
Location tendencies of the international automotive industry: 'footless companies going east and south' or 'regionalisation of value chain profiles'?

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The paper discusses the location strategies of the international automotive industry. Its aim is to develop a new scientific approach to the explanatory factors behind how automobile companies and their suppliers structure their international value chains. A special focus is laid on relocation tendencies from the 'old' industrialised countries to new markets in Eastern Europe and Southeast Asia. The paper reviews empirical evidence of value chain reorganisation over the last 15 years and some common tendencies such as a stronger organisational differentiation of functions in the value chain. The analysis shows that economic factors alone cannot explain location strategies; in addition to cost, markets, and economies of scale and scope, other factors such as product complexity, physical space and process time aspects, the institutional embeddedness of the producers, actors' strategies and company trajectory influence decision-making processes.

automotive industry; location strategies; original equipment manufacturers; OEMs; customer-supplier relations; international value chains; globalisation; first-tier suppliers; regionalisation.

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The automotive industry, as one of the most globalised branches of the world economy, was also one of the first sectors strongly affected by the recent financial crisis. This reveals the sensibility and fragility of markets as well as of the global texture of value chains in this classic and, at the same time, highly innovative part of the economy. What will the regional impacts of this crisis be? Will the international automotive industry shift even faster away from its traditional regions of production (the triad of North America, Western Europe, and Japan) towards new emergent countries like South Korea and the BRICS (Brazil, Russia, India, China, South Africa) in terms of production volume and perhaps also with respect to the division of labour and functions in the globalised value chain? Some other sectors reveal very clear tendencies in this direction: over the last 20 years, the volume centres of the international textile industry have shifted from the traditional European centres of production towards China and other emerging countries such as Turkey; the focus of the computer hardware industry went from the USA and other Organisation for Economic Co-operation and Development (OECD) countries such as Japan towards newly industrialising countries like South Korea, Taiwan or the People's Republic of China (PR China); India became a headquarters for the growing international software industry.

As the financial crisis is just beginning to have a strong impact on the midterm strategies and structures of the international automotive industry, it is difficult to predict consequences for the regional distribution of production volumes and functions in the value chains. But it might be helpful to have a closer look at the quite contradictory tendencies of regional development within the car industry since the 1990s, since there are examples of decreasing dynamics in emerging countries' auto industries and of expanding value chain shares in old and highly industrialised countries. In the case of the Mexican auto parts industry, for instance, after decades of prosperity and growth, the dynamics have gone down since the 1990s and only a few local companies have emerged (Carrillo and Contreras, 2008). The same is true for the automotive sectors of other important Latin American countries such as Brazil or Argentina (Humphrey *et al.*, 2000). In addition, up until the financial crisis, those companies in the international automotive industry with headquarters in the triad regions of the USA, Western Europe (especially Germany, France and Italy) and Japan performed at least as well as those rooted in emerging countries (such as India, South Korea or PR China). Whereas the reversal from old and highly industrialised to emerging markets and countries is obvious in some sectors (such as electronic hardware production), it is not as clear in others (such as carmakers and first-tier suppliers; see Sturgeon and Lester, 2004).

How can these different and partially contradictory tendencies of location in the international automotive industry be explained? Are (labour) costs actually the dominating and decisive factor determining location? Is the technical complexity of the product an important factor restricting the free globalisation or fragmentation of the value chain? Could the societal embeddedness of headquarters explain the various global location strategies of different companies? How much does the timing of the country and industry trajectories matter? Could (the 'rigidity' or flexibility of) labour regulation explain the dynamics of carmakers' and suppliers' international location?

The aim of this article is to present another theoretical model of the factors influencing location strategies. In addition to cost, markets, and economies of scale and scope, other factors such as product complexity, physical space and process time aspects,

the institutional embeddedness of the producers, actors' strategies and company trajectory are explained theoretically and controlled for empirically. Empirical evidence shows that location strategies and the global restructuring of value chains do not follow solely liberal market conditions. With regard to the reorganisation of Original Equipment Manufacturers' (OEMs) and automobile suppliers' value chains, some common tendencies such as a stronger organisational differentiation of functions and a certain north–south and west–east movement can be proven. In addition to these common trends, this paper will show that the theoretical factors presented can explain location strategies and carmakers' value chain reorganisation.

The main arguments that will be developed are that the patterns of location strategies and restructuring of international value chains within the automotive sector:

- cannot be simply and easily characterised as 'from the north and west towards the south and east', but in fact reveal quite contradictory tendencies
- have to be analysed according to a differentiated model of the influencing societal factors.

In the third section, some empirical evidence for the regional (and not simply global) distribution patterns of automotive value chains will be shown with a focus on the European branch of this industry. Finally, some conclusions will be drawn concerning the future location strategies and international development of the automotive industry.

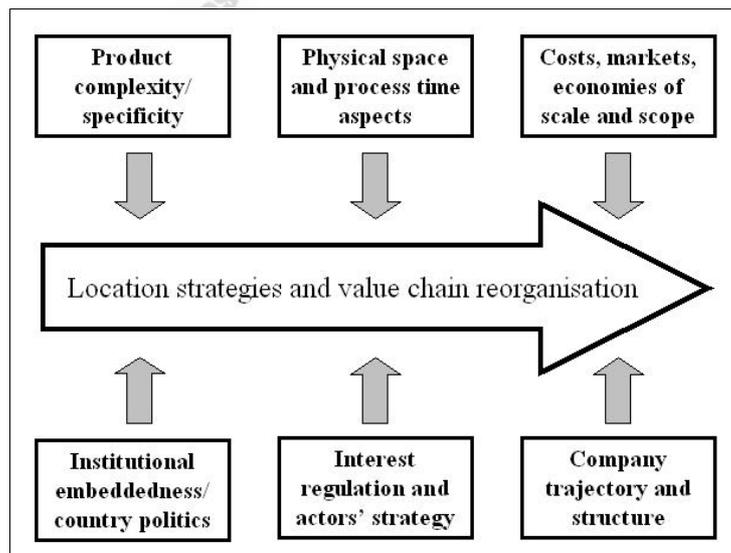
Without doubt, there have been structural shifts in the geographical and functional division of labour within the global automotive industry since the 1990s. First, there has been a long-lasting transfer of functional production steps and product components from the OEMs to the automobile suppliers. Second, this interorganisational functional and volume shift from OEMs towards suppliers has gone hand in hand with a fundamental restructuring and hierarchisation of the supplier industry. This is mainly reflected in the differentiation of first-, second- and third-tier suppliers. A third and interconnected trend is the fundamental internationalisation process of the automotive industry as a whole, which reveals some significant north–south and (for Europe) west–east migration of important parts of the sector. All three tendencies are represented by the development of the distribution patterns of production volumes and employment (see Section 3: 'Global restructuring of value chains – empirical evidence and enigmas', p.12).

OEMs have been the driving power of internationalisation tendencies in the automotive industry. Within the European Union the production systems increasingly intertwine, as stated by Schamp (2005). But this integration – especially of the Eastern European countries – does not mean that a clear picture or unique mobility patterns of the spatial division of labour are becoming visible. Site decisions sometimes become reversible, and a clear differentiation between centre and periphery of production is not observable.

In general, there is no company that exists as an "action unit of transformation of physical and social reality" (Pries, 1998, p.20) with a generally accepted algorithm for how to take into account and weigh the short-, medium- and long-term goals, the volume of expected benefits for each length of time and the probability of actually obtaining

those benefits. Therefore, location decisions have to be analysed in the broader societal embeddedness of automotive companies. One important approach that integrates actor strategies in explaining firm trajectories was developed in the context of the GERPISA network, mainly by Robert Boyer and Michel Freyssenet.¹ In this framework, four strategic types of OEMs were developed to react to new market conditions. The strategies of the different OEMs depend on their former investments in brand, plants and techniques and have to account for all dimensions in the end. The first strategy follows the aim of ‘mass and diversity strategy’. These producers build volume models to reduce costs while simultaneously offering sophisticated models through common platforms for different models. The other strategic models can be characterised by the terms ‘quality production strategy’, ‘innovation and flexibility strategy’ and ‘sustained cost-reduction strategy’. Thus car producers do not have ‘one best way’ to follow, but rather several different strategies depending on the trajectories of the firm (Freyssenet *et al.*, 1998). Becker-Ritterspach (2006) follows the same argument of a hybridisation of the transfer of production systems. Hybridisation outcomes in his sense vary according to three factors: transfer scenarios, contextual misfits/recontextualisation pressures and recontextualisation modes. The variations in the relocation and production of MNEs are related to their strategic and institutional contexts. As location strategies and value chain reorganisation do not simply follow ‘objective’ cost and profit aspects (since there is no ‘objectivity’ in company decisions), an integrative model has to be used to explain actors’ strategies: Of course, *economic rationales* such as costs, markets, and economies of scope and scale influence management decisions, but *organisational factors* such as physical space and the process time aspects as well as the *company trajectory* and *structure* also play important roles. If production is reorganised and value chains are expanded to newly industrialised countries, those actions depend on *technical factors* such as the complexity and specificity of a product. Furthermore, the institutional embeddedness, the interest regulation and *actors’ strategy* affect the decision making for and the specific patterns of value chain reorganisation (see Figure 1).

The influencing factors of location strategies



Given the complexity of the influencing forces of location strategies and value chain reorganisation, it can be assumed that these processes vary in their relative importance from one global carmaker to another and from one region or country to another. In this way, the configuration of the driving forces of value chain reorganisation is different for each internationally active company. A carmaker (such as Ford, General Motors (GM), Kia or Hyundai) operating mainly in mass markets and competing at the middle range of products and prices could (*e.g.*, due to highly standardised components and medium-quality standards) and should (*e.g.*, because of the high cost sensitivity of the products) organise the value chain in a more global way than a premium niche producer (such as Porsche, Lexus or Audi). Taking such a differentiated framework or driving forces into account, one could then explain why, under certain conditions a higher percentage of the value chain and production is kept in high-wage countries and why under different conditions the value chain (*e.g.*, for a price-sensitive standardised small car) could be organised around the world. The specific pattern of internationalisation in the automotive industry is characterised strongly by the complexity of the product, the 'semiotics' or social meaning of the brand and models, the production volumes, the growth dynamics of companies and regions, and the experiences and strategic orientations of actors, mainly management and labour.

2.1 Costs, markets, and economies of scope and scale

In addition to costs – which are of course an important factor for relocating or establishing production sites – access to important retail markets is another important economic factor. Within the cost argument, labour costs are regarded as one of the crucial factors, but empirical research shows that the relocation of production is followed by coordination costs for foreign production, which can dismantle labour cost advantages (see, *e.g.*, Fuchs and Giese, 2003; Kinkel and Zanker, 2007). In addition to cost factors, OEMs' strategies showed that 'soft factors', such as labour flexibility and working time schemes, also play a role in production decisions (see, *e.g.*, Pries, 2006; Schamp, 2005). Following the argument of markets, OEMs and suppliers have to orientate their production towards growing markets such as those of the BRICs since growth potentials lie in these regions, whereas the European and the North American markets are stagnating. At the same time, differences in retail markets influence production strategies as well. Consumers of different countries or regions prefer different types of cars with regard to design, interior, technical equipment or ecological standards (see Schamp, 2005). Although growth potentials lie in the BRIC states, German OEM brands, for example, still mostly export within the EU market. The OEMs have to produce in the most important macroeconomic markets, as the example of Daimler-Chrysler shows. Through the opening of a new production site for the M-class in Tuscaloosa, Alabama, sales for the luxury S-class produced in Germany also rose in the US market; this shows that the M-class plant location in the USA had some indirect effects on the overall sales dynamics in that region, which were not considered and not expected in the beginning. Many of the indirect effects of or nonforeseeable impacts on location strategies (such as currency relations, economic conjunctures and import-export policies) involved in the reorganisation of value chains make a case for 'bounded rationality' (Simon, 1957). The same sample of – often not directly economic and hardly fully calculable – rationales influences, in the opposite way, the decisions of carmakers *not* to leave certain

production sites and countries. Against any logic of economies of scale and of direct production costs, GM Europe maintains production sites in Sweden and the UK due to the correlation of the national plants with national or international brands (Vauxhall in the UK and Saab in Sweden).

2.2 *Physical space and process time aspects*

As OEMs depend on the just-in-time delivery of modules from their suppliers, space and time are critical aspects for both parties. To reduce risks, suppliers are forced to build their plants near the OEMs. Another reason for the local space in the automotive industry is that (due to the relatively high volume and weight in relation to price as compared, for example, to the electronics industry) the transportation of many modules is cost intensive and the modules and production within European and US OEMs need to fulfil high and sometimes varying quality standards. This aspect may explain why OEMs build new plants while maintaining plants in Western Europe, against direct production-cost arguments. If countries with high wage levels offer working-time flexibility, a qualified and flexible workforce and a good infrastructure, this can actually compensate the direct labour-cost advantages of low-wage countries, as Pries (2006) has shown for the case of BMW.

According to Kinkel and Zanker (2007), a panel survey of German automotive companies and suppliers reveals a clear trend of outsourcing of production towards Eastern European countries, but a relocation of parts of the outsourced production in about a fifth of all cases is also observed. The case of the opening of a new BMW production plant in Leipzig, Germany and not in Kolin, Czech Republic shows that, under certain conditions, high-wage countries could win a site-location competition – in this case due to the offering of working-time flexibility, a large number of qualified workers, good infrastructure and a stock of suppliers (see Pries, 2006). This suggests that decisions on location sites for automobile production are based not only on ‘hard’ economic factors of tangible and directly measurable economic costs, but also on ‘soft’ factors such as the learning effects of management, workforce qualification, supplier networks, transportation infrastructure and quality of life. From the opposite perspective, the example of Toyota’s European activities reveals that hard economic losses of plants (like Toyota Motor Manufacturing in the UK) could last more than a decade and must not necessarily lead to divestment if the continued existence of such production locations is justified in a long-term strategy (Pardi, 2006a–b).

2.3 *Company trajectory and structure*

Although all car producers follow the same strategy of lean production, the institutional embeddedness of the producers has an impact on the implementation of this strategy. Nevertheless, not only institutional aspects matter (see Section 2.5), but the company’s own trajectory and structure also affect location strategies and value chain reorganisations. Depending on this trajectory and structure, different paths towards globalisation can be found among the OEMs of the automotive industry (see Freyssenet *et al.*, 1998). Looking at the German Big Three OEMs Volkswagen (VW), BMW and Daimler, it is clear that their paths towards globalisation proceeded differently according to their trajectories and strategies (Eckardt *et al.*, 2000).

Regarding the trajectories of car producers, the GERPISA approach (see, *e.g.*, Freyssenet *et al.*, 1998) argues that the historical relationships between company actors and the multiple socioeconomic contexts surrounding these enterprises are constitutive elements of their productive model. The trajectories of the automotive companies are based on divergence, not convergence towards universal models. Furthermore, a 'hybridisation' of production models takes place; nationally developed profit strategies and production models are transferred into other national contexts by the companies. This includes a process of adaptation and learning. Thus a model does not function the same way in different contexts, but a modification of the model is important. That is why the process of internationalisation does not lead to a convergence of management strategies or of the organisational structures of companies (Beyer, 2001, p.28). The same is true for production decisions. Whereas standardised mass production is located in Asian countries, Western European and American production sites have to specialise in science-led sectors and industrial production in order to make use of their Research and Development (R&D) expertise (see Morgan *et al.*, 2002).

2.4 Product complexity/specificity

The automotive industry has to be seen in the light of its product strategy with regard to the OEM-suppliers relationship as well. The supply industry today produces whole modules for the OEMs that are complicated to build and have to be of high quality. On this point the automotive industry stands in contrast to, for example, the information and communication industry, which produces more specific parts and is less dependent on just-in-time delivery and the reduction of transport costs. This leads to different location strategies (see, *e.g.*, Jürgens and Rehbehn, 2004; Sturgeon and Lester, 2004).

Furthermore, some OEMs follow the strategy of producing a wide range of different models on the same platforms. By this, they want to satisfy different customer needs and at the same time gain economies of scale (see, *e.g.*, Fuchs and Giese, 2003). The production of modules through outsourcing processes in the automotive industry results in more production workers in supplier plants and fewer in the final assembly plants. The modularity goes along with a supply-base consolidation as first-tier suppliers buy second-tier suppliers and with a co-location of assembly plants and supply plants.

The strategy of the leading firms is that, by divesting themselves of noncore functions, they can reap value more quickly from innovations while spreading the risk in volatile markets; because of this, suppliers are more responsible for the design and engineering of products and subsystems. As suppliers have to act globally and with high quality standards, most suppliers come from and have their headquarters in northwestern countries. Starting from there and in order to reduce production costs and at the same time keep up a high quality level, they build new plants more frequently in Eastern Europe than in East Asia. Most of the suppliers come from the triad of the USA, Japan and Western European countries, mainly France and Germany. Every fourth of the hundred biggest suppliers worldwide comes from Germany, putting this country's suppliers in third place behind the USA and Japan. In the case of the supplier industry, cost factors go along with quality factors, as customers imply a certain quality standard (Fuchs and Giese, 2003).

The strong influence of product complexity and specificity can be observed by contrasting luxury producers against mass car producers. Premium segment producers such as BMW or Porsche have profits several times higher per unit sold than Opel, Ford or Renault. Therefore, criteria such as top quality, strong and long-term supplier relations, and security in logistics and against supplier bankruptcy are much more important for premium carmakers than for mass producers (see Table 1).

Schematic comparison of location criteria of premium and mass producers

<i>Criteria</i>	<i>Luxury car producer</i>	<i>Mass producer</i>
Security in logistics and from bankruptcy	High	Low
Stable supplier relations	High	Low
Product-related services	High	Low
Brand image	High	Low to medium
Time to market	Low	High
Product variability	High	Low
Customer proximity	High	Low
Quality	High	Low to medium
Price	Low	High

2.5 Institutional embeddedness and country effects

International strategies and the restructuring of value chains have to be regarded in the light of institutional embeddedness and national politics. As can be seen in special economic zones, such as the 'Maquiladoras' in Mexico for US automobile production, or in national policies for public industrial parks as in Brazil (see, *e.g.*, Kilper and Pries, 1999) or China (see, *e.g.*, Jürgens and Rehbehn, 2004), the restructuring processes of Western producers are influenced by the national politics of emerging regions. Thus 'state offers' such as supplier network policies or tax reductions play an important role in the decision of where to locate new production plants. In addition, the concept of institutional embeddedness can help explain why Western producers keep part of their production in their countries of origin. As Gleich *et al.* (2006) state, German producers of cars and parts need to be more innovative than their Asian competitors in order to justify their higher product prices on the market. To become a leader in technology they cooperate through networks with other OEMs and suppliers as well as with the public sector (*e.g.*, with universities).

National varieties in company strategies are also due to the fact that there are different methods on the national level for the creation and handling of norms. Automobile producers depend on a compromise between governments and themselves. This compromise between companies, states and labour organisations is a fundamental viable condition for each productive model, as Pardi (2006b) states based on the work of Boyer and Freyssenet (2003). Companies do not have to adapt solely on the micro level of their direct external environments in order to bring coherence to their profit strategies, but on the meso level as well, where companies actively interact with their institutional, political and social environments, particular with the state.

“Not only the institutionalization of a market architecture is mainly the product of state regulation, but also when the architecture of a market is destabilized firms seek the help of the state, which is also the case when the social compromises implied by their productive models enter into a state of crises.” (Pardi, 2006b, p.7)

Case studies in different automotive companies and different historical settings show the constitution and evolution of specific patterns of compromise between capital, labour and the state according to countries and periods (see the series *Actes du GERPISA*, e.g., GERPISA, 2006).

2.6 Interest regulation and actors' strategy

Even within the same institutional contexts, companies decide and act quite differently. This becomes obvious when comparing the internationalisation trajectories of GM, Ford and Chrysler within the same US context, of Renault/Nissan and Peugeot/PSA within the same French context, and of BMW, Daimler and VW within the same German context (Freyssenet *et al.*, 1998; Jürgens *et al.*, 1989). All these experiences coincide with the fundamental study of Chandler (1962) and his bold hypothesis that “structure follows strategy”. Companies do not only adapt passively and reactively to their environment, but are able to take strategic decisions in a given environmental context or even to influence or manipulate their environmental situation. The specific mechanisms as to how strategic decisions are made could vary a lot, but the contingent patterns of inter- and intraorganisational interest regulation will always play a decisive role.

This is especially important for location decisions and processes due to the fact that offshoring and outsourcing or relocation processes always have impacts on employment and power relations between different plants and actor groups. The simple bifurcation between capital and labour interests cannot explain the complex entanglement of inter- and intraorganisational bargaining processes. The management *and* labour representatives of a specific production site most frequently share many interests when the reorganisation of value chains is concerned. Both interest groups often defend their location against other plants of the same company and against possible winners of outsourcing processes such as first-tier suppliers or newly established plants in low-cost countries. A good example is the complex inter- and intraorganisational bargaining processes in the case of the General Motors Europe (GME) group, where the workers' representatives of all sites producing the same platform or the Astra model (Ellesmere Port, UK, Antwerp, Belgium, Trollhättan, Sweden and Bochum, Germany) cooperated and competed in the so-called Delta group as well as in the GME group as a whole (Greer and Hauptmeier, 2007; Bartmann and Dehnen, 2009; Kotthoff, 2006; Rott, 2008).

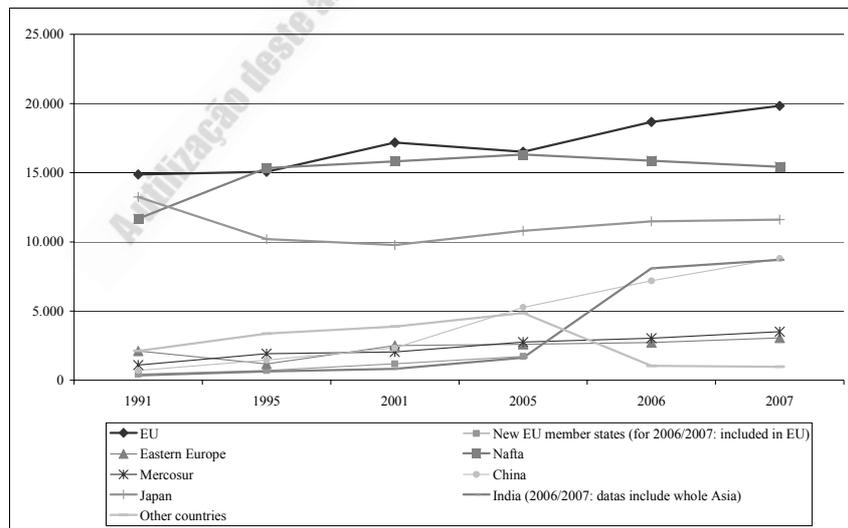
Interest regulation and actors' strategy as influencing variables of global location dynamics are not focused solely on management and labour – local and national governments and politicians interact with these as well. The density and quality of local relationships matter with regard to improving the ability of local enterprises to compete in global markets. Policy makers try to enhance economic and employment conditions for 'their' local or national suppliers. All these decision-making processes are, by nature, based on “bounded rationality” (Simon, 1957). Actors act and decide based on their accumulated experiences, their basic values and their strategies. Location selection is a complex negotiation process where preferences, perceptions and modes of interest

regulation play an important part. Taking into account all the aforementioned influencing factors of location strategies and value chain reorganisation, it is more difficult to forecast the future development of the international automotive industry.

Empirical research on value chains and location strategies emphasises the importance of using an integrative model to explain management decisions. In the following section, the theoretical factors that influence location strategies are highlighted through empirical evidence. Furthermore, some statistical data are presented which show the restructuring of international value chains within the automotive sector.

Looking first at the regional distribution of the worldwide production of cars, the highest proportions of production still remain in the 'old' automotive industries such as the EU (the 15 old EU member states) and the NAFTA region (USA, Mexico and Canada). But as Figure 2 shows, Chinese and Indian production is steadily and quickly increasing as well. These tendencies emphasise the fact that, besides costs, access to important retail markets is another important factor. In 1991 the production of passenger cars and motor vehicles in China stood at 709 000 vehicles; 15 years later the production is more than seven times higher with 5.2 million units. In comparison, the expansion rate of EU production increased by around 6% between 1991 and 2005, the production of the NAFTA region by around 25% and that in Japan decreased by more than 10%. In 2007 automobile production increased in Europe solely in the new EU member states and in Eastern Europe. In Asia production volumes increased in all countries except for Japan (see, e.g., VDA, 2008).

Global automobile production by region, 1991–2007 (in 1000 units) (see online version for colours)



Note: Production includes passenger cars and commercial vehicles (including trucks).

Source: VDA International Auto Statistics (1991–2007)

Emerging countries show much higher growth rates than mature industries such as those of the EU or the USA. Lung (2004) divides the emerging markets into three categories:

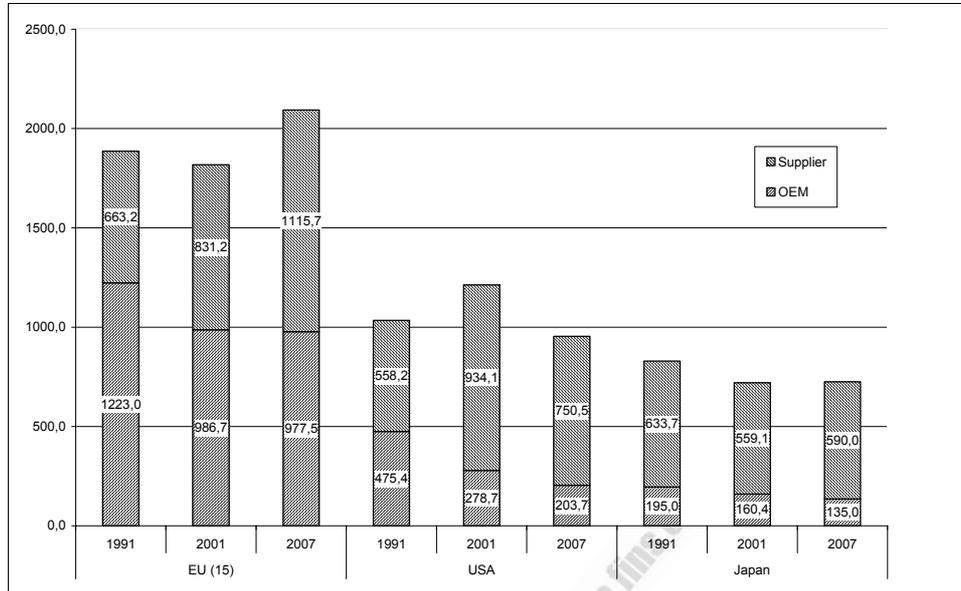
- 1 the Integrated Peripheral Markets (Mexico, CEEC)
- 2 the Emerging Regional Markets (ASEAN 4, Mercosur, CIS)
- 3 the Protected Autonomous Markets (China, India, South Korea).

The highest proportion of growth can be found in the protected autonomous markets. Within the Asian market the vehicle production of especially China and India grew tremendously, whereas the production of Japan decreased. But not only elementary production increased in China and India; they started to develop technological competencies as well, *e.g.*, through the establishment of the Delphi worldwide centre in China and the increasing intensity of software engineering in India. Additionally, the production of their own brands, *e.g.*, within Chinese production, increased worldwide from 0.39 million vehicles in 1996 to 5.38 million vehicles in 2007. Furthermore, Asian OEMs have initiated joint ventures within Asia (*e.g.*, between Japanese OEMs and the Indian supplier industry) as well as with European and US brands. For example, Nissan and Renault started a joint venture in order to strengthen their positions on the European and Asian markets. Today Nissan and Renault produce some of their models on the same platforms and have a strong cooperation in R&D. Cooperation takes place on a functional level as well as on a regional level. Even though Renault still has its core sales markets in Europe and Nissan in the USA, Japan, China and Mexico, both companies had and still have monetary benefits from this cooperation (Schmid and Hartmann, 2006).

In addition to production strategies and investment decisions for new markets, the transfer of knowledge and competencies between OEM headquarters and their foreign subsidiaries and suppliers signals trends of internationalisation as well. Those aspects underline the company trajectory and structure as well as the aspect of physical space and process time as influencing factors of location strategies. In their study on VW de Mexico and its supplier industry, Endres and Fuchs (2007) argue that knowledge transfer does not have to take place through spatial proximity but can occur through organisational or 'quasi-hierarchical' proximity as well. Organisational proximity means that different firms belong to one organisation, whereas *quasi-hierarchical* proximity in the value chain is a relationship across company borders. In the case of VW de Mexico, knowledge transfer takes place at the international level. Knowledge acquisition of the suppliers occurs inside the organisation or it is controlled through *quasi-hierarchical* connections in the value chain. In just a few cases, such as the development of the New Beetle, basic competencies were transferred completely to a foreign subsidiary.

Within the old, highly industrialised countries, one can find a long-term trend of production shift from OEMs to the supplier industry, which goes along with a decline of employment rates at the OEMs and an increase at the suppliers. Roughly said, all three regions (EU 15, USA, Japan) maintained their overall employment levels, and the USA and even more the European automotive industry experienced structural employment shifts from the OEMs towards the suppliers. This indicates that, concerning the overall employment tendencies, the observable changes are much more of a qualitative and restructuring nature than that of absolute volume shifts. Concerning the OEM-supplier relation, the USA tends to adapt to the Japanese situation, while the Western European countries still reveal a very strong employment weight of the OEM side.

Employment rates in the 'old' triad regions, 1991–2007 (in 1000 units)



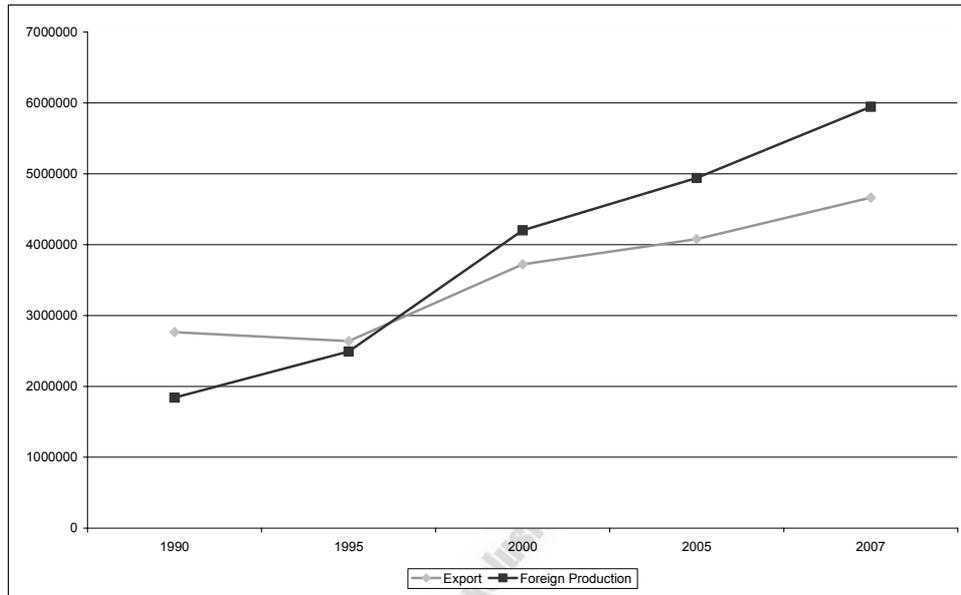
Notes: EU = EU 15. Data of employment distribution for OEMs and suppliers estimated for 2007.

Sources: VDA (1991; 2001; 2007); OICA (2007)

In the new emerging markets in Asia, as well as in Eastern Europe, employment rates have grown both in the supplier industry and in the OEMs. Comparing the employment rates by region between 1991 and 2005, it is striking that employment rates declined not only in the EU 15, the USA and Japan, but in some of the new EU member states as well; within Europe employment increased only in Eastern European countries and the new EU member states such as Romania, Poland and the Czech Republic (*e.g.*, VDA, 2001; 2008). In 2008 the increase of employment in the new EU member states led to a direct employment of 2.3 million people in the EU 27 (see ACEA, 2008). In a country case study, Nunnenkamp (2003) reveals the increasing interconnectedness of value chains at the European level for those carmakers based in Germany. Over the last 20 years the amount of exports and imports of auto parts has increased not only in absolute but also in relative terms in comparison to total car production. Foreign production, outsourcing and offshoring of parts' and components' production increased significantly.² At the same time as a corollary increase of imports for parts and components produced outside Germany was induced, significant growth could also be observed in the export of (mainly high-value) parts and components from Germany. The overall conclusion of this case study of the restructuring of the automobile value chains of German carmakers at the European level could be summarised as follows: The functional hierarchisation and the macroregional differentiation of value chains at the (Western) European level increased competition, efficiency and the volume of flows of parts, components and units. During the 1990s these processes secured employment for Germany, although these structural changes represent challenges especially for less-qualified workers (for the

UK market, see Morgan *et al.*, 2002). New data about the export and foreign production of German cars show that export production is still growing but that foreign production has been higher than exports since 1997 (see Figure 4).

Export rates and foreign production of the German automotive industry, 1990–2007
(see online version for colours)



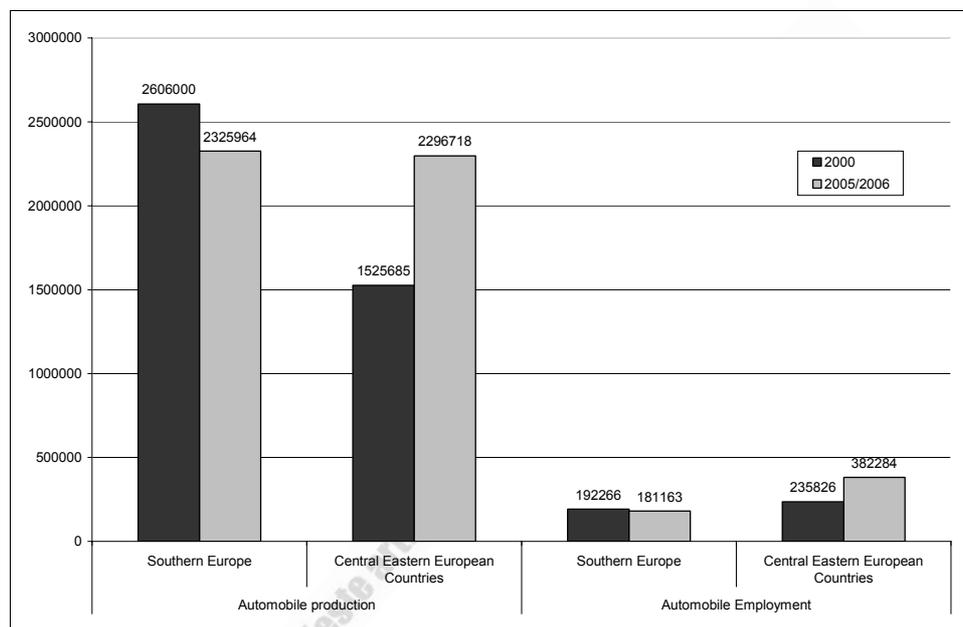
Source: VDA (2008)

Whereas during the 1980s the expansion of intermediate consumption focused mainly on southwestern European countries, from the 1990s on it was oriented towards Eastern European countries, especially to the new member states of the enlarged EU of 27 countries. As research conducted by Bilbao-Ubillos and Camino-Beldarrain (2008) shows, OEMs and supplier industry producers take notice of different costs in their location strategies. A comparison of southern Europe (Portugal and Spain) and Central Eastern European countries (the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia) makes clear the expansion of production towards Eastern Europe (see Figure 5).

The new competition and the production interdependence of highly industrialised countries with low-income countries mainly increased on a regional level, but there is no consistent linkage between foreign production and international value chains. In fact the strategies are site related: countries with high volumes of units produced by German home-based carmakers – such as China, Mexico and Brazil – revealed relatively low absolute volumes of imports and exports of parts and components with Germany, and the corresponding exports from Germany to these countries are much higher than the imports from there. The case of the Czech Republic is quite distinctive: Although the volume of units produced there by German carmakers is almost as high as in China, the parts and components trade is more than double as high as the case of the Czech Republic, and the imports from there to Germany are higher than the

German exports to this country. In a study on the Czech supplier industry conducted by Pavlinek and Janak (2007), the structure of that industry is described. Within the modularised structure of first- to third-tier suppliers, Czech suppliers play an important role next to foreign suppliers. This may be an indicator for high export rates from the Czech Republic to Germany. Furthermore, new research on the relocation of the German supplier industry shows some tendencies towards a relocation of production from foreign countries back to Germany, which has an effect on German imports and exports as well (Kinkel and Zanker, 2007).

Development of automobile production and employment in southern Europe and Central Eastern European countries



Note: Data for production from 2006, for employment from 2005.

Sources: ACEA (2007); Bilbao-Ubillos and Camino-Beldarrain (2008)

The physical space and process time aspect for location strategies can also be found in the case of the location decision of a new BMW production site in 2005, where Leipzig, Germany won the location competition against Kolin, Czech Republic and Arras, France (see Pries, 2006). From the very beginning BMW followed a long-term capital strategy with an own-company image in premium segment production, which influenced the decision in the end to build a new production plant in Leipzig, East Germany and not in Kolin, Czech Republic. The development of new models and the ever-increasing total production volume led to the decision to build a new plant. The long-term capital strategy goes along with product and manufacturing methods that are developed simultaneously through close cooperation with system suppliers. The main location criteria that BMW applied can be summed up as follows:

- feasibility and general socioeconomic conditions
- integration in the overall plant production network, economic viability and flexibility

- efficiency in realising the investment and starting production in spring 2005
- close proximity to main customer markets.

“In the final stage Leipzig won out over Kolin, although the Czech site offered a 30 percent over all labour-cost advantage. In July 2001 the then BMW CEO Milberg clarified that approximately one-fifth of the total costs related to automobile production stem from labour costs; therefore, location criteria, such as qualified workers, logistics infrastructure and market proximity are also very important factors.” (Pries, 2006, p.9)

Alongside the ‘soft factors’, such as the proximity and stability of an established supplier network or the negotiated production and labour flexibility, an important hard factor for Leipzig was that BMW received a maximum amount of financial support from the EU fund for disadvantaged regions; but this would probably have been the same for the investment in Kolin.

In sum, taking the case of the German carmakers at the beginning of the new century, the value chains of production for the European market could be characterised as ‘europeanised’ in the sense that higher proportions of reorganisation take place *within* Europe (with a clear trend towards Eastern Europe) than within Asia or North and South America. In a similar way, the value chains of production for the Asian, North American and South American regions are reorganised at the regional level. This includes a major shift of R&D activities from being concentrated in headquarters towards a more regionalised distribution of R&D. This is a clear indicator of the restructuring of the international functional division of production and labour. The old idea of highly segmented international value chains where the countries in the south and in the east would play a role only as ‘extended work benches’ or assembly locations for cheap and unqualified labour has to be rejected on the basis of empirical evidence.³ R&D activities as well as the highly qualified jobs associated with new-model testing and the initiating of new models’ production processes have been transferred – at least to a certain extent – from the (former) centres to the (former) peripheries.

A study of the Product Development Process (PDP) of three new models of the most important German carmakers – the VW New Beetle, the Mercedes M-class and the BMW Z-3 car – revealed a substantial translocation of resources and assets from Germany to the USA and Mexican plants during the 1990s (Pries and Schweer, 2004). The same is true for research conducted by Vale (2004) on the investments of VW and Ford at Autoeuropa, Portugal. He shows that innovation and knowledge were transferred from carmakers to the new regional supplier network at Autoeuropa. The study of Pries and Schweer (2004) uses PDPs as a measuring tool for analysing internationalisation and the spatial distribution of resources, functions and competencies in international companies. The analysed products and plants reveal new PDPs following new market and production strategies that are aimed at establishing the brands in the US market. The products are planned and developed in new organisational structures and built for the world market. They stand for a new market segment and a qualitative internationalisation shift of the companies. The transfer of R&D activities can be found at international automobile suppliers as well, if the new sites meet quality criteria. Delphi (the large US supplier, a spin-off of the GM group) established more than 30 technology centres for R&D around the globe – the largest of them in Ciudad Juárez, Mexico. Several of the most important global OEMs have increased their R&D capacities in the most dynamic emergent markets of China and India.⁴

Based on a comparative study of the automotive and information technology sectors, Jürgens and Rehbehn (2004, p.6) draw the following conclusion:

“In any case, achieving cost advantages and assuring consistent, robust quality performance throughout the value chain has become a primary concern for final producers in both industries. Up to now, final producers have mostly relied on pressuring suppliers to reduce prices. In the future, more emphasis will be laid on coordinating processes and integrating suppliers more closely, and on harmonizing processes across interorganisational interfaces.”

This has far-reaching consequences for company organisation and the branch of management that has to handle time, costs, capital and the quality of the production. For a better integration of suppliers, the corresponding hierarchisation of first-, second- and third-tier suppliers is crucial; this allows the OEMs to integrate the first-tier suppliers from the early stages of R&D and product construction. R&D translocation of the OEMs will, in this way, also induce an R&D translocation of first-tier suppliers. Furthermore, the authors state that those two highly internationalised branches follow different strategies. Since just-in-time delivery and the reduction of transport costs are less urgent for the value chains in the information industry than in the automotive industry, there are great differences in the supplier structures. Information products are designed and could be designed for the world market in Chinese industrial parks, whereas the automotive industry focuses on regional markets; thus, until now, automobile companies such as VW and GM use their Chinese plants or joint venture cooperations as market entry chips only, without a strategic orientation towards global exportation from China.

Within the different industries, institutional embeddedness leads to different forms of production strategies and a national adjustment of production models, as Kwon (2003; 2005) argues in his research on the changes in production strategies within the Japanese, German and US automotive and electronics industries. Although US and German industries followed the Japanese model of lean production, the process was not an imitation process but a process of creative industrial adjustment and ‘hybridisation’ inspired by the Japanese competitors. What is called ‘best practice’ is not a single model; rather there are multiple ideal types of economic efficiency according to different organisational perspectives and institutional environments. Even between the western industries of the USA and Germany, the adaptation of the Japanese model was divergent. Regarding the outsourcing processes of the automobile producers, the carmakers in both countries reorganised their contractual relationships with suppliers and focused on long-term contracts and close cooperation. With the new contracts, new problems for governance arose, which were handled differently by US and German automakers; new norms had to be created for the customer-supplier relationship, which led to a relationship of conflict and distrust in the USA and a trusting and fair partnership in Germany.

Sturgeon and Lester (2004) present an argument similar to that of Jürgens and Rehbehn (2004) in their research on the growth of Newly Industrialised Economies (NIEs) in East Asia and the impact of North American and European firms on them. Their findings from the electronics and motor vehicle industries also emphasise the influencing factor of ‘product complexity and specificity’ and show a twofold development: on the one side, the Asian supply industry is growing, but on the other, US and European firms are becoming more dependent on suppliers from the West because of increasing demands on the suppliers in general. Increasing levels of international competition and the deverticalisation of value chains:

“have led to the emergence of lead firms with little if any in-house manufacturing and the rapid expansion, growing financial strength, and increasing competence of the largest external suppliers of core manufacturing services, which in a self-reinforcing dynamic of industry co-evolution has fuelled further outsourcing by lead firms and more consolidation within the supply sector.” (Sturgeon and Lester, 2004, p.66)

Although internationalisation processes can be found in both sectors, the authors emphasise significant differences, on the one hand, between the automotive and the electronics industry and, on the other, concerning the consequences for different regions. Whereas contract manufacturers in electronics have mostly emerged from North American firms, global suppliers in the motor vehicle industry came from Europe and Japan as well. Regarding the growth of Asian suppliers, a supplier-oriented industrial upgrading – which means a transfer of skills and technology from the leading firms to the local suppliers – is possible for the electronics industry, but is hardly achievable for the motor vehicle industry in the short term, since technical sophistication is necessary in order to design and produce complex modules and subsystems. Another problem for Asian branches is that the substantial design know-how remains mostly in the home countries and the supplier logistics need to be synchronised with the leading firms. Up to now and in the near future, many local suppliers in East Asia will not have the capability to act and react internationally.

In a similar direction, Herrigel (2006, p.3) argues that, in recent years and in the light of supply chains’ restructuring between suppliers and OEMs, new forms of cooperation and communities have emerged:

“[...] the peculiar contradictory pressures felt by all producers within the supply chain, in the context of a general trend toward vertical disintegration, have given rise to new more porous and recombinatory organizational forms that have, among other things, dislodged industrial communities from their traditional territorial moorings.”

The former spatial character of communities has become fluid and subject to constant change; transnational ‘epistemic’ and project-oriented working communities are emerging. The same pressure as that within the supply chain has led to new styles of governance practices that in turn led to joint goal setting in those new communities. Thus the achievement of continuous improvement in efficiency, cost reduction and innovation is far more formalised today, because of new pressures in the competitive environment. The environment has caused changes in the relationship between suppliers and OEMs, with a growing dependence of OEMs on the development and production input of suppliers. This has led to a specialisation of the suppliers as they have had to develop strategies to match the needs of OEMs and improve production quality, while at the same time reducing costs. They followed the trajectories of ‘global community enlargement’, through imitating roles and functions in the value chain, and created intimate and self-reproducing ties across significant distances. Those new communities resulted in:

“[...] the widespread diffusion of new style governance arrangements that ensure transparency and mutual accountability in collaboration at three levels: a) the division of labour in production; b) intra-firm relations between and among the centre and operating units; and c) at the level of the region in which firms are (were) embedded.” (Herrigel, 2006, p.16)

Those three levels followed new pragmatic disciplines, *e.g.*, benchmarking, simultaneous engineering, procedural quality standards, 'root cause' error detection and correction analysis – these being mechanisms that combine flexibility with standardised formal procedures.

In general, whereas the last decade of the 20th century brought an intensive regionalisation of automobile value chains, *e.g.*, in the macroregion of Europe, the NAFTA zone or Southeast Asia, at the beginning of the 21st century these value chains are being increasingly restructured at a global level. For the suppliers, mainly the first-tier suppliers, this structural change includes a transfer of R&D to offshore plants, concentration and growth, specialisation in knowledge and products, the increase of electronic technology, and the increasing internationalisation of production systems (*e.g.*, Kinkel and Zanker, 2007). In 2002 German suppliers held a proportion of 37% of R&D activities. According to estimations, this proportion will grow to 63% by 2015 (Kinkel and Zanker, 2007). For suppliers, this goes along with higher costs for R&D, as OEMs today want to buy complete modules. These tendencies can be found not only in Western automotive industries but in its Asian counterpart as well (*e.g.*, Banerjee *et al.*, 2005). In terms of internationalisation of production, German suppliers are more internationalised than their foreign competitors; German suppliers produce in more than 60 countries with more than 1200 subsidiaries, licensing or shareholdings and gain more than half of their total revenue internationally (Fuchs and Giese, 2003). The new international division of competencies does not necessarily go along with competency losses for headquarters in highly industrialised countries. As a study by Fuchs (2003) shows, today's multinational suppliers can be characterised by interdependencies of power that offer possibilities to plants in newly industrialised countries as well as in Europe or the USA. Within the Asian supplier industry there has not been a strong tendency towards internationalisation. The strategy of this supplier industry has been marked by joint ventures, especially between Japanese in-house suppliers and Indian suppliers (*e.g.*, Banerjee *et al.*, 2005). Since the 1990s Japanese OEMs have started these joint ventures with Indian suppliers and were the first ones to enter the Indian market. The entrance of international OEMs in the 1990s led to major changes in the Indian supplier industry regarding manufacturing and quality standards, which led to higher export rates from Asia (in general) to Europe and the USA. Regarding the import rates in automobile production from Asia to Germany, import increased from 5,248 million euros (in 2003) to 5,513 million euros (in 2007). As Banerjee *et al.* (2005) have shown, the same is true for imports from Asia to the US market, especially regarding imports of components. Still problems remain for Indian suppliers regarding the internationalisation of sales and production markets which do not exist for Japan or China. As Mitra (2007) shows, Indian suppliers have so far failed to establish efficient supplier clusters and horizontal cooperation among firms to form groups of globally competitive suppliers.

Based on an initial observation of these general tendencies, one major question arises: Is the north–south and west–east migration of the international automotive industry the only pattern and a unilinear and irreversible trend, or are there reverse tendencies as well? Empirical research on the internationalisation patterns of the German automotive sector and especially on OEM supplier relations has led to interesting answers (Kilper and Pries, 1999). Panel surveys of important automobile suppliers with headquarters in Germany revealed that a significant part of those companies that had opened new production sites in Middle and Eastern Europe later on decided to bring back at least a part of this production to Germany. Almost all of the interviewed companies had underestimated the

indirect costs and problems of offshoring and outsourcing abroad (Kinkel and Lay, 2005). The process of the north–south and west–east migration of value chains mentioned before is not unidirectional – neither for suppliers nor for OEMs.

For the case of suppliers, Kinkel and Zanker (2007) define three different types of internationalisation strategies. Whereas the production strategies of home-based players and market- and customer-oriented foreign producers do have positive effects on employment in German plants, only the strategy of cost-oriented foreign producers had negative implications on employment rates in Germany. Even though the intention of cost-oriented foreign producers is to reduce costs by transferring production to low-income countries, the data show that this strategy does not always lead to a reduction of costs, as money has to be spent in a lot of transaction costs which were often not foreseeable, such as additional coordination costs, language and cultural learning costs, a weak and precarious supplier infrastructure, *etc.* Although the different types have different implications on employment trends and on the specific contours of value chains, all surveyed suppliers performed R&D in their German plants.

The same is true for all European OEMs: they still concentrate their R&D at the headquarters (see Schamp, 2005). Customer-related foreign production strategies of suppliers were mostly induced by OEMs (following the customer abroad or ‘follow sourcing’). In this sense, new critical tendencies have to be mentioned, as OEMs pressure suppliers to build cost-oriented plants in low-income countries, a strategy that is not always reasonable from an economic perspective but which allows for higher OEM pressure on suppliers’ cost reduction. The outlined empirical evidence reveals some ambiguous trends of internationalisation and emphasises the specificity of the automotive sector as compared to other highly internationalised branches, which highlight the necessity for an integrative theoretical model as illustrated above.

Having reviewed some empirical evidence of value chain reorganisation over the last 15 years, some common tendencies such as a stronger organisational differentiation of functions in the value chain and a certain north–south and west–east movement of OEMs and suppliers can be observed. But in addition to these common and very general trends, the situation is quite ambiguous, contradictory and dynamic. Mass producers follow different paths from premium segment carmakers. Outsourcing and offshoring processes are not the only tendencies, but exist alongside insourcing and relocation tendencies towards the old and highly industrialised production sites. Different patterns of knowledge management and R&D location strategies can also be observed.

This very complex picture refutes a simple narrow economic approach to location strategies and value-chain reorganisation. Liberal market economic aspects and simple cost arguments are often taken and used as a discursive pressure tool and as a ‘rationality myth’. The actual dynamics of location strategies are influenced by a complex field of power, in which six factors could be identified in the fields of market, institutional and organisational arguments:

- 1 costs, markets, and economies of scope and scale
- 2 physical space and process time aspects

- 3 company trajectory and structure
- 4 product complexity/specificity
- 5 institutional embeddedness/country effects
- 6 interest regulation and actors' strategy.

Taking for granted the strong dynamics and 'attraction power' of emerging markets such as those of the BRICs, it is very difficult to predict the actual and specific outcome of these processes in the future structure of the international automotive industry. Due to the specificities of product complexity, the societal embeddedness and functions of the car as the highest valued commodity (after and in addition to housing), and the ecological challenges of mass transport after the era of fossil energy consumption, completely divergent scenarios of the future of the automotive industry could reasonably be sketched out. One extreme option would be the emergence of independent and very strong new global carmakers (such as Chinese and/or Indian ones) that would define or at least strongly influence the sector in a decade or two. This would be a similar process to the emergence of Toyota in the 1980s. Another extreme option would be that the current strong players in the international automotive industry, such as the American Big Three (GM, Ford and Chrysler), the German Big Three (BMW, Daimler, and VW), some other important European carmakers such as Renault, PSA and Fiat, and the Japanese (Toyota, Honda) and Korean (Hyundai, Suzuki) big players would build strategic alliances and joint ventures with carmakers from the BRICs. A third scenario includes a fundamental shift in the logic of car production like the one experienced, for example, in the electronics industry, where a car would be defined not only by the specific brand of the OEM but by the brands of the most important component suppliers. Like 'Intel Inside', the slogan could then be 'powered by BMW engines', 'wired and controlled by Bosch', 'interior equipment by Delphi' or 'solar drive by SolarDrive'. Based on the current financial crisis and its impact, prediction is even more difficult, and perhaps some alternative scenarios for the future of the international automotive industry could emerge. Whatever the actual development will be, in contrast to following a simple economic or technical determinism, social scientists should analyse and attempt to predict the industry's outcomes with a holistic and differentiated conceptual approach.

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- 1 GERPISA stands for Groupe d'Etudes et de Recherches Permanent sur l'Industrie et les Salariés de l'Automobile; see, *e.g.*, Boyer and Freyssenet (2003) and the website <http://www.gerpisa.univ-evry.fr/>.
- 2 See also Vale (2004) for the case of VW and Ford and their investments in Autoeuropa, Portugal.
- 3 In other industries like shipbuilding there is some empirical evidence that specific regions like Eastern Europe are used as an "extended work bench" for world markets (Ludwig and Tholen, 2007).
- 4 See, *e.g.*, the example of the Shanghai Auto City (<http://www.shautocity.com/english/qcgcy.htm>, visited 2 April 2008) or Banerjee *et al.* (2005).

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