



HAL
open science

Optimising the Global Value Chain: An Analysis of the Automobile Industry

Ulrike Mayrhofer, Ana Colovic

► **To cite this version:**

Ulrike Mayrhofer, Ana Colovic. Optimising the Global Value Chain: An Analysis of the Automobile Industry. 10th Vaasa Conference on International Business, Aug 2009, Finland. pp.19. halshs-00690207

HAL Id: halshs-00690207

<https://shs.hal.science/halshs-00690207>

Submitted on 22 Apr 2012

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

10th Vaasa Conference on International Business, University of Vaasa, Finland, August 23-25, 2009

Ana Colovic and Ulrike Mayrhofer

OPTIMISING THE GLOBAL VALUE CHAIN: AN ANALYSIS OF THE AUTOMOBILE INDUSTRY

Ana Colovic and Ulrike Mayrhofer (2009). Optimising the Global Value Chain: An Analysis of the Automobile Industry

This article analyses location strategies pursued by multinational corporations. The authors examine different conceptual frameworks proposed in the literature, in order to identify major determinants of location choice. The analysis focuses on production and R&D activities, which play a strategic role in the global value chain of companies. The field chosen for empirical investigation is the automobile industry, in which the spatial dimension plays a particularly important role. In a context in which markets and competition are globalised, car manufacturers need to optimise the location of their activities in order to remain competitive. The arguments presented show that most manufacturers concentrate a large part of their production and R&D activities in their country of origin or home region. However, the relative importance of production and R&D facilities based abroad is constantly growing, especially in emerging markets, which can be considered as particularly attractive territories for multinational corporations. In a context in which the attractiveness of cities, regions or countries seems to be in a state of constant change, the present study enhances our understanding of location choices made by multinational corporations.

Key words: Location Choice, Multinational Enterprises, Automobile Industry

Ana Colovic, PhD, Associate Professor, Rouen Business School, Boulevard André Siegfried, 76825 Mont Saint Aignan, France, ana.colovic@groupe-esc-rouen.fr.

Ulrike Mayrhofer, PhD, Full Professor, IAE Lyon, Université Jean Moulin Lyon 3, Magellan Research Center, 6 Cours Albert Thomas, 69008 Lyon, France, ulrike.mayrhofer@univ-lyon3.fr.

1. INTRODUCTION

In the context of economic globalisation and growing regional integration, multinational corporations need to reconsider the choice of location for their activities, in order to optimise their global value chain (Dunning, 2009). In particular, recent years have featured the internationalisation of production and R&D activities. For instance, according to figures provided by UNCTAD, multinational corporations, which account for half of all expenditure on R&D worldwide, currently conduct 28% of their R&D abroad. Specialists expect this trend to become more marked in the coming years, with these activities being increasingly based in emerging economies (UNCTAD, 2005). Available studies show that territorial attractiveness is undergoing far-reaching changes, and includes in particular the growing importance of so-called emerging markets, such as China and India (ANRT-IFRI, 2005, 2006).

This development raises many questions for both research and business: What criteria guide companies' choice of location? Which territories do they consider most attractive? Is this internationalisation of activities seen as an opportunity or a constraint? What role do foreign-based production and R&D facilities play? Do companies in different countries pursue similar strategies? To answer these questions, we will first examine conceptual frameworks developed in the literature and then analyse location strategies adopted by multinational companies. The objective of the paper is twofold: (1) to contribute to a better understanding of location strategies adopted by multinational companies and (2) to identify major determinants of location choices. The field of investigation chosen for the empirical study is the automobile industry, which can be considered as a globalised sector in which car manufacturers compete on a global scale.

2. INTERNATIONAL LOCATION OF ACTIVITIES: A STRATEGIC CHOICE

Locating activities internationally can be defined as the choice firms make to do outside their national borders what they could do in their home country (Mucchielli, 1998). We will start by examining the major conceptual frameworks devoted to location strategies, and then attempt to identify the determinants of those choices.

2.1. Location strategies: theoretical perspectives

Location strategies applied by companies, especially multinationals, have received increasing attention since the 1960s. Researchers have sought to understand why multinational corporations choose one country rather than another as a base for their activities, and which market entry modes they adopt for foreign countries.

Between 1960 and 1970, the so-called 'partial' approaches set out to identify determinants of corporate internationalisation, with each approach explaining internationalisation on the basis of a single determinant, or a small number of determinants. For example, Vernon (1966) put forward the 'life cycle' concept, based on technological advantages, to explain American investment in Europe. The author argues that the life cycle of a product has five stages: development, launch, growth, maturity and decline, with companies applying different strategies at each of these stages, notably in their location choices for production activities. Studying location choices made by Japanese companies, Ozawa (1979) suggests that the multinationalisation of companies is motivated by the transfer of innovation from the home country to the host country. For Hymer (1976), firms benefiting from monopolistic advantages, such as imperfection in product or factor markets, can succeed in foreign markets. Transaction cost theory (Williamson, 1975) suggests that companies internalise their activities in foreign markets, rather than export their products, because of transaction costs, which may have a negative impact on market performance.

Since the 1980s, researchers have tried to find more comprehensive explanations of internationalisation. In the eclectic approach, Dunning (1988) examines entry modes that companies use to expand into foreign markets. The author explains that the choice between licensing, exporting and foreign direct investment is guided by 'OLI' advantages: *Ownership* advantages, which correspond to the specific advantages possessed by the firm; *Location* advantages, or the advantages arising from locating

activities abroad; and *Internalisation* advantages, or the benefits arising from internalising activities in international markets. If a company enjoys only Ownership advantages, the most appropriate mode of entry is to sell a license. Exporting is the optimal choice if the company possesses both Ownership and Internalisation advantages. Lastly, basing operations abroad using foreign direct investment will be beneficial if all three categories of advantage are present: Ownership, Location and Internalisation. Although the eclectic theory is static in character (changes in these advantages over time are not studied), it allows to better understand the choice of market entry modes. It offers a conceptual framework for more recent theories that attempt to take a dynamic view of location choice, taking into consideration the costs for the firm and the changes in market structure over time. It is, however, worth noting that Dunning's eclectic theory considers the issue of location only from a microeconomic perspective, and leaves aside important macroeconomic factors, most notably the comparative advantages of different countries.

The models of strategic location produced by the industrial economics school seek to explain strategic interactions of firms. This approach emphasises that actions taken in relation to location have an impact on competition between firms, because the location chosen by one firm is likely to influence its competitors' location choices. Horstman and Markusen (1992) use this to model the choice between exports and foreign direct investments for competing multinationals. Mayer and Mucchielli (1999) propose a model that considers the strategic interactions of firms.

It is important to emphasise that these different models do not take into consideration the spatial dimension of location choice. Indeed, until the 1990s, the geographical dimension of location was absent from conceptual frameworks of internationalisation. Nevertheless, this dimension has a major impact on choices about where to base corporate activities. Location strategies do not depend solely on internal factors. They are also shaped by aspects related to the attractiveness of territories; that is, towns, cities, regions and countries. The consideration of such aspects for the organisation of activities led to the development of a new approach, the so-called New Economic Geography.

Considering the spatial dimension

Initiated by Krugman (1991a), the New Economic Geography examines how industrial activities are organised spatially. It argues that industrial activities tend to agglomerate in certain regions, and it tries to provide an explanation of the fact that some regions seem to attract more economic activity than others. This school of thought stresses the interaction of commercial costs and economies of scale, as drivers of agglomeration, at the corporate level (Head & Mayer, 2004). Researchers have looked at agglomeration as a phenomenon, and offer explanations of its occurrence. They suggest that the benefits of agglomeration, such as reduced transport costs, increased product variety and lower unit product prices, encourage firms to concentrate in certain places. Producers and consumers choose to be co-located in order to benefit from economies of scale of companies, while simultaneously reducing commercial costs as far as possible (Head & Mayer, 2004). Indeed, Krugman (1991a, 1991b) explains the agglomeration of activities by pointing to 'upstream' (*forward linkages*) and 'downstream' effects (*backward linkages*). The first type of effect relates to the search for high demand, encouraged by perfect labour mobility, one of the hypotheses of Krugman's initial model. Downstream

effects result from consumers' search for diversity, since consumers concentrate in locations that offer the widest variety of goods. In their international location model, Krugman and Venables (1995) argue that 'backward' and 'forward' linkages between companies (notably because of their interdependence at the intermediate goods level) lead to the choice of nearby locations (in the same region), and thus to industrial agglomeration.

Research on the geographical or spatial dimension of activities converges with Porter's thinking (1990) on the competitive advantage of multinational (or global) companies. According to Porter, the competitive advantage a company obtains by operating in more than one country stems largely from two sources: its location (or the nations in which it operates) and its activities. The advantages linked to location arise either from the company's country of origin, or from the other regions (countries) in which the company bases its activities. A multinational company uses the advantages of its home country to penetrate foreign markets. It may also seek advantages based on the location of specific activities in other nations, in order to reinforce the advantages offered by its country of origin, or possibly to avoid its inadequacies.

Porter (1990) suggests that a multinational company typically enters the global competitive market by drawing on the advantages provided by its home country. As time goes by, however, successful companies usually combine the advantages derived from their country of origin with the advantages that arise from also having some activities based in other nations. A high performing company will usually combine the advantages of its home country, the advantages offered by locating its activities in carefully selected places and the advantages arising from its global operations network (Porter, 1990). Porter argues that there is therefore a "compelling need to reorient our thinking about corporate strategy in a way that sees location ... as integral to a firm's success" (2000: 254).

We should note that, in Porter's work, the 'nation' or 'country' emerges as an important factor in companies' competitiveness. His model, known as the *Competitive Advantage of Nations* (1990), can be applied at the level of the nation (country), but also at the level of regions within countries. It is frequently used to explain the economic performance of regions characterised by high concentrations of companies and associated institutions: the 'cluster' concept, which is defined as "geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in linked industries, and associated institutions (...) in particular fields that compete but also co-operate" (Porter, 1998, p. 197).

2.2.Determinants of location choices

One recent trend in the areas of industrial economics and international economics is the fragmentation of the production process. Krugman (1995) argues that the international fragmentation of the corporate value chain is one of the most important aspects of the international economy. Such fragmentation is particularly visible in multinational companies that choose to locate different activities of their value chain in different regions. The organisation and the distribution of production and other activities of the company are conducted at the global level, and this is part of what is called the global value chain (UNCTAD, 2002). This process involves activities such as production, distribution, marketing and research and development (R&D). The logic underpinning

the location choices for these various activities is not identical in each case, and it is thus difficult to draw general conclusions about the determinants of those decisions. In the present study, we analyse in particular the determinants of the location of production and R&D, since these activities are traditionally considered of major importance to multinational companies. After examining the determinants of production location, we shall look at R&D, until recently the least internationalised activity, but one that has been increasingly internationalised in the past few years, leading territories to compete in attracting research laboratories of multinationals. The analysis of the territorial dimensions of the location of 'innovative' activities leads us to examine the 'cluster' concept proposed by Porter (1990).

Choice of location for production

A large number of studies have looked at multinationals' choices of location for their production activities. The main reason is that, in the context of globalisation and the need to maintain the attractiveness of given territories as locations for industrial activity, the issue of multinationals' location choices is highly critical.

By bringing together various streams in the literature on the location of economic activities, Mucchielli (1998) highlights four broad types of determinants of international location choices by companies: the demand of the market for goods, from which the company attempts to benefit at each location; the cost of production factors that its subsidiary will be using; the number of local and foreign companies already based in that location; and the various policies applied by local authorities to attract economic activity. Mucchielli (1998) analyses the last two determinants in more detail. Specifically, he argues that the impact of the number of companies already based in a region is less clear than the impact of demand and production costs (Mucchielli, 1998). This is because both centripetal and centrifugal forces may be present. Geographical distance offers isolation from competition (Anderson *et al.*, 1992), and it may thus motivate companies to locate their activities far from their competitors. This implies that the presence of a large number of companies will intensify competition and reduce the attractiveness of the territory. Conversely, positive externalities may exist between companies located in proximity to each other (shared labour market, reduced transport costs for intermediate goods produced by nearby companies, technology transfers, etc.), and such forces may push companies towards geographical agglomeration (Mayer & Mucchielli, 1999). Political measures to enhance attractiveness take various forms: job creation subsidies, temporary tax exemptions, low taxes, etc., and, all other things being equal, they are likely to encourage companies to choose a particular territory (Mayer & Mucchielli, 1999).

In recent research, Fontagné and Mayer (2006) obtain results similar to those of Mucchielli (1998), and Mayer and Mucchielli (1999). They suggest that multinationals locate their production subsidiaries where they will, they hope, be most profitable. As for the determinants of location choices, the authors distinguish four main categories. The first group of determinants relates to production costs. These are largely a function of labour costs (a key element, and the reason for many industrial relocations), and national and regional public policies (in particular, those relating to subsidies and taxes). The second group is linked to the level of demand to which the company can gain access by locating its activity in a given region. The choice between several locations will take account of the market potential of each location (Fontagné & Mayer,

2006). The third group of determinants concerns the intensity of competition, and this is influenced by transaction costs. In the absence of transaction costs, all companies face the same competition everywhere, and in that case the location of their competitors will influence their location choice. Conversely, if transaction costs are present, distance provides some protection against competition, and consequently a firm will seek to avoid regions where competitors are based. This tendency to avoid competition has been identified in research on location. Despite this, companies may also select regions where other companies are present. This is because, as many empirical studies have shown, the effects of agglomeration are also a key determinant of location choice. The fact that companies gather together in clusters is often explained by pointing to positive externalities from which they can benefit in such places. Consequently, agglomeration can be identified as the fourth major determinant in choices concerning the location of production.

Among the host-country factors that influence location decisions, Flores and Aguilera (2007) distinguish between economic factors, on the one hand, and institutional-cultural factors, on the other. Economic factors are linked to the profitability that is expected from a host country market. These factors include the size of the market of a particular country (Contractor, 1991), as expressed by such indicators as GDP, GNP and growth rates; the number of potential customers; the infrastructure available in the host country (Loree & Guisinger, 1995; Cheng & Kwan, 2000); but also the expected costs of MNE operations, notably wage levels in the host country (Meyer, 2004). The institutional and cultural factors emphasise the importance of non-economic factors in MNE location choice, including political, legal and cultural dimensions. Flores and Aguilera (2007) argue that MNEs tend to locate their activities in those host countries that are politically, legally and culturally close to their home country.

Choice of location for R&D

For many years, R&D was a function kept at headquarters and therefore internationalised to only a limited extent, mainly because of its strategic character. However, in recent years we can observe an increase in the internationalisation of R&D. This phenomenon is the consequence of the internationalisation of production, and it is currently an important dimension in economic globalisation. Some aspects of this process are documented and discussed, and its existence is accepted; but the underlying mechanisms continue to be insufficiently understood, particularly because of their complexity (OECD, 2005). R&D's internationalisation remains an essentially intra-Triad phenomenon (Japan – Europe – USA), but certain emerging economies are clearly becoming more important as new destinations.

Until recently, R&D was undertaken abroad in order to adapt products and services to local requirements, with knowledge being transferred from corporate headquarters to foreign subsidiaries. Indeed, Defever (2006) finds a strong link between locations chosen for production and those chosen for R&D. Analysing the location choices of 11,000 companies, the author argues that production and R&D are mutually beneficial, and that the strong vertical links between these activities are capable of generating cumulative effects, such as those described by the New Economic Geography (Krugman & Venables, 1995). R&D is a corporate function that has a positive effect on production.

Kuemmerle (1997) studies changes in the R&D function, and concludes that a

centralised approach to R&D is no longer adequate, mainly for two reasons. First, there is an increasing amount of relevant knowledge in the world, and companies therefore need to be present in an increasing number of places, in order to gain access to that knowledge, and to absorb the research results generated by foreign universities and competitors. Second, companies that sell their products around the world need to improve the process from development to the market, by increasing its speed. For these reasons, the R&D function is becoming increasingly independent of production, and it now requires the creation of global knowledge networks. Companies are currently basing their research centres abroad to ensure proximity not only to local markets, but also to centres of scientific excellence, and are thus able to take advantage of the knowledge generated by the latter (OECD, 2004).

For Hatem (2007), the following are the reasons for locating R&D laboratories abroad: the adaptation of products to the local market; 'global sourcing' strategies and access to local skills; increasing numbers of innovation and training locations around the world; the search for improved cost/effectiveness ratios; the shift from a 'closed' to an 'open' innovation model; and progress in information and communication technologies. Autant-Bernard (2006) argues that a large market size, a large stock of ideas and a low level of competition in the target region increase the probability of setting up R&D laboratories.

Many factors appear to determine the choice of the location of R&D (cf. table 1). More specifically, the combination of several factors allows companies to define their location strategies.

Table 1. Factors determining R&D location choices.

Factors determining R&D location choices	
<i>Human factors</i>	<i>Factors linked to infrastructures</i>
Quality of scientific labour	International accessibility
Abundance of scientific labour	Infrastructures
International openness of researchers	<i>Factors linked to the general R&D environment</i>
<i>Scientific and technological factors</i>	Innovating environment
Existence of centres of excellence	Ease of creation of spin-offs and new companies
Reputation of research centres	Quality of life
Technological specialisation of the country	Living environment
International reputation	Dynamic labour market
<i>Factors linked to regions</i>	Openness to FDI
Networks of companies	Entrepreneurial spirit
Geographical proximity to actors	Protection of intellectual property rights
Image of region	<i>Factors linked to financial aspects</i>
Cooperation between companies and universities	Role of government in financing research
Presence of research teams nearby	Financing of research centres
Regional aid policy	Financial system
Quality of regional institutions	Taxation
<i>Market and demand factors</i>	Public funds for R&D
Attractiveness of market	<i>Cost factors for companies</i>
Growth potential of market	Economies of scale
Need to adapt to the local market	R&D costs

Source: Colovic (2006)

According to Patel and Vega (1999), a distinction can be made between two types of strategy, or two types of objectives, in location choice: ‘home-base exploiting’ and ‘home-base augmenting’. In the first case, knowledge is transferred from the home base to the subsidiary based abroad, the objective being to use this knowledge to adapt products to suit the local market. In the case of ‘home-base augmenting’, the objective of the subsidiary is to provide the company with new knowledge (thus augmenting its knowledge base). The company will therefore seek to locate its R&D activities in a geographical area rich in knowledge, and favourable to its transfer and circulation. The characteristics and organisation of that area then become key components in the choice of location. In this perspective, the ‘cluster’ concept already mentioned becomes centrally important. Porter popularised this concept in his book *The Competitive Advantage of Nations* (1990). The author establishes the “diamond of national advantage”, four interconnected factors that, in his view, determine the competitive advantages of a country. The four points of the diamond are factor conditions (skilled labour, infrastructure, natural resources, etc.), demand conditions (strength and nature of demand, desires and perceptions of consumers, level of sophistication), strategy (rivalry) in the industry (organisation and management of companies, level of competition), and related and supporting industries (procurement, corporate services, production of components, etc.). Although his original thesis was applied to nations, Porter has acknowledged that the majority of economic activity occurs at the regional level. For this reason, his ideas are often applied to urban areas and regions. In the view of the OECD, ‘clusters’ are production networks formed by highly interdependent companies, agents producing knowledge and customers, all linked to each other in a value-added production chain (OECD, 1999). For Rosenfeld (1997), a cluster is a geographical concentration of similar firms, related or complementary, with active channels for business transactions, communication and dialogue, that share specialised infrastructure, labour markets and services, and face the same opportunities and threats. This definition stresses the role of social interactions and cooperation in determining the dynamic nature of the cluster. The importance of social interactions is also underlined by Jacobs and DeMan (1996) and by Saxenian (1994), in her analysis of Silicon Valley. The growing literature on clusters highlights the relevance of networks of interrelated firms as key factors in the ability to produce innovative new products or processes for global markets, in a timely manner (Wolfe, 2009). The ‘cluster’ concept incorporates several important dimensions of innovation in the modern world: the increasing benefits generated by the accumulation of knowledge; recognition of the fact that accumulation is a process dependent on past choices, and is non-linear and shaped by the interaction of market forces; the importance of organisational innovation in creating institutions and procedures capable of managing more complex forms of interdependence; the role of confidence in avoiding the escalation of transaction costs generated by increased levels of specialisation; and the role of cultural and institutional variety in encouraging creativity (OECD, 2001a).

The research done by the OECD Focus Group on Clusters suggests that clusters involving high technology - information and communication technologies, for example - are generally borderless, while more mature clusters typically function at the national or regional level (OECD, 2001b). This does not mean, however, that local clusters cannot be created in such high-technology fields.

It should be emphasised that clusters are not static. They grow, evolve, become mature and, in some cases, die. Clusters can remain functional for decades if they are supported by a continuing process of revitalisation. If they become rigid and self-focused, they can, like companies, be destroyed by outside changes. Specifically, technological discontinuities may make a cluster's assets - market knowledge, technical expertise, workforce knowhow and skills - irrelevant.

The analysis of conceptual frameworks of the location strategies of multinationals highlights the complexity of strategic decisions. It suggests that these choices are determined not only by factors linked to the company, but also by factors associated with the host country. Given the fundamental changes occurring in the global environment (Dunning, 2009), it is tempting to analyse the location strategies actually applied by companies. Our choice was to examine the automobile industry, in which location has become an important factor in competitiveness.

3. LOCATION STRATEGIES ADOPTED BY CAR MANUFACTURERS

In the automobile industry, the spatial dimension plays a particularly important role. In a context in which markets and competition are globalised, car manufacturers need to optimise the location of their activities in order to remain competitive. Many of them have considered whether it is appropriate to choose foreign locations for their production and R&D activities. Before comparing the choices of location made by major car manufacturers, we will examine some of the major trends of the global automobile industry.

3.1. The global automobile industry: the growing importance of emerging markets

The global automobile industry has seen profound changes that are likely to influence location choices made by car manufacturers. For many years, the industry has been dominated by three main regions: Western Europe, North America and Japan. These three areas have been the main markets for automobile companies: in 2007, 59.4% of the 70.5 million new vehicle registrations worldwide were in one of these three areas. In Western Europe, the number of newly registered vehicles was 17.2 million (or 24.4% of total world registrations), the NAFTA area (USA, Canada, Mexico) had 19.3 million (27.4%), and Japan had 5.4 million new registrations (7.7%). In recent years, these three main regions have reached the stage of maturity, and market growth either remains limited (+0.8% in Western Europe between 2006 and 2007) or declines (-3% for NAFTA, -6.7% in Japan). Although Western Europe, North America and Japan account for most production and R&D activities, car manufacturers now tend to locate their activities in other geographical areas that appear to be more attractive, and specifically in emerging economies (CCFA, 2008).

In fact, emerging markets have recently gone through a period of strong growth, which has also involved the automobile industry. In certain regions, the growth rate of the automobile industry is particularly high, especially in Central and Eastern Europe (+21.3% between 2006 and 2007) and Asia (+12.5%, not including Japan and South Korea), South America (+25.2%) and Africa (+6.1%). With 8 million new vehicle registrations in 2007, car sales in China exceeded those in Japan: China has thus

become the third largest automobile market in the world, behind Western Europe and North America (CCFA, 2008). Given their growing importance for the global automobile industry, emerging markets are also attracting more investments: most car manufacturers are thus seeking to locate production activities and, to a lesser extent, R&D in those countries.

In 2007, the number of motor vehicles produced worldwide (passenger cars and commercial vehicles) rose to 73.2 million units, an increase of 5.7% over 2006. The trends observed at the beginning of the new millennium seem to be continuing: for example, a slight increase or decline in production can be observed in Western Europe (+2.6% since 2006), North America (-2.9%) and Japan (+1%), while at the same time production has been increasing significantly in some emerging markets, especially in Central and Eastern Europe (+22.2%), Turkey (+11.3%) and China (+22%). Table 2 shows the geographical breakdown of automobile production worldwide.

Table 2. Geographical breakdown of world motor vehicle production in 2007.

Geographical area	Number of vehicles (thousands)	% of total world production	Change 2006/2007 (%)
Western Europe	16,691	22.8	2.6
<i>Subtotal for Germany</i>	6,213	8.5	6.8
<i>Subtotal for France</i>	3,016	4.1	-4.8
<i>Subtotal for Spain</i>	2,890	4	4
<i>Subtotal for United Kingdom</i>	1,750	2.4	6.1
<i>Subtotal for Italy</i>	1,284	1.8	6
<i>Subtotal for Belgium</i>	834	1.1	-9.1
<i>Subtotal for Sweden</i>	366	0.5	9.9
Central and Eastern Europe	5,055	6.9	22.2
Turkey	1,099	1.5	11.3
NAFTA	15,454	21.1	-2.9
South America	3,655	5	15.8
Japan	11,596	15.9	1
China	8,882	12.1	22
South Korea	4,086	5.6	6.4
Other countries	6,635	9.1	-
TOTAL	73,153	100	5.7

Source: CCFA - Comité des Constructeurs Français d'Automobiles (2008). *The French Automotive Industry. Analysis and Statistics*, Paris, p. 6.

Table 3 highlights the relative contributions of the 15 leading car manufacturers to the worldwide production of vehicles in 2007. The Japanese group Toyota ranks first (taking the first place from General Motors, as in 2006) ahead of the US group General Motors and the German group Volkswagen (taking the place from Ford thanks to a 10% increase in production). The world ranking continues to be dominated by manufacturers originating in the automobile industry's three major regions, although the importance of certain manufacturers from emerging markets is growing visibly, notably in Asian countries such as China, South Korea and India: the Tata group, for example, produced

588,000 vehicles in 2007, and recently launched a car selling at less than \$2,000.

Table 3. The world's top 15 car manufacturers in 2007.

Car manufacturers	Number of vehicles (thousands)	% total world production
1. Toyota	9,498	13
2. General Motors	9,350	12.8
3. Volkswagen Group	6,268	8.6
4. Ford	6,248	8.5
5. Hyundai-Kia	3,987	5.5
6. Honda	3,912	5.6
7. PSA Peugeot Citroën	3,457	4.7
8. Nissan	3,431	4.7
9. Fiat-Iveco-Irisbus	2,679	3.7
10. Renault-Dacia-Samsung	2,669	3.6
11. Suzuki-Maruti	2,596	3.5
12. Chrysler	2,539	3.5
13. Daimler	2,097	2.9
14. BMW	1,542	2.1
15. Mitsubishi	1,412	1.9
TOTAL	73,153	100

Source: CCFA - Comité des Constructeurs Français d'Automobiles (2008). *The French Automotive Industry. Analysis and Statistics*, Paris, p. 8.

An analysis of the global automobile industry reveals several trends: the stagnation of demand and production in the three core areas of the automobile industry (Western Europe, North America and Japan), the rising importance of emerging markets not only as markets, but also as destinations for investment, and the appearance of new competitors in emerging markets. It thus seems interesting to examine the effects of these trends on the location strategies adopted by major car manufacturers.

3.2. The location choices of major car manufacturers

Given the relative sizes of the manufacturers from the three main geographical concentrations of the automobile industry (*cf.* Table 3), we shall look more closely at the location strategies applied by manufacturers from those three areas. Do these companies continue to be based essentially in their country of origin? What percentages of their production and R&D activities are located in other Triad areas, and in emerging markets? What role is played by their production and R&D units located abroad? Are European companies developing strategies similar to those of their US and Japanese competitors? To answer these questions, we compare the choices made by major actors from each of these three key areas.

Table 4 sets out the geographical distribution of production of European car manufacturers. It can be observed that, on average, European car manufacturers locate 71% of their production activities in the European Union, and in particular in their home country. This choice can be explained in part by the fact that Europe provides the main market for the majority of European brands, even if the creation of production facilities

on other continents reflects their plans to diversify sales, and to benefit from the advantages offered by locations in other countries. It is interesting to note that the presence of European car manufacturers in the two other “traditional” automobile regions, NAFTA and Japan, is distinctly limited, or even non-existent. However, the respective percentages of production activities located in emerging markets seem to be more important, especially in South America and China, which account for 11% and 6%, respectively, of the total production activities of European car manufacturers.

Table 4. Geographical breakdown of the production of major European car manufacturers in 2007 (%).

Car manufacturers	EU	Other European countries, Turkey	NAFTA	South America	Japan	South Korea	China	Other countries
BMW	87	0	10	0	0	0	0	4
Fiat-Iveco-Irisbus	63	7	0	27	0	0	3	3
Daimler	70	1	14	4	9	0	0	1
Porsche	100	0	0	0	0	0	0	0
PSA Peugeot Citroën	79	0	0	7	0	0	6	14
Renault-Dacia-Samsung	69	13	0	9	0	7	0	1
Volkswagen	65	0	7	13	0	0	14	13
European car manufacturers	71	3	5	11	1	1	6	7

Source: CCFA - Comité des Constructeurs Français d'Automobiles (2008). *The French Automotive Industry. Analysis and Statistics*, Paris, p. 53.

French car manufacturers are attempting to strengthen their presence in international markets, notably in order to seize the opportunities offered by emerging economies. The PSA Peugeot Citroën group, which has 17 automobile production centres and 15 mechanical component plants and foundries, allocates priority to several geographical areas. As Christian Streiff, the chairman of the Company's *Directoire* (replaced by Philippe Varin in June 2009), says, looking at the four priorities defined for the coming years (product and service quality, lower costs, broadened product range, internationalisation), “we must take advantage of our strengths in order to increase our size rapidly in China, to become a major player in Mercosur and to continue to expand in Eastern Europe”. The creation of production facilities in China (in collaboration with the Dongfeng Motor Group), in Argentina, Brazil, the Czech Republic (in collaboration with Toyota) and Slovakia should help to achieve these objectives. Most production facilities based in emerging countries serve largely to satisfy local demand, but the vehicles manufactured in certain countries are also destined to be sold in higher-income markets. An example is provided by the production of the Citroën C1 and Peugeot 107 in the Czech Republic, for supply to Western European markets. Conversely, PSA Peugeot Citroën group R&D continues to be based in France, where the company runs four research centres and one design centre (Mayrhofer, 2008; PSA Peugeot Citroën, 2006).

The location strategy applied by Renault appears to be similar: although the group concentrates the majority of its R&D in France (with the exception of R&D projects, which are conducted as part of the alliance with Nissan), it has also chosen to base production in emerging markets. The group has, for instance, set up production facilities in Romania, Latin America (Argentina, Brazil, Colombia and Mexico) and South Korea, and, more recently, in India (creation of a joint venture with the Indian firm Mahindra) and Iran (a joint venture established with Aidco, an Iranian firm). The purpose of most of these plants is to meet local demand, but the Logan (a model manufactured in Romania) is also sold in other countries (Renault, 2006). The Renault group is currently looking at the location of its R&D activities, even though, as stressed by Pierre Beuzit, delegated director for energy at Renault, “the internationalisation of research at Renault reflects a necessity rather than a genuine desire on our part”. The company has, for example, chosen to keep its R&D activities in France, in order to reduce the costs arising from the geographical distribution of these activities (e.g. costs of control and setting up operations, and the risk that knowledge may leak). Nevertheless, to meet the requirements generated by its international expansion (improved knowledge of markets and consumers, adaptation to local regulations and controlling production costs), Renault has recently adopted a new organisational structure for its innovation process. In the past the main R&D centre, based in France, delegated very little to innovation departments abroad (which are based near the production units, in Romania for instance), but it now gives decentralised innovation entities more autonomy, especially regarding the adaptation of vehicles to the specific needs of local markets. However, the company seems determined to maintain a certain degree of control of R&D, to enable the brand to preserve the homogeneity of its image, and to express its essential characteristics (ANRT-IFRI, 2006).

Unlike their French counterparts, several German manufacturers have chosen to continue to produce the majority (BMW, Audi-Volkswagen group) or even the totality (Porsche) of their vehicles in Germany. This decision can be explained by their willingness to take advantage of the image associated with their home country in the automobile industry (country-of-origin effect). Germany does indeed enjoy a particularly positive image in the automobile industry (Hertrich & Mayrhofer, 2007). As Patrice Franke, chief executive of Audi France, explains, “in many countries, consumers are willing to pay higher prices for cars designed and/or made in Germany. The adoption of a premium pricing policy (that is, prices higher than those applied by generalist brands) enables us to remain competitive despite the high cost of labour across the Rhine”. The positive image associated with cars “*Made in Germany*” explains why some German brands have chosen to keep their production facilities in their home country. For example, 90% of all Audi-branded vehicles are manufactured in Germany (Hertrich & Mayrhofer, 2006). The same is true of the subcontractors who have based their activities near these carmakers. For example, ‘clusters’ are to be found near Stuttgart in Baden-Württemberg (around the Mercedes and Porsche plants), near Munich in Bavaria (around the plants of BMW and Volkswagen), and, more recently, near Dresden (around the Volkswagen plants) and Leipzig (around the BMW and Porsche plants) in Saxony, thus forming a network of vehicle and original equipment manufacturers.

Table 5 highlights the preferred location strategies of the three main US car manufacturers, Chrysler, Ford and General Motors. The table shows that Chrysler produces 97% of its vehicles within the NAFTA region, whereas Ford and General Motors have located 45% of their production in their home region. They have also based several production facilities in the European Union (37% for Ford and 21% for General Motors, but only 3% for Chrysler), but neither is present in the Japanese market. Ford and General Motors have also established production facilities in emerging markets, notably in South America, which account for 6% and 7%, respectively, of their total vehicle production. General Motors has also developed production subsidiaries in South Korea (10% of production) and China (11% of production). Unlike European car manufacturers, Ford and General Motors have more important R&D centres abroad, the main purpose of which is to adapt their vehicles to the specific needs of local markets. More recently, these R&D facilities have been integrated into a global R&D network in which certain entities play a strategic role. For example, the General Motors group recently assigned the design of a new model for the global market (the Meriva) to its R&D unit in Brazil. Rather than using the strategy usually applied by manufacturers, which is to adapt an existing model, the parent company asked the Brazil facility to develop a new model meeting the needs of consumers in different countries. This request has enhanced the autonomy and importance of the Brazilian subsidiary, which now finds itself competing with US, European and Asian subsidiaries for the design of new models and other strategic activities in the group (UNCTAD, 2005, p. 146).

Table 5. Geographical breakdown of the production of major US car manufacturers in 2007 (%).

Manufacturers	EU	Other European countries, Turkey	NAFTA	South America	Japan	South Korea	China	Other countries
Chrysler	3	0	97	0	0	0	0	0
Ford	37	5	45	6	0	0	5	3
General Motors	21	1	45	7	0	10	11	5
All US car manufacturers	24	2	53	6	0	5	7	3

Source: CCFA - Comité des Constructeurs Français d'Automobiles (2008). *The French Automotive Industry. Analysis and Statistics*, Paris, p. 53.

Table 6 indicates the geographical breakdown of the production of the major Japanese automobile groups. It shows that although, on average, Japanese car manufacturers base nearly half their production in their home country, their presence in the NAFTA area is visibly stronger than that of European carmakers: for example, Honda and Nissan produce 37% and 35%, respectively, of their vehicles in NAFTA countries. Conversely, the presence of Japanese manufacturers in the European Union is more limited than that of their US counterparts (nearly 8% on average). Unlike their European competitors, more Japanese groups have based their R&D activities abroad. This can be explained by the limited size of their domestic market, which encourages Japanese manufacturers to

increase their international development. For example, Toyota has R&D centres in Belgium, the United States, Australia and Thailand. The role of these facilities is to adapt vehicles to meet the specific requirements of local markets, and to contribute to the group's global R&D activities. The basing of R&D facilities in Belgium, the USA and Australia can be explained by the importance of these markets for the group, but the creation of an R&D centre in Thailand was justified by several factors: the existence of a production and sales facility, local infrastructure, political stability, geographical position, labour skills and the measures favourable to investment adopted by the local government (UNCTAD, 2005, p. 145).

Table 6. Geographical breakdown of the production of major Japanese car manufacturers in 2007 (%).

Manufacturers	EU	Other European countries, Turkey	NAFTA	South America	Japan	South Korea	China	Other countries
Subaru	0	0	19	0	81	0	0	0
Honda	6	1	37	3	34	0	12	8
Isuzu	0	0	1	6	45	0	4	44
Mazda	1	0	6	1	77	0	8	6
Mitsubishi	5	0	6	2	60	0	5	23
Nissan	17	0	35	0	34	0	9	5
Suzuki-Maruti	9	0	1	0	47	0	7	36
Toyota-Daihatsu-Hino	7	2	18	2	54	0	5	14
All Japanese car manufacturers	8	1	20	1	49	0	7	14

Source: CCFA - Comité des Constructeurs Français d'Automobiles (2008). *The French Automotive Industry. Analysis and Statistics*, Paris, p. 53.

The above presentation shows that car manufacturers from all three core areas of the automobile industry have opted for different choices in locating their activities. European companies, for example, continue to concentrate the majority of their R&D and production facilities in their country of origin, or in other EU countries. In this perspective, it should be added that Europe continues to be attractive for automobile investment, including R&D, because the integration of new member states into the European automobile production system has enhanced the competitiveness of European companies in this sector. Europe's automobile centre of gravity is thus tending to shift eastwards, where the sites of car manufacturers, as well as those of vehicle equipment manufacturers, are based (ANRT-IFRI, 2006). It should nevertheless be noted that most European carmakers have declared their determination to strengthen their presence in other markets, especially in Latin America and, to a lesser extent, in China, South Korea and India. Conversely, American and Japanese manufacturers have internationalised their production and R&D to a greater extent. They have based production and R&D facilities not only in the European Union, but also in high-growth markets, in order to take advantage of the opportunities offered by those countries.

However, it is important to note that the globalisation of car manufacturers remains limited. Our analysis thus contributes to the debate in the literature on the regional vs.

global character of MNEs' operations. Recently, Rugman (2005) analysed the 500 largest multinational firms, and concluded that the great majority of these firms concentrate their activities in their home region: North America, Europe or Asia-Pacific. The author argues that most companies are not global, but rather regional or, in some smaller proportion, bi-regional. Flores and Aguilera (2007) examined the location choices of the top 100 US MNEs in 1980 and 2000. Their findings suggest that the extent of MNEs' activities around the globe is more extensive than assumed by the regionalists' arguments, and also well beyond Ohmae's Triad, but still less widespread than claimed by the globalists - the two main traditions in the globalisation-regionalisation debate. Our comparison of the location strategies of car manufacturers seems to strengthen these observations.

This analysis also shows that the role of production and R&D units based abroad has changed. For manufacturers, the initial purpose of setting up such production plants was largely to meet local demand, but vehicles produced in certain emerging countries are now being sold in high-income countries. The same is true of R&D facilities based abroad, which appear to be evolving from a focus on adaptation to local markets (*'home-base exploiting'*, to use the terminology of Patel & Vega, 1999) to contributing to manufacturers' global R&D (*'home-base augmenting'*). This development also applies to original equipment manufacturers, which need to base their operations near the vehicle plants, if they are to meet the increasingly stringent demands of their customers.

4. CONCLUSION

In a context in which the attractiveness of given regions or countries seems to be in a state of constant change, the present study enhances our understanding of the location choices made by multinational corporations. It can be seen that emerging markets are now particularly attractive as bases for production and R&D. According to a survey conducted by UNCTAD, China is currently considered the most attractive country for R&D investment, followed by the United States and India (UNCTAD, 2005). China's attractiveness can be explained by a number of factors: the availability of skilled labour, demand from universities and research institutes for private funding, the possibility of entering into cooperative arrangements with renowned Chinese universities, the existence of high-tech business parks, incentives for foreign investment and the potential for lower costs. Concerning India, foreign investors particularly appreciate the availability of a skilled workforce, the potential for cost reduction, the proximity of production facilities and the use of English as the language of business (ANRT-IFRI, 2005, 2006).

This analysis of the automobile industry reveals that car manufacturers view these markets as increasingly important, although the strategies adopted by the various automobile groups are not identical. For example, European companies are particularly active in the new EU member states, which are registering high rates of growth, and whose geographical proximity enables transport costs to be limited, especially in the case of vehicle exports to other European countries. Indeed, the production and R&D facilities located in emerging economies appear to be playing an increasingly large part in the global value chain of the actors concerned, and some of the entities that have been set up are now being used to meet market demand in other countries.

The tendency for car manufacturers to locate their production and R&D in different countries or geographical areas raises questions about those views of globalisation that see it, simplistically, as a process of convergence between nations. The need felt by companies to diversify the geographical locations of their production and R&D in order to ‘capture’ the advantages offered by other countries or geographical areas, confirms the relevance of the analyses put forward by Porter (1990). It also highlights the growing importance of geographical dimensions of strategic decisions, especially for the optimisation of the value chain. This analysis shows that existing frameworks need to be integrated into a more general framework that makes it possible to understand the complex issues associated with location (Buckley & Hashai, 2009; Dunning, 2009). To elaborate this general framework, it seems necessary to extend the analysis to other industries and to observe location strategies over a longer period of time.

REFERENCES

- Anderson, S., De Palma, A. & J.-F. Thisse (1992). *Discrete Choice Theory of Product Differentiation*. Cambridge, MA: MIT Press.
- ANRT-IFRI (2005). *Internationalisation de la R&D: Tendances récentes*. Conference, November 30, Paris.
- ANRT-IFRI (2006). *Les réseaux mondiaux d’innovation dans l’industrie automobile*. Conference, April 27, Paris.
- Autant-Bernard, C. (2006). Where do firms choose to locate their R&D? A spatial conditional logit analysis on French data. *European Planning Studies* 14, 1187-1208.
- Buckley, P. & N. Hashai (2009). Formalizing internationalization in the eclectic paradigm. *Journal of International Business Studies* 40, 58-70.
- CCFA - Comité des Constructeurs Français d’Automobiles (2008). *The French Automotive Industry. Analysis and Statistics*. Paris: CCFA.
- Cheng, L. & Y. Kwan (2000). What are the determinants of the location of foreign direct investment? The Chinese experience. *Journal of International Economics* 51, 379-400.
- Colovic, A. (2006). *Attractivité des territoires pour la localisation des activités de R&D: Etude des facteurs déterminants*. Report for ANRT-FutuRIS, October.
- Contractor, F. (1991). Government policies toward foreign investment: An empirical investigation of the link between national policies and FDI flows, *Paper presented at Annual Meeting of the Academy of International Business*, Miami, FL.
- Defever F. (2006). Functional fragmentation and the location of multinational firms in the enlarged Europe. *Regional Science and Urban Economics* 36, 658-677.
- Dunning, J. (1988). *Explaining International Production*. London: Unwin Hyman.
- Dunning, J. (2009). Location and the multinational enterprise: A neglected factor? *Journal of International Business Studies* 40, 5-19.
- Flores, R. & R. Aguilera (2007). Globalization and location choice: An analysis of US multinational firms in 1998 and 2000. *Journal of International Business Studies* 38, 1187-1210.

- Fontagné, L. & T. Mayer (2005). Les choix de localisation des entreprises. In: *L'économie mondiale 2006*. Ed. CEPIL. Paris: Editions La Découverte.
- Hatem, F. (2007). *La localisation des centres de R&D en Europe. Pourquoi et comment les attirer en France?* Seminar on corporate relocation, Bordeaux University, November 9.
- Head, K. & T. Mayer (2004). The empirics of agglomeration and trade. In: *Handbook of Regional and Urban Economics: Cities and Geography*. Eds. V. Henderson & J.-F. Thisse. Amsterdam: North-Holland, 4.
- Hertrich, S. & U. Mayrhofer (2006). Les défis à l'international d'un constructeur automobile haut de gamme: un entretien avec Patrice Franke, Directeur Général d'Audi France. *Décisions Marketing* 43-44, 137-146.
- Hertrich, S. & U. Mayrhofer (2007). Audi AG: un succès signé «made in Germany». *Regards sur l'économie allemande* 80, 29-34.
- Horstman, I. & J. Markusen (1987). Strategic investments and the development of multinationals. *International Economic Review* 28, 109-121.
- Hyer, S. (1976). *The International Operations of the National Firms: A Study of Direct Foreign Investment*. Cambridge, MA: MIT Press.
- Jacobs, D. & A-P. De Man (1996). Clusters, industrial policy and firm strategy: A menu approach. *Technology Analysis and Strategic Management* 8, 425-437.
- Krugman, P. (1991a). Increasing returns and economic geography. *Journal of Political Economy* 99, 483-499.
- Krugman, P. (1991b). *Geography and Trade*. Cambridge, MA: MIT Press.
- Krugman, P. (1995). *Development, Geography and Economic Theory*. Cambridge, MA: MIT Press.
- Krugman, P. & A. Venables (1995). Globalisation and the inequality of nations. *Quarterly Journal of Economics* 110, 857-880.
- Kuemmerle, W. (1997). Building effective R&D capabilities abroad. *Harvard Business Review* 75, 61-70.
- Loree, D. & S. Guisinger (1995). Policy and non-policy determinants of US equity foreign direct investment. *Journal of International Business Studies* 26, 281-299.
- Mayer, T. & J.-L. Mucchielli (1999). La localisation à l'étranger des entreprises multinationales. Une approche d'économie géographique hiérarchisée appliquée aux entreprises japonaises en Europe. *Économie et Statistique* 326-327, 159-167.
- Mayrhofer, U. (2008). Management de la diversité culturelle: Cas «Toyota Peugeot Citroën Automobile: une joint venture franco-japonaise. In: *Cas en Management Stratégique: Autour de la Mise en Œuvre*, 152-171. Eds. O. Joffre & E. Simon. Cormelles-le-Royal: Editions Management & Société.
- Meyer, K. (2004). Perspectives on multinational enterprises in emerging economies. *Journal of International Business Studies* 35, 259-276.
- Mucchielli, J.-L. (1998). *Multinationales et Mondialisation*. Paris: Editions du Seuil.
- OECD (1999). *Boosting Innovation: The Cluster Approach*. Paris: OECD.
- OECD (2001a). *Innovative Clusters: Drivers of National Innovation Systems*. Paris: OECD.
- OECD (2001b). *Innovative Clusters: Drivers of National Innovation Systems*. Paris: OECD.
- OECD (2004). *STI Outlook*. Paris: OECD.

- OECD (2005). *Internationalisation of R&D: Trends, issues and implications for S&T policies*, Background Report, Forum on the Internationalisation of R&D, Brussels, March 29-30.
- Ozawa, T. (1979). *Multinationalism Japanese Style*. Princeton, NJ: Princeton University Press.
- Patel, P. & M. Vega (1999). Patterns of internationalisation of corporate technology: Location vs. home country advantages. *Research Policy* 28, 145-155.
- Porter, M. (1990). *The Competitive Advantage of Nations*. London: Macmillan.
- Porter, M. (1998). *On Competition*. Cambridge, MA: Harvard Business School Press.
- Porter, M. (2000). Locations, clusters, and company strategy. In: *The Oxford Handbook of Economic Geography*, 253-274. Eds. G. Clark, M. Gertler & M. Feldman. Oxford: Oxford University Press.
- PSA Peugeot Citroën (2006). *Rapport annuel d'activités*.
- Renault (2006). *Rapport annuel d'activités*.
- Rosenfel, S. (1997). Bringing business clusters into the mainstream of economic development. *European Planning Studies* 5, 3-23.
- Rugman, A. (2005). *The Regional Multinationals*. Cambridge: Cambridge University Press.
- Saxenian, A. (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press.
- UNCTAD (2002). *World Investment Report: Transnational Corporations and Export Competitiveness*. New York/Geneva: United Nations Conference on Trade and Development.
- UNCTAD (2005). *World Investment Report*. New York/Geneva: United Nations Conference on Trade and Development.
- Vernon, R. (1966). International investment and international trade in the product cycle. *Quarterly Journal of Economics* 80, 190-207.
- Williamson, O. (1975). *Markets and Hierarchies: Analysis and Antitrust Implications. A Study in the Economics of Internal Organisation*. New York: The Free Press.
- Wolfe, D. (2009). Introduction: Embedded clusters in the global economy. *European Planning Studies* 17, 179-187.