	323	29.7	465	26.9	74	15.5	111	15.6	185	15.6	357	22.9	667	25.3	1024	24.4
USA	45	14.2	54	10.2	99	11.7	16	12.9	40	13.1	56	13.0	133	20.7	132	12.1	265	15.3	80	16.8	83	11.7	163	13.7	274	17.6	309	11.7	583	13.9
-Japan	11	3.5	33	6.3	44	5.2	7	5.6	71	23.2	78	18.1	29	4.5	35	3.2	64	3.7	18	3.8	24	3.4	42	3.5	65	4.2	163	6.2	228	5.4
Japan	27	8.5	23	4.4	50	5.9	9	7.3	22	7.2	31	7.2	37	5.8	68	6.3	105	6.1	69	14.5	108	15.2	177	14.9	142	9.1	221	8.4	363	8.7
Other	318	100%	528	100%	846	100%	124	100%	306	100%	430	100%	641	100%	1088	100%	1729	100%	477	100%	710	100%	1187	100%	1560	100%	2632	100%	4192	100%

Source: MERIT-CATI.

Table 4A.2. Distribution of strategic technology alliances within and between economic blocs, for other technologies, 1980-84 and 1985-89

	Automotive			Aviation/defence			Chemicals		
	80-84	85-89	total	80-84	85-89	total	80-84	85-89	total
Europe	18 29.0	18 12.6	36 17.6	25 28.7	53 37.6	78 34.2	34 19.4	42 17.9	76 18.5
Europe-USA	10 16.1	24 16.8	34 16.6	24 27.6	31 22.0	55 24.1	31 17.7	54 23.0	85 20.7
Europe-Japan	6 9.7	16 11.2	22 10.7	1 1.1	0 0.0	1 0.4	14 8.0	21 8.9	35 8.5
USA	2 3.2	17 11.9	19 9.3	21 24.1	41 29.1	62 27.2	21 12.0	31 13.2	52 12.7
USA-Japan	10 16.1	39 27.3	49 23.9	7 8.0	3 2.1	10 4.4	35 20.0	28 11.9	63 15.4
Japan	2 3.2	7 4.9	9 4.4	2 2.3	4 2.8	6 2.6	6 3.4	6 2.6	12 2.9
Other	14 22.6	22 15.4	36 17.6	7 8.0	9 6.4	16 7.0	34 19.4	53 22.6	87 21.2
	62 100%	143 100%	205 100%	87 100%	141 100%	228 100%	175 100%	235 100%	410 100%
	Food & beverages			Heavy electric/energy			Instruments/MT		
	80-84	85-89	total	80-84	85-89	total	80-84	85-89	total
Europe	3 21.4	8 28.6	11 26.2	19 31.1	30 37.5	49 34.8	6 14.3	13 24.5	19 20.0
Europe-USA	3 21.4	4 14.3	7 16.7	13 21.3	22 27.5	35 24.8	9 21.4	19 35.8	28 29.5
Europe-Japan	2 14.3	2 7.1	4 9.5	0 0.0	4 5.0	4 2.8	0 0.0	6 11.3	6 6.3
USA	4 28.6	4 14.3	8 19.0	11 18.0	6 7.5	17 12.1	8 19.0	9 17.0	17 17.9
USA-Japan	0 0.0	2 7.1	2 4.8	9 14.8	4 5.0	13 9.2	17 40.5	5 9.4	22 23.2
Japan	0 0.0	0 0.0	0 0.0	4 6.6	6 7.5	10 7.1	2 4.8	1 1.9	3 3.2
Other	2 14.3	8 28.6	10 23.8	5 8.2	8 10.0	13 9.2	0 0.0	0 0.0	0 0.0
	14 100%	28 100%	42 100%	61 100%	80 100%	141 100%	42 100%	53 100%	95 100%

Source: MERIT-CATI.

Appendix 3. 'Market' versus 'technology' motives for newly established strategic technology alliances, by sector, 1980-1984 and 1985-1989

	Market access/			R&D/technology/		
	80-84	85-89	total	80-84	85-89	total
Biotechnology	9%	15%	13%	70%	86%	80%
New materials technology	44%	26%	31%	47%	73%	66%
Information technology	44%	36%	39%	50%	61%	57%
Automotive	45%	55%	52%	47%	41%	43%
Aviation/defence	13%	16%	15%	66%	62%	63%
Chemicals	50%	51%	51%	22%	36%	30%
Food and beverages	57%	36%	43%	29%	21%	24%
Heavy electrical equipment	23%	24%	23%	59%	30%	43%
Instruments/medical technology	36%	23%	28%	57%	76%	67%
Other	17%	30%	23%	17%	17%	17%
Total	34%	31%	32%	51%	63%	58%

Source: MERIT-CATI.

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5 Corporate control and competitiveness: the French case

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5.1 Introduction

O. E. Williamson has convincingly argued that the organisation of firms should be taken into consideration to explain Japanese and American economic performance (Williamson, 1985). Recent advances in the theory of the firm have also emphasised the role of a number of factors in competitiveness. The presence of these factors is supposed to explain why plant and equipment earn more profits if they are owned by one corporation rather than by another. These factors include particular technological skills, complementary assets and efficient routines (Dosi *et al.*, 1991). It can be argued that the corporate control and its efficiency are central features of organisation and are skills which analysis of competitiveness must take into account.

The protection that surrounded domestic capital markets and the control of foreign investment flows have given specific characteristics to corporate control in the individual European countries. West Germany and France, to quote but two countries, present marked contrasts. The superior postwar performance of German firms has often been attributed to the close relation between banks and industry (Cable, 1985). In France, the existence of 'groups' of firms, connecting non-financial and financial companies and benefiting from administrative influences, has given rise to industrial achievement, but has been accused of having weakened smaller businesses (LEREP, 1987).

The aim of this chapter is to analyse the role of corporate control as an intermediation between ownership and management. We concentrate on the French M-form of organisation – the groups – and ask why more and more firms (of different size) are adopting this kind of structure. Our hypothesis is that this form is associated with better performance related to internal efficiency (and thus gives a competitive advantage).

In section 2 attention is given to the special historical features of the