RACE2050 *- Responsible innovation Agenda for Competitive European transport industries up to 2050*

D2.1 –Report on transport foresights since the 1960s: strategic warnings, visions and outlines.

Dissemination level:

Public

Table of Contents

1. Executive Summary

To engage in the future is a historical condition of civilised life. But it's the 20th century and modernity in particular that represent the will to plan and anticipate *the tomorrow* more frequently than ever before. To foresight means not just to calculate, but to project the technological, political and societal developments, visions and trends that might occur in the future. However, it is literally a blurry process, which rather uncovers the conditions of the presence, than predicting the future in detail. In this respect, some dystopian foresights include a markedly normative character as they intend to warn and actually aim to avoid the realisation of their undesirable predictions. By drawing negative pictures of the future such foresights might be more activating than others; consequently, might be more likely to evoke necessary changes of present conditions. When e.g. in 1968 the French Jean-Jacques Servant-Schreiber claimed in *The American challenge* that "shock is better than surprise" (Servant-Schreiber 1968, 20) he was often criticised for his pessimistic worldview, but exactly that certain diction might have been the right choice to not only let Europe readjust to new global conditions but to let Europe gradually extended its global magnitude.

In the last 50 years the European transport industry faced several threat periods and external competitive pressures that pushed to reorganize and to readjust industrial and political structures. The American threat (in the 1960s and early 1970s) emphasized Europe's missing economies of scale; the subsequent Japanese threat (in the 1980s and 1990s) emphasized Europe's low quality and poor production efficiency compared to Japanese lean production; and the ambiguous Chinese threat (from 1990s and beyond) currently highlights the country's low production costs, which already induced wide-ranging off-shoring activities to Asia. In the following, this report identifies and assesses diachronically the content of changes in the respective framework conditions and identifies several trends envisioned by previous foresights as well as their impacts on the transport and on the political field. With this long-term assessment the report aims to detect patterns of foresight and effects on the transport industry, leading also to a better understanding of how foresights may induce industry changes, adaptations and competitiveness at large. Thus, it shall provide useful ideas and lessons from the past that not least generate recommendations for RACE2050's strategic content of transport industry foresights up to 2030 and beyond.

The American threat

1960s future forecasts often projected the European fear of becoming an American "satellite", which eventually pushed to closer European collaboration and the renewal of the European integration process. In order to cope and to compete with economic and technological American supremacy, Europe for the first time seriously envisioned to achieve a 'critical mass', thus benefiting economic and political scale effects. As responses

to the threatening future forecasts, transnational collaboration, common policies and a wider market were consequent measures to establish framework conditions competitive against the US. In the transport field, among the beneficiaries we can list the precariously weak European aviation sector that heavily benefited from strategic governmental investments. Prominent outcomes were the Concorde and Airbus Industrie, considered for us as political and technological responses to the American threat. Hence, in the long run, the American threat paradoxically appears to be "the luckiest chance" for the European aviation sector.

The Japanese (automotive) threat

In the 1980s Japan's remarkable high-efficient, high-quality and cost-saving production systems posed a serious competitive threat particularly to European carmakers, demanding to consequently revolutionize an outmoded, inflexible concept of Fordist mass production and domestic business orientation. Such a challenge pushed for i) radically adjusting and adapting to the overarching Japanese concept of "lean production", and ii) boosting European integration towards the 1992 Single Market. As the Japanese threat caused the industry to further internationalize and to renovate production and quality factors, the political sphere was again induced to obtain a European 'critical mass', also in order to overcome the stagnation of 1980s "Euroscepticism". The fear to lose Europe's "industry of industries" pushed the sector's top-management and policy makers to learn from its main competitor and to catalyse global integration, which turned out to be a precondition for its further success in emerging markets up to this day. In other words, the above meant to gradually diversify Europe's industrial foundations and to shift away from the formerly economies of scale towards economies of learning and (international) cooperation. However, the industry's adjustment process in context to the Japanese threat did not exhibit homogeneously as it generated winners and losers in the automotive sector.

The ambiguities around China. A threat 'in the making'

Since the 1990s, China's incomparable economic development has been a mixed blessing for the European transport industry. On the one hand the transport industry was highly profiting from almost unequalled Chinese demand; but on the other hand its emancipating national industries are increasingly feared to become sophisticated competitors in the world markets. Thanks to continuing Chinese technology transfers, particularly the European rail sector already can be declared to face a Chinese "threat". However, perceptions about whether to declare China a threat or rather an opportunity can hardly be generalized as they are widely differing – not only from industrial sector to sector, but also from company to company. General speaking, since the 1990s, the fear to lose European industrial structures (which was experienced through extensive offshoring and outsourcing, especially of low-skilled labour activities) generated a political impulse

to promote cost advantages within the Eastern European sphere and has been securing efforts to further extend and restore a European 'critical mass'. In this respect, the EU eastward enlargement in 2004, the efforts to create the European Single Sky, the Commission's high ecological vehicle and product standards or the on-going harmonization of the rail market can be assumed correlating strongly with the rise of China's competitiveness. Since the transport industry is still too much profiting from Chinese demand, the benefits so far offset possible rebound effects of rising competition. In this respect, China, compared to previous threat periods, cannot yet be considered a comprehensive menace but surely will evolve as such in the next years.

2. Introduction

This report is part of RACE2050's deliverables to be submitted in June 2013. RACE2050 is a research project granted by FP7 scheme that assesses the past and the future of the European transport industry. The here present deliverable 2.1 is linked to the project's Work Package 2 (Long Term Assessment) and is entitled *Report on transport foresights since the 1960s: strategic warnings, visions and outlines*.

In this report, RACE2050 aims to identify positive effects that derived from past periods, which posed a threat to the European transport industry by challenging external competition. Through diachronic comparison of transport industry's foresights since the 1960s, the report will identify and examine changes in the framework conditions and in the past foresight strategies, particularly in the context of warning foresights. The report aims to analyse whether and how respective (dark) future outlooks mobilised the industry leaders and policy makers to enhance competitive resilience and change business models. With the help of those historical examinations, the objective is to feed RACE2050's subsequent scenario making process and to recommend strategic measures for strengthening European transport industry's global position for 2030 and beyond.

This report notably follows a historical and cultural approach. Its major resources are state-of-the-art reports and foresight studies of the respective periods. Thus, although keeping in the top consideration quantitative factors, it is focused to a qualitative and diachronic analysis aiming to understand the European debate, decisions and policies that have led to our present situation and that notably secured a strong position of European transport industry. Beyond that, it faces to the question of foresight's normative power. Even though this report does not aim to present clear measurable and quantitative impacts of foresight studies, it presents evident correlations between warning foresights and European industrial and political responses. As an overall long term assessment, this

report shall provide a basis for further investigations and discussions of what we can learn from the history of the future and aims to understand the history of European integration as a history of continuing responses to external pressures.

3. An industrial take-over? The "American threat" of the 1960s

This chapter aims to identify the impacts of the "American threat", expressed in Europe's industrial lack of *economies of scale*. Considering this economic concept the core contemporary business obsession of the 1960s and hence, the main driver of economic success, the Europeans were progressively convinced to have not big industrial structures adequate to the need of the global competition. Starting in the early 1960s, this subject became more and more debated and was increasingly felt to undermine the Old continent. Consequently, economies of scale were discussed as the most crucial economic challenge within Europe's 1960s economic future discourses. Against this background, the *Plowden Report* (1965) on Britain's aircraft industry future and "*Le Défi Américain*" (1967) concerning the increasing American supremacy illustrated the continent's lacking industrial structures, therefore demanding for a new quality of inter-European collaboration and adaptation policies for achieving scale advantages comparable to the US. In order to cope with this European shortfall, those state-of-the-art and foresight studies exemplarily highlighted the request for political, economic and organizational measures in order to circumvent (or at least to compete with) US industrial and technological domination. In a long-term perspective those measures materialized in policies (European Parliament 1969, European Commission 1970, World Economic Forum 1971), new transnational European industries (*Concorde, Airbus*) and management organization.

The 1960s and early 1970s industrial European debates show how external threats in form of an overarching competitiveness advantage can (to some extend) become an incubator for long-term consolidation and success. By receiving substantial political support (particularly accounting for the weak aviation sector), European industry in the medium run benefited from the American threat. Naturally, not all the policies were successful; actually, the most flourishing outcomes were those initiatives having a low profile, strongly market oriented and low technological ambitions, as the Concorde versus Airbus history shows us. Economic weakness created both the need and the chance to find a niche in the market, which soon leads to more ambitious outcomes.

3.1 Envisioning a European 'critical mass'

3.1.1 The background: shifting transatlantic relations – *coping and competing*

In the course of the 1960s Western Europe was experiencing a gradual realignment from predominantly transatlantic and national orientation to an intra-European perspective. After the US had played the major role in rebuilding and influencing a war-torn Europe, the established transatlantic system of military, monetary and economic securities was continuously put into question within Europe's political and public spheres. The rallying cries were *coping* and *competing* with the US. As Europe was soon recovering, its traditional transatlantic partner was henceforth considered to become a growing economic competitor for the future; or, the other way around, Europe felt increasingly prepared to catch up scales of productivity and innovation that it had lost as a consequence of the World Wars. The transatlantic relationship – in a long-term perspective – faced a significant turning point (Zimmermann 2000, 87ff.).

With Kennedy's assassination in 1963, his initial vision for a strong transatlantic interdependence and cooperation based on "two separate but equal entities" (Kennedy 1962) came slightly out of range. Within a ten-year period the aim of an even closer collaboration between the 'old' and the 'new' world was slowly rephrased by a re-emerging European voice that steadily would pursue its own interests. Motivated by preventing contemporary future prophecies of being commanded by the US economically and technologically predominance, the main pillars of transatlantic monetary and economic structures were openly criticized, while at the same time European deficits were eagerly analysed. Economically, it were America's vibrant *economies of scale* that together with the *Bretton Woods* system – the leading international monetary system of fixed exchange rates under the US dollar leadership – started to worry European establishments. European deficit of appropriate large industrial structures was considered to cause mid-term irrelevance in the global economic order, while US financial hegemony permitted high US direct investments. Beyond that, the Europeans didn't want to be crushed politically between the super powers of the US and the Soviets. Therefore, European states started to follow differentiated self-contained strategies of coping with the situation "in-between" the Cold War parties.

So, in the 1960s, the factors which made Western Europeans satisfied of the post-war political and economic order created in the 1940s were eventually felt as limitations. The quick European recovery, the more relaxed competition versus Soviet Union and the need to face the end of colonialism were pushing elements towards new balance of power. One way to face this new framework conditions was a broader trans-European cooperation, also in order to achieve a proper independent agenda from the US one: "at

the end of the 1960s, all European countries exhibited a clear preference for European programmes" (Zimmermann 2000, 87).

Given the contemporary unequal industrial conditions and Kennedy's less Europe-visionary successors Johnson and Nixon, a growing number of European stakeholders, supported by an increasing public and political debate, more likely suspected to become an American satellite than to become part of an equal entity. Consequently, those doubts and considerations were expressed in far-ranging notions like *The American challenge* or *The American threat* and led to frame many of the political and public debates of the 1960s and early 1970s. Those reports, pamphlets and books gave voice to the fear and the implicit admiration of US economic and – to a lesser extent – its cultural dominance. However, from the mid-1960s Western Europe, facing an American threat, might have encountered a flashback debate that it had already experienced in the 1920s, this time prominently personalized by France's president Charles de Gaulle and – as a written manifest – expressed in Jean-Jacques Servant-Schreiber's milestone book "Le Défi Américain" (The American Challenge).

Against this background, the following pages will analyse that transition, as well as the European alarming debate.

3.1.2 Economies of scale – key factor of US competitiveness and European weakness

According to the mainstream economic debate, the winning factor of the US industrial sector was its *economies of scale*. US big industrial company structures were the most productive and successful. Both North-American and European stakeholders often repeated the praise of bigger industrial dimensions that incorporated both fear and admiration; scale effects meant that a single company having a capital expenditure of – for instance – 3Mio $ was considered more productive in output compared to two companies having a capital expenditure of 1,5Mio $ each. Prices per unit decreased if production was transformed to the scale of mass production, which was achieved by merging companies, standardising products and/or production sites. Over time a single company able to achieve scale advantages would become more and more competitive, to the point to be the market leader, and eventually reach a natural monopoly. Europe in the 1960s, although having started to aggregate industries, was comparatively lacking of those structures, mainly because of national interests, cultural and linguistic barriers, and geographic constraints. Those elements, too often, were formidable limitations in reaching otherwise necessary and desired economies of scale. So, in the mid-1960s it were only 40 American firms that employed about 3.5 million people in companies like General Motors, General Electric or IBM. Those companies represented the forefront of scale economies that consequently formed a giant pool of 'technostructures' all over the United States. Moreover, the US was considered to have a leadership in almost every

field, not only in production, but additionally ranging from the fields of advanced-technology to academic rates (Servant-Schreiber 1968, 38).

Shocking for change – "Le Défi Américain" (The American Challenge)

In 1967 it was the French journalist Jean-Jacques Servant-Schreiber who most outstandingly highlighted the major European weaknesses and future challenges in his milestone book "Le Défi Américan". Having sold more than 600.000 copies in France alone and being translated into 15 languages, this book finally publicized passionately what many European economists and politicians were already discussing in the course of the 1960s. Labelling the status quo of US industry as the "American Colossus", he convincingly suggested, "it is the giant American firms, not the medium-sized ones, that play the major role in penetrating the European market" (Servant-Schreiber 1968, 18). The European weakness was – beside other noticeable economic, managerial and political deficits – evidently a result of lacking economies of scale that would soon in the near future cause Europe's total dependence on US domination, because "the largest corporations are the ones most likely to undertake the investment and research activities essential to successful competition – particularly in the fields of advanced technology" (Ibid., 40). Given those obvious scale differences between the huge US 'technostructures' and a traditionally small number of medium-sized firms on the European side, Servant-Schreiber emphasized the key role of US scale economies entering the European market. Thanks to their great size they would win the future race in a growth spiral: "1. Great size permits the development of an advanced technology; 2. This scientific potential pushes the firm into new areas and thereby places it in a position of leadership; 3. The firm becomes useful to the government for carrying out various projects, and wins government contracts and tax-supported research grants; this in turn increases its profit potential and its growth – the circle becomes a self-generating spiral" (Ibid., 49). Amplified by Herman Kahn's and Hudson Institute's future study of life in the year 2000 (Kahn and Wiener 1967), Servant-Schreiber consequently draws an alarming picture in which Europe, while having to fear additional threats from upcoming countries like India and China, **"**will belong to a different world, a world somewhere between the advanced societies and the underdeveloped ones" (Servant-Schreiber 1968, 26). Moreover, as an extrapolation of the lasting deficit of European scale economies, he stated a foresight, soon became famous, which must have been the ultimate challenge to European stakeholders in all fields related to industry:

> "*(…) it seems clear that we Europeans cannot hope to participate fully in that world of the future. This does not mean we will be poor; probably we will grow*

> *even richer. But we will be overtaken and dominated, for the time in our history, by a more advanced civilization*" (Ibid., 32).

Naturally, Servant-Schreiber didn't want to create a self-fulfilling prophecy, he didn't aim to discourage the recovering European continent; on the contrary his main ambition was to wake up the Community in order to prevent Europe gradually "sink[ing] into decadence without ever understanding why or how it happened" (Ibid., 21). Although he was sometimes criticized of representing the European economy as too defensive and of not adequately reflecting the economic reality (Stoltenberg 1968, De Cugis 1969), – particularly concerning the booming car industry – "Le Défi Américain" literally described Europe as facing a realistic American shock. While, here and there, his study might have been inflated, alike many other negative future and horror scenarios it made use of a certain didactical dystopian character since "shock is better than surprise because it forces us to pay attention" (Servant-Schreiber 1968, 20).

Indeed, the main reason of his book lay, as he said, in creating a counterattack. Consequently, a list of measures and adaptations was proposed. As, among others, in particular one action was emphasized headmost, that is "focusing on 'major operations' of advanced technology, establishing a minimum of federal power to protect and promote European business, transforming the relationship between business, the university, and the government, intensifying education for young people and liberating the imprisoned energies by a revolution in our methods of organization" (Ibid., 113). Secondly, the "creation of large industrial units capable of competing with the American giants, both by their size and their management" (Ibid.) was a key element to face the American challenge and to regain control over the future of Europe. These measures targeted the creation of a new European 'critical mass'. Building bigger business units and carrying out large-scale projects, or unifying legal and fiscal rules, all those proposals intended an installation of scale economies following the US model. If Europeans were concentrating their efforts, by 1980 they could for instance "make a showing in space without using American satellites, build nuclear power plants that can match the American-made ones in price and compete with the U.S. on the supersonic civilian aeroplane market" (Ibid., 121-122).

But should those ambitious goals be achieved in the current network of sovereign European states? A critical mass of bigger business units, it was evidently expressed, could only be achieved by an un-dogmatic policy on a supranational level: "Elementary logic, freed from any a priori dogma, suggests that Europeans must accept a minimum of federal power if they want their societies to survive" (Ibid., 124). Not national, but notably European policies were demanded to form the framework for the future. The Community itself was considered to be the only suitable level where an effective policy could be established and put into action. In other words, economies of scale demanded for policies of scale as much as for even stronger supranational institutions than the

already existing ones. "*Only at a European, rather than a national, level, could we hope to meet the American challenge on all major fronts. […] Leaving aside questions of ideology, there is no other solution to our industrial problems than forming some kind of organization, one of whose outlines we shall try to draw as precisely as possible so that we can avoid the emotional and polemics that go with abstract ideas*" (Ibid., 82).

Servant-Schreiber urged to uncover Europe's deficits, because he knew about the continent's potentials. Surely he smelt the atmosphere of an increasing mood to emancipate from US dependence while at the same time he was looking forward to seeing the reinforced European economy sustainably growing. Furthermore, he might have been motivated by a realistic fear to lose a historically grown European self-confidence. Economic motivations were evidently aligned with cultural motivations. It is no wonder that a French contribution became a leading force of re-Europeanization, since France's politics seemed at the forefront of the desire to escape from US-American 'control'.

Framing the future discourse I.

Launching environmentalism – Rachel Carson's Silent Spring (1962)

In 1962 the American marine biologist and natural historian Rachel Carson published a milestone book that is claimed to have launched not only the American environmental movement: Her volume is declared to have changed a whole contemporary perspective of rethinking mankind's relationship with nature. By documenting the harmful effects on the environment caused by the contamination of air, earth, waters and particularly by the use of pesticides – or, how Carson stated, "biocides" like DDT in US agriculture – the book prominently and urgently addressed the need to consider environmental issues in order to avoid an assumed chain of evil. The uncontrolled and unexamined use of pesticides was stated providing an environmental shock scenario very soon: a spring season without singing birds, literally a silent spring. But beyond that, the rebound effects caused by the technologically engineered control of nature and a heedless pace of man that would have offset the pace of nature were assumed to kill not only birds and animals, but also humans. Concentrating exemplarily on the implications of pesticides, the book outlines the irrecoverable interventions of poisoning food chains causing cancer and genetic damage or contaminating the world food supply by the continuing toxication of birds and other animals. Mankind would have acquired significant power to change the nature of the world by science and technology and would represent an arrogance of supposing that nature exists only for the convenience of the human race. Accordingly, mankind would not live in coexistence with nature but would wage war against nature, notably with chemicals, pollution, radiation or – aforesaid – with insecticides and pesticides.

This book provided basis for a new kind of foresight strategy, which emphasised environmental threats. By depicting a nameless American town where all life from fish to birds had been "silenced" by the effects of using DDT, Carson created a new public awareness that nature was vulnerable to human intervention. Technological progress would strictly need regulation or would even need to be curtailed. In times of prominent political and public beliefs in the potentials and promises of technological development not many seemed to worry about the disappearance of wilderness, but the extreme threats narratives Carson had outlined could for the first time not be ignored. In response to the book, President Kennedy's Science Advisory Committee in 1963 was ordered to examine the issues the book raised. As a result, the study thoroughly justified Carson's findings and beyond that defended the heavy head winds by a revolting chemical and agricultural industry. In the following time, DDT came under much closer government supervision and was eventually banned in 1972. Inspired by Carson's subversive, provocative and courageously approach, readers were motivated to shift their view of our relationship with nature, encouraging readers to participate in the newly awakened discipline of ecology and stimulating scientists to further elaborate the complexities of nature. In short, in a broader perspective, Carlson's book had been declared as the start of environmentalism (Stoll 2012). *Being translated in many languages, it quickly prepared the way for the rise of green movements and political engagements worldwide, particularly in Sweden, France and, of course, the US itself. Although the vast agricultural use of chemicals was considered less a European problem but mainly an American problem, Silent Spring entered the public debate through newspapers and even cartoons* (Ibid.). *Carson became a cultural icon and provided the proper mixture of a good writing, a wide pre-popularity and the contemporary American atmosphere that was already feared by health scares through contaminated food and radioactive fallouts. This powerful book had the legacy to highlight the ecological interconnections between nature and human society and continues to haunt the contemporary world as chemicals in agriculture continue to play a major role and global food scandals are filling the headlines rather often. With entering the political and economic agendas (in Germany or the UK later than elsewhere in Europe), this book can be assumed to have influenced the transport industry too as the principles of pollution and environmental are inherent to the sector. Despite Europe's calmer responses in the beginning, the green movements became even stronger during the 1980s and have repeatedly quoted "Silent Spring" as an inspiring source. Today in many European countries environmental issues have already entered prominently the mainstream for transport policies (see e.g. the evolution of European White Papers), thus, in the long-run Europe might have internalized Carson's famous statement more intensely than others to eventually creating a European tradition of environmental concern:*

"No witchcraft, no enemy action" would have silenced our "stricken world. The people had done it themselves" (Carson 2002, 3).

Framing the future discourse II.

Club of Rome's "Limits to Growth"

Going beyond the subject of growing environmental pressures, Limits to Growth, issued in 1972 by the Club of Rome, can be considered the world's most famous foresight study. Having investigated five major trends of global concern – an accelerating industrialization, rapid population growth, widespread malnutrition, depletion of non-renewable resources and a deteriorating environment – the established models by the Limits to Growth became the most challenging and probably the most popular object of current future discourses. Having distributed more than 12 million copies in 37 languages, the author's set up a computerized world model that aimed to holistically extrapolate present trends in consideration of the complex interplay of the five major trend factors. The outputs were three scenarios, two of them saw a collapse of the global system in the mid-way or late 21st century, and only one of them saw a "stabilized world" in which technology and social policies would have reached a global equilibrium by perfect birth control, less material consumption, full pollution control etc. The collapsing scenarios predicted a rising environmental pressure against only a slow growth in food supply and diminishing resources. Technology, in this respect, was considered to mitigate and prolong the collapse, but was considered not to "prevent the ultimate decline of population and industry, and in fact did not in any case postpone the collapse beyond the year 2100" (Meadows 1972, 4). *Against the background of an on-going exponential growth in production, population and resource consumption the authors eventually alarmed: "The limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity"* (Ibid., 1). *With this foresight study the authors could provide only very limited predictions as the input factors are highly dynamic and projections would only be correct if they would be following the same patterns they have followed throughout the world history. But, however, beyond 'telling the truth' they rather aimed to indicate the system's behavioural tendencies and aimed to shake up decision-making processes. Instead of illustrating how exactly the future will look like, the Limits to Growth – often misunderstood and discredited as a doomsday prognosis for the mankind* (Nørgård, Peet and Ragnarsdóttir 2010) – *offered models simulating the consequences of interactions between the Earth and human systems. Thus, the collapsing world scenarios had the purpose to motivate political changes as only drastic measures for environmental protection proved to be suitable to change the system's behaviour, and only under these circumstances, scenarios could be calculated in which both world population and wealth could remain at a constant level. So far, it was assumed, the necessary political measures were not taken.*

Today, the forecasts seem to have proven more realistic than many might have expected in the early 1970s. As examined in 2008, the "observed historical data for 1970–

2000 most closely matches the simulated results of the LtG [Limits to Growth] ´standard run´ scenario for almost all the outputs reported" (Turner 2008, 37). *In other words, although the Club of Rome provided the business-as-usual model as the most alarming foresight, the world has predominantly developed in that respective direction. Furthermore, technology hasn't saved us and was held "overly optimistic in growth rates"* (Ibid.). *So, although having reached a tremendous global audience the Club of Rome's warning outcomes did not directly change the global situation towards an aspired situation of global equilibrium. Although the detailed impacts of this milestone publication to behaviours and political cultures are hardly measurable, alike Carson's environmental publication, the discussion about the world's destiny could not any longer put aside and continuously entered the political agendas. This study most prominently and profoundly tried to raise a political debate that has a legacy up to this day. Indeed, the Club of Rome publication provided a baseline scenario, and its 1972 alarming character remains urgent like 40 years ago: "That the global system is on an unsustainable trajectory unless there is substantial and rapid reduction in consumptive behaviour, in combination with technological progress" (Ibid., 38). Following this approach the European transportation landscape should make a difference and has to take up the challenge to even more remind ourselves that it is time to move in the direction of what the Club of Rome considered to be the major ingredients to achieve a global equilibrium: "a realistic, long-term goal that can guide mankind to the equilibrium society and the human will to achieve that goal"* (Meadows 1972, 9).

3.1.3 Plowden Report (1965)

„For the present we consider that Britain should give a clear priority to Europe in the direction of her future policy of collaboration"
(Plowden 1965, 48).

In December 1964, the British Minster of Aviation appointed a detailed study on the future of British aircraft industry. It was a time when the industry suffered from a deep crisis. Although technically relevant, the massively subsidized British military and civil aircraft industry failed to sell its products and consequently was facing a loss of legitimacy. Having absorbed huge resources of public and private capital, the Plowden Report study was conceived as a road map to formulate "what should be the future place and organisation of the aircraft industry in relation to the general economy of the country, taking into account the demands of national defence, export prospects, the comparable industries of other countries and the relationship of the industry with Government activities in the aviation field; and to make recommendations on any steps and measures necessary" (Ibid., 1). The result of this inquire clearly suggested the need of European (instead of American) partnership and collaboration and pushed the UK

government to refresh and adjust its policies towards Continental Europe. Paying tribute to changing production and technology conditions, the high-rising time and budget expenditures for aircraft development and an overwhelmingly US advantage due to its huge domestic market and national defence demand for military aircraft, the report proposed to reduce the subsidies for British aircraft industry and to let it expose to less protection and governmental security. Once more it was especially the American scale effect benefits that clarified the inherent disadvantages of the British industry. Actually, the report claimed how the above framework condition could be applied to all European branches, considering that "unit costs are crucially dependent on the size of the market. The relatively large American domestic markets, both military and civil, put Britain at a serious disadvantage in relation to the United States" (Ibid., 38).

Keeping in mind the overarching economic obsession of scale economies and scale markets, the Plowden Report logically surveyed what only few years later Jean-Jacques Servant-Schreiber put on the agenda for the whole industrial sector: "*The national aircraft industries in Europe all suffer from the same basic problem that their home markets are too small. They are not strong enough singly to secure a reasonable share of world markets in the face of United States competition. None of them is likely to survive alone for many years as a significant force in world aviation*" (Ibid., 46). In other words, Americans devices were cheaper, faster in delivery and more flexible adopting and creating innovation; moreover, they were becoming the major producer and customer, leaving the British aviation industry behind, with a market share of a merely 8% in the mid-1960s. Because of those scale disadvantages, the report emphasized that the "basic problem is to improve the relationship between sales of the industry's products and their development and initial production costs" (Ibid., 38). Consequently this was only thought achievable by breaking open the industry's national orientation and dependence towards international cooperation and collaboration: "The fundamental need was to increase efficiency, to achieve competitive scale economies, and to reduce development cost" (Tyson and Chin 1992, 34). Although the Americans were traditionally the favoured cooperation partners, at this time they were considered to reject such offers, because "the United States, unlike Britain, has no over-riding need for a partnership in aircraft development and production" (Plowden 1965, 44). Such a situation was not believed to be a short-term condition, but to continue for many years. Americans were neither believed to step into transatlantic joint research programmes, nor to sell any type of military or civil aircraft, even if it was the adaptation of an American type. Those considerations led to the serious consequence of "ruling out the United States as a possible partner for Britain's main future efforts in collaboration" (Ibid., 44), which evidently marked a caesura in the economic transatlantic relationship.

Considering the above, the British aviation industry of the mid-1960s was forced to further collaborate. The report's future warning of facing a lack of North-Atlantic partners pushed to upgrade the earlier Concorde plans with France that started in 1962 and

pushed to further exploit an already established cooperation 'over the Channel'. Consequently, alike a confession, the pathbreaking report proposed a new impulse for Anglo-French partnership: "*The combined resources of the English and French industries marshalled in good time towards common objectives [and] offer a basis, probably the only basis, for maintaining a major aircraft industry in Europe through the 1970s*" (Ibid., 46). So, this report acted as a decisive refreshment of existing policies and plans, aiming for a more efficient distribution of work within a common project, a clearer sense of direction and not at least a greater willingness to cooperate. The existing cooperation policies centring on the Concorde still were rather weak, thus, "a new attitude of mind" was required, reflecting "a far more powerful momentum to achieve extended collaboration with Europe in the next five to ten years" (Ibid., 48).

Due to the fact that all other European aviation industries suffered from the same framework conditions, collaboration was – optimistically – a chance to cope and to compete with American supremacy and – considered pessimistically – was the only realistic way to not being thrown out of the race. Economic motives of achieving scale economies and a bigger market pushed for European integration in the aviation sector, but, at the same time, increased the need for an even bigger market beyond the British and the French ones. Considering the enormous development and production costs for building new aircrafts, it was necessary to assure a 'critical mass' not only in the field of joint research, but also in the field of possible customers. Thus, as a precondition to let future cooperation become commercially successful, "a wider market is not likely to be assured unless other European countries take part in the project" (Ibid., 46). The direction of future collaboration proposed by the Committee clearly embarked on a strategy to include further European countries "to promote a European aircraft industry consisting of the British, French, German, Dutch and Italian industries, together with any other European countries who wish and are able to take part" (Ibid., 48). Basing on those framework conditions, the Committee urged for quick measures, requesting a conference of European Aviation ministers, long-term policies and the installation of administrative machinery for securing joint programmes and harmonization of technical requirements.

As a result, in 1965 the Plowden Report was approved and short time later the British Prime Minister Harold Wilson was eventually found on the first page of "The Times" with his emphasis "to create a new technological community, to pool with Europe the enormous technological inventiveness of Britain and other European countries, to enable Europe on a competitive basis to become more self-reliant and neither dependent on imports nor dominated from outside, but basing itself on the creation of competitive indigenous European industries" (THE TIMES 1966, 1). Consequently, the British government and aviation industry seemed to have abandoned a strategy of national independence and autarchy; moreover, they were aiming to refresh already existing projects in order to give them new impetus. Since the few project collaborations with other European countries, "such as the construction of the supersonic aircraft 'Concorde'

and the fighter 'Jaguar' with France, had been rather frustrating experiences“ (Zimmermann 2000, 106), Britain’s newly forced Euro-approach must have been of crucial symbolic value for the European transport industry.

3.1.4 Conclusion: Envisioning a European ‘critical mass’

The above analysed European status reports that can also be considered warning foresight studies, exemplarily representing a key political and public debate within the European 1960s future discourse that centred on lacking scale economies. By that time it became widely comprehended, that “single European states had no chance to compete successfully with America” (Ibid., 105). Thus, both the selected studies proposed measures towards a new and notably *European* ‘critical mass’. First, against the background of expensive technological development costs that afforded a wider level of efficient collaboration, and second, on the level of widening the market in order to secure that those new products will be bought by a ‘critical mass’ of national and private customers. The Plowden Report in this respect was a kind of warning foresight that emphasized policy reforms in order to pursue a *European* strategy instead of an exclusively national one. Since it was not too optimistic, it has seen critics not least in British parliamentarians who complained about lacking positive long-term objectives, but exactly its warning character of suspecting to lose the whole industry could have caused a strong attention and impact. While the Plowden Report was a sectoral analysis, “Le Défi Américain” has achieved to bring the issue of lacking scale economies and comparable markets to a broader public and political sphere; moreover, to the agenda of Europe’s economic future. To regain control over the future of Europe he proposed a set of measures that all aimed to promote trans-European business activities in an environment of benefiting scale effects. Due to his convincing narrative he could have successfully pressured politicians and stakeholders to prevent the warning prophecies of a declining Europe from fulfilling.

Throughout the 1960s, economic motivations were not least lined with cultural aspects, nevertheless they accounted for an important foundation of changed national perspectives and policies. Although Europe in the following 1970s saw many setbacks and difficulties, in the long run the concept of economic self-organisation was becoming one of the political backbones of European integration. In short, the American challenge marked a decisive period for European collaboration, or in the words of Jean-Jacques Servant-Schreiber, “*The American challenge really only adds an external pressure to what is an internal necessity*” (Servant-Schreiber 1968, 200).

3.2 Resulting policy outcomes for a re-emerging European competitiveness

After having examined the scale problem in the foresight sphere, we now want to analyse mid-term impacts to political and industrial decisions in Europe that were likely to be induced by foresights such as the ones discussed. The first EEC Summit in The Hague 1969, the 1971 Davos European Management Forum and the 1972 Werner Plan can be contextualized as outcomes in the realm of policy and decision-making. The Concorde project as well as the Airbus project can be considered as materialized industrial outcomes and reactions to the American challenge, furthermore marking distinguished approaches that very much differed in success. Extending the Plowden Report's focus on the aviation industry we will finally concentrate on the industrial impacts of that certain sector due to its special vulnerability to lacking scale economies.

3.2.1 EEC Summit The Hague 1969

In December 1969 the heads of government from all Member States of the European Community met in the Dutch city The Hague for a breakthrough in European cooperation. The summit commonly is underestimated in European integration history and too often falls behind the great milestones like the Treaty of Rome 1957 or the Maastricht treaty 1992 (Geary 2012). But as a seminal announcement for an intention to create a common European currency, it has to be considered an institutionalized reply to the American challenge; moreover, a political turning point in European debate. The summit released Europe from a decade of integration stagnation and started a wave of policies (which lasted until the mid-1970s) that are all linked to improve European competitiveness. In 1969 industrial weaknesses were already defined, and a growing public interest was concerning a new (more integrated) European political and economic 'critical mass'. With an appropriate timing, and against the background of inner-European controversies and blockades throughout the 1960s, the 1969 summit set the scene for new European policies; this through i) *completing* existing policies (particularly for the agrarian sector), ii) *deepening* the construction of European Community, and iii) *extending* the Community with new members. In the aftermath of Servant-Schreiber's enormously successful alarming foresight and against the background of the Treaty of Rome's pending refreshment, the Member States finally nailed down their denomination for a stronger European political and economic community. Benefiting from changes of government in France (Georges Pompidou) and Germany (Willy Brandt), and probably knowledgeable of "Le Défi Américain", this was an anticipated step forward, because "it has to be recalled that in 1967/68 the UK still stuck to the world role of sterling, France showed no signs of abandoning its policy of monetary autonomy, and Germany was torn between the continued defence of the dollar-gold-system and a more nationalist monetary policy"

(Zimmermann 2000, 102). In short, the continuing discussions throughout the 1960s about the American challenge for Europe's economic and monetary future, culminated – similarly to earlier commitments in the aviation sector – in a plan to create the European 'critical mass' able to cope with Americas economic dominance and to fulfil the aim to become a strong third power between the USA and the Soviet Union. It is not possible to differentiate economic from cultural and political motivations that fed this further step of the European integration; however, the outcome of this summit was to establish scale advantages in a wide range of fields:

a) *Markets of scale*: Widening the market, enlarging the Community by paving the way for Great Britain's, Ireland's and Denmark's memberships (fulfilled 1973).
b) *Institutions of scale*: Supplying the European Commission with more financial resources and powers of decision.
c) *Finances of scale*: Declaring the target to create a common European currency.
d) *Politics of scale*: Agreeing on common agricultural policy and declaring the intention to harmonize European foreign policy.

Although the European Community was struggling in the following decades to achieve those targets, and it experienced hard time before seeing (some of) those ambitious goals fulfilled, "what followed from The Hague meeting was an attempt to guarantee the forward motion of the integration process. Irreversibility, which had been a constant feature of the Community since 1958, was a guiding concept in the period between The Hague summit and the signing of the Maastricht Treaty" (Geary 2012, 10). Reorientation on common goals and financial capacity building in the monetary area were fed by fearing the eroding Bretton Woods system; reorientation on common political decisions were fed by Brandt's new "Ostpolitik", showing the willingness to create political "scales" in between the super powers.

3.2.2 Davos European Management Forum (1971)

The aftermath of The Hague summit saw new initiatives in several fields. Before highlighting some industrial reaffirmations and new outcomes in the transport field, we briefly want to examine the scale building efforts expressed through another important platform, which was established in that period and lasts until today – the *European Management Forum* in Davos, renamed later in *World Economic Forum*. Founded in 1971, this meeting of – particularly European – top CEO's emphasized a second and more complex aspect of the American threat. It was not only economies of scale in which the Americans functioned as unchallenged benchmark, but it was furthermore their management strategies leading to major advantageous benefits in methods and production. A few years before the first meeting in Davos Servant-Schreiber subtly nuanced, "it is American-style management that is, in its own special way, unifying

Europe" (Servant-Schreiber 1968, 7). Consequently, the European Management Forum aimed to set the scene to work on the organizational and managerial aspects of the transatlantic imbalances. Admired as science and as art, American management strategies caused a "managerial gap" (Ibid., 57-61), leaving Europe behind due to less rational and efficient decision-making processes. So, even if Europe would achieve economies of scale that have the same size as the Americans, they would still lack the art and knowledge of leading such an organization appropriately. To fill that gap some 500 high-level Europeans from 1971 on were invited to learn American management strategies at the annual European Management Forum, strongly supported by the patronage of the European Commission. With famous speakers like John Kenneth Galbraith, one of the leading economists of his days, the physicist and futurologist Herman Kahn and the President of IBM, Jacques Gaston Maisonrouge, the 1971 Forum can be claimed as an evident institutionalized outcome of the warning foresights that had requested adaptions and learning processes. Beyond the learning aspect, the 1971 Forum expressed a symbolic value too. Some of the most important Western European stakeholders found themselves in a new constructed conference centre, surrounded by state-of-the-art technology, which not only was a useful tool, but surely served in the role of closing – or rather provokingly highlighting – the often debated technology gap between the USA and Europe. The review of the year 1971, thus, astonishingly remembered how "the first Davos meeting set a precedent that the Forum has maintained ever since: the use of the latest information and communications technology. Borrowing from the US space agency's mission-control operations, Klaus Schwab, founder and executive chairman, had a closed-circuit television system set up to cover sessions and facilitate interaction among participants. The Forum also created a database of information on the programme and on participants to organize working groups and panels. Computer generated models were employed to analyse the implications of strategies under consideration and predict the impact that any specific allocation of resources would have on their businesses and the environment. Monitors displayed the managers' 'decisions', while colour slides illustrating the consequences of these choices were projected on large screens" (Schwab 2009, 9).

3.2.3 Werner Plan (1970)

Rounding up the policy and management outcomes that correlate with warning future foresights of the 1960s, we exemplarily want to briefly examine the Werner Plan as a measure to achieve scale advantages on the monetary level. As a pioneering outcome of The Hague meeting, this commission of experts around the Prime Minister of Luxemburg, Pierre Werner, presented a blueprint and road-map for achieving a European Monetary Union (EMU) within ten years. The expert group openly promoted the completion of the

initial European 1957 agreements that so far were criticized to "*have not in fact led to the coordination or effective harmonization of economic policies in the Community, which would, however, have accorded with the spirit of the Treaty of Rome and which could have been realized to a large extent by the application of the fundamental provisions of the Treaty and in particular of the articles relating to economic and monetary policy*" (European Commission 1970, 8). The Werner Plan proposed how to coordinate economic policies between Member States, how to harmonize budget policies and how to reduce margins of fluctuation between currencies. The envisioned completion of the monetary union was considered to have the effect of "a lasting improvement in welfare in the Community and will reinforce the contribution of the Community to economic and monetary equilibrium in the world" (Ibid., 9) and by that reflected much of the period's 'Euro-optimism'. For achieving this goal, the transfer of responsibilities from the national level to the Community was considered as much essential as the harmonization of instruments of economic policy. The 1970 Plan therefore claimed institutional reforms and the centralisation of decisions for economic policy. As a refreshing impulse for the unsatisfying progress in the European integration process, the Werner Plan's objective was considered "realizable in the course of the present decade, provided the political will of the Member States to realize this objective, solemnly declared at the Conference at The Hague, is present" (Ibid., 14).

However, it was too early to fulfil the entire plans, mainly due to the end of the Bretton Woods system and the oil price shock of 1973 that "placed significant monetary pressure on the member states struggling to maintain their currencies within the agreed arrangements" (Geary 2012, 12). The Plan was ahead of its time and was hardly realized, but despite its lack of implementation it "was a defining document and set the intellectual discourse on the relationship between economic and monetary integration in the decades after it was produced**"** (Ibid.). Despite of the Plan's subsequent disillusion in the crisis-shaken 1970s, the Werner Plan nevertheless accounted for another important policy outcome from the 1960s economic future warnings. Although the drastic objectives were not accomplished in the proposed time frame, within the following years it was most notably the European Exchange Rate of 1972 that obviously based on proposals of the Werner Plan and for the first time reduced the currency fluctuations between nine Member States. As a bilateral intervention system against the US Dollar it fuelled to collaborate stronger on the monetary level and successively led to the even stronger European Currency Unit (ECU) in 1979. In that respect, the ECU, in a long-term perspective, can be considered strongly related to the 1960s approach of achieving a European 'critical mass' and as a direct outcome of the American threat period.

3.3 Resulting industrial outcomes for a re-emerging European competitiveness

The 1960s witnessed several European partnership programs in aviation and airspace that were launched more or less simultaneously, although they differed in their success. Most famous were the Concorde and Airbus programs in civil aviation, the ELDO (*European Launcher Development Organization)* program in space aviation or the MRCA *(Multiple Role Combat Aircraft)* in the military field. As seen above, those cross-border collaborations aimed to reduce the costs in a rationalized European production network and aimed to set up more economical sustainable structures. Following our perspective, they were also necessary reactions to the American threat, as they created scale economies parallel to political ambitions to generate a European market of benefiting size. However, they can provide valuable hints and lessons for the present engagement with the future.

3.3.1 Concorde – a flying icon of political dreams

Within a variety of fields the Europeans feared to lose the future race against the Americans, the civil aviation sector in the 1960s was one of the most challenging. Demanding high technology, most rational and efficient collaboration and a huge domestic market, this field particularly mirrored European deficits and the lacking competitiveness as shown above. Yet, in terms of civil supersonic aviation, the Europeans seemed to have an advantage due to hesitant American developments (Servant-Schreiber 1968, 84). Basing on older British plans of the 1950s to develop a supersonic airliner and against the background of the failed Comet aviation project, the British at the beginning of the 1960s were in a quick need to establish a new project of high technological and prestigious value (DER SPIEGEL 1963). To win the supersonic race, in 1962 a collaboration with the French partners Sud Aviation and SNECMA was signed with BAC (British Aircraft Corporation) and Bristol Siddeley, altogether presenting a first Concorde prototype in 1967. The Concorde based on a high-tech and speed oriented approach, requiring tremendous amounts of resources from the participating governments. Charles de Gaulle personally aimed to develop an aircraft with a preference on speed over passenger capacity, which was achieved for a giant price. Focusing on a high-income jet set society, this aircraft, in service from 1976 to 2003, despite its unbelievable speed level had massive costs of

Figure 1 - Concorde aircraft at the start

operation, extreme noise levels and operated only for a maximum of about 6.000 km. In short, this aircraft did never orientate on market needs, but on "maintaining technological expertise, providing employment [and] securing Britain's entry into the European Common Market" (Saxton 2010). Remarkable technological innovation and the supremacy in civil supersonic aviation, which now was located in Europe, were achieved at the price of marketable implementation. With only 20 airplanes built, it never became economic, but highly iconic. Although the Concorde project was a clear reaction to the American threat and although collaborating successfully on a European level, the project reflected the overconfident hope to cope with scale deficits by creating an overarching technology. It appeared as if speed and technology "somehow" would resolve the lack of economic efficiency. However, the calculation did not work out and despite its technological breakthrough, it became one of the most expensive and inefficient reactions to the American threat; moreover, a lasting lesson for the European transport industry to never equate technological capacity building with economic capacity building. As a flying icon this airplane might like no other means of transport stand for the awareness that technology matters, but only if embedded in rational economic structures. A hazardous 'reach for the stars' might never be an end in itself.

3.3.2 Airbus Industrie – betting on growth in the aviation sector

The counterpart of the Concorde project was *Airbus Industrie*. Established on a 1967 agreement between France, the UK (stepping out in 1969) and West Germany, and formally set up as an even wider consortium of European aerospace manufacturers in 1969, Airbus followed the opposite approach to Concorde. In contrast to the high-flying prestigious goals of the Concorde, the Airbus followed a target-oriented approach, focused on market needs, capacities, usage of existing engine technologies and particularly oriented on future demands. Airbus speculated on a fast growing demand of people who want to fly more and cheaper in the future. An expected low-cost mass aviation consequently demanded for more rational than prestigious aircraft, which itself turned out to be an icon in the long run. Efficiency and broad customer access were to outweigh speed and luxury: "At a time when other manufacturers were concentrating on three- or four-engine aircraft, Airbus entered the civil aviation scene in the 1970s by developing the first-ever widebody twin-engine – the A300. This aircraft featured low fuel consumption,

Figure 2 - Airbus' pioneer aircraft, the A300

highly efficient operating costs and reduced external noise levels, and incorporated Category 3 landing technology along with enhanced passenger comfort in the cabin and containerised cargo handling" (Airbus Company). Orienting on American firms like Boeing or McDonnell Douglas, Airbus created a competitive and rational medium-range distance aircraft (A300) in order to seize "the last chance of European independence in the aviation sector" (Strauss 1972). The organization seemed to be in agreement with American manufacturers in the point that "American plane-makers and financiers backed the less prestigious view that economy of scale would drive airliner design for the foreseeable future – not speed" (Saxton 2010). The less-is-more approach of the A300 (which used already existing developments in engines to save costs dramatically) should seduce American and Asian airliners by a price advantage; moreover, by convincing with increased efficiency (Newhouse 2007). The technological low profile was associated to niche markets orientation in order to gain a conspicuous number of orders, with the ambition to avoid as much as possible any direct struggle with the American counterparts. The Asian airlines were therefore a natural target, although in a broader view they were considered to be already in the 1970s the market of the future. Airbus in the long run, after having a troubled beginning like e.g. currency disadvantages against the Dollar or scepticism among the participating governments, became a huge success, nowadays selling more aircrafts than the American competitor.

It seems to us that Airbus was so successful because its economic and intellectual scale advantages were consequently achieved by a truly European collaboration. But compared to the Concorde, which followed a similar strategy, it became profitable in the long run, because the future foresights of major European and Asian airlines (e.g. Korean Airlines) were taken into account and were adjusted very carefully throughout the whole process. Airbus therefore literally established a 'flying bus', a quick, cost-saving, accessible and reliable A to B solution for longer distances. Qualitative mass production outweighed over-specialization; (re)combination of existing tools and target-oriented reduction outweighed stand-alone technologies that lack of market analysis. If the Concorde was a technological and iconic *crowbar*, the Airbus appeared as a chilly technocratic machine, that basing on its efficiency advantage – particularly after the 1973 oil crisis – was even more demanded and steadily was able to develop its capacities to now offering the A380, the biggest civil airplane in the world.

3.4 Conclusion: Lessons from the American threat

What we can learn from a period when Europe felt immensely pressured by American dominance in economic and technological fields? Europe seemed able to cope with dark future foresights by reorganizing itself through strong political will, reflective analysis and future demand-driven concepts. The European 1960s and 1970s evolved visible and far-

reaching reactions to the American threat by trying to adopt the critical factors of American success, foremost the concepts of economies of scale and managerial competencies. To put it simple, “the fundamental need was to increase efficiency, to achieve competitive scale economies, and to reduce development cost“ (Tyson and Chin 1992, 34). Transnational collaboration, common policies and a wider market were top-down measures to achieve basic framework conditions for a comparable competitiveness with the US. These developments, by no means, were linear. Many were accompanied with setbacks and regression, disappointments and refreshments; however, many of them were successful measures since they were the only way out to retain a powerful global position. Notably the year 1969 marked an important turning point for the overarching goal of adjusting competitive framework conditions, not least for the transport industry. That year exposed a rapid reorientation for common European goals, although little time before the already started projects experienced several difficulties, weaknesses and ambiguities: ”In 1968 and early 1969, the MRCA [multi-role combat aircraft], Airbus and ELDO were all in deep crisis, and it is only due to the reaffirmation of European cooperation in 1969/1970 that they survived despite those great difficulties“ (Zimmermann 2000, 108). Stringent political will and excessive political power, notably in the strong need to comply with economic requirements, became a driving force to reorganize Europe. Economic motives of achieving scale economies and a bigger market were also factors pushing for a more viable European integration. Many of the industrial outcomes in the transport sector like Concorde, Airbus or ELDO were set up, controlled and financed with public resources; national governments had the role to provide the activation energy. Thus, particularly the aerospace industry was therefore highly politicized and not least exploited as units of European self-preservation and visible counterattacks to cope with the American challenge. As shown above, the achieved Concorde airplane was perceived as a little victory over American technological predominance and, for the British case, was considered a compensation for previous failures.

What for the transport industry remains a lesson to be learned is that a weak and desperate sector, like the aviation industry in the 1960s, can in the long run become a strong and highly competitive sector. Since the car and rail industry were much less affected by the American threat, or were considered to have a stabile future, policy makers were able to concentrate their capacities on the weakest field, the aviation and aerospace sector. Consequently, an announced disaster became a winning sector. Hence, in the long run, the American threat paradoxically appears to be the luckiest chance for the European aviation sector.

We can additionally learn that analysing current market demands and carefully anticipating future demands is the necessary basis for making a formerly weak industry strong. It was especially the focus on the Asian markets – due to lower competition with the hegemonic American firms – that in the long run provided Airbus the first orders.

Airbus was also lucky in its timing, considering how the 1973 oil crisis made these products suddenly appealing, due to its lower operational costs, against the technological (American) mainstream, which was boosting its performances. The two examples of Airbus and Concorde lead us to state that a comprehensible approach of rationality and efficiency can be more successful than prestigious political self-representation in disguise of high technology.

Beyond that, we can learn that if Europe is facing existentialistic dangers, which threat its self-conception of a powerful global force, the nation states can much quicker overcome exclusive national perspectives. Extrinsic motivations might have fuelled common decisions much stronger than intrinsic persuasions about a common Europe. Following that, as a last point we can learn that a warning "horror" scenario like "Le Défi Américain" for the 1960s might have been a more fruitful circumstance than political "Durchhalteparolen" (mere motivation slogans). In this respect, Servant-Schreiber's contribution to an already existing discourse might have only been the final symbolic but decisive impulse to strengthen the political will towards an already started European unification process and towards competitive projects in technology, transport and infrastructure.

4. Catalysing global integration – The Japanese threat of the 1980s and 1990s

4.1 Readdressing the challenge

In the post-war economic world order the Americans stood, uncontested, at the forefront of global competitiveness as the key players of scale economies. Using latest technological and management methods allowed them to climb the ever heights of Fordist production patterns. But it was the early 1970s when the Western World had openly to designate an emerging player in the Far East, catching up in almost all relevant terms of industrial production. Japan, in the 1960s, had experienced growth rates of up to 14% through strict governmental planning in key and future industries and a high efficient production. The Asian country was undergoing a tremendous economic rise, which eventually challenged the US, and Europe much faster than most experts would have expected. Japanese impressive export rates threatened foreign markets and their balances of trade, offering high quality, reliable capital-intensive and continuously improved products accompanied with astonishingly low cost. The Europeans spent the 1960s and 1970s mainly concentrating on successfully catching up with American productivity and to cope with the threat characteristic of more advanced scale economies and management methods. But 'suddenly' they had to cope with an upcoming Japanese threat that centred on sectors like electronics, machine tools, shipbuilding, and – particularly challenging for Europe – on automotive manufacturing.

In contrast to the American threat, the 'weak signals' of an upcoming Japanese threat seemed to have remained underestimated in Western Europe's perception during the 1960s. Only when Japan in 1968/69 was overtaking Germany's economic performance and became the new number three in the world, the warning signs of the early 1960s, against this symbolic background, were ultimately understood. Consequently, the basic atmosphere of having been surprised followed a sometimes-shocking obstinacy and can be emphasised as a key condition for Europe's most challenging and somewhat disillusioned 1980s. As shown above, in 1968, Servant-Schreiber, successfully addressing the American challenge to Europe, raised the dictum that shock would be better than surprise (Servant-Schreiber 1968, 20), but in terms of the Japanese threat that followed up or even overlapped the American threat, it was definitely the other way around: surprise was causing a shock.

Cassandra cries and rude awakening

Even if Japan's rise was quicker than that of any other nation before, its success was neither falling from the sky, nor was it unpredictable. There have been early warnings on both side of the Atlantic, above all Norman Macrae's "Consider Japan" in 1962, but they

were underrated or not believed due to the little role Japan initially played in European trade volumes. Throughout the 1960s Japan's trade volume with the European Community was not considerable and all together it had a little impact, so there was little fear or even scepticism. But from the late 1960s the situation changed completely: "between 1969 and 1977 Japanese exports to Europe increased by 620%, from $1.4 to $8.7 billion" (Lehmann 1982, 41). Awakened by those circumstances, Europe was forced to deal with an upcoming economic power and its challenging impacts on European industry; moreover, with a Japanese 'assault' on what were considered 'sensitive sectors', those assumed most vulnerable to growing imports. Shifting from textiles and bulk steel to small consumer electronics, in the late 1970s particularly passenger motorcars and machine tools were considered such sensitive industries. Since three quarters of the EC's 1970s imports were transport equipment and machineries (Shepherd 1981), this heavy concentration thus let the Japanese threat gradually be most well-known among Europe's carmakers.

In short, the late 1970s saw an overwhelmingly quantitative presence of Japanese exports and economic performance (fuelled by the two oil crises) and abruptly enforced the need to position Japan on Europe's political and economic agenda. Especially the years 1968 and 1969 were a crucial milestone of readdressing and widening the formerly exclusive transatlantic role-model perspective to henceforth introducing Japan as both a growing challenge and opportunity to increasingly learn from. Not least it was the 1970 World Exhibition in Osaka that symbolically set the scene for a new attention to the Asian state, which had reached the global spotlight for having achieved to catch up to the club of traditional industrial states.

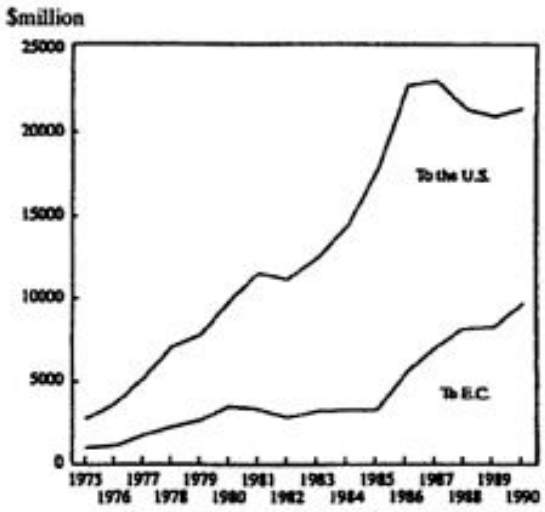


Figure 3 - Japanese exports of cars to Europe and the US - (Sachwald 1995, 176)

Consequently, a diffuse and yet dense wave of foresight publications urged to convince stakeholders and public to include Japan as a key global player of the future, furthermore at once materializing the Western World's surprised character in the light of

Tokyo's stunning economic speed. Among the many foresights, like Hedberg's "The Japanese Challenge" (Hedberg 1969) or Kahn's "The Emerging Japanese Superstate" (Kahn 1970), the future for Europe was drawn in uncertainty and slightly pessimistic tones due to persistently anticipated growth rates up to the 1980s and due to Kahn's prediction of a world leading Japan in the year 2000. At the beginning, the European discourse concerning the Japanese threat was predominated by a tendency of cultural scepticism and underestimation towards Tokyo, accompanied with an (partly mysterious) admiration for the raising competitor. Additionally, some authors tended to include in their warnings a depiction of Japan's character as an aggressive and conquering one (Scharnagl 1969). However, and despite this first period of quick and blurry assessments, "West Europeans, unlike the Americans, have paid little attention until recently to the Japanese economic phenomenon and have done little to prepare for it" (Hanabusa 1979, viii). More drastically, European considerations degraded Japan "as a merely developing country which through copying had managed to produce some cheap products of acceptable quality in a few specific fields" (von Brockdorff 1992, 10). This was an assumption that would radically avenge. At a latest in the early 1990s, Japan – due to continuous success in particularly the fields of automobile and micro-electronic industries – were considered the European Community's "chief competitive adversary"; It was considered "not a political choice with deeper and perhaps sinister significance, but results from the perceived weakness of the two other candidates for competitive rivalry – the United States and the NIEs [Newly Industrializing Economies] – leaving Japan 'as the one to beat' by default" (Hager 1992, 22).

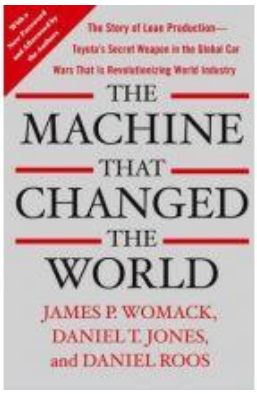
4.1.1 Factors of Japanese competitiveness

Since the very beginning, the examination of the Japanese post-war advancements and its descriptions about its economic success were most often accompanied by questions about the underlying reasons. Over the decades, countless publications were aiming to uncover the complex (and sometimes occult) secrets of Japanese ways of production, management, marketing, as well as the background of its culture. The huge variety of attempts to explain Japanese competitiveness represented the rush of the West to keep pace with the continuous Japanese innovative production process that increasingly involved the whole supply chain of production. However, the many investigators overlapped in the understanding that Japan had learned to combine foreign developments of mass production with refined domestic configurations, gaining an unique industrial organisation, based on "the achievements of economies of scale, sophisticated marketing, vigorous exploitation of technical advances, emphasis on product reliability and a substantial awareness of changing Japanese factor endowments *vis-à-vis* the international division of labour" (Shepherd 1981, 387).

The narratives about Japan's successful factors can – today – be summed up as a nation radically focusing on innovation and efficiency through the role of strict governmental planning (with administrative guidance through the MITI, Ministry of International Trade and Industry). Furthermore Japanese strength was considered having been achieved by a fruitful capital and investments environment, a highly competitive domestic atmosphere and, not least, by radical protectionism for its massive domestic market. Those aspects were recurrently found as key factors throughout the 1970s, 1980s and 1990s, albeit altering in significance and focal points. The previously mentioned Herman Kahn, 'chief prophet', futurist superstar and popular enunciator of a 'Japanese 21st century', pointed out at least a dozen factors that would cause the unique competitiveness (Kahn 1970, 156f.), including cultural and historical elements, like the compensation of Japan's defeat in the Second World War through relocation, and a new strong concentration on, exclusively, the economic field. However, associating the Japanese threat to the European transport industry, it was without question the increasingly automated production processes and the high production volumes of small, high-quality and fuel-efficient cars that headmost challenged Europe's car manufacturing industry. In this vain, it was foremost the milestone MIT study *The Machine that changed the world* of 1990 (Womack 1990) that finally invented the collective term *lean production*, which summed up a new industrial reality experienced in Japan and created two pillars of the 1990s' economic assessments in the transport industry and other fields: First, an overarching manifest for a generation of managers and workers. Second, a dense description of a new generational concept of post-Fordist production; moreover, the arrival of an inexorable and unavoidable new production system (Kenney and Florida 1993) that was flexible, customer oriented and much more efficient than ever before. To this day, this ground-breaking study of Toyota's production philosophy has not suffered the loss of importance and will be analysed as the overarching economic concept of the 1980s and 1990s in next stage of this report. The MIT study might have been the same contemporary peak point for assessing the Japanese threat as it was *Le Défi Américain* for the engagement with the American threat period. By condensing the atmosphere of its preceding decades, those two books were prominently publicizing the need to actively rebalance respective competitive inequalities that were caused by new economic landscapes.

The Japanese threat marked and catalysed the changeover to a new industrial structure, aiming to create knowledge-intensive products on increased internationalized scale, using high-technology and organizational skills in order to achieve a leaner production: higher productivity, better product diversification and overarching flexibility in case of new demands. The many aspects of this third major transformation in the automotive history (Altshuler 1984, 29) ranging from "just-in-time" to "total quality" principles shall be briefly described in the next step.

4.1.2 The dogma of lean production



The long-lasting engagement with Japanese competitiveness culminated in the beginning of the 1990s with the results of a book that was the product of a five-year study, financed by all the world's major car producers and suppliers. Having been sold more than 600.000 times, *The Machine that changed the world* of MIT's *International Motor Vehicle Program* (IMVP) for the first time had "constituted a quite comprehensive effort at understanding the international differences between automobile production systems" (Sachwald 1995, 196), offering a synopsis of competitiveness inequalities that were already widely felt, but hardly understood throughout the previous decades of Japanese growth. Such a study was based on the critical assumption "that the auto industries of North America and Europe were relying on techniques little changed from Henry Ford's mass-production system and that these techniques were simply not competitive with a new set of ideas pioneered by the Japanese companies" (Womack 1990, 1). It hereby finally became clear that the Japanese challenge was substantially *organizational* and that the competitive strength of its automotive manufacturing was notably not the result of mystical capabilities, but of a *lean* production system, transferable also to other regions. The basic concept was that Japanese producers would do more with less – "half the human effort, half the manufacturing space, half the investments in tools" (Ibid., 11) – but behind this simplistic motto the need for a holistically restructured system was claimed as necessary: "As for mass production, lean production is actually a whole system relating strategy, product, organization and management. The ability is to provide the right product to the right time and at right quality level, which implies an organization which is capable of producing relatively short series at acceptable costs" (Sachwald 1995, 195). The main goal of this new production philosophy (that indeed was challenging the traditional ways of production) was to radically abolish wastefulness and defects causing (rigid) production constraints. The simplicity of lean production was expressed by leaving out all possible dispensable work steps in order to ensure a complete and higher customer satisfaction. Active participation by workers, a hierarchically organized supply system, and a flexible reaction to new evolving demands were considered some of many crucial principles of the lean production, exemplified by Toyota's company production system.

The lean production principles, according to (Womack 1990)

- Teamwork
- Communication
- Efficient use of resources

- Continuous improvement and motivation (Kaizen)
- Quality management
- Flat hierarchies
- Customer orientation
- Flexible changes in production system and adaptation of changing demands

The lean production objectives

- Optimization of all resources
- High flexibility, low costs, customer satisfaction
- Low volume per type, high total volume

Already by 1949 Toyota had established its unique Toyota Production System (TPS) that was coupled with a customer oriented Total Quality Control (TQC). Although using principles of mass production, TPS, which can be considered synonymous with a lean production, was gaining its huge productivity effect by a most effective bundling of *just-in-time* and *autonomation* principles. As the former means letting everything reach the assembly line in the correct moment and in the correct amount, the latter describes the combination of automation and human skills. That means processes should flow, but, despite highly automated assembly lines, the worker should be able to stop the assembly line in case of an indicated problem or defect. In a more literal sense, machines and human workforce should not be in concurrence but in symbiosis (Ibid., 283ff.).

Womack, Jones and Roos described lean production as a mental process and a concept, which is not simply a tool, but a philosophy of fully integrated production processes contrasting evidently with those in Europe or North America. Against the late 1980s background of the world facing massive overcapacities of 8 million cars caused by inflexible mass production and a continuously threatening Japanese success – curtailed only by heavy trade barrier and protectionist policies – Womack, Jones and Roos revealed and appealed to the industry that "the world has an acute shortage of competitive lean-production capacity and a vast glut of uncompetitive mass-production capacity. The crisis is caused by the former threatening the latter" (Womack 1990, 10).

Japanese production organization (involving its constant improvements and refinements, its high R&D and high equipment investments) would match better the demands of an internationalised market showing increasing variability and flexibility. Beyond that, the MIT study was highly psychological, providing hope for a stricken industry. According to MIT research, through lean production the costs for manufacturing a car were 1.500-2.000 US$ below American mass production units. Thus, the inequalities causing the Japanese threat were not located in cultural myths or policies: they could be found in the production process and they were inescapable in the long run. With the MIT study, an

already existing vast variety of responses to the Japanese threat seemed finally to converge to the core of the problem; hence, it was just the peak point of an on-going investigation. Lean production throughout the 1990s and up to this day became a model to adopt and to implement and therefore was considered a final remedy. More dramatically, it was considered to change the whole world industry in the 1990s, reaching far beyond the automobile industry. Thus, the MIT study was more than just a case study: it indirectly became a foresight study, too. In the author's widely received pathetic persuasion, the adaptation of the lean production system "*will change everything in almost every industry – choices for consumers, the nature of work, the fortune of companies, and, ultimately, the fate of nations*" (Ibid., 10). Lean production would combine the best aspects of pre-modern craft production and of mass production by reducing cost per unit, while at the same time improving the quality, the product range and providing better and more challenging working conditions for the people. In short, the authors believed "lean production will supplant both mass production and the remaining outposts of craft production in all areas of industrial endeavour to become the standard global production system of the 21st century" (Ibid., 285.).

Since the concept of lean production was the overarching economic concept it seems relevant to provide further insights about foresight and studies concerning the European automotive industry addressing the transformation of production systems. Well, before MIT 1990 research, those other studies were more and more addressing the European products' low quality and its poor production efficiency. They were increasingly creating awareness of production inequalities and offering industrial and policy measures, although before 1990 those enquires lacked of a clear target of coping or implement Japanese production patterns.

4.2 Surprise, fear and proclamation: Foresights from the 1970s to 1990s in the light of Japanese threat

4.2.1 Swallowing the bitter pill of admitting the change – *Future of the European Automobile Industry* (1976)

In 1976 the Commission of the European Communities published an outlook on the future of the automobile industry, which can be read today as a black scenario for the sector. Against the background of the 1973 oil price shock, that caused a poor economic climate and a rapid decline in domestic and export demand, the industry was illustrated as going through a radical change: the oil crisis was mentioned as a historical turning point for the whole sector. In 1975 Japan, for the first time, had replaced the Community

as the world's major car exporter, also benefiting from its small and fuel-efficient motor-vehicles production. The EC's black scenario for the period 1975-1985 predicted only a slow recovery with a low domestic demand; a likely danger of losing even more competitiveness by labour cost pressure; and an increased global competition, led by Japan, US, and the developing countries – like Argentina or Brazil – and also from Soviet bloc countries. In short, it was proclaimed, "*the European car industry will face the greatest difficulties it has ever known*" (European Commission 1976, 11). Apparently, there was an awareness of relevant production inequalities, especially in comparison to the Japanese automotive sector and there have been active warnings for Japan's increasing market share. Yet the character of uncertainty on how to react becomes evident in this official document.

> *"Japanese car production will increase dramatically. Japanese production exhibits an exceptionally high level of productivity, which enables the Japanese manufacturers to sell their cars at prices well below those of the European manufacturers. If these forecasts are correct, Japan will gain an important share of an expanding market. Competition with this country will be extremely difficult in the next ten years" (Ibid., 10).*

The European industry was in a depressing situation and was still caught up in the Fordist production pattern. Although there was evidence of the ultimate need to react, the industry seemed yet to underrate the value of a detailed analysis of Japanese production systems. At this point, the defensive future objectives of the EC in 1976 was still to hold out as long as possible and to "delay the gradual cording of its share of the world market by increasing its competitivity" (Ibid., 11). The proposed measures were still focused on higher concentration of industry, maintaining the technology role and retaining diversity of industry, rationalizing or improving plant productivity through automation, but no evidence about organizational shifts or how to learn from the Japanese challenge. Generally speaking, the 1976 EC study illustrates a contemporary business-as-usual attitude after the oil price shock, highlighted in the point of expecting that "the sale of powerful cars will not be affected in the medium term" (Ibid., 3). However, the need for a long-term transition remains clear. Against that background, the necessary reduction of labour costs provided a dark future outlook in which the industrial adjustment was paid with social insecurity. The 1976 forecast declared frankly: "There are substantial grounds for believing that in the coming decade the industry as a whole will gradually lose several hundred thousand of its present total of jobs" (Ibid., 16). Obviously the late 1970s were still lacking a good information basis upon which helpful policies could be established, thus the need and stimulation for new research projects (also funded by the EC) was clearly apparent in this realistic and therefore black foresight scenario. In short, the term and concept of *lean production* as a holistic understanding of detailed production

differences was not yet invented and the learning-from-Japan aspect remained low. However, as an historical turning point the inertia of three decades of automotive growth came evidently to a stop. The same EC's proposal to form an "ad hoc" group of all relevant stakeholders of the automobile industry – in order to be better prepared for future demands and changes – shows how relevant was the change. Such an instrument has never been needed before in Europe, because never before the industry had been on the edge of drifting into non-significance and structural transformation.

Conclusion

The 1970s, after the first oil price rise, saw an industry that was substantially under shock. The 1976 EC future outlook up to 1985 was already pointing out general measures to cope with the loss of competitiveness, but still it was lacking of the adequate tools. Furthermore the EC was hesitant to intervene in the industry sector, due to the claim that changes in the industry should be made by the industry itself. But, on the other hand, the EC feared the social consequences of a further industrial decline and/or in case of a radical need for adjustments. With those limitations in mind, it seems that 1976 EC report impacted the field and made evident the need to change.

4.2.2 Addressing the industry's adjustment pressure – *The Maturity and Crisis in the European Car Industry* (1981)

This significant 1981 report by Daniel T.Jones (one of the authors of the following 1990 MIT study) highlights an intermediate peak point of the Japanese threat discussion that clearly indicates the product and productivity inequalities as the major threat factor of both the present and the future of European car industry. At this stage the current challenges for European manufacturers were a maturity problem and an accelerated internationalisation of production and sales. Decrease in car demand for Western Europe was indicated without ambiguity – approving the late 1970s expectations – while the pressure to adapt to an increasingly converging car demand for smaller, standardized and more efficient cars ("world cars") due to recent oil price shocks was accelerating international competition. However, the spearhead of competition was evidently considered Japan. European manufacturers to that day had already lost many export markets to the Japanese, especially in the US, where between 1970 and 1979 European share "fell from 11% to 5% while the Japanese share rose from 4% to 17%" (Jones 1981, 11). But also the domestic markets were challenged since the Japanese had captured more than 10% of almost every national market in Western Europe. Moreover, the future outlook remained a black one as it was considered "unlikely that the motor industry will again play a locomotive role in Western Europe, though it will do so in less mature economies, such as Spain, Brazil, Mexico and South Korea" (Ibid., 1).

Technological change and the expected divergences lead Jones to state how the automobile industry was in a transition stage. He openly claimed the role of Japanese industry, and stressed its technological progress. In this vein, coping to the Japanese challenge was foremost a question of technological rebalancing and collaboration, because "in model technology and process efficiency the Japanese are setting new world standards. The best producers in Europe will be able to keep up in model technology but not in process efficiency. Weaker producers will suffer as a result, though collaboration with the Japanese may offer a survival strategy. Therefore, even if the threat of growing direct imports from Japan is resolved through outright protection or negotiated restraint, internal pressures from Japanese producers will arise" (Ibid., 60). Those internal pressures meant foremost the acceleration of technological change and divergence of a formerly convergent production system. Since "all major manufacturers are in the process of increasing the level of automation throughout their production operations" (Ibid., 14), it would remain the core issue for the next 20 years. Particularly smaller low volume specialist producers were expected to hardly survive this technological race unless they would start mergers and joint ventures. Jones' future outlook signified:

"The 1980s will, nevertheless, see a speeding up of the pace of product innovation, due to intensified competition in a global market, the rising price of energy, new regulatory controls and the potential opened up by the electronics revolution. In the main this will concern incremental changes in product technology, with the possibility of radical changes involving new engine types or the use of new materials" (Ibid., 58).

Conclusion

According to Jones in 1981, the future survival and future competition for the automobile industry in Europe would foremost be of technological nature. Although the author exemplarily defined the production and efficiency sphere as the crucial subject of investigation and adjustment, in 1981, however, Jones had to admit "forecasting the direction of technical change is a hazardous exercise by its very nature, and represents perhaps the biggest area of uncertainty facing car manufacturers today. Technical change is certainly accelerating at the present time but it is not yet clear what the consequences will be" (Ibid., 7). Thus, his study shows an industry in transition and uncertainty, exactly at the same moment when symptoms of change were already visible throughout Europe's plants and markets. While the short term foresights expected a business-as-usual until the mid-1980s, it was not yet clear what the decade would look like. Beyond that, one thing was made clear as a state-of-art declaration, as a threat and as a motivation: "*The Japanese are the clear leaders in production efficiency and both the US and European industries have declared that it is unlikely that they will ever be able to catch up*" (Ibid., 65).

4.2.3 Fighting the inner threat of slowness – *The Community and the car industry* (1984)

The second oil price shock of 1979 put further under pressure the European car industry, which already suffered an on-going recession. The car industry in Europe witnessed a continuous dropping of exports between 1970 and 1980s up to 23%; whereas Japanese exports – fuelled by the two oil crises and changing demand patterns for small and fuel-efficient cars – in the same period grew by 426% (European Commission 1982, 2). Alarmed by a very slow recovery at the beginning of the 1980s and considering its relevant role in EC economy, the car industry in 1984 was even more a subject to the European Commission investigation and policy emphasis. Against the background of large-scale and widespread job losses, which numbered 220,000 between 1980 and 1982, the Community, as illustrated by 1984 EC report, tried to intervene more precisely. 1984 report illustrates the increased awareness of Japanese competitiveness and the clearer awareness of shifting away from the classical Fordist production patterns. Additionally, it was stated an increasingly integrative understanding of the industry's competitiveness.
Altogether, with the 1984 report, the European policy-makers left the stage of surprise and started to respond to the Japanese challenge. The 1984 report indeed requested to rethink the whole production system and, thus, to accelerate the shift to new models: "*The commercial challenge from Japan – felt in Europe and the United States alike – shows that the decline of the Community car industry cannot be explained by the recession and successive oil crises alone. The demand for cars in Europe did slow down at the start of the 1980s. But the problems of the European industry flow, to a much larger extent, from the slowness of its reaction to a period of enormous change in motor manufacturing*" (European Commission 1984, 2).

In short, the difficult framework conditions were one reason for the industry's crisis, but it was not least an *inner threat* of too slow adaptations and reforms that was considered a main constraint. Inner structures were addressed to finally accept the dogma that "the car industry has entered a new age, marked by profound changes in vehicle technology, manufacturing methods and market trends" (Ibid., 2). Since a major 1981 debate in the European Parliament the Commission widely distributed its statement that declared once and for all the end of conventionalist production systems. Instead, new technology would be taken as central in the production roles. The above should be "an essential precondition for competitiveness and must be permanently and more speedily incorporated in new models and production lines" (Ibid., 4). The 1984 document demonstrates that self-critical approaches and a learning mentality slowly extended the predominating rhetoric towards the Japanese as scapegoats disturbing European peace. Against the background of the widely implemented European car protectionism, the mid 1980s might have set the scene for eventually addressing the overdue rebalancing measures within the industry.

In the early 1980s Japanese success and the Community's crisis were apparently still correlating, but both the industry and the EC in 1984 – especially when compared to the late 1970s – seemed to claim more clearly (and optimistically) which would be the necessary counteractions to recover soon. The 1984 report vividly advertised the promising opportunities of technological adaption, since "the return on investment in the car industry in Europe is potentially among the greatest in the world" (Ibid., 5). The Commission attracted and 'ensnared' the industry to fully accept, live and implement the transition from Fordist mass production to a new lean production system.

More generally, the proposed EC policy measures showed a deeper understanding of Europe's *structural weaknesses* and its potentials: "Despite a massive size of its manufacturing base, the Community industry suffers from a handicap in comparison with world competition: it is still, for the most part, the sum of over-fragmented and heterogeneous national industries" (Ibid., 5). Facing the rising Japanese (and the re-emerging US competition), the EC saw the need to advertise itself as a future market leader after the hard years of recession. The Community would hold a number of "trump cards" to make a success of the technological revolution. The black scenario character of 1976 was replaced by more confident tones, probably backed up by the industry's slow recovery starting in 1983. The motivation for both the industry and the EC might have been to achieve a win-win situation due to an expected general increase in worldwide car demand. The industry would only need to properly prepare for securing its future 'piece of cake' while the EC would legitimate and strengthen its position as a powerful actor within the political stakeholders; moreover, as a "partner of modernization" (Ibid., 8).

Conclusion

Although the 1979 oil crisis might have been an un-expected outcome, the situation in the early 1980s guaranteed further elements for a shock therapy. The slowdown of the EC "domestic" market and the stronger Japanese competitiveness advantages demanded for an even quicker transformation. As a result, the early 1980s saw more than two hundred thousand lost jobs and heavy financial losses for the EC car industry, as logical consequences of both the recession and the price for a partly started transitional process in the automotive sector in form of automation and rationalization. This 1984 document depicts the increased awareness of the Japanese threat that centred on general production inequalities between Japan and Europe as the overwhelming economic and political focal points. Still there was no role-model study available and there were no signs of openly copying Japanese production systems. But, however, a shifting rhetoric from the rather defensive shock and surprise character of the late 1970s to a more self-critical and offensive analysis of Europe's structural weaknesses. Among those weaknesses, there was a too slow pace in adapting new technology standards. The EC tried to find its role as a 'crisis task force' by correctly addressing the need of better internal framework conditions and more precise supporting policy measures. The

modernization process in Europe's most important industry was already started when it was crossing the trough of demand and sales in 1981. The Japanese were still considered to increasingly penetrate the European markets, reaching already 40% of market share in Greece or 31% in Denmark by 1983.

If by the time of the mid-1980s the European industry would get back to the business-as-usual-model and if not soon the industry would adapt, the next crisis was feared to be even worse.

Countries	1970	1975	1980	1984	1988	1991	1992
US	3.7	9.4	21.3	18.3	21.3	30.2	30.0
Germany	0.1	1.7	10.4	11.6	15.5	15.3	13.7
UK	0.4	9.0	11.9	11.1	11.4	10.7	12.3
France	0.2	1.5	2.9	3.0	2.9	4.0	4.1
Spain	–	–	–	0.6	0.9	2.3	2.7
Italy	a	a	0.1	0.2	0.9	2.6	3.0
Portugal	10.7	20.5	7.5	8.5	7.8	9.2	n.a
Greece	-	-	49.2	30.9	38.9	31.6	n.a
Belgium	4.9	16.5	24.7	20.1	21.0	22.3	21.3
Netherlands	3.1	15.5	25.7	22.0	27.7	27.8	27.0
Norway	11.4	28.3	39.1	33.5	39.3	45.1	42.5
Sweden	0.7	6.5	12.1	15.0	25.5	25.3	24.6
Austria	0.9	5.4	19.2	27.0	33.1	28.7	29.7

Figure 4 - Share of Japanese Brands in US and selected European car markets – (Sachwald 1995, 174)

4.2.4 Arrival at the lean production universe – *The European Motor Vehicle Industry* (1992)

The 1992 Communication from the European Commission to the Council, the European Parliament and the Economic and Social Committee holds some interesting insights into the conditions of the overall competitiveness aspirations of the European automotive industry in the early 1990s. Because this Communication conglomerates previous views and ideas of all involved parties from manufacturers and suppliers to social partners and national governments, it represents a kind of stakeholder summary and provides the overarching need – or even the obsession – for further adjustments in this sector due to the industry's "severe problems" of restructuring. This document furthermore illustrates the arrival and the embedding of the MIT's *The machine that changed the world* into the European industrial policy realm.

After having experienced, from the mid-1980s, a remarkable and surprising stabilization in its domestic market, the European automobile industry in 1992 was facing

positive outlooks for the year 2000. With 16% growth of production and an upcoming East European push in demand, Europe was expected to become "by far the most important integrated car market in the world" (European Commission 1992, 2). An expected production of 16 million units in 2000 and further internationalization and expansion to new markets let this future forecast be a pink scenario, but only if the following underlying conditions were fulfilled. The absolute precondition to actually experience the "pink" forecast would be to overcome the productivity gap between Japan and Europe. In short, the already approximated but still unequalled production systems between Europe and Japan caused the biggest concern for the future. As the European market was moving to be an unprotected area in form of the Single Market, the Japanese were expected to penetrate it more than ever before, representing "a formidable challenge to the EC car industry" (Ibid., 19). Japan, at this stage, was still the unbeaten role model for this significant industrial sector: "*The industry needs to make itself as competitive as possible, defined by such features as productivity, quick adaptation to market evolution and trends educated and motivated workforces, high levels of internal investment and strong competition within the sector*" (Ibid., 3). All those key factors were mirroring Japanese production characteristics; moreover, the concept of lean production that was vastly debated since 1990. Against the background of the MIT study, the European handicaps of lower productivity, lower quality and lower flexibility might have become even more obvious than they were before. Production was, despite the started processes, not yet "lean" enough since "European car producers needed an average of 35.3 hours in order to assemble a vehicle, compared with 16.8 hours, i.e. less than half that figure, for the Japanese" (Ibid., 4). Europe's automobile industry seemed not yet prepared to adapt the future's increasingly fragmented demand. Against those future framework conditions, the overarching experienced and expected competitiveness factor for the markets of advanced industrial countries was the "customized production of technologically sophisticated goods of high-quality" (Ibid., 4). Europe, following this Communication, did not feel safe to manage this on-going structural change against the Japanese dominance in productivity, flexibility and quality. Despite its positive outlooks, this foresight can be considered another didactical forewarning in order to prepare Europe's automotive sector properly.

To define precise measures, more investments in equipment, higher R&D spending, more flexible production and workforce's training for lean production methods were requested as classical solutions not differing very much from the years before. But what was new was an integrated approach to respond to the unsolved Japanese challenge. To reach the aim of regaining a strong position in the world markets and to eliminate the above-mentioned handicaps, an "effective mobilization of all the parties concerned" (Ibid., 3) was evoked.

Conclusion

In 1992 European car manufacturers had experienced more than 15 years of crisis and were facing the transition from the traditional mass production system to a lean production. Although all major manufacturers had started the transition with different approaches and successes, Japan still was the unbeaten role model. In contrast to previous studies, the 1990s assessed the Japanese threat with a more integrative approach, involving all relevant stakeholders. Additionally, the whole supply chain stakeholders´ involvement was claimed as necessary to gain competitiveness. The automotive industry tiers and the component industry were suddenly getting the centre of the stage, given their relevance to secure a higher quality of products. All parties of the automobile industry had to cooperate more closely for acting successfully in the world markets. Against the background of positive foresights in demand and production until 2000, the opportunities for the EC's auto industry were enormous, but the threat of Japanese penetration of the unprotected Single Market was felt even more significantly. Japan in the early 1990s was still the major challenge, but since the key factor has been detected, that is the "lean production", it was claimed as an opportunity to grow. External competition became eventually a stimulus for Europe's industry.

4.2.5 Enlarging the scope of competitiveness – *GERPISA research program of the International Network of the Automobile* (1993-1996)

The identification of quality and productivity inequalities as the key factors of Euro-Japanese competitiveness was the main aim of the *International Network of the Automobile* developed by GERPISA. From 1993 to 1996 almost two hundred researchers in four working groups from twenty countries participated in this cooperative international research, following the MIT study's impulse and pushing forward the investigation of the adaptation of new emerging industrial models for the automobile industry. The outcomes of this vast research present Japan as a slowly maturing, but still leading role model of production, productivity, efficiency, quality and flexibility. Despite advanced European achievements, the majority of carmakers in Europe would still have to learn from Japan, even if world economic and geopolitical framework conditions declared a rather optimistic future for the sector. Remarkably, the GERPISA research even more declared the necessity for stronger and deeper industrial transformation around the dogma of lean production and flexibility, otherwise European manufacturers would not be able to benefit from those 'pink' outlooks. The background of growth forecasts in global demand, and an estimated need for "eighty additional factories, each producing 200,000 vehicles per year in the emerging markets" (Freyssenet, et al. 1998, 454), led to consider as central the demand for motorization in developing countries. By this, the traditional production (and consumption) triad of Europe, Japan and the US needed to

focus on those regions. An expected growth in developing regions like Brazil or South East Asia would push for even stronger adjustments processes in the industry and for rethinking traditional perceptions of the geographical markets in the future. Quality of production, thus, was considered to become a key factor for competitiveness of (European) manufacturers. Additionally, the future of the automobile industry was declared much more internationalized. Japanese manufacturers in this regard would still remain the most advanced players, despite an already strong degree of the whole industry's internationalization. Since Japanese carmakers were the most experienced in running production sites all around the world, the European OEMs, it was predicted, "may be at a disadvantage in the race of internationalization, with the possible exception of South America" (Ibid., 456). Moreover, the basic future challenge, not at least but particularly for the Europeans, was expected the successful combination of:

- *Economies of scale* (ability to save costs by mass production of components and goods)
- *Economies of scope* (ability to provide a huge variety of steadily updated models in an increasing niche market)
- *Economies of replication* (ability to easily set up material production sites for assembly and components in different countries)
- *Economies of learning* (ability to transfer knowledge to new emerging market production sites)

Within this future race of successfully combining the above economic fields, the GERPISA study declared "the European companies have the advantage of greater experience with regard to stylistic aspects and therefore economies of scope, the Japanese firms have already demonstrated that they possess a notable maturity, particularly in the economies of replication and in the transfer of economies of learning, whereas the American firms can count on a marked advantage in the more traditional economies of scale" (Ibid., 457). Furthermore the industry was warned to subsequently expand the production process with factors that might have been previously considered rather 'soft', e.g. levels of commitment in the workforce: "The European automobile companies clearly have the most difficult task ahead, given that they must achieve simultaneously a higher level of commitment on the part of the company personnel and greater flexibility in the use of their workforce. As far as commitment is concerned, in recent years the European producers have made significant progress, thanks to improvements and industrial relations with union organizations. Yet there remains much to be done in terms of experiments with organizational forms of new types of employment relations if the processes under way are to endue" (Ibid., 459). Compared to Japan, European manufacturer's ability to train workers to be more flexible in a world of increased uncertain demand patterns would dangerously lag behind.

In short, this study still acknowledged and highlighted Japan as a role model in many fields (even though a maturing one) and urged the European industry to further

adjustment processes; but beyond that, it presented far more differentiated modalities for future competitiveness than only production inequalities and scale economies. For instance flexibility and commitment of workforce, product planning adjustments to local tastes and conditions were highlighted to become stronger factors in the future, key elements necessary to cope with an increasingly uncertain change in global demands. Rather than exclusively focusing on automation processes, Japanese working conditions – widening the competitiveness understanding – seemed at this stage to have found more attention, by admitting Japanese "higher levels of participation and identification with company objectives" (Ibid., 459). Flexibility of machines might have been widely understood: now the workforce was requested to adopt and to "live" the dogma of flexibility, since "the issue in Europe over the next decade is the extent to which there will be a systematic and recurring short-term instability of demand, whether in individual markets or for individual models, even if the overall market context is characterized by gentle growth" (Ibid., 459).

However, the concept of "lean production" at this stage was widely accepted and can be indicated as marking its final arrival in the industry's discussions of the mid-1990s. When the MIT study *The machine that changed the world* provided the impulse of adjustments, the following GERPISA program forwarded the discourse with *company-specific* programs to effectively adopt modern, flexible manufacturing and new product development processes and expanded the discussion with particularly the need of greater workforce flexibility.

4.3 Strategies and policies towards the Japanese threat

4.3.1 Policy responses and adjustments since the 1980s

The Japanese threat to Europe was headmost determined by tensions in trade issues rather than on other political fields. As Japan throughout the 1970s was catching up to become the third economic world power – symbolically becoming a member in the Group of Seven by 1975 – and Japanese export rates were increasingly threatening European domestic markets, the 1980s and 1990s were leaving behind the 1970s path of free trade and low tariffs to set up a neo-protectionist environment. Since the 1980s, the core question for European trade policies was how it should react to external threats. Should it close its markets to outsiders to form a "Fortress Europe" or should it keep the market open sticking to the philosophy of free trade and GATT achievements for accepting the risk of letting some branches threatened by external companies? The problem and dilemma for Europe, however, was considered that "no one quite seems to know how to meet the Japanese challenge" (Hager 1992, 23). Since this quotation is representing a

general uncertainty in how to respond properly, surely it is only half the story, thus the following section shall analyse defensive and offensive responses in the policy realm.

4.3.2 Defensive and (neo-) protectionist policies

As shown above, the Europeans predominantly felt surprised and to some extent shocked by quick Japanese success. Their governments and industries – despite several warnings – were rather unprepared to meet the Japanese challenge and for a period lasting until the mid-1980s saw no other chance than to – sometimes radically – protect their home markets and those industries vulnerable to highly competitive and expansionist foreign producers from Asia. Comparable weak industrial competitiveness in combination with long-lasting recessions after the two oil crises were causing growing trade balance deficits between Europe and Japan and let the main European mechanisms to respond to the Japanese challenge become defensive and selectively protectionist. But it was especially new forms of non-tariff protection that were invented as non-orthodox practices in the grey area of the previous GATT agreements. *Neo*-protectionist outcomes were foremost VER's (Voluntary Export Restraints), fixing the maximum amount of Japanese exports to a certain country in disguise of voluntariness. But as Sachwald points out accurately, "the term itself is typical of neo-protectionism, since it is actually an euphemism to designate new forms of quantitative restrictions" (Sachwald 1995, 179). Summing up, the mix of classical protectionist and neo-protectionist responses in order to protect European home markets encompassed:

- Import restrictions
- Licenses
- Non-tariff trade barriers, particularly VERs (Voluntary Export Restraints)
- Rhetoric of accusation and defamation

The scope of protectionism in Europe was highly variable, according to the threat potential to each national producer, and according to the nation's respective sectorial strength and 'self-esteem'. By that, Italy, Spain, France and Portugal were the first to establish quantitative restrictions on Japanese car imports, whereas Germany and the UK remained rather liberal. By the end of 1981 all West European countries all secured VERs on cars with Japan, although West Germany and the Benelux, which were withstanding longer than all others. In short, the widely circulated notion of "Fortress Europe" of the 1980s was the result of both protecting the Community's internal integration objectives and eventually enforcing Japan to open up its own strictly protected domestic market to European export. Moreover, it was considered a way of 'gaining time' to let the European industry to renew internally and to adjust to the major transformations in demand, quality, management and production. Although the warnings of the 1960s and early

1970s were loudly publicized, "*American and European producers have identified the central problem, which was the evolution of the production paradigm, quite slowly and have had difficulties in both deciding and implementing adequate strategies. The hypothesis (sincere or not) was that Japanese producers operated under such different conditions that confrontation was unfair. Consequently, a number of countries resorted to protection*" (Ibid., 178).

The early 1980s, being torn in the interest of an economic triad, were far away from a liberalized world trade, possibly finding its peak point of trade barrier regulations in the EC's "New Commercial Policy Instrument" (NCPI) of 1984, a deterrent trade weapon. Despite by the mid-1980s Japan was slowly opening its market and despite a normalization of trade balances with the EC and the USA, the European defensive and protectionist character can be indicated as a main policy response to the Japanese threat. However, it will be shown that this defensive policy can be considered a catalyser for both European integration and industrial restructuring.

Accusation and defamation

A remarkable side aspect of political responses – a minor, but yet an impacting element – and one that illustrates the deepness of the threat caused by the Japanese challenge to European integration, is the accusation and defamation of Japanese as "laser beams", "workaholics living in rabbit hutches", or of the Japanese doing "social dumping". Demonstrating another psychological sphere of coping with the threat to Europe, those aggressive and sometimes offensive or even racist estimations led to accuse the Japanese to conquer external markets with dumping practices and to consciously prevent free trade. The French Prime Minister Édith Cresson was even comparing the Japanese with "yellow ants trying to take over the world" (News Week 1991) and marked the intermediate peak point of criticism in a highly alarmed European atmosphere. The considered "seeming lack of reciprocity in Japan's economic relations and its undermining of the international trading system" (Hughes 2001, 52) manifested the Japanese threat in European minds and illustrated the Euro-Japanese tensions since the late 1970s resulting from trade controversies. Especially the Japanese protectionist strategy, with high State intervention, was opposed to traditional Western individualized economies of free trade, moreover criticizing Japan harshly to "have benefited greatly by acting contrary to the tenets of individualism" (Samson 1993, 61). Neglecting Europe's own protectionist measures, the Japanese were not uncommonly identified as predatory. Their corporations and governments would "have neither practiced free trade nor free enterprise, and they are quite prepared to restrict the freedom of the market when it serves their purpose" (Ibid., 61).

On the opposite pole of the discourse some authors accused self-critically the accusation by highlighting that the Japanese "have been made the scapegoats for the inability of industry in the European Community to be competitive at home or abroad" (Shepherd 1981, 375).

Japanese "transplants" as Trojan Horses

Protectionism in the automobile industry of Europe and the US had provided a strong incentive or rather enforced Japanese producers until the mid-1980s to open up production sites throughout the US and Europe in order to bypass national import restrictions. Beyond "greenfield" investment approaches, joint ventures, cooperation with local partners and capital participations reflected a variety of means of Japanese externalization. Since the international markets were of crucial importance for the Japanese industry, their manufacturers were both concerned about the future difficulties to be met when continuing the export strategy (Sachwald 1995, 174) and at the same time were attracted by accessing the growing markets abroad. This situation since the 1980s caused the evolution of an increasingly internationalising production system. By the mid-1980s it was clear that the Japanese trend of securing its exports would prevail: *"In short term, the advanced Western countries will retain their lead roles as recipients of these flows. Their stability and profit potential are overwhelming attractions for Japan's shrewd and hotly competitive investors. Furthermore, ‚Japan Inc' has targeted such fields as biotechnology, robotics, and advanced computers, and markets for these goods are well-developed in the West"* (Hiraoka 1985, 506). Particularly the UK and Spain were favoured destinations for massive Japanese direct foreign investments. Due to the UK's weak car industry and a welcoming political environment of the Thatcher era, the UK emerged as "the standard-bearer of Japanese car investment" (Shepherd 1981, 380). Consequently, in 1984 Nissan opened up a production plant in Sunderland, which soon would become the most efficient plant in the whole of Europe, although facing massive criticism, particularly from French politicians and industrialist such as Peugeot's CEO Jacques Calvet. Japanese transnational corporations on European soil were seen "as tending to have a corrosive influence upon European unity by attacking the very symbols of European industrial strength, such as the car industry" (Hughes 2001, 56). Moreover, the Japanese "transplants" – as materializations of a highly internationalized Japanese industry – were considered 'Trojan Horses', or more drastically, the starting point of a final attack on Europe. Flooding the European market with efficient, cheap, small and better cars, this arrival of Japanese producers was occasionally considered an "European Automotive Apocalypse" (Lehmann 1992). This also led to question "whether the local content levels of models produced in the UK plants of Japanese producers were of the level to be treated as products of European origin" (McDermott 1996, 10). In this vein, the UK was accused to have a lack of Community solidarity, while Japanese car

manufacturers with plants in Europe, symbolically, were not invited to the newly formed Association of European Automobile Manufacturers in 1991 (US counterparts were instead taking part). Since the USA had seen the rise of Japanese market share in cars up to 30%, many Europeans warned to meet the same fate. Nester, for example, argued a four-stage invasion of Japanese in the US, which would likely account for Europe as well: "First the Japanese come to the United States to study techniques, make contracts, become aware of marketing problems, and uncover weaknesses. The second stage involved returning home to train work forces in foreign ways, while adapting native Japanese practices to the new technologies and simultaneously enter into licensing agreements with the Americans. During this period Japan's government would erect import barriers to foreign competitors. The third stage involved Japanese firms uniting, usually under MITI's direction, to attack the American market. The product was sold underpriced with the aim of conquering a large market as soon as possible. During the fourth phase the Japanese would upgrade their product to take over higher priced segments" (Nester 1990, 202).

Without reconstructing the oscillation of perceptions towards Japan holistically, it can be concluded that the Japanese threat caused several waves and degrees of criticism, but – more interesting – also waves of self-criticism that led to address internal weaknesses instead of 'evil' external competitors. These offensive and constructive policies shall be examined in the next step.

4.3.3 Offensive and constructive policy responses on Community level

The Single Market: "1992" in the light of the Japanese threat

A key element of the European competition toward Japanese industry was the identification of internal weaknesses. The main element to catch up in terms of competitiveness was considered in the final decision of boosting European integration towards a common Single Market and towards common policies at the beginning of 1993. The Treaty on the European Community encompassed 300 directives for the industrial arena; in general they intended two crucial points. First, to strengthen the trade flows of persons, capital, goods and services, thus widening the "domestic" European market opportunities. Second, to strategically become strategically stronger in bargaining processes with Japan. The many different trade policies experienced in European countries in the early 1980s were ranging from highly protectionist to rather liberal policies, to the point it was said, embarrassingly, "that there was no real common market for cars". Given that situation, "a common external policy and more open markets were the most important prospective consequences of the Single market for the car industry"

(Sachwald 1995, 81). By that, the Japanese threat – like the American threat two decades before – strongly correlates with the Community's Member States' 1992 milestone to collaborate and to unify more closely than ever before. In that sense Lehmann argues: "To revitalize, to re-industrialize and to regain global competitiveness, the creation of the single market was presented as the solution" (Lehmann 1992, 41). Since a functioning and trustful domestic market can be the precondition for mutual innovation, quality and economic success, the Community's aim was to establish an expanding single European market. Competition as well as technology and R&D cooperation were "the overriding objective[s] to regain economic dynamism and international competitiveness" (Hager 1992, 17). By saving time, shipment and administrative cross-border costs, it was predicted, "companies located within the European Community and doing business will no longer be handicapped by the wasteful market fragmentation which for decades has cut sharply into European competitiveness *vis-à-vis* Japan and the U.S." (Daems 1990, 41). In short, the radical systemic revolution of a European Single Market gained impetus also by the fear of European industries to face Japanese lower production costs and higher quality products. This was a reminder for the Europeans "to recognize the need to coordinate more fully their economic, political and security interests". In doing so the Japanese threat "had an indirect and ultimately positive effect upon progress towards European integration" (Hughes 2001, 57).

The 1992 milestone Treaty on the European Union aimed to improve competitiveness of motor vehicle producers in Europe by a wide range of measures. Among them they encompassed the harmonization (or at least approximation) of laws of Member States and the harmonization of technical and environmental rules. Furthermore, the policy framework aimed to support new forms of industrial cooperation, especially between manufacturers and component companies. Since European car producers – in contrast to Japan – were lacking of cooperation with companies in key technology sectors, European producers were motivated to renew collaborations in order to launch R&TD initiatives, "bringing together the manufacturers and users of integrated circuits" (European Commission 1992, 11). A range of R&D programmes within the EUREKA network reaching from ESPRIT, RACE to BRITE or DRIVE were renewed or enlarged in order make the motor vehicle industry more competitive through research and technological development. Again the Japanese organizational structure between industry and politics around the MITI institution might have acted as a role model for Europe too. Despite a long-standing initiative of European R&D policies, in 1992 it was criticized that "European research is failing to produce enough international competitive advantages" (European Commission 1992, 10). Still there was lacking ability to translate the vast research activities into good selling products.

Additional policy responses to the Japanese threat in the early 1990s were planned wider public investment aids. Here particularly funds for training and retaining European car producers' workforce illustrated the awareness of the human capital's crucial role,

which now – against the background of a better understanding of Japanese production systems – was considered “one of the decisive factors in competitiveness” (European Commission 1992, 13). Article 123 of the 1992 treaty clearly allowed “using the Social Fund to make it easier for workers to adapt to industrial changes and to changes in production systems. In the future, in the context of these objectives, a major effort will be devoted throughout the Community to vocational training and retraining in anticipation of industrial and technological changes” (Ibid.).

With extending domestic operations, aiming for horizontal industrial policies of (supra) national governments with sectorial aid program, the 1992 treaty “was a response to two glaring failures: (1) macro-economic stagnation (stagflation), diagnosed as resulting from rigidities in factor and goods markets, including services; and (2) declining shares of high-tech exports centred around lagging competence in micro-electronics” (Hager 1992, 18). Massive horizontal policy operations were framed by the 1991 Joint Declaration between EU and Japan that aimed for more cooperation and the reduction of trade tensions. By stabilizing the degree of competitive danger, the inner adjustment process was started with much more effort from the beginning of the 1990s. Beyond that, the future threat of a liberalized Europe after the 1992 treaty might have induced more efforts than anything else in the policy sphere: “the prospect of [Japanese] competition and deregulation, by stimulating defensive or adaptive investments, did more to accelerate the take-up of IT technologies in the European economy than all Community and EUREKA programs put together – by a wide margin” (Ibid.).

4.3.4 European environmentalism

Since the 1960s, the effect of global warming has increasingly been understood in the relation with emissions of carbon dioxide gas. Air pollution caused by households, the industry and traffic have gained wide attention as environmental threats. Increased damages caused to people’s health e.g. through smog, reversed the affirmative promise of motorizing societies and opened up public and scientific discussions about the downsides of affluent societies and how to protect the global environment. Throughout the 1980s, evidence for global warming accumulated. With the help of computers, some future climate models were illustrating the major changes and raising the awareness towards the environmental threat of global warming, which slowly replaced an older macroeconomic threat of increasing population. Among the most famous environmental threat scenarios are the Club of Rome’s “The Limits to Growth” (1972) and the outcomes of the World Climate Conference in 1979. Whereas the former report was already mentioned in the previous chapter about the American threat period, the latter came up with a conclusion that "it appears plausible that an increased amount of carbon dioxide in the atmosphere can contribute to a gradual warming of the lower atmosphere, especially

at higher latitudes. It is possible that some effects on a regional and global scale may be detectable before the end of this century and become significant before the middle of the next century“ (World Meteorological Organization 1979, 2). Moreover, it declared, ”Long-term survival of mankind depends on achieving a harmony between society and nature. The climate is but one characteristic of our natural environment that needs to be wisely utilized” (Ibid., 4). Ranging from melting polar caps to highly impacting CFC gas emissions, the debate moved to consider the global warming process as a man-made process, resulting in the establishment of the International Panel on Climate Change (IPCC) in 1988. Within the relevant period for the Japanese threat, this institution – set up by two United Nations organizations – has made the biggest efforts to produce striking reports for both political decision-making and economic stakeholders. Headmost the “IS92” scenarios, published in 1992, can be considered the path breaking first global long-term scenarios until 2100, providing estimates for the full impact of greenhouse gases (IPCC 2004). The report reinforced the understanding that the main driving forces of future greenhouse gas trajectories will continue to be demographic change, social and economic development, and the rate and direction of technological change (Houghton 1992). One crucial aspect was indeed the future of mobility and transport. More precisely, it was stated how the automobile played a key role in both causing and – hopefully in the long-term – mitigating the effect of global warming.

Policy makers had already since the 1970s' oil crises put ecological subjects on the agenda, but it took until the early 1990s to establish a network of more dense and binding multinational commitments. In the light of the 1992 IPCC scenarios, the UNCED Rio-Summit of 1992 finally set the scene for a breakthrough framework program on world climate and decided on the Agenda 21. Naturally, also Europe was in charge of mitigating the climate change as one of the main pollution sources of greenhouse gas emissions. Consequently, from the early 1990s onwards the European Community continuously increased its efforts to respond to alarming environmental foresights. Whereas the 1976 Communication on *The Future of the Community's Car Industry* was still mentioning the need to reduce the social cost of car usage and to set deadlines “by which increasingly stringent standards to reduce the pollution and noise caused by cars and to improve safety must be met” (European Commission 1976, 3), in the 1982 and 1984 European Files on *The Future of the Car Industry* environmental issues evidently played a minor or even non existing role compared to objectives to stay alive economically and to cope the Japanese threat. Ecological advances in the car technology were not yet considered a competitiveness factor, at least not in those official documents.

It took until the already mentioned 1992 Communication on the European Motor Vehicle Industry that the automotive sector was evidently put in charge to mitigate climate change, though rather gently compared with today's requirements. “Stringent but realistic environmental standards“ (European Commission 1992, 7) were announced to come or to be renewed soon, at this stage also in order to raise the competitiveness of

the motor vehicle industry by incorporating environmental constraints for new market entrants. Moreover, the awareness of ecological requirements was considered essential for "the social acceptability of the products in question" (Ibid.). Since the promising image of the automobile had suffered, type-approval procedures and limit values of emissions in the early 1990s were illustrating the final political willingness to respond to the environmental issues. However, they still represented a rather weak and uncertain changeover to reach clear and strict limitations, in which the need to cope with environmental problems was openly mixed with a competitiveness advantages in a globalizing market.

By the end of the 1990s, the environmental issue had fully reached the sector's agenda, both on the producers' side and the policy area. Up to that day, the role of technology in coping with environmental problems outweighs discussions about reducing mobility as a whole. Most emission scenarios struggled to incorporate a deeper level of complexity: specifically the interrelated personal, aesthetic, social, and political choices that people make when reacting to a changing climate around them. As most scenarios aim to provide rational choices, the realm of future novels, which are focussing on didactical and narrative future images, might have a played a similar key role in stimulating policy responses to cope the continuing environmental challenge.

4.3.5 Industrial responses and adjustments in the automotive sector

After two oil crises and long-lasting recessions, the European car industry sector never stood still, but up to this day faces continuous transitions in production, management, quality, cooperation and internationalization. Moreover, this interminable transition and adjustment paradigm became itself a key condition of post-fordist production patterns under the umbrella-term of flexibility. Given that dynamic character it is sheer impossible to draw the full picture of auto producers' adjustments, which varied locally and from company to company. However, one overriding intersecting concept of most of the producers was to steadily cut considerably the dependency on a single product (like e.g. VW's Beetle) and to establish a more balanced product range on sometimes unitary platform construction. More generally, European producers, albeit late, were continuously "cutting assembly times, communizing parts, setting up more intensified supplier networks, trimming layers of management and direct worker head count, shrinking inventories etc." (Roegner 1994, 19). Beyond that, European producers started (with varying intensity and success) "programs to build company spirit, exploit environmental niche markets, increase the availability or power and comfort extras, and improve union relationships" (Ibid.). Those internal strategies to cut costs while raising productivity geared very much towards Japanese experiences, which were made

bilaterally through visiting Japanese production sites, exploiting a growing literature on the subject, or with the help of strategic joint ventures and cooperation. Not least it was the arrival of Japanese production sites on the European market that fuelled a transfer of knowledge and technology and, although previously feared, evolved an invaluable impulse to rebalance the competitiveness inequalities. With the 1990 MIT study, the European car industry, which "has focused its efforts almost entirely within the boundaries of its domestic markets" (Donnelly, Mellahi and Morris 2002, 30), acknowledged the highly intensified competition on the world level and consequently internationalized, internally, by "Japanizing" its production system and, externally, by collaboration and exploitation of new emerging markets.

4.3.6 Global integration and cooperation

Throughout the 1980s the means of raising competitiveness in the car industry were expanded. Among the classical methods to grow by mergers and acquisitions in order to exploit economies of scale, it appeared new forms of cooperative agreements between competing companies that expressed an evolution of global competitiveness in the vehicle industry. On the one hand Japanese producers were forced to go abroad (as shown above); on the other hand European and Japanese producers hoped to benefit from each other in terms of costs-savings, knowledge transfer, management and market access. For instance, given the fact that a wider product range and quickly changing models would be needed to match the future demand, the costs for such activities increased enormously. Thus, collaborations in production, research, and design, or component development, sought to save costs and to lower the risk of accelerated cycles. Just to point out some examples: Honda's cooperation with Rover in 1979 or Mitsubishi's joint venture with Volvo and the Dutch government in 1995 or VW's 1987 agreement with Toyota to produce some Japanese models in Wolfsburg illustrate only a few of the many cooperation cases. Ford and Mazda, GM and Isuzu, the partnerships were manifold, even though not always successful. In short, the Japanese competitiveness advantages around the concept of lean production, which had caused European protectionism, paradoxically, since the 1980s became the integration machine for the global alignment

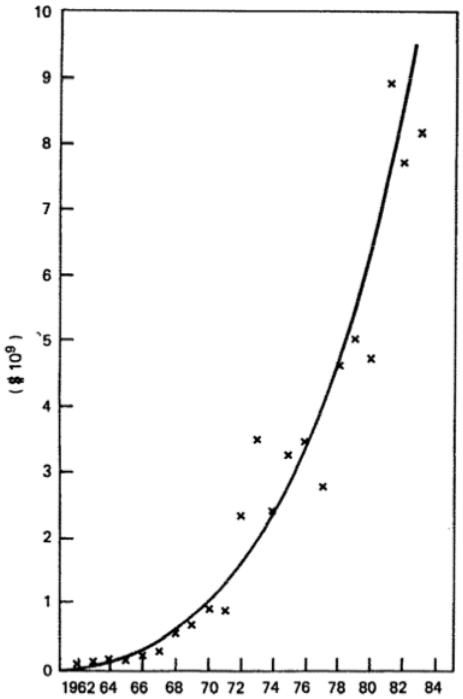


Figure 5 - Japan's direct overseas investments - (Hiraoka 1985, 479)

of the whole industry, because Japanese producers had to go abroad and were in the need to cooperate with local producers to save risks, get market access and to successfully transplant their production system. Sachwald concludes the effects of Japanese direct investments in Europe as follows: “Firstly, as these investments have been largely aimed at jumping trade barriers, they have increased the degree of competition faced by the American and European producers. Secondly, these investments have been instrumental to knowledge transfer from Japanese to American and European carmakers and suppliers” (Sachwald 1995, 208).

The UK case

The arrival of Japanese producers in the UK fruitfully illustrates how the Japanese challenge served as a catalyser for both domestic revitalization and global integration, thus internationalization. UK’s auto industry in the 1980s was in a deep crisis. Having seen a plummeting in produced units from 1.92 million units in 1972 to 0.88 million units in 1982, this sector was considered the epitome of British decline and inefficiency and its constricting labour environment. Low productivity with too much manpower, low qualities in plants of too much capacity were named the severe weaknesses and beyond that “was seen to represent the loss of competitiveness in UK manufacturing generally” (McDermott 1996, 6). Enforced by European protectionism Japanese producers came to Europe – and not by chance – chose the UK as their springboard to the European continent. In the light of a welcoming policy environment for direct foreign investments, and most notably against the background that there was no indigenous industry that was worth to be protected, the Japanese invested more than 3 billion pounds until the mid-1990s in new production sites and other cooperation with local suppliers (Ibid., 8). By that, a weak industry was revitalized and, moreover, pushed other companies like Ford, GM, Rover or Peugeot to invest more in the UK. The Japanese “transplants”, in the long run, have given the crucial impulse to learn from Japanese production systems in assembly and the component sector. The arrival of Japan in the UK, contrary to the previous doubts and fears, was a win-win situation for the British and the European car industry. Knowledge of labour relations, supplier relationships, recruitment and training skills and production technology could be practiced and experienced in proximity. Given the fact that Japanese producers demanded their quality standards from the suppliers, they eventually were enforced to “transform themselves to meet their buyers’ rigorous requirements” (Ibid., 9).

4.3.7 Diversification of production

Another strand of industrial responses to the Japanese challenge emerged from the already mentioned GERPISA research programme that analysed the emergence of the lean production model for the motor industry. Its valuable outcomes discovered that there would not only be 'one best way' of implementing Japanese production systems. The actual variety of Japanese production styles clashed against the too easy universal message of lean production. Instead of diffusing a single production model, GERPISA suggested the co-existence of "a variety of models will continue to coexist and flourish" (Pries 2001, 13) and depicted organizational trajectories, which followed an individualized adaptation of lean production. While the Japanese car producers had different production systems, this was even more remarkable in their transplants in Europe and North America. In contrast to early assumptions, transplants developed *hybrid* structures of Japanese production models, which were in the need to be adapted to the local conditions and to host country's methods. Following this interesting path means to understand the internationalization and globalization of the car industry – which was induced by the Japanese challenge – as a far more diversified process than just to consider the industry within McLuhan's 'Global Village' metaphor. While the leading principles of production might be "universalistic and global recipes for modernisation of production" (Ibid., 22), the model of production, if it is a Japanese or a German 'model', cannot be generalized. "Distinct firm trajectories" represent an even more homogenous industry and will imply new and even 'better' production sites, along with new production inequalities and competitive advantages. In short, the story of a more efficient, high-quality production that is matching more and more ecological requirements has not ended yet.

4.4 Winners & Losers of European car producers facing the Japanese challenge

In spite of the many difficulties European producers had to face since the emergence of a new competitive player of high-degree in the Far East, generally all producers in the long-term benefited from the Japanese challenge because they changed their ability to produce more flexible, more international, with higher productivity and in better quality by continuously focusing on organizational and technological improvements. Adaptations were heterogeneous and had differing key aspects of implementation. While Mercedes and SCANIA paid much attention to renew its workforce philosophy by transferring teamwork methods (Donnelly, Mellahi and Morris 2002), Fiat for instance was focusing very much on the automation process (Jürgens 2012). By the end of the 1990s, all the major producers of Europe represented an individual but dynamic set of management, production and organization practices; moreover, an 'intrinsic logic' of each company's world views. Moreover, what formally was considered a European disadvantage – too

many producers on a too small market – in a globalized world of fragmented niche demand turned out to become a crucial competitiveness factor. However, already in 1992 Jean-Pierre Lehmann summarized the expected long-term success across this industrial sector of crucial importance for Europe:

"*Ultimately the défi japonais may turn out to be benign as was the défi américain. Europeans learned a lot from American management methods, benefited from American capital and transfer of technology, and generally welcomed American 'cultural imperialism'. Ultimately the défi japonais may well revitalize Europe"* (Lehmann 1992, 52).

The Japanese companies were considered to have "solified European car manufacturers' resolve to improve and prevail" (Roegner 1994, 21). Surely, overdue modifications were enforced by Japanese competition, at a latest when they arrived with productions sites on the European continent and reached for growing market shares that could only be held down by political pressure. However, there appear to be companies that benefited more and those that struggled more when facing the challenge to cope with Japanese competitiveness advantages.

First of all, the most significant benefit from the Japanese challenge was gained by Europe as a whole, which became a more dense and coordinated political and economic entity. Like the American threat, the Japanese threat forced the Europeans to cooperate more closely and to remove internal weaknesses, to enlarge its domestic markets, to raise and to support competition and R&D activity. Evidently, the milestone 1992 treaty of the European Union needs to be closely understood as a response to the Japanese challenge that often felt like a threat, especially for the political stakeholders and the public. Surely, one of the sectorial winners might have been the component and supply industry. Their active role in improving and securing product quality – as one of the main overarching business topics of the late 20th century – was finally recognized and supported. Supplier relationships consequently entered the top of the manager's agendas; supply chains were recognized as being more complex and cumulative.

Ironically, another winner of the Japanese threat is the UK. Having lost much of its manufacturing pride throughout the 1980s, it was – of all things – the Japanese production sites that brought back know-how, productivity and investments to Britain and let the motor industry catch-up. A final remark about who was benefiting in the long-term from the Japanese threat leads to the German producers. Particularly the "Big Three" (VW, BMW and DaimlerChrysler) in the early 1990s changed radically their approach as domestic producers and international sellers. They entered the global stage (fuelled also by German unification benefits) and had to quickly restructure their production model and their product strategy. In order to achieve economies of scope (more models), they had to set up new economies of scale, which meant also to implement Japanese production patterns rather deeply. The label "made in Germany"

was exported to other areas, especially to the USA and Brazil. Lately, the crisis of 1993/94 seemed to let these producers finally realize that a too strong reliance on the volatile domestic market might cause troubles in the future. So, this crisis was the "final impulse to change concepts and to once more read the MIT-studies for now dedicate massive efforts for understanding and exploiting the human resource factors of team work" (Jürgens 2012). In short, the combination of expanding business strategies and of refining the Japanese methods in an individualized way set the scene for today's most successfully exporting German car companies. Against the contemporary fear of losing the race (in a next crisis) and against the background of a new car boom in the US in the early 1990s, the German companies aggressively put all their eggs in one basket. In short, the only chance to survive was considered to sell more globally, which was illustrated by leaving the German „Sonderweg" (Germany's unique kind of coping with globalization). Given the similar Japanese situation of being highly dependent on exports, the German automotive industry in the 1990s might have felt the same pressure that Japan experienced when starting its remarkable automotive career. Comparisons of Japan's trans-nationalization in the 1980s and Germany's globalization trajectories in the 1990s are therefore meaningful. Last but not least it was – even more ironically – the Japanese benefiting from their self-induced dynamism. What is often concealed is the dialectics of adjustments around the dogma and paradigm of lean production. Knowledge and technology transfers not only derived from the East to the West, but also vice versa (Ibid.). This process is continuing and in contrast to the assumption of a fully converged worldwide production philosophy, new differences will arise and will again create competitiveness advantages. Japan e.g. is right now discovering *sustainable production concepts* that Europeans need carefully to study in order not to get shocked again like in the 1970s and early 1980s.

On the side of potentially disadvantaged players, Fiat shall be briefly highlighted. Fiat was the European company facing many difficulties when adapting Japanese methods or more precisely, was too much following a "technology fix" approach. Having invested massively in automation processes but less in training a flexible and high-skilled workforce, Fiat had to discover that "doors could still fall off a car, even if they had been put there by a robot. Productivity rose, but not the quality" (Donnelly, Mellahi and Morris 2002, 32). Concentrating mainly on productivity improvements was not enough to meet the Japanese challenge sufficiently. Radical new strategies, structures and both new external and internal relationships were lacking, also due to "non-compatibility between Fiat's past trajectory and a new evolutionary avenue purely and merely based on Toyotaism" (Camuffo and Volpato 1998, 333). In short, the divergences in institutional and cultural context were constraining its adjustment process more than in other organizations. Moreover, the combination with high reliance on its domestic market let Fiat appear generally renewing, but sticking more to older concepts than others. Fiat appeared on the 'greyer' side of an altogether growing industrial sector.

4.5 Conclusion: Lessons from the Japanese threat

The Japanese threat implies many lessons for the future of the European transport industry of which some possible lessons shall be presented. We can learn that Europe, centring exclusively on political-ideological attitudes of 'national champions' and a 'not invented here' mentality (Lehmann 1992) cannot survive in a complex and globalized world. The industrial reality of a highly internationalized and dynamic sector is not matching a traditional image of national symbols of identity anymore. In other words, the internationalized car industry history can teach us to rethink the sometimes too tight traditional concept of national identities or politics and to enlarge the concept with more flexibility. Europe, once more in the 1980s, was trying to defend cultural essentials and was gaining its motivation to react, but a Nissan produced in the UK might meanwhile have become the same symbol of national/regional affiliation, as it is a Peugeot being traditionally produced in France. Particularly France and Italy had to learn that lesson and finally had to bow to procedures of international business, as welcoming a first plant of Toyota in France by 1999, or by removing the import restrictions. Japan's more economic-pragmatic attitude enabled and enforced, however, Europe to discover how to become more willing to learn, to be less defensive and not to rest in national complacency. Coping with the Japanese threat and rebalancing the challenge meant to diversify Europe's industrial foundations and to extend the exclusively admired concept of economies of scale towards economies of learning and cooperation. Competitiveness, we can learn, becomes in the long run more complex and subject to steady dynamics. In the case of Japan, competitiveness was claimed to be an organisational problem that needed different methods than the scaling problems within the previous American challenge. If a challenge is to be approached successfully, all the participating areas need to reorient, including the governmental shift in its role of preserving national champions and its misleading adherence to indigenous national vehicles. Against the background of the 1980s, Japan's feared leading role in quality and productivity has been a crucial catalyser to split the Community (by heterogeneous import restrictions), although, finally, unifying it in order to speak louder and together with a common voice. Once more, an external player (like the US in the 1960s) pushed Europe to move closer together in 1992. Europe without external pressures would not appear the same as it is today. More drastically, Europe might essentially need external pressure to survive in the future. Japan, however, has been the benchmark for Europe's industrial future, particularly for the automotive sector. The fear to loose industrial dominance, the fear to lose the future race for growth, and not least the fear of losing cultural essentials can push Europe successfully towards adaptation processes and beyond that gives new impulses to other world regions.

What other lesson can we learn from the Japanese threat? Despite the bitter and distressing 1980s trade barrier policies that reversed the previous worldwide achievements of free trade and lower tariffs, this sanction paradoxically accelerated the process of rebalancing competitiveness disadvantages and accelerated the process of internationalizing this sector faster than ever before. Western protectionism that actually aimed to keep Japanese players insignificant on the European domestic markets, led to their even closer appearance in form of Japanese transplants and consequently to the inevitability of Japanese competition. We can learn that a weak industry like UK's automobile sector in the 1980s can recover if the policy environment is less protective than elsewhere and particularly is less bent on preserving its 'national champions' subsidies (McDermott 1996). Put simply, learning from the UK case, the slogan for the future could sound like the following: If there is nothing to protect, opt for aggressively welcoming foreign investments and advertising for the entry of former competitors on your own market. Sometimes weakness can become a winning factor or even the precondition for recovery. The Japanese only invested in the weakest sectors and in peripheral areas of Europe, in regions of high unemployment rates. Such a strategic disadvantage could become the precondition for foreign investment in the UK, given a foreign-friendly policy environment. Anyway, the Japanese had huge risks in investing abroad and were in the need to cooperate locally to save costs and thus catalysed global integration. Overcoming national sensitivities let Britain regain competitiveness; with the help of foreign knowledge, investments and technologies its automotive sector was clearly revitalized and became even attractive for other European producers. For example the takeover of Rover by BMW in 1994 can be assumed BMW's attempt to get access to Rover's fresh knowledge accumulated in years of Rover's cooperation with Honda in UK. Generally speaking, European producers learned much from the arrival of the main competitor 'at the front-door', not least strategies of investment. It is not by chance that the new American and Mexican productions sites of Mercedes-Benz (Tuscaloosa), BMW (Spartanburg) and VW (Puebla) follow exactly the same pattern of investing in peripheries, and illustrate one of the quickest learning effects from the Japanese challenge. Against the background of the UK transplants case, we can learn that distressing European blockade trade barrier measures had positive secondary effects and, thus, can be considered successful. Moreover, the Europeans learned increasingly to focus on growing markets abroad and to rely less on older attitudes of being a domestic producer, but also, or even instead, international seller. Learning from the Japanese, European producers followed the often-successful Japanese examples and established plants in North America and particularly Latin America to finally let the car industry become fully internationalized. Learning from best practice examples combined with a preparedness of taking economic risks turned out to be a European factor of success by securing market shares abroad. European producers had not only to adopt lean production principles; moreover, they at the same time had to relocate their business

location activities towards the whole globe. Lean production since the 1950s was established under the conditions and with the stipulation of exporting goods. So, whoever implements lean production will see correlations of internationalized business strategies, because achieving higher capacities and productivity induces the need to sell the higher capacity on new markets with more demand. In short, we can say that Japan made Europe think more export oriented and more willing to learn from outside instead of steadily defending European cultural “essentials”.

As a last point of many other possible lessons, we foremost can learn that early warnings need to be heard and recognized more seriously. Europe’s late acknowledgment of Japanese competitiveness advantages caused its shock atmosphere in bitter early 1980s. The time to readjust international differences will be shorter in the future. Based on the experiences of the Japanese Cassandra effects in the 1960s, indicating and assessing early warnings will become a key future ability and precondition to save time necessary to renew industrial structures and products.

5. Of blessing and threatening: China and the European transport industry

The world rarely has seen such a rapid rise and a country's quick global appearance than that of the People's Republic of China within the last three decades. Starting with economic liberalization processes by Deng Xiaoping in 1978 right after Mao Zedong's passing, the mainly poor, mostly agricultural and economically isolated socialist country consolidated its economic success with averaged annual growth rates of 9% to become today's second-largest economy after the USA in terms of nominal GDP. Between 1978 and 2003 the GDP of the country's 1.3 billion inhabitants grew to nine times, placing it "among the fastest-growing economies in any two-and-a-half-decade period in modern economic history" (Lardy 2005, 122). In the near future, not only economic but also political and military dimensions of the Chinese rise will become an even greater fact of the age, letting China – like about 200 years ago – return to its historic position as the dynamic centre of the global economy.

The focus on foreign trade (represented in China's five-year plans) played a key role in achieving the strictly top-down planned growth. China radically attracted foreign capital with very low labour costs in order to import "the latest technologies from abroad and carrying out full-scale industrialization at an accelerated pace" (Kwan 2002, 11). The Asian country aimed (like in previously decades) to leapfrog intermediate stages of economic development in order to make up leeway as fast as possible. Framed later in the term of a 'social market economy', China chose a policy rather contrasting from other socialist or developing economies, and particularly from the rise of Japan and Korea, which notably came up in a protectionist environment. Instead, while on the one hand subsequently privatizing farmland and industries in order to increase agricultural and industrial productivity, the Chinese government within the last twenty years opened up radically for foreign direct investments and granted access to its tremendous domestic market for the price of extensive technology transfers. This environment consequently provided "*possibilities for economic actors to exploit comparative advantages in a more rational division of labour*" (European Commission 2004, 235). In order to reach its ambitious national goals, foreign investors are given massive incentives to invest in manufacturing goods in China that subsequently can be exported from China into the world. This welcoming, virtually 'courting' industrial policy for export-dominated labour-intensive manufacturing sectors (including the transport sector) was accomplished through tariff-free imports of machines and components, huge rebates on VAT and very low bureaucratic and environmental restrictions. Having attracted thousands of foreign enterprises – particularly in Special Economic Zones (SEZ) like Shenzhen or Zhuhai in the southern and eastern coastal regions – China since the 1990s turned out to become the world's manufacturing centre for low-value-added and low-tech goods, often quoted as the *extended workbench* or the *world's workshop* of industrialized countries and prominently distributed worldwide under the controversial label "Made in China". As a

result of the above, since 2002, China has beaten the US as No. 1 Foreign Direct Investment (FDI) destination, illustrating a win-win-situation for both foreign companies seeking to save costs and endeavour new markets as for China, which depends on foreign expertise and funding to reposition itself on the world map (Davies 2010).

Within this successful process of attracting foreign capital, the many classical tax and administrative incentives certainly were (and still are) one side of the coin, but the more decisive incentive for Chinese competitiveness might have been the combination with China's very low labour costs. A mass of millions of people moving from the rural into the strongly urbanizing coastal areas provides frequent surplus and constant flow of cheap workforce (literally resembling Marx' reserve army of labour), which since the 1990s makes it highly seductive to offshore and outsource production from the Western World to China. In short, the established partly neo-liberal conditions under socialist guidance since the late 1970s have made China "one of the most competitive global locations for the assembly of manufactured goods for export" (Lardy 2005, 123), having accumulated an Inward Foreign Direct Investment stock of 473 billion dollars by 2009 (Davies 2010, 2). Being so much depended on foreign investments, consequently, "by 2003, foreign firms accounted for over one-quarter of China's output of manufactured goods" (Ibid.), whereas in 2009 already 153 of the largest 200 exporters in China were firms with a foreign stake. In this manner, China became the world's largest trading power with expanding global market shares and not least the world's largest energy consumer (Enerdata 2012). In 2003 China was expected to become the world's largest economy by 2041 (Goldman Sachs 2003, 2). This foresight was updated, and OECD now expects China to become the world leader already by 2016 (OECD 2013), bolstered with a growing private sector, a growing middle-class and massive infrastructure investments. Despite rising social inequalities and doubts about the future of China's one-party system, it has already overtaken the EU as the second largest economy in nominal GDP, by this evidently setting the scene to let an era of American, European and Japanese economic dominance come to an end. China became in the last two decades – most evidently in the current world economic crisis – the undisputed engine of global and regional economic growth, particularly supporting Japan's or Germany's export-driven economies and further catalysing global division of labour and the relocation of production.

As the Japanese dominance of the 1980s and 1990s forced foremost the automotive sector to internationalize, the Chinese low cost production and new market opportunities since the mid-1990s pushed the whole manufacturing industry and the service sector to ultimately leave the traditional sense of domestic business activity.

The central question: Is Europe's transport industry facing a "Chinese threat"?

Narratives about a Chinese threat are, however, widespread and involve not exclusively economic concerns but also military concerns. As European perspectives used to be more

relaxed, the US and some Asian countries have more often referred to China as a future threat since they fear expansionism and foreign aggression, or more precisely, the end of US security leadership in Asia and the starting of regional insecurities. While on the military side China is accused to steadily raise military expenditures (notably remaining far behind US levels), its rapid economic growth is made responsible to cause trade frictions with Japan, the US and the EU. More apocalyptic assumptions even claim China to be currently "waiting until it is fully developed before dominating the world" (Bustelo 2005, 2). China's stronger foreign policy against the background of its economic, political and military emergence is often claimed to be an evidence for gradually performing "its hegemonic tendencies" (Ibid., 3). But beside those political threats we can trace more solid economic parameters. Most prominently, Chinese very low labour costs are accused to cause a loss of manufacturing jobs in mature economies, and even causing the deindustrialization of the Western countries. A further indicator for a consequent shift from Euro-Atlantic economic dominance towards a Chinese 21st century is considered China's growing Overseas Direct Investments (ODI) in developed countries. Although the latter still remains quite marginal (European Union Chamber of Commerce in China 2013), those tendencies are traditionally providing a breeding ground for fearing to lose "cultural essentials" of the West and are creating the framework to percept China as a threat.

Countering the negative considerations, China is indeed mentioned as the engine and true driving force behind current world economic growth and might rather follow its established theory of 'peaceful rise' (*heping jueqi*) than to increase an aggressive 'great power' mentality. Following this approach, China would be depending on a peaceful international world order and therefore defends "an international system in which countries and regions with diverse systems and cultures, that progress in different ways, at a different speed and following different models, will coexist in harmony" (Bustelo 2005, 4). In contrast to the threat scenarios, this approach estimates that "China will make a greater contribution to the well-being of humanity" (Ibid.), which cannot be claimed utopian considering, e.g. German export success of recent years. The idea of a Chinese threat might clearly account for a growing economic competition on the Chinese domestic and the world markets, as more Chinese competitive companies step into the global arena. However, summarizing the recent discussion about the Chinese political and economic threat, some foresights seem indeed too radical, or become a self-fulfilling prophecy through following a belief in the inevitability of a conflict that suddenly "can become one of its main causes" (Ibid. 6). But is that also accounting for the European transport industry?

Attracted significantly by the low labour cost advantages and by the promise of securing market access, China's rapid and unique economic rise in the form of a 'state capitalism' was since the 1990s variously and ambiguously considered a complementary *opportunity* or, on the opposite, an upcoming *threat*. The offshoring and outsourcing

prospects as well as the lucrative market access were claimed to be a great opportunity to raise revenues and competitiveness; China's low cost production environment is on the other way around, traditionally considered a threat and a challenge for the European employment market. Beyond that, since China is increasing its position in knowledge-intensive, technically-advanced goods and services, the Chinese threat can assume a new form, the one of global presence in high-specialized markets, competing with the European transport industry.

Compared to the textile or consumer electronics industry, the more knowledge-intensive transport sector was, so far, less severely affected by relocation activities to China. This was also an outcome of the inner-European shift to new EU countries after 2004. Beyond that, Chinese exports of cars, planes or trains to Europe have not yet reached the visible significance of Japanese 1980s exports. Against this background, the European transport industry cannot yet commonly be declared to face a Chinese threat as the promise of benefiting from growth in the 'Middle Kingdom' still offsets concerns about its potential rebound effects in the future. Even more, the perceptions within the different segments of the transport field are strongly varying and remain ambiguous.

Thus, by analysing a selection of sectorial foresight studies since 2000, this chapter aims to describe the European transport industry as situated right "in-between" the manifold and complex discussions about China, and its trend to represent an opportunity or a (future) threat. Moreover, those selected studies highlight Europe's sectorial differences. Oscillating between promises and doubts, the implications of China's rise for the transport sector needs to be answered sectorial and cannot be generalized.
Even more specifically, it is sometimes necessary to understand the issue analysing each single OEM, because the rise of China clearly covers both the dimensions of fearing one (future competition in upmarket segments) and a promising one (low labour costs, market access). Therefore, a section will finally investigate the European automotive industry as an exemplary field by answering the question of who can (so far) be declared a winner and who a loser from the rise of China. Again, due to the fact that the Chinese threat discussion is a current subject, the question of whether China is more a threat or an opportunity cannot be answered in a satisfactory way. At the current stage, ambiguity rather than clarity characterizes this question, which shall be discussed in the following pages.

In order to better understand the current situation of European transport sectors, some more detailed observations about the country's development are highly requested.

5.1 China's economic rise from the "extended workbench" to an emancipated competitor

In the late 1970s, with the country's open-door policy, China's trade growth objectives were relying heavily on foreign inputs. Consequently the country promoted itself successfully as the ideal offshore destination; moreover, as the world's favourite place for cost-saving manufacturing. In this respect, the already mentioned Special Economic Zones were explicitly established as incubators of capitalist orientation. They had the purpose to attract foreign capital, know-how and management methods, especially by providing lucrative benefits in terms of low labour costs, low regulations, low environmental restrictions and a tax-friendly free trade environment. As laboratories for a new economic order, the Chinese government was using SEZs initially to test, refine and stage its reforms in a restricted and easily manageable area. Western, Japanese and especially South Asian companies or investors reacted soon, offshoring labour-intensive production and low-skilled manufacturing operations, following cost-cutting motives in production or envisioning access to the giant Chinese market. Notably, the strategy of searching for lower cost areas for manufacturing was neither new to Europeans nor to Americans. Since the European Single Market expanded steadily towards Eastern Europe, intra-European offshoring became a routine, although controversial, issue throughout the 1990s (Kirkegaard 2005). American companies on their side had – around the same time – experienced shifts in parts of their production to the Mexican border region, termed *maquiladora* (Sklair 2011). However, the traditional characteristic for the offshoring model is the clear organizational and intellectual hierarchy between home country and offshore location. The offshoring concept commonly implicates that "the most demanding and innovative parts of the work are kept at the home location, while activities that can be well planned and easily relocated are given to the offshore and nearshore regions" (ISF 2007, 12). Offshoring strategies generally aim to cut costs and are fuelled by the hope to gain more market share through strengthening the company's competitive advantage by labour arbitrage effects. Despite this rather simple definition, offshoring is by no means one-dimensional, nor without complexity and ambiguity. On the contrary, the concept itself is underlying many variations and perceptions; moreover, it is embedded in dynamics of politicization and fluctuating economic popularity. While in the early 1990s offshoring was considered a business activity of pure and simplistic product assembly, nowadays offshoring involves the whole bunch of process innovation ranging from R&D to product design activities (Lewin and Couto 2007). Beyond that, 'back-shoring' tendencies to relocate previous offshoring from foreign to home markets have become an evident countertrend in the recent past. In short, the scope and motivation of relocation activities – with China as one of its main world destinations – slightly shifts according to time, actor, product, branch and framework conditions at the offshore location. While for instance Asian companies were mostly using China as an

export platform, Western assembly operations were more focused on investing in China to additionally supply its domestic market. The latter strategy was illustrated prominently by Volkswagen, which sells, like Airbus, the output of its steadily expanding joint ventures entirely in China, by this securing "a dominant share of the Chinese car market for over a decade" (Lardy 2005, 128).

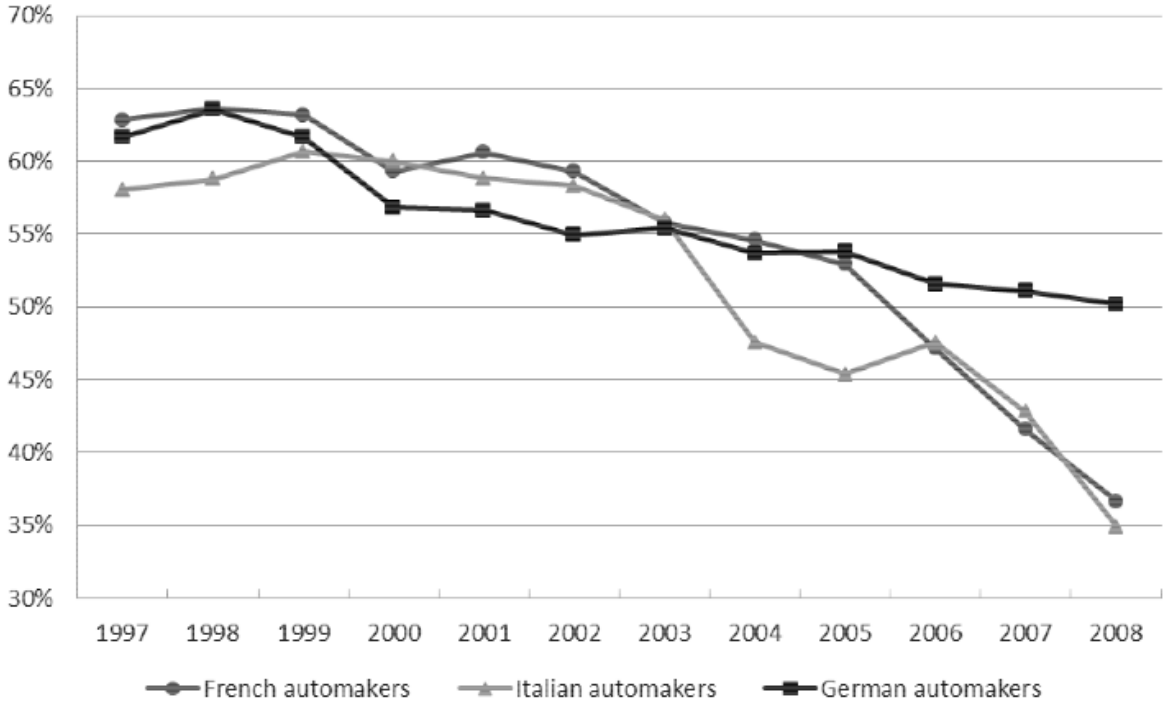


Figure 6 - Share of inland production in Europe's automotive sector - (Chiappini 2011, 24)

China's transport industry emancipation: high aspirations

Whereas until the early 2000s China was considered a centre for export manufacturing activities of foreign enterprises, since the mid-2000s the large state-owned Chinese enterprises spread their wings to increasingly become key domestic and global competitors. Following the indications of China's 12th five-year plan (2011-2015) the government aims generally to elevate the core competitiveness of manufacturing industry and seeks to upgrade indigenous research and innovation capacities. Among selective key industries, particularly the automotive sector is dedicated to upgrade productivity, quality and technology levels towards high-tech segments, and this in order to achieve stronger domestic and global competitiveness. This should especially "alarm" Western producers to carefully observe China's progress. Within an overall developing transport manufacturing market, enterprises like SAIC, FAW, BYD or Dongfeng are named some of the future key automobile producers with an envisioned annual 25 million-unit production. The rapidly growing and subsidized domestic market is today already the world's largest car market, facing growing urban middle-class demand for automobiles.

Until 2015, following the political will, Chinese domestic car producers should gain a 50% market share. Moreover, BYD (Build Your Dreams) even aspires to become the world's leading car producer by 2025, involving a huge fleet of electric cars. Currently more than a dozen producers are likely to be merged for greater scale effects in the years to come, although still depending on foreign technological, design and management know-how. As a result, to close the gap, an almost unmanageable number of joint ventures cluster are established around the leading Chinese car producers, for instance ranging from Toyota and GM to Audi and Mazda under the roof of FAW (FAW 2013).

Competition in the rail market is increased by the two dominant rail manufacturing players CSR (China South Locomotive and Rolling Stock) and CNR (China North Locomotive and Rolling Stock), which are highly benefiting from the on-going governmental infrastructure investments in rail and rail equipment that totalled 19.1 billion dollars (Lashley 2013) alone for the second half of 2013. With the Railway Development Plan to 2020 China is about to set up the world's largest national express railway and high-speed railway network and already has exceeded its ambitious goals of previous five-year plans. Currently, "stiff local-content rules stipulate that 70-90 percent of rail equipment be manufactured domestically" (Renner and Gardner 2010, 8). CSR and CNR manufacturers have increasingly learned "to reproduce vehicle design in local factories" (Ibid.) thanks to the technology transfer from their Western joint venture partners like Bombardier, Alstom or Siemens. However, huge contract volumes for track and rail equipment let China "account for more than half of global rail equipment expenditures in coming years" (Ibid., 8), having at least mid-term positive effects on Western manufacturers that provide sophisticated technology for the politically ambitious Chinese future prospects. But as the technology transfer will proceed, Chinese manufacturers are expected to increasingly challenge the traditional European leadership in this market section. Attracted by the lucrative Chinese market for trains, components, signalling etc. that account for about $50 billion a year (Financial Times 2010), the engagement of Western and Japanese manufacturers in China secure a steady flow of high technology and knowledge. As a result, CSR and CNR are very soon expected to be "growing into formidable global competitors" (Ibid., 25), which are already increasing their bidding activities within the domestic market but also worldwide.

In the aviation sector, China's state-owned Commercial Aircraft Cooperation of China (COMAC) is aiming to become a global player in commercial civil aircraft production. The *C919* model shall – over the next 15 years – be capable of capturing 50% of China's medium-distance aircraft demand, and it is scheduled to operate by 2016. Although COMAC is expected to dominantly supply the Chinese domestic market (and facing competition from China's high-speed rail system), this new entrant could become the most challenging threat for the traditional duopoly of Airbus and Boeing. As the Chinese government has pushed its domestic airlines to order 20 *C919* aircraft respectively, COMAC has a higher start-up-invest as once Airbus had when starting in 1960s Europe

(Fasse 2011). The current geo-political Chinese influence in Africa and Latin America hereby could support sales of Chinese aircraft in developing markets. Moreover, offshoring production to China is also accounting for the aviation sector as "the first Chinese assembled Airbus A320 rolled off the lines in August 2009, from the Tianjin plant which received an estimated $1.2 billion for development" (Pecht and Leonard 2009, 1). Offshoring in this respect includes and enhances "all aspects of research and development, design engineering, manufacturing, and systems integration" (Ibid., 3).

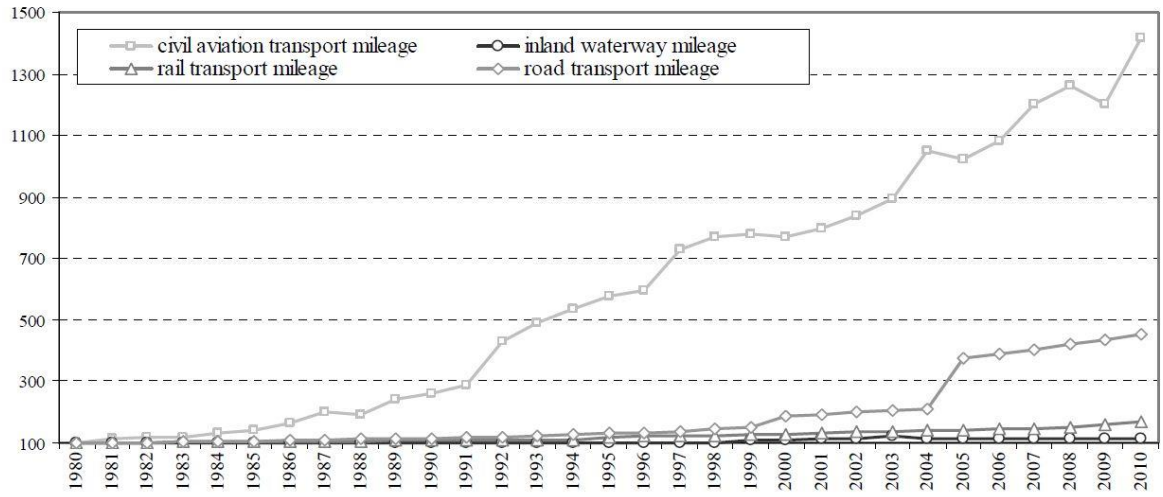


Figure 7 - Growth of Chinese inland transport (1980 = 100) - (Energies 2012, 582)

Summing up, China's current transitional atmosphere reflects the emancipation from the world's workshop for export-driven Western companies to a growing Chinese self-determination as an economic player, both on its domestic and on world markets. Parallel to this emancipation process China is still highly dependent on Western technological and management know-how and its willingness to attract FDI is unbroken. To cope with the hungry transportation demand illustrated in figure 7, China, at this stage, has undoubted become the most attractive market for the European transport industry.

5.2 The promise of low labour costs and offshoring/outsourcing production

Whether China's economic rise might be assessed a threat or a harmonious development, the subject of much lower Chinese labour costs since the 1990s became a key issue also for the European transport industry. The extreme wage differences, even compared to other developing economies, can be identified as one of the main competitiveness differences and was considered the main reason for China's continuing export success. Against this background, offshoring and outsourcing since the 1990s followed the striking cost-cutting arguments and became an appreciated business obsession to gain cost advantage and to stay competitive.

Seen from a historical perspective, today European manufacturers are *once again* facing a competitiveness disadvantage against the incomparable economic conditions in

another world region. While the American threat was highlighting European business model and management deficits around scale economies, and the Japanese threat was emphasizing technological and organizational advancements in production and workforce, today the China accentuates low-cost production. Thus, while in previous decades industrial integration and technological development were key indicators for economic success, the Chinese economic challenge to some extent 'simplifies' the competitiveness conditions back to the 'old' workforce cost aspect. In short, "*The issues are less about technological supremacy than they are about the implications for developed country economies of a continuing outflow of investment and labour market displacements from the associated shifts in production and trade*" (Adams, Gangnes and Shachmarove 2006, 96). Therefore, the following section shall define the scope of the challenging Chinese wage implications and the European offshoring activities.

China's low labour costs: the world's gold mine?

Chinese labour costs are still among the lowest in the world. Although they are annually rising at growth rates of around 10%, they still account for only a fraction of other developing countries' wage levels, not to mention Western wage levels. As reliable statistics are lacking it is difficult to truly assess China's real competitive strength in terms of low labour costs, but apparently they produce a huge cost advantage. Published Chinese statistics often do not meet international standards, instead data and information needs to be drawn individually from the enterprises. According to the United States Department of Labour that conducted the most ambitious attempts to light up the statistical darkness, in 2004 the average Chinese hourly wage in manufacturing was $0.66 compared to a European or US factory worker who earns $20-$30 hourly (Bannister and Cook 2011). Within four years this hourly wage level would have more than doubled to $1.36 in 2008 and for today is estimated to have reached slightly more than $2.00. Those rising wage tendencies are enabled by continuing overall economic growth and supporting governmental measures of minimum wage increases. However, the differences within China's mainland remain glaring. The rural or suburban workers (although also facing huge wage increases) are far from the average national compensation since only factory work in urban areas, where most of high-value exports originate from, is among the best paid. As a result of general wage increases, the competitive advantage of low labour costs seems to diminish rapidly, but, however, remain significant. According to Reuters, a very recently published Meryl Lynch study consequently accentuated the 'historical' turnover that Mexico today provides cheaper labour cost conditions than China (Reuters 2013).

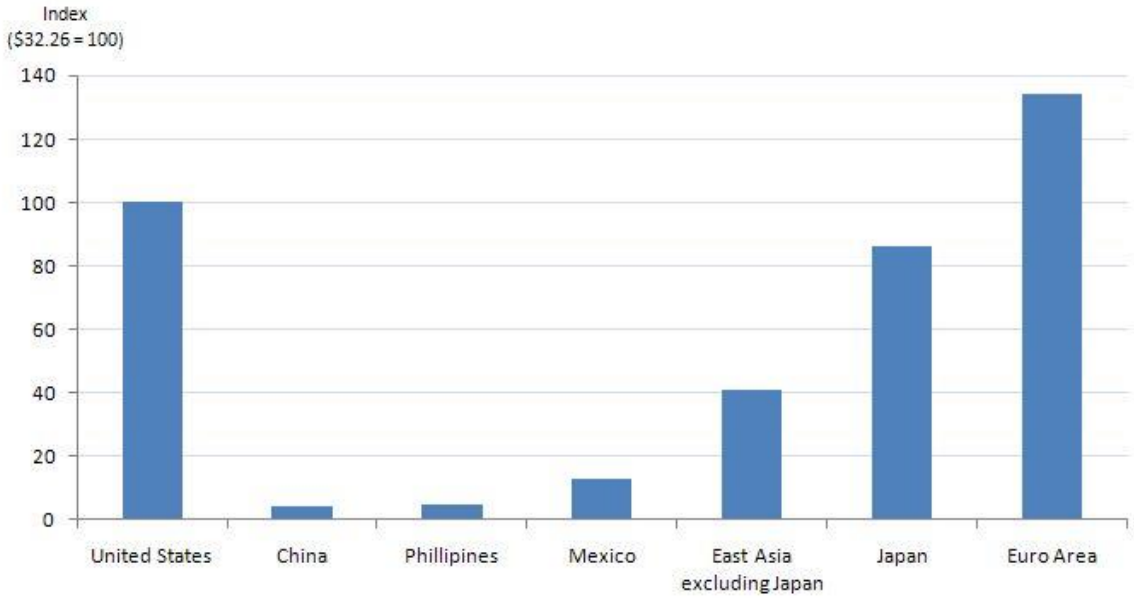


Figure 8 - Index of hourly compensation costs in manufacturing, selected countries and areas, 2008 (Bannister and Cook 2011, 49)

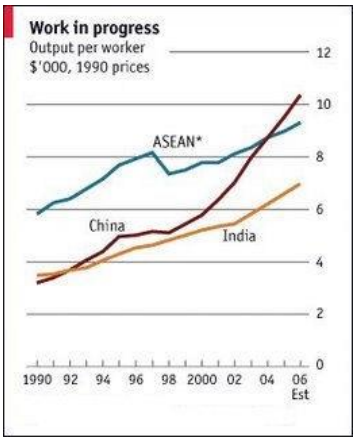


Figure 10 – Productivity comparisons, 2007 – (ILO 2007, 34)

Year	National currency basis (Yuan)	U.S. dollar basis (US$)	Index (US = 100)
2002	4.74	0.57	2.1
2003	5.17	0.62	2.2
2004	5.50	0.66	2.3
2005	5.95	0.73	2.4
2006	6.44	0.81	2.7
2007	8.06	1.06	3.4
2008	9.48	1.36	4.2

Figure 9 - Estimated hourly compensation costs of manufacturing employees in China, 2002–08 - (Bannister and Cook 2011, 45)

Beyond low wages that illustrate a factual key cost ingredient for competitive enterprises, productivity differences need to be considered relatively. Ceglowski and Golub are emphasising to consider productivity gaps, because low labour costs alone "by themselves do not guarantee that a country's workers are competitive in the world market for manufactured goods. Labour productivity also matters for international price and cost competitiveness" (Ceglowski and Golub 2007, 579). Therefore they proposed relative unit labour costs (RULC) that would provide a more "compact measure of international competitiveness that encapsulates the key sources of the controversy surrounding China's phenomenal export growth" (Ibid., 599). But despite a considered productivity gap derogating the Chinese labour cost miracle, the country's average labour costs in 2002 still "was about 25-40 per cent of the US level and correspondingly low

relative to the EU, Japan, Mexico, Korea and most other newly industrialising countries" (Ibid. 611). Moreover, until the early 2000s the productivity gains would have outpaced wage growth. Taking into account the relative labour costs and the currency devaluation, "the Chinese cost advantage implied by its RULC is, in most cases, substantially smaller than that suggested by a comparison of wages alone" (Ibid.).

Summarizing, China's still low labour costs are accounting without doubt for one of the key factors generating China's competitiveness and attractiveness for FDI streams since the 1990s, and are explaining the fabulous economic growth in the last two decades. A favourable exchange rate, the large inflow of FDI and management, the gigantic domestic market as well as reduced costs of communication and transportation notably play other key roles. However, since many of those factors might change over time, the labour cost advantage will even in the long-term remain rather stabile due to China's unbroken flow of rural population that has the potential to become workers in sectors other than the agricultural. As Adams et al. underline, "*Appreciating the exchange rate, even by substantial amounts, is not likely to greatly diminish Chinese competitiveness. China's huge pool of cheap and increasingly mobile labour means that even with exchange rate readjustment, competitiveness based on low labour costs will be maintained for quite some time*" (Adams, Gangnes and Shachmarove 2006, 120). Thus, despite the dramatic changes in wage levels, China is not likely to lose its competitive advantage of low labour costs in the next decade and Europe will not be able to compete on the level of low wages. Instead, Yang et al. stated "China is likely to maintain a global labour advantage to support its status as the world's factory and remain an attractive destination for FDI" (Dennis Tao Yang 2010, 501). Furthermore, due to the "persistently increasing gap between the wages in skill-intensive industries and labour-intensive industries", Yang et al. anticipate "that a robust supply of labour and skill will likely stabilize China's wage growth to a moderate pace in the near future" (Ibid.). China is prospected to have still a long way to go before approaching wage levels of other emerging markets. Even if the Mexican level were already reached, other effects like the huge domestic market would still favour China as the world's No.1 FDI destination. Other countries like the "next eleven", including Mexico, Vietnam, Indonesia or the Philippines, might already provide lower wages, but they are lacking of China's scale, efficiency and supply chains (Adams, Gangnes and Shachmarove 2006).

Offshoring and outsourcing production: the world as a 'bazaar economy'

To gain competitive advantages in cost-lucrative low wage regions European companies since the 1990s felt increasingly attracted to offshore and to outsource production of goods and services. As offshoring production refers to the "acquisition of intermediate inputs by companies (or governments) from locations outside the consuming country", outsourcing refers to the autonomous "purchasing of intermediate inputs by companies

(or governments)" (Kirkegaard 2005, 3). While outsourcing means to buy supply by independent third party contract partners, offshoring means to remain in closer linkage and relation with the source company. Especially the rapid developments in ICT and the lower costs for communication fuelled and catalysed offshoring of services to other countries, notably to India and China. By this, ICT "has expanded international trade by lowering transaction costs and making entirely new things tradeable" (Ibid. 4). However, the detailed extent of European offshoring and outsourcing activities remains non-transparent and hard to measure since there is a lack of authoritative official statistics. In order to avoid a feared or upset public, companies might hide away those numbers, because after all the business activities of relocating production and services could become highly socially and politically explosive, like particularly experienced in the US (Bronfenbrenner and Luce 2004). To relocate business in the very most cases means to lay off workers and to cause unemployment. But although the 2000s saw some pessimistic scenarios, like the Forrester Study of 2004, which totals the number of jobs to be sent outside with 1.16 million workers in the EU and 3.3 million in the US (Forrester Research 2004), the actual effect on the labour market remained relatively low. With e.g. roughly 100,000 job losses in the European service and IT sector in 2004, the effects of relocation would affect far less than 0.5% of total jobs in the service sector. In short, the sense of an "imminent doom for Europe's labour markets because of offshoring and offshore outsourcing is unwarranted, even if one relies on the highest job loss estimates available" (Kirkegaard 2005, 10). Noticeable, European manufacturing capacity is about to flow out of the EU-15, but a) remains strongly within Europe as it is often transferred to Eastern Europe and b) is far from proving feared scenarios and "talks of imminent total deindustrialization" (Ibid., 7). Thus, offshoring and outsourcing can hardly be considered a threat rather than an opportunity. "Perhaps up to 2 percent of Europe's service-sector employment and a similar minor share of manufacturing employment may be affected in the coming decade, so most ominous European employment predictions must be rejected" (Ibid. 25). The effects of continuing globalization and trade expansion might gain in the long-term perspective even new employment, but in the short-term is naturally experienced as negative. Instead, policy makers try to soften public excitement by providing the basic framework for the Chinese challenge: "As jobs will be lost in traditional production activities, new jobs will have to be created in activities more decisive to meet the challenges from newly industrializing countries" (European Commission 2004, 272). So, China is not only a threat, but also an opportunity for new jobs, provided Europe has a stronger focus on high-skilled labour.

We should also consider how, in recent years, the concept of offshoring is itself considered slowly maturing and diversifying. In the traditional sense, the search for cheaper labour conditions around the globe is "tailing off and to some extent [is] being reversed" (The Economist 2013). Backshoring, as mentioned above, emerges to be a new

trend for selective activities, following the general assumptions that "multinationals will certainly not become any less global as a result, but they will distribute their activities more evenly and selectively around the world, taking heed of a far broader range of variables than labour costs alone" (Ibid.). Given the still high labour cost arbitrage of China it is too early to identify this trend as a major shift. Beyond that, it is hard to differentiate between publicity effects of, for instance, US companies like GM relocating call centres to the US, and hard economic facts of new cost savings "at home". Moreover, evaluations and surveys of whether to stay or to go back home are complex due to companies' current stronger preferences to show presence in the developing market. Even if the cost advantage might diminish, the vicinity to future customers might outweigh rising wages or infrastructural costs. So, beyond overlapping motives for offshoring and outsourcing, the tendency of securing market access might evolve more clearly in the future and could offset the classical obsession and race for cost-saving activities in the labour context. Exemplarily, The Economist recently cited Pierre Beaudoin, chief executive of Bombardier: "*now Bombardier is in China for the sake of China*" (Ibid.).

Summing up the above, the highly unequal labour costs between the EU and China will persist for many years, even if Chinese wages keep rising annually. Thus, Europe will not be able to compete on the basis of low wages, but instead, its companies will continue to expect cost-savings behind continuing to relocate production and other business activities. Despite the inherent danger of losing further manufacturing clusters to Asia, according to the European Competitiveness Report 2012, there's a tendency that „more sophisticated products seem less likely to be offshored"(European Commission 2012, 7). As the transport industry is in many areas already developing towards a high-tech industry (especially in aviation and in the specialized European shipbuilding), production systems, R&D etc. are more and more demanding for a high-skilled workforce and might, even abroad, less seeking for low-skilled labour cost advantages or in some cases might even stay home in order to secure proper personnel. Furthermore, reasons and motives behind offshoring and outsourcing could imply stronger securing market access and vicinity to the customer instead. Even if relocation activities will continue to play a key role to stay competitive and to reduce the cost basis, the horror predictions of Europe losing its entire industrial workforce have not come true and were exaggerated, also because the EU enlargement provided lucrative inner-European offshoring destinations. In short, relocation strategies are dynamic and it is very likely that the core high-end operations and most profitable segments of the value-added chain like R&D and Design will remain at the home regions, provided that companies find proper infrastructures and high-educated workforce. The Chinese threat that was felt by the public since the 1990s could be mitigated against the background of general upstream quality gains in the European transport industry. As last years' EC Competitiveness Report

declared: “In-house R&D and specialisation in knowledge-intensive products is an alternative to offshoring to lower-cost locations” (Ibid.).

5.3 Sectorial transport future studies since 2000 addressing the rise of China

5.3.1 *Smelling the air of rising competition*. Future prospects of the European Automotive industry in the European Competitiveness Report 2004

The Commission’s European annual Competitiveness Report for 2004 exemplarily illustrates the dual perceptions of China as an opportunity and as a danger. China within a SWOT analysis of the European car industry was explicitly listed among the current opportunities for providing a highly attractive market. But the subsequent future scenarios of the report listed China high on the agenda as having a threatening potential for low-priced exports flooding the European market and – even worse – for becoming an emancipated productive producer that has caught up with European competitiveness.

On the one hand China is declared to have the sweetest prospect to increasingly consolidating the European industry; on the other hand it is feared that already the automotive industry “must face the challenge of a loss of knowledge in return for market access” (European Commission 2004, 120). This, in the long-run, might have a negative rebound effect. In the worst case scenario for the next 10 to 15 years from 2004 onwards, the Report declared that “*Chinese manufacturers have emerged as highly productive producers who have transferred know-how and competitive resources out of joint ventures into companies which are completely under Chinese control*” (Ibid., 222); and this, eventually, forcing European manufacturers to totally refocus their production system, “leaving only marketing and R&D facilities in Western Europe” (Ibid.). In such a unfavourable scenario of de-industrialized West, the rise of China would, in line with lacking European productivity and rising energy prices, cause a situation that “labour intensive production operations are at first shifted towards the new Member States and, as labour costs start rising there too, they might move further east” (Ibid.).

While the 2004 European Competitiveness Report certified the European automotive sector a strong performance and a positive future outlook, it highlighted also the role of labour costs and offshoring production. Particularly new inner-European opportunities and innovation potential were already beneficial for the automotive sector and secured its international position. The EU enlargement had “proved an opportunity to restore the efficiency and the cost effectiveness of its value chain” (Ibid., 219). Among the major driving forces of the competitiveness of the automotive sector, labour cost advantages in Central Eastern Europe accounted as a key advantage, providing a benefiting environment for the most important European industry.

East and Central European labour cost differences, which are in distinction to very low Chinese labour costs termed “affordable”, and on-going privatization of state-owned enterprises, would have allowed international companies “to acquire existing production plants and to employ their qualified labour force” (Ibid., 220). The accession of the New Member States that joined in 2004 would “offer profitable production circumstances based on their labour cost and tax policy” (Ibid.). Thus, those elements were providing key cost advantages to stay competitive within the greatly pressured and globalized car market. Although not comparable to Chinese extra-low wages, Eastern European employees were highly qualified. This latter positive element will not last, because “since other production locations catch up in educated labour forces with less regulation, the European competitive position is eroding” (Ibid.). Although in this context China’s role was not directly mentioned, the intention of China catching up with the competitive edge of European manufacturers in terms of quality and qualified labour forces becomes evident.

Summing up, the 2004 report illustrated China’s inherent and pending role as being the healing saviour (especially for the engineering and transport equipment industries), and at the same time bearing the potential of becoming the future fatality that slightly could erode Europe’s strong competitiveness position. If Europe would neglect to further strengthen innovation and cost-cutting strategies, China would profit vigorously by European failures and would together with a forced technology transfer in joint ventures strike back rigorously. As the “main challenge relates to China’s advantageous factor, in particular labour endowments” (Ibid., 272), the EU enlargement was advertised as providing not the same, but at least ‘affordable’ labour costs in combination with an already existing distinct local expertise. The issue of labour costs and the engagement with the Chinese challenge, illustrated through this official document, ultimately by the mid-2000s entered the top European economic and political agenda. The awareness of engaging with China, due to its accelerated rise after its entry to the WTO in 2001, became evident when the Commission’s Competitiveness Report for the first time contained a special section assessing the “challenge to the EU of a rising Chinese economy”. However, China in 2004 was detected a challenge rather than a threat, though it was stated that China’s rise “has become increasingly more complex in recent years and its exports could adversely affect a broad range of industries in the EU” (Ibid., 256), notably having differing sectorial impacts.

Focusing on keeping up the strong European automotive position in the world markets and in order to prevent a horror scenario of Chinese penetration and productivity leadership, European manufacturers by this Report were motivated to show presence in emerging markets (foremost China), but also particularly to follow the strategy of stronger exploiting Europe’s ‘little China’ in the east of the continent. “The new Member States have emerged as great production opportunity for the European

automotive industry. Especially Poland, the Czech Republic, the Slovak Republic and Hungary show a promising combination of traditional expertise in the sector, affordable labour and the proximity to the large European markets" (Ibid., 225). Taking "full advantage of the enlargement" in terms of cost-savings was considered a key condition for success, or in context of an expected Chinese competitive pressure in the future, a strategy to survive. Making use of a 'critical mass' of Europe, "the new Member States and candidate countries have so far been able to offer more attractive near-shore centres" (Ibid.), by successfully rebalancing the competitiveness deficits of high West European labour costs. In short, the European car industry around the mid-2000s was not considering China as a threat, mainly due to European technological leadership, additionally gained compensation potentials in labour cost savings, as well as new markets from the EU enlargement.

As this section is not aiming to investigate the whole dynamics in the automotive landscape since the rise of China's economy, it might yet be worth mentioning that the situation since 2004 has changed. China's auto producers are catching up rather quickly as they are "developing capacity to undertake more complex assembly functions and research and development, including in electric cars" (Bailey, et al. 2010, 313). The long-lasting joint ventures between Western and European car producers have established a remarkable technology pool in China and set the scene for the evolution of Chinese brands from former joint ventures to national champions. Although Europe is not yet experiencing significant imports of Chinese cars compared to 1980s Japanese imports, however, Chinese competitors now own Volvo. This might only be the first of more drastic steps to come. So far, only a few Chinese producers are heavily internationalized and they are mostly interested in the internal Chinese market or in markets of other developing countries. Stepping into advanced markets through acquisitions is not yet a major Chinese business strategy, but this might change soon and needs to be followed carefully. Thus, "whilst China is not as yet perceived by US and European producers as an import threat, it may well do so in the not-too-distant future" (Ibid.). Thus, a Chinese threat that was not dramatically felt in 2004, might be arising very soon. However, it is not yet prominently reflected within the report landscapes of the automotive industry. As many European producers are benefiting from the lucrative Chinese market and the Europeans only experience insignificant imports of Chinese cars, the sector is *still* focusing on China as an opportunity.

5.3.2 *Neither a threat, nor underestimated*. LeaderShip 2015 – Defining the Future of the European Shipbuilding and Ship Repairing Industry

Analysing *LeaderSHIP 2015* – the central long-term future programme on the European maritime transport sector conducted in 2003 – China in the 2000s was not so much

evaluated as a threat, but much more as a stimulating factor. The latter mainly through a further development of a secure, continued and consolidated lucrative niche approach of the European shipping industry, and the top world market position in construction of complex vessels such as cruise ships, ferries, mega-yachts, dredgers, special rescue boats etc. Since forty years ago the European shipbuilding industry was hit with full force by Japanese and later South Korean competitors and was about to fully disappear in the late 1980s, the perception of the Far East has traditionally been of threatening nature. China, however, at that stage was not yet on the map of major shipbuilding nations as it appeared only in a relatively short time competing with the established players. The European industry had already gone through a long and hurting – but yet successful – readjustment process towards a "high-tech industry" (European Commission 2003, 6), with sophisticated products, to the point that the European shipbuilding industry nowadays seems to less fearing low Chinese labour costs.

What matters the European shipbuilding industry is the risk of losing technological supremacy due to low protection of intellectual property rights, or the expected shortage of high-skilled labour force in Europe. In other words, the European shipbuilding industry had already experienced the low labour costs shocks with the triumph of Japanese and South Korean shipyards decades ago, and it had already learned from that by re-positioning itself into a niche (but lucrative) approach.

Thus, China's low labour costs seem to cause less concerns than other factors do. Although the wage differences compared to China are crucial and are considered a weak point for Europe, the Chinese shipyards would anyway focus on a low-tech mass segment of labour-intensive bulk, container ship and tanker construction, hence, a market that traditionally the Europeans have already half-abandoned. Moreover, according to this central programmatic document, China is not directly feared as a main competitor in the European high-end niche market, but is considered an indirect threat as Chinese shipyards are assumed to strategically produce overcapacities, which are consequently deteriorating prices worldwide. Against this background, the Chinese industry is accused to enjoy unfair "State supported strategic investments" that would "have resulted in an imbalance between supply and demand" (Ibid. 9). Additionally, "excess production capacity, created for strategic reasons" is therefore considered the key problem in world shipbuilding (Ibid.). In this respect, the core future competitiveness of this sector involves a strong political dimension of intergovernmental trade policies. Consequently, establishing a "level playing field in world shipbuilding" (Ibid., 11) is listed the first of many recommendations, illustrating the industry's general status to rather raise concerns about the policy frameworks and inner European constraints than to raise concerns about the huge imbalance of labour costs between China and Europe. On the contrary, LeaderSHIP 2015 advises (enforcedly) to plainly distinguish from competing at the bottom end of the market, as it quotes that "*European shipbuilders have to compete internationally through advanced technological solutions, not through low costs*" (Ibid.,

16). Underlining this approach the more detailed 2009 *Study on the Competitiveness of the European Shipbuilding Industry* evaluated the following: "Labour costs typically account for some 20% of the overall costs. Europe clearly shows higher labour costs in comparison to its Asian competitors, although low labour cost competition is mainly focused on China and emerging shipbuilding nations. Korea and Japan do not have significantly lower labour costs and have even higher labour costs than some European countries (such as Romania). Due to its specialisation in the high value added segment of the market labour costs are less of an issue in shipbuilding in Europe" (European Commission 2009, 12). As Asian dominance is already a fact, the future is likely to generate a further erosion of European market shares in terms of shipbuilding in CGT volumes, but, however, "Whereas in 2007 the market share of production volume completed (in terms of CGT) was 17% for Europe and 82% for Asia in 2007, in absolute terms, the production-value of Europe (€12.0 bn) was more or less equal to Japan (€12.5 bn), higher than China (€9.0 bn) and lower than South Korea (€17.9 bn)" (Ibid., 27). Those numbers indicate the realization of a successful niche approach strategy that does not fear direct Chinese competition as long as they don't step into the high-end segment.

Summarizing, the European shipbuilding industry, due to its specialization strategy, declares to have "good reason to be confident about its future" (European Commission 2003, 6) and considers China not as a niche market competitor but more general as a reason for worldwide price deterioration for the industry as a whole caused by strategic production of overcapacities. Although the rising market shares of Chinese yards after 2003 might have been taken more into consideration today, inner-European threats of a lacking high-educated workforce, poorly funded research, development and innovation (RDI), or losing technological leadership by unprotected intellectual property rights outweigh the concerns about the crucial Chinese advantage of low labour costs or the need to offshore and outsource production. In other words, the real future threat is considered to be a European one: "A more prominent theme is the shortage of high educated labour. Although due to market developments the absolute demand for shipbuilding labour is not expected to show strong increases, there is an on-going demand for highly skilled labour. This is further aggravated by the ageing population leading to the retirement of current skilled employees in the coming two decades" (European Commission 2009, 12). Due to concentration on complex ships, a knowledge-based production process, high technical expenditure and a complex subcontractor network, the skilled workforce is considered a key resource to stay competitive in the high-end niche market, beyond that is a fragile essential for the sector's survival. Compared to the automotive industry, the EU enlargement for the shipping industry in this context seems to be considered less appealing in terms of relocating production activities. Although also offering opportunities, the EU enlargement was uncovering the low productivity of Eastern yards that will have to be restructured. On the one hand, the enlargement has extended the whole European portfolio toward conventional

shipbuilding and toward a diversification of the sector as "shipyards in accession countries focus on a different product portfolio" (European Commission 2003, 36).

This strategic European industrial sector represents self-confidence for the future because it has learned the lessons of previous decades that led to realign the whole industry and seems to elaborate how to retain its current strong position. With further aiming for more specialization and diversification, the European shipbuilding industry cannot be considered passively hold out in the established niche market approach, but seems to smell that the competitive edge needs to be consolidated and extended as in the near future e.g. Chinese shipbuilders could be "slowly shifting up the ladder towards more complex vessel segments" (European Commission 2009, 169). The Chinese up-market orientation is likely to happen as the country's shipbuilding industry is in a current depression due to former overcapacity and low productivity, therefore needs to be radically diversified. In this respect, analysing LeaderSHIP 2015, China for the European shipbuilding industry is neither a threat nor it seems to be underestimated. Beyond that it becomes obvious that although the sector is highly exposed to globalization, the future of the sector might be more likely decided within Europe, not outside Europe. The inner threat of retarding the pace of specialization outweighs the external threat of low labour cost pressure or differing production capacities.

5.3.3 *Frightened of China*. Future prospects of the European rail industry in the 2009 UNIFE Annual Report and ERRAC Research Program

Examining the 2009 Annual Report of the Association of the European Rail Industry (UNIFE), China appears among the industry's future threat scenarios, illustrating the industry's concerns evolving toward the rise of the East. Against the background of an increasing competition "with Chinese players bidding in the framework of European call for tenders" (UNIFE 2009, 50), the industry, more than other sectors in the transport field, faces growing pressure from Asia both in manufacturing and operation. Consequently, one of four future scenarios for the rail industry until 2025, established by UNIFE in collaboration with Boston Consulting Group, is the "Dragon Corp." in which "China dominates the world and is leader in the rail supply industry" (Ibid., 52). More precisely, the alarming scenario depicts that "*in the next 20 years, European rail suppliers will either be swallowed by Chinese competitors or struggling to find a new business model. China will rule the world, from an industrial and financial point of view, and will get an easy access to technology and resources. Europe will lose from its prominence over global affairs*" (Ibid., 49).

Although the "Dragon Corp." scenario was only one of three scenarios the Annual Report 2009 stated that this future prospect centring on Chinese dominance is to "becoming more realistic every day" (Ibid., 52), hence it illustrates the current transition

towards a clear Chinese threat perception in the European rail industry sector. Following that scenario, Chinese rail enterprises would lead the world with cutting-edge technologies, thanks also to previous technology and know-how transfers, and they would do so with lower final cost. Surely this future prospect is an extreme one and has provocative characteristics, but however UNIFE considers it far from improbable. Despite a forecasted 2.7% growth for the global rail market until 2017 (UNIFE 2012b, 28), fuelled by positive transport megatrends for rail, an accelerating Chinese competition is already considered more than just a "weak signal". As world markets outside China are increasingly expected to raise demand for rail equipment and signalling systems, the Chinese competitors, such as CSR and CNR, are preparing for bidding for as many high-speed rail and urban transit systems as possible to become an exemplary key industry of China's new competitiveness. Already neighbouring countries like Burma, Thailand and Laos see the construction of Chinese-built high-speed rail projects (NewsAsia 2013), thus UNIFE, particularly against the backdrop of a challenging crisis in Europe in 2009, expects a decline of European market shares and a potential of Chinese manufacturers or operators entering also the European market. Despite European rail manufacturers are still highly (but yet decreasingly) benefiting from mammoth Chinese governmental infrastructure investments, Chinese companies are already looking to the European market. Backed by the renewed land bridges between Asia and Europe for freight transport, Chinese enterprises are promoting large-scale projects like completing the Marmaray project in Turkey in order to create an entry market for European countries. With those and other projects in the pipeline, UNIFE 2009 Report, despite its alarming foresight of a potential Chinese threat that is already felt in some field, surprisingly does not address the Chinese issue within its future actions. Only more recently the sector experienced, with the ERRAC Roadmap Projects (European Rail Research Advisory Council), the evolution of strategies to avoid the sectorial negative predictions. In 2011 such a research program stated that Chinese companies would have already caught up very rapidly with European companies giving, consequently, a bunch of industrial responses: "*The European rail industry, however, will not be able to compete with rivals from developing countries on the basis of price. Only continuous innovation and quality improvement can enable European companies to compete successfully*" (ERRAC 2011, 3). Measures to improve the overall European competitiveness, both towards other modes of transport and other sectorial competitors from abroad, are projected "going beyond interoperability with technological solutions for a better integrated European railway system; develop innovations for intelligent mobility; green transport (based on economics and legislation demands)" (Ibid., 7). R&D, like in all other sectors, is considered the key factor of staying competitive; however, funding and strategy for R&D have to make a difference, indicating and removing current weaknesses within the research policy framework system, while the whole sector needs to be addressed for a too low rate of market uptakes coming out of R&D. So, generally speaking, research and innovation

efforts will have to increase dramatically by improving “the performance of products, production processes and reduced life cycle costs (benefiting from economies of scale), with the aim of improving the economic attractiveness of the rail transport mode” (ERRAC 2011, 17). A final clear warning states how “Asian and African economic development will lead to increased market trade demand”, and knowledge and information transfer will be faster: “It should not be assumed that railways in their present form will survive as the preferred transport mode, if they do not rise to this challenge” (Ibid., 14).

Figure 11 - The railway sector's rude illustration for fearing China in the future - (UNIFE 2009, 52).

Summarizing, the European railway industry can be openly declared to face a “Chinese threat” as advance warnings within the industry indicate a high potential for Asian, and particularly Chinese domination on the global railway market until 2025. Despite European growth expectations for the medium term, Chinese competition is about to happen on previously European-dominated markets very soon, which to some extent becomes already visible as first global bidding processes were won by Chinese competitors against European tenderers. Lower production costs, a continuing technology transfer, strong domestic Asian markets with partly protectionist measures, the offering of lucrative full-package end-to-end solutions as well as ambitious R&D developments will further strengthen the new actors in the market. In short, a novel awareness of these elements is overtaking the lack of responses as experienced until a few years ago. Thus, it might be fruitful to remind to the railway industry stakeholders how that previous lethargies of other transport sectors (like the car industry in the late 1970s) had massive negative rebound effects. Setting up scenarios like the “Dragon Corp.” in 2009 surely is one aspect of addressing the future, but notably they have to be linked with taking actions concertedly. The ERRAC Road Maps provide such actions with emphasizing a central role of R&D, business preparedness and harmonization of national

rail systems to secure future European competitiveness in the rail sector. In this respect, innovation needs a new approach that involves to better match market expectations and not to developed innovation just for the sake of innovation.

Today, China is not any longer underestimated, but, however, the overarching policy and industrial responses to compete globally are still is in its infancy, not least constrained by Europe's historically fragmented railway topography.

5.3.4 *Not before 2020.* The aviation sector's "Beyond Vision 2020 (Towards 2050)" Background Document.

The European civil aeronautics and air transport sector is very likely to face the emergence of new competitors. However, it cannot (yet) be declared to face a crucial "Chinese threat" compared to the rail sector. Among the future challenges indicated in the 2010 ACARE "Background Document Beyond Vision 2020 (Towards 2050)", like environmental and funding constraints for high-rising R&D costs, increasing energy prices and geopolitical threats, the subject of new competitors appear only as one element among a variety of challenges and uncertainties. However, the duopoly of Europe (Airbus) and USA (Boeing) as world market leaders – the result of a consolidation process that started in the 1970s and lasted for decades – is considered rather stabile. But in the medium run increasing competition for the Europeans will probably develop with the emergence of new engine and airframe manufacturers from China, Canada, Russia and Brazil. They are supposed to "bring many new dynamics, as well as technological variety and complexity to the air transport sector and to the aerospace industry" (European Commission 2010, 12). So far only a very limited number of aerospace companies serve the global market and only a few countries have expertise in aeronautics. But a growing number of countries have ambitions in civil aeronautics "with a vast potential to serve the worldwide market" (Ibid., 56). China, in this respect, is considered to become the most impacting competitor among these new players, with COMAC (Commercial Aircraft Corporation of China) being the most likely candidate to break the traditional duopoly in the field of single-and twin-aisle passenger aircraft. Like other emerging BRIC economies, too, China can benefit in particular from "large internal markets, financial resources, and a highly skilled human capital base" and has "the capability to invest a huge amount of money in RTD to compete with the current leaders" (Ibid.).

Together with Embraer, Bombardier or the new Russian aircrafts by UAC (United Aircraft Corporation), it is particularly the Chinese C919 (scheduled operating by 2016) that has to be taken very seriously. Airbus probably is keeping a rather low profile on that issue and, according to the ACARE Background Paper, such a novelty does not scare European industry yet. Instead, against the background of a massively growing future demand in air travel and a huge backlog of orders from previous years, the European air

transport industry is declared to be in a "*better situation compared with the automotive or other industries*" (Ibid., 44). Within the positive medium-term future expectations of this sector, which is highly exposed to the good and bad effects of globalization, "a specialized low-cost aircraft, made in China and operating Africa, is a realistic example" (Ibid., 49) of Chinese future competition. Obviously the Chinese are expected to enter a niche market with new business models, serving and supplying markets and regions that they have already engaged with for previous energy reasons or road/rail transportation supply. Thus, the country's today's close links are expected to provide the Chinese market of tomorrow.

Beyond the future challenge of new market entrants, the sector, comparable to the shipping industry, seems to suffer more from the risk of inner-European constraints caused by expected bottlenecks on airports, air traffic congestion or the sectorial dependence on huge R&D expenses that could become more difficult to be financed. In order to retain technological leadership in Europe and to achieve a necessary technology breakthrough for mitigating the environmental impact of aviation, there is a need for funding and financing long-lasting aircraft research. And this against the background of the current crisis, in which capital markets are expected to become tighter, influencing the ability of the air transport industry to be funded. Considering how "huge efforts [only] translate into small technological improvements" (Ibid., 52), funding constraints might thwart the sector's inherent traditional success factor of steady innovation harder than Chinese competition. "Aerospace is one of the most research-intensive sectors in Europe, and despite tough times, more than 12% of its turnover is dedicated to Research & Development" (Ibid., 9). While, on the European side, funding structures could weaken, the aviation industry at the same time would have "to face more competition on the aircraft market from China, who are strongly supported by their governments – and this places additional pressure on prices, market share, and profit margins" (Ibid., 58). Not labour costs imbalances might threaten the European industry, but financial pressure for essential innovation might diminish the technological advantages towards Chinese actors that receive better governmental funding provisions. Thus, to avoid a Chinese threat and to retain a leading position on the world markets towards 2050, the key factor seems to be lobbying for technology, innovation and consequently, their financial security. In other words, "the European Air Transport industry [meeting] future challenges will only be possible with a strong commitment to the vigorous evolution of current technologies and achieving new breakthrough technologies. […] Securing financing for vital new programmes and technologies will be a major issue for the future" (Ibid., 9).

Maybe no other transport sector is so much affected by future uncertainties and price volatility than it is the case with the air transport industry and its operators. The increasing demand for air travel might also evolve the emergence of new business models that could create "new demand for a set of modified product and technology

requirements" (Ibid., 49). As low-cost carriers now dominate half of the European market and this business model is everything but a niche market it needs to be considered for other world regions. The real challenge could be – after 2016 Chinese airlines fly with low-cost C919 aircraft – a lowering of the world market price for aircraft, due to producing strategic overcapacity; and this in addition to pressure to European airlines to radically reorganize their business models towards low-cost carriers. This scenario would provoke a double threat to manufacturers and airlines alike and may be a race to the bottom in terms of revenues.

Summing up, at the current stage the European aeronautics industry cannot be declared to feel excessively troubled about its future by upcoming Chinese competition. In contrary, China at the moment is clearly an indispensable market opportunity as "mainland China will need 3,832 new passenger planes over the next 20 years, including 2,520 single-aisle aircraft, with the total worth US$509 billion, according to Airbus" (Bloomberg 2012). Every fourth Airbus aircraft is sold to China, which is already No. 2 in deliveries worldwide after the United States. Moreover, it is a production opportunity. New plants in China (like Tianjin for Airbus) might exploit lower labour costs, but more essential, they will secure market access as well as design and specification adjustments for local tastes. In the near future full backlog orders and growing future air travel demand will probably sustain the European sector, but it is also commonly understood to steadily innovate for retaining technological leadership. Despite the pink near future prospects, it is certain that China will make every effort to place a low-cost aircraft in this strategic global market by the end of the decade. It might be questioned how *indigenous* a Chinese aircraft can be, which was made in a global supply chain, but beyond that issue the implications of this new market entry are difficult to evaluate. The aviation sector is the most complex and fragile transport sector, it is highly vulnerable to geopolitical threats and energy constraints, in short it faces the most particularities within the transport field; thus, even medium-term forecasts are rather problematic.

In short, if there is a "Chinese threat" it might evolve first, only in a special segment of aircraft and air service and second, not before 2020. It seems, there is time to prepare and there is strong awareness and willingness to act now, both on the industrial side (with ACARE and its Strategic Research Agenda) and on the policy level (setting up EUROCONTROL, Clean Sky Joint Undertaking and particularly the European Single Sky) to achieve a 'critical European mass' for research and strong domestic demand. Chinese competitors, among the new entrants from Canada, Brazil or Russia are nevertheless taken very serious as the most likely candidates to challenge the traditional duopoly of Airbus and Boeing. Winning factors for the industry's sustainable future are clearly considered technological progress and its backbone, the security for financing R&D. By pointing out Chinese competitiveness advantages in terms of governmental funding, the aeronautics lobby might successfully claim for additional funding in the future. The crisis, however, has surely given Chinese developers a certain chance to reduce the R&D gap,

but as the crisis comes to an end and financing facilities relax, the upcoming Chinese competition will probably lead to massive technological developments within the duopoly of Airbus and Boeing. Key issues for the future are increased fuel efficiency and building environmentally friendly aircraft with low maintenance costs. In short, a market and technology approach that Airbus historically has made succeeding over others in the long-term. Beyond that, the psychological factor might have a benefiting impact on OEMs like Airbus. Customers and airlines need aircraft that create confidence and which are proven to be safe. Every new market entrant might face a primary retention for new products, which again will give more time for readjustments. The wild card of a failing test phase of the Chinese C919 could delay a Chinese threat for years; Boeing's troubled Dreamliner 787 provides good example. Also the huge inner-Chinese competition with high-speed rail may not be underestimated. Chinese airlines are suffering from the competitive high-speed rail network, which serves efficiently for distances until 1000km. The Chinese aviation industry, which aims to supply its domestic market first, could suffer a major setback, if the impulse for domestic airline demand is less intense (Bloomberg 2012).
The real challenge of this sector will be the expected need to achieve a new technological breakthrough as energy prices will increase and airlines, which are more and more pressured by lost-cost carrier competition, will demand for steadily reducing their cost base. The role of low labour costs, in that respect, seems less relevant for the aeronautics industry. A Chinese low-cost approach both in manufacturing and airline operation might become a successful niche market, but it probably contradicts with the ever high rising expenditures to achieve such cost-saving fuel efficiency or the development of new light materials. To compete with the unequal funding provisions in China and the EU, the European industry will need to further collaborate, merge and search strategically for "chances offered by specialized firms all over the world" (Ibid., 53). But as Euro-Chinese cooperation and joint ventures are already taking place, it will however become difficult to label this sector indigenous Chinese, American or European. The Chinese threat, before having really started yet, might fade away and dilute in any firm's future need to organize the best possible global supply chain, following an old business saying: if you can't beat them, join them.

5.4 Winners & Losers in Europe's automotive landscape

As the above has demonstrated, the implications of the rise of the 'Middle Kingdom' for the European transport industry are variable. Generally, the Chinese threat seems to be 'in the making' and, except of the rail sector, it has not yet become a critical dimension, since the rhetoric 'China as an opportunity' still outweighs the potential rebounds of an upcoming globally competitive Chinese industry. Moreover, the actual threat for several European industrial sectors and in particular individual companies consists rather of a

race to make use of the promising Chinese growth engine than to fear Chinese imports in the European markets. In other words, winners and losers from the rise of China must be defined (so far) as who has the abilities and right strategies to benefit from China's opportunities and who has not. Following this concept, the next section, in context of the ambiguous implications of China's rise, shall briefly outline the scope of winners and losers in Europe's most important transport sector, the automotive industry.

In 2000 Timothy J. Sturgeon and Richard Florida presented the outcomes of a milestone MIT research study that aimed to better understand the implications of the accelerating globalization phenomenon for the world's automotive industry. Reversing the title of its MIT predecessor, *The World that Changed the Machine: Globalization and Jobs in the Automotive Industry* highlighted the sector's historical revolutions and dynamics. Such a study can be considered the background against each individual company's success or failure can be validated and what, beyond that, might frame the sector's future competition in the 21st century. In their conclusion, the authors stated two elements. First, the totally internationalized state-of-the art in the world's automotive sector, and second, the preconditions of staying competitive in a globalized world. Only who was able to master the industry's continuing transition would be able to survive, precisely, a transition *"from an older ´domestic´ model of competition that allowed automakers to compete by exporting from supply-bases rooted in their home countries, to an emerging ´global´ model of competition that increasingly demands day-to-day production functions be organized on a regional and global basis; from an industry that once treated emerging markets as dumping grounds for old models and production equipment, to an industry that is building leading-edge productive capacity in far-flung corners of the globe; from an export-led industry where firms from different countries competed mainly through markets, to a network-led industry with each major firm producing within each major market""* (Sturgeon and Florida 2000, 92).

Against this background, the success of companies would have and will basically overlap with the race to establish local production in the "largely untapped markets in Asia, Eastern Europe and South America" (Ibid.), both in order to seek low-cost locations for final assembly and to secure market access close to the final customers. The future automotive industry will see an increased "globalization of the supply-base" (Ibid., 94) and therefore it will paradoxically return with "renewed vigour to the 'built-where-sold' approach to automobile manufacturing established during the 1930s, even in an environment of falling barriers of trade" (Ibid., 47); moreover, it will experience "regionalization within a global pattern" (Bailey, et al. 2010, 313). In short, globalization, from a meta-perspective, would evoke a shift in a company's core competences, "*from excellence at the point of production – now more or less assumed – toward excellence in governing spatially dispersed networks of plants, affiliates, and suppliers*" (Ibid., 1). China,

in this respect, plays a major role for reorganizing the industry, as it is its major pulling factor.

Following these industrial megatrends, who exactly gains the benefit and who lacks behind? Who has reorganized properly since market saturation on home markets and continuous global competition are increasingly driving to change?

Winners

Among Europe's big six automotive players, the winners are those who managed best to step out of the exclusive dependence on their domestic markets by increasing export-orientation and internationalisation, but at the same time still gain good profits from their traditional markets. This condition allows compensating the sluggish and decreasing demand in the ultra-maturing home markets in Western and especially Southern Europe through growing sales in emerging countries like China or South America. Winners are those who source supply and final assembly globally as well as those who took the risk of being first comers in a foreign market. Even if the "majority of vehicles sold in these markets however is assembled locally", this situation doesn't harm the production in Europe, but instead "contributes to investments in R&D and high added-value jobs in EU" (European Commission 2012, 15) Additionally, winners are those companies who take customers in emerging markets as serious as customers in their home markets in terms of quality, design and reliability, and which have a wider portfolio than that of exclusively small car producers where cost pressure is higher, revenues are lower and Chinese segment competition will increase in the future. Instead, premium brands and niche approaches are the most successful, while in combination with smaller and middle-class cars, gaining more revenue for R&D reinvestment. In context with the rise of China it is particularly the German automotive sector, which benefited from this strongly emerging market. Being traditionally export-oriented and providing high-skilled workforce as well as a huge variety of supplier clusters, Germany's strongly diversified industry remained at the forefront of competition. Particularly the Volkswagen group with its twelve brands and affiliates, ranging from classical middle-class motor vehicles to premium and luxury brands, coaches, trucks and motor bikes, but also BMW and Daimler gained record profits in previous years, not least thanks to their strong performance on the Chinese market (DER SPIEGEL 2013). According to those companies' balances, the lesson from the Japanese threat – radically internationalizing and substituting a traditional orientation as 'domestic producer and international seller' towards a more globalized perspective of opening up plants in other key markets – seems to have been learned successfully especially by German brands. Over the years, the European market volatility has, for instance, "led BMW to broaden its production base outside Germany. These adaptations are steadily reducing BMW's focus on Germany only, which today accounts for around 60% of the automaker's output (nearly 2 million cars per year), down from about 70% of its output a decade ago" (Cisco 2013). Notably, the whole European automotive industry

has strongly internationalized, also PSA, Renault or Fiat remarkably followed the trend of export-orientation and internationalization, although experiencing a slower expansion in international markets. However, China in this respect experiences the widest possible differences between Fiat and Volkswagen. Being in China since 1983 already, Volkswagen clearly enjoys a first comer advantage in what became the biggest car market in the world. VW is likely to have gained a better market access through its long-standing three joint ventures compared to other producers. With about 25% market share in China in 2012 (Forbes 2012), the VW group sells already more than 1 million cars annually. Stepping very early into the market, not only means to be among the first to produce brand loyalty, but it also means to understand local tastes or design conditions better than others; furthermore, this not least might create closer links with local political and social institutions. In short, with its strategy of establishing models for the Chinese taste in combination with its booming luxury and premium segments of German or Italian origin, the Volkswagen group has turned its Chinese challenge into a threat for others.

Losers

The losers are those European car producers that were stepping rather late into the Chinese market, those that were traditionally focusing on a small car segment and those that were traditionally having the tendency to rather focusing on a growing European home market. As the 2008 crisis decreased radically the demand in Europe, particularly "the midmarket French and Southern European producers saw their market dwindle drastically" (Cisco 2013, 3). Although their business approaches encompassed internationalization strategies, they markedly followed a slower pace or focused stronger on other regions than China. Additionally, these producers were focusing on small or middle-class car segments, which for instance didn't let them benefit from a ten-year boom of Asian demand for premium cars or SUVs. Although now growing strongly, as a consequence each CSA and Renault have a market share of about only 3.5% in the Chinese car market, the biggest in the world. Fiat, according to Bloomberg News, in 2011 sold exactly "991 vehicles in the Chinese market, compared with 2.55 million units for General Motors Co. (GM) and 2.26 million at Volkswagen AG (VOW)" (Bloomberg 2012). This might exemplarily demonstrate the weakness in making use of Chinese opportunities and might underline the above remarks: The real threat is implied by not properly benefiting from the given opportunities but is not yet directly implied by Chinese competition.

Although French and Italian brands are slowly upgrading in the Chinese market, the revenues cannot yet compensate the heavy losses in the traditional home markets in Europe. However, this is very likely to change in the future since the share of cars sold outside Europe is continuously rising, as recently seen for Renault in 2012 (Renault 2013). Also Fiat is now re-entering the giant Chinese market for the price of disregarding investment in the home region, which will surely cause job losses and political tensions.

While German producers, despite also suffering from lower European demand, are still comparable well positioned on their home markets, the French and Italian producers today have fully understood the need to further internationalize (particularly towards China); however, probably not without readjusting and harming the industrial landscape back home. Additionally, the risk of a slowly indicated overcapacity in China's automotive landscape could complicate the recently started efforts to step into the Chinese market (KPMG 2012).

Summing up, on the road to China some European OEMs were better prepared than others. Especially the German manufacturers can today reap the fruits of previous internationalization efforts, notably coping with the former crisis that was induced by the Japanese threat. Despite all the producers have started to strongly internationalize, the highly differing sales of Fiat and Volkswagen in the world's biggest car market China prominently illustrate the implications of different business approaches and market segments among the European producers; moreover, they are highlighting the historically different degrees, paces and regional focuses of export-orientation.

It might be only another small indicator, but as Volkswagen since a long time gives it new models notably Chinese names, the French and Italian manufacturers are still sticking to their original French and Italian names. It might be about the time to overthink such symbolic 'homesickness' and to demonstrate the ability to differentiate better between manifold target regions.

5.5 Conclusions & Lessons from the Chinese threat

The world's state of mind is strongly connected to China. As the world's growth engine and soon the largest economy in the world, the country's exceptional growth generates both opportunities and uncertainties for the future, expressed in ambiguous perceptions about China's economic rise a mixed blessing. However, dealing with China today has become inescapable since the country no longer wants to remain exclusively the location for foreign assembly activity, but aims to become a strong competitor on its own, not least in the transportation sector. After twenty years of technology transfer, Chinese multinationals are now slowly entering the global market place with their own brands, stepping out of the shadow of previously established manufacturing hierarchies.

Against this background, this chapter aimed to highlight the ambiguous and sometimes diffuse perspectives of the European transport industry on whether to perceive China as a threat or an opportunity by analysing a selection of transport foresight studies since 2000. The analysis indicated an ambiguous atmosphere. On the one hand an overall growing transport market and China's unexhausted appetite for European products are evidently consolidating crisis-shaken European OEMs. But on the other hand the

gradually evolving capabilities of their new and strong, State-funded and sophisticated players lead to rising concerns about growing Chinese competition.

The rail sector already places China high on the agenda as a future threat. The aviation sector and the shipbuilding industries underpinned by their strong high-tech approaches are rather confident about their future, since China in the medium-term is expected to focus on different niche markets. Right in-between this spectrum is the automotive sector that, on the one hand, strongly benefited from tremendous growth rates and rising demand for European (especially German) cars, but on the other hand paid the price for the most long-lasting technology transfers. The high ambitions of the Chinese 12th five-year plan indicate that soon the Chinese automotive joint ventures might turn out to become national or global champions, which will again change the automotive geography and evoke a Chinese threat for the middle-class and small-car segments in five to ten years.

As a further result, the perceptions about China can hardly be generalized as they are widely differing – not only from sector to sector but also from company to company. In contrast to previous threat periods for Europe, the Chinese challenge is less culturally defined as "we against them". Globalization has to be fought out and tackled individually, as China can embody both, an opportunity *and* a threat. Evidence for this individualized approach can be found in the automotive realm as German carmakers are powerfully benefitting from their export-driven business philosophies, while Italian and French were having stronger domestic market orientation, slower internationalization, or were rather focusing on different markets than the Chinese one, for instance Latin America. The late, failed or too small-sized entry into the Chinese market by Renault, Fiat or Citroen – compared to Volkswagen's prime mover advantage of more than 20% market share – illustrates that within the same sector, China might be a winning factor to survive and grow or, on the opposite might be a missed opportunity that turns out to be a threat. As a consequence, Fiat considers to fully concentrating its investments in Asia, thus, considers leaving Italy to some extent behind, while German carmakers (except Opel), thanks to their strong early-bird presence in China, could even consolidate their traditional places of location from Wolfsburg to Stuttgart.

Beyond the threat consideration on an organizational level, it was particularly the European public considering China as a reason for job losses. As low labour cost exploitation and offshoring/outsourcing activities became the core business obsession of the 1990s and 2000s, the European employment structures had to suffer from an overarching adjustment process that considerably decreased the number of jobs in manufacturing and services (DER SPIEGEL 2004). But even if the offshoring process since the 1990s caused several job losses in European countries among low-tech and import competing industries (like particularly in textiles, toys, lower-tier office and computer equipment), they evidently were of no significant consequence in other sectors (Dauth, Findeisen and Suedekum 2012, 2) On the contrary, recent publications even claim

noteworthy employment gains in several European countries despite offshoring and despite the trade expansion between EU and China, particularly in higher-skilled jobs: "We estimate that the rise of "the East" [including Eastern Europe] has created some 493,000 jobs in Germany in the period 1988-2008" (Ibid., 5). So, despite that Europe cannot compete with one of China's most decisive competitiveness advantages – the low labour costs – horror scenarios of a total deindustrialization of the West turned out to be more than exaggerated. First, because Europe's transport industry still has relevant 'critical mass' in form of a relevant European market; second, because core operations dominantly remain at home and depend on established knowledge and supplier clusters; third, because Europe in itself had lucrative offshore and outsource locations provided by the EU enlargement. Trivially spoken, Europe had since the 1990s experienced its own "little China" in Eastern Europe, which absorbed to some extent the industry's extensive relocation activities. That is why we want to emphasize that in the last twenty years the Chinese threat in Europe – compared to the US – felt much less dramatic. As a rough assumption we suspect that the threatening characteristics of China's rise were fluctuating in Europe: being strong until the mid-2000s due to feared and conducted low-skill job losses in manufacturing, being eased afterwards due to EU Eastern Enlargement and being stronger again since the financial crisis appeared to be China's fundamental catch-up effect for becoming an independent high-skill competitor. The latest developments in Europe could now evoke a new relocation wave as a 'last chance to survive', as shown with Fiat's latest announced plans.

However, like in previous decades, the fear to lose European industrial structures was an impulse to promote cost advantages within the Eastern European sphere, and has secured efforts to extend and restore a European 'critical mass'. In this respect, the EU eastward enlargement, the creation of the European Single Sky, high ecological vehicle and product standards or the harmonization of the rail market can be assumed correlating strongly with the rise of China and can be interpreted as policy responses to a) supplying European industry with a more efficient, functioning and collaborative home market and b) thereby boosting those industries to better compete on global markets.

Today, Europe cannot – evidently – compete on the labour cost level, but has to struggle to keep its leading role in technology and research. Thus, the real threat potential is not yet exclusively posed by China's emancipation from foreign investments to a sophisticated global player, but has also inner-European reasons. As shown in the sectorial analysis, many concerns are focused on lack of skilled workforces. Moreover, fears of not gaining enough finances for high rising R&D expenditures raise concerns in the Europe's world leading aeronautics industry. And last but not least, decreasing demands in the home markets are causing major threats to the continent's carmakers and its suppliers.

Thus, what we can learn from the period of an overwhelming and continuing rise of China is that Europe is fully capable of participating in a country's rapid growth both as a facilitator (FDI) and a beneficiary (market access), assuming that the existing opportunity on the global *and* on the European fields are properly used. The widespread activities of European transport companies in China show they have learnt the lessons from previous threats, and they were able to internationalize beyond the domestic markets retaining technological and design leadership. As a result, Europe experienced an unbroken strength in the transport sector, although its biggest challenge ahead will be in mastering a 'regionalization within globalization'. European transport industry will have to steadily rebalance its activities on both the home and the foreign markets in order to quickly compensate plunging demands or overcapacities. In this respect, especially the German carmakers that adapted the Japanese transplants approach more radically than others. Accordingly, the market share of German manufacturers in the premium segments of the world's biggest car market is at about 80%.

Beyond that, we can learn from a long-term perspective that the threatened consequences of relocating production remained relatively overrated as they were even gaining new employment in high-skill and service sectors, or were "at least" relocated within Europe (Kirkegaard 2005). In order to retain the strong current European position, global orientation for both selling products abroad and sourcing cost-effective supply chains need to become the key competences, especially as home markets are volatile like never experienced before. In this respect, relocation activities are not so legitimated by cost-saving reasons, and instead are strategic activities for securing market access. Relocation activities will remain a sensitive topic for Europe as some companies are starting even to offshore the crown jewels of European leadership like R&D activities (e.g. Audi in China). The efforts of achieving a European 'critical mass', that can compete on the level of high-skilled activities, will be demanding and furthermore could steadily polarize the EU in sub-regions. Therefore, Europe might need to follow a parallel strategy. First, achieving a new *regional* European 'critical mass' by strengthening and further harmonizing the continental market, the legislation and regulation, while at the same time sourcing radically for markets, materials and labour force *globally*. As accounting for the aviation sector, "in the 1990s, the industry was mainly driven by cost-reduction. Now the emphasis is to secure quality and 'grab' the various strategic chances offered by specialised firms all over the world (along with the potential market access offered by these firms)" (European Commission 2010, 53). Thus, the need to further internationalize doesn't necessarily implicate the next threat of being de-industrialized. On the contrary, as mentioned above, geography matters more than before, as the established knowledge clusters are the most important infrastructure and backbone for a field like transport that is highly depending on technological development to stay competitive.

Summing up, since the transport industry is still too much profiting from Chinese demand, the benefits so far offset the possible rebound effects of a Chinese economy.

What might continuously increase European concerns is the State-funded massive emancipation of Chinese manufacturers, which will be able soon to put enormously under pressure the European manufacturers. In 1990 no Western company had to face Chinese competition, but „China has taken advantage of the West's offshore production model and its associated technology transfer to develop a manufacturing capability" (Pecht and Leonard 2009, 1). Today, after twenty years of technology and knowledge transfer, Chinese manufacturers have already made up for or have even overtaken Western capacities and market shares in all relevant transport equipment sectors. 10 years ago Europe had not yet to fear a Chinese threat but it might be right now that we are experiencing a threat 'in the making', whether politically motivated or economically justifiable. However, up to the present moment, European companies are heavily benefiting from Chinese demand in transport equipment, know-how and technology.

6. Conclusions from 50 years of external threats posed to the European transport industry. Is yesterday's fear today's factor of success?

This chapter summarizes the main lessons that can be derived from the past external threats to the European transport industries posed by the competition from the US (in the 1960s and early 1970s), Japan (in the 1980s) and most recently China (since the 1990s). Following the analysis of European responses to the previous threats in relation to relevant foresights, the aim is to assess the influence of selected foresight studies from the past, in particular past "nightmare" scenarios, on the European transport industries, and to derive some implications to future foresight activities.

6.1 Main lessons from the American threat

Evidently, when Europe was alarmed by the perceived imminent US dominance centring on huge American economies of scale in the 1960s, it was able to cope with such fears by self-reorganizing through strong political will and new concepts of transnational cooperation. It seems that a warning "horror scenario" like Servant-Schreiber's book "Le Défi Américain" ("The American Challenge") has contributed to strengthening the political will towards an already existing but stagnating European unification process and towards innovative and competitive transport projects. To this end, top-down measures were taken such as transnational collaboration, common policies and widening of the market in order to achieve political and economic scale effects. From the American threat we could conclude that a threat can turn into opportunity and a weak sector (like the European aviation industry in the 1960s) can become highly competitive, once there is a careful analysis of current and future market demands. Beyond that, the notable examples of Airbus and Concorde can be understood as responses to the American threat, showing that a comprehensible approach of rationality and efficiency (Airbus) is more successful than prestigious political self-representation in disguise of high technology (Concorde). Moreover, when Europe's self-conception as a powerful global force is threatened, the nation states seem rather quickly to overcome exclusive national perspectives.

The main foresight-oriented works reviewed in the context of the American threat were Servant-Schreiber's "The American Challenge" (1968) mentioned above, and the Plowden Report (1965). Certainly, Servant-Schreiber's book, while highly influential, was not a foresight study in the classical sense, as it did not involve foresight methods and foresight researchers. It did express, strongly and passionately, the opinions of economists and politicians, regarding the European weakness facing the fear of total inevitable domination of the giant US "technostructure" and economy of scale. However, it was a sort of foresight in the sense of a dystopian vision, which intentionally included exaggerations to shock the readers. The author's overarching concept, which might

declare the decisive relevance for such future studies, concluded: *"shock is better than surprise because it forces us to pay attention"* (Servant-Schreiber 1968, 20).

The Plowden Report (1965) resulted from a study of a committee appointed by the UK Minister of Aviation, about the future of the British aircraft industry. This also was not exactly a foresight study by today's standards, but it focused on the future problems of the industry and on economic and political considerations of the British government. A central argument of the report was that the aircraft industry received government support quite out of line with other industries, and that a run-down was desirable. No wonder that the British aircraft industry and the aeronautical engineers reacted with anger. The President of the Royal Aeronautical Society criticized the Plowden Report for not believing in the potential of aviation, and the Society organized a special protest meeting against the report (Guzzetti 1994). British parliamentarians criticized the report as well, complaining about lack of clear long-term objectives (Ibid). Nevertheless, as a loud warning this report was influential in the long run as it pushed for transnational cooperation with France for Concorde in order to survive.

6.2 Main lessons from the Japanese threat

The analysis of the European reaction to the Japanese threat shows that again, like in response to the US threat, Europe seems to need an external pressure to succeed in competition in the long term. Europe had to adopt more flexibility towards traditional concepts of national business identities, and it had to abandon its sticking to political-ideological attitudes of 'national champions' and NIH (Not Invented Here) mentality. Japan's efficiency and its pragmatic attitude forced Europe to shift from former economies of scale to economies of learning and cooperation. At first, the fear of Japan's leadership split the European Community (by applying highly differing national import restrictions), but finally it prompted it to act in a more unified manner. Japan became a benchmark for Europe's industrial future, particularly for the automotive sector. The British automobile sector showed that a weakened industry could recover by radically welcoming foreign investments and letting former competitors enter its own market. Actually, it seems that weakness can become a winning factor, or even the precondition for recovery, since the Japanese only invested in the weakest sectors in Europe and in peripheral areas with high unemployment. Following Japan, Europe learned to focus on growing markets abroad by establishing plants in North and Latin America and by effectively internationalizing the car industry. Learning from best practices and taking economic risks turned out to be a European success factor.

However, another important conclusion can be traced here: early warnings need to be heard and recognized more seriously. The required response time is likely to be shorter in

the future, therefore identifying and assessing "weak signals" of change will become crucial.

Chapter 4 mentioned several foresight and forward-looking works in the context of the Japanese threat of the 1980s. The main three were: Herman Kahn's *"The Emerging Japanese Superstate"* (1970), *"Future of the European Automobile Industry*" (a ten year outlook for the European car industry published in 1976 by the Commission of the European Communities) and *"The Machine that Changed the World"*, a highly influential book (published in 1990) that summarized the work of a team of researchers at MIT's International Motor Vehicle Program (IMVP).

At the very beginning of the incursion of the Japanese vehicle production into European markets, the reports and foresights highlight that widespread panic was abundant. The common people and government officials alike were certain that the Japanese were about to take over the industrial market by undeniable virtues, some of which could aptly be described as practically 'mystical' in nature. Certain futurists, such as the venerated Herman Kahn, who pointed out at least a dozen factors that indicated an oncoming 'Japanese 21st century', only encouraged the panic. His 1970 book convinced the readers that Japan would inevitably become a world leader in 2000.

Kahn's foresight received support from other reports, particularly *"Future of the European Automobile Industry*" from 1976. Nonetheless, in 1990 came out the first major book dedicated to understanding the Japanese industry from within, *The Machine That Changed the World*, a product of a five year study led by MIT and financed by major car manufacturers and suppliers. The MIT study first introduced the term "lean production" to characterize the production philosophy of leading Japanese car manufacturers. The still on-going International Motor Vehicle Program (IMVP), founded by MIT in 1979, has had a major impact on the global automobile industry and the related economy. Its interdisciplinary research work involved more than 50 senior scientists, management experts, social scientists and engineers at more than 25 universities worldwide. The focus was not exactly methodological foresight, but rather an analysis of the global automotive industry and understanding the challenges it is facing for the future. The IMVP program's data-driven methods set the standard for industry research.

In response to the Japanese threat, *"The Machine that Changed the World"* had a somewhat similar effect to *"The American Challenge"* 23 years earlier, but it was also different. The readers realised that the Japanese success did not stem from "mystical" or entirely cultural factors, but instead from a new kind of mass-production system that Europe's and North America's old mass-production mechanisms could not compete with efficiently. The challenge was *organizational* in nature, which implied that the European and American manufacturers could emulate the Japanese system to reach similar success.

So we see here a case study in which at least some futurists were leading decision makers in a wrong direction, because of the limited understanding they had of Japanese

manufacturing plants. Kahn and other futurists ignored the subtle details of Japanese handiwork and focused instead on the more "attractive" and widely accepted ideas of cultural, even racial distinction between Japanese and Europeans. In the end, instead of taking into consideration the surprising and as yet unknown reasons for the Japanese superiority, they fell back to stale arguments that provided no real course for change.
The important lesson here could be that useful foresight cannot be based only on the "known" but also on the unknown. Futurists and forecasters should keep in mind that past ideas and conventions can change rapidly, especially in light of the ever-growing rate of technological evolution. New and surprising ways for thinking about technology and its use must constantly be sought out and understood. This approach will find its fulfilment in RACE2050 WP6, where "Wild Cards" – surprising ideas and occurrences with low likelihood but potentially high impact – will be considered and contemplated.

It is instructive to elaborate more about the importance of strategic surprises. Systematic foresight studies, and in particular credible scenarios about alternative futures, can be very instrumental in assisting decision makers to anticipate – and prevent – strategic surprises. Scenario experts like Peter Schwartz and Doug Randall emphasize two features that are very essential (and difficult) for organizations and policy makers: being both *imaginative* and *systematic*. *"One cannot foresee strategic surprises without being imaginative, but the results will not be believable without being systematic"* (Schwartz and Randall 2007, 97). They also observe that decision makers (as well as ordinary people) tend to deny strategic surprises, and this denial is a powerful cognitive bias that makes companies and nations susceptible to strategic surprise. They even give the rising of China (hardly a surprise) as an example: *"People say, 'China can't maintain its recent success, can it?' And yet China keeps growing in importance"* (Ibid). According to Schwartz and Randall, because of the power of denial, making a foresight analysis *believable* is so essential. This can be achieved by believable scenarios, even if they describe what is perceived as having low likelihood. "Well-crafted scenarios can help organizations that suffer from denial about future change to rehear it in advance. By articulating challenging, yet plausible, ways in which a future could evolve, scenarios encourage management teams to 'think the unthinkable', anticipate surprises, and try out new possibilities" (Ibid).

6.3 Main lessons from the Chinese threat

China's tremendous growth brings into being both opportunities and uncertainties for Europe's competitiveness. After twenty years of technology transfer, Chinese multinationals are slowly entering the global market with their own brands. The European railway sector already feels seriously threatened, in contrast to the aviation and shipbuilding industries, which still feel rather safe since China is expected to focus on different niche markets in the medium-term. In-between is the automotive sector that so

far benefited from high growth rates and rising demand for European (especially German) cars, but already had to pay the price of the most long-lasting technology transfer. The perceptions about China's threat differ from sector to sector and even between firms, so generalization is difficult. The Chinese challenge is less defined culturally as “we against them” than the preceding American and Japanese threats.

In the globalized world China can be seen as a threat or as an opportunity. The horror scenarios of a total deindustrialization of the West turned out to be highly exaggerated, even if Europe cannot compete with China’s low labour costs. The current threat is not Europe's inability to compete with low labour costs, but to lose its leadership in technology and research. The EU eastward enlargement, the creation of the European Single Sky, the harmonization of the rail market or even the envisioned Free Trade Agreement between the EU and the US in this respect might correlate with the rise of China and can be interpreted as policy responses to a potential Chinese threat. More precise, concerns about shortage of European high-skilled workforces in the shipbuilding industry might soon cause enforced relocations into other world regions. Fears of insufficient financing for ever rising R&D expenditures raise doubts about the future position of the European aerospace sector. Decreasing demands in the domestic markets are causing major threats to the European transport equipment industries and their suppliers. In short, the Chinese threat might presently evolve rather as an inner-European issue (workforce and financing deficits) than as a fear to be flooded with Chinese exports.

Nevertheless, the continuing rise of China shows that Europe better than ever before is able to participate in a country’s rapid growth both as a facilitator (investing in China) and a beneficiary (gaining market access). However, a growing concern is that in the future the state-funded emancipation of Chinese manufacturers will exert enormous pressure on European manufacturers. Thanks to years of technology and knowledge transfer, Chinese manufacturers have already matched Western capacities and market shares in all relevant transport equipment sectors, even though so far the developed countries are heavily benefiting from Chinese demand in transport equipment, know-how and technology.

The most important foresight studies mentioned in the context of China’s remarkable rise and its inherent threat potentials were: The EC Competitiveness Report 2004, LeaderShip 2015 (a study about the maritime sector conducted in 2003), the UNIFE (2009) and ERRAC (2011) reports about the rail industry and ACARE (2010) study "Beyond Vision 2020 (towards 2050)” about the aviation sector. In contrast to the previous threat periods, the Chinese impact is far from being terminated and should by no means be generalized as a threat. It is an on-going process that is still difficult to assess due to ambiguous considerations. The main finding for the European transport industry: benefits from undamped Chinese demand still outweigh rising competitive pressures caused by gradually sophisticating Chinese companies. Thus, China might rather be a threat *in the*

making and will activate in the not-too-distant future (within the next five to ten years) if not replaced by a post-Chinese threat induced by the "next eleven". So, a Chinese threat cannot yet be clearly indicated for the whole European transport sector but notably has already entered the transport industry's agendas, particularly in the rail and the automotive sector. Against this background, the respective chapter aimed to screen and sort sectorial perceptions about China whether it is considered a threat or an opportunity. It therefore focused less on investigating the foresight's impacts than on mapping the current sectorial foresight landscape in context with China. As a result, the foresight character seems to have changed. While the American and the Japanese threat foresights indicated unequal economic conditions that forced to learn something completely new or/and to readjust to something better, the China-oriented foresights are less negative or fatalistic but seem to be more activating right from the beginning, and actually they tend to *defend* a meanwhile successfully established European position. Although the selected foresights highlight the unequal competitiveness factor of Chinese low labour costs, the European industry is aware of not being able to compete on the level of low wages, but it seems instead motivated to strengthen and shape the current position of holding the technological and know-how leadership in many fields. That is why current China-related foresights are less 'culturalistic' compared to, e.g., the Japanese threat. In other words, to this day we haven't seen another Herman Kahn. Current foresights seem to be more careful and might have learned that radical cultural stereotypes and accusing distinctions do not match anymore the contemporary business approaches of a globalized European transport industry.

6.4 Lessons from past foresight studies and their impact

The general aim of foresight studies is not "to predict the future" (an impossible mission) but rather to provide the best available information and knowledge about evolving (and changing) trends and about possible (alternative) futures. Such knowledge is essential for informed debates among stakeholders so that the final result is usefully supporting decision making, towards achieving a desirable future (or at least minimising the risk of undesirable futures). Therefore, an important question is how much actual impact foresight studies have on policy making. This question has been often asked since the beginning of foresight studies, and the answer is very far from being easy.

Finally, in the context of "the history of the future" related to transport, we would like to be able to assess the impact of past transport foresights in order to gain insights for future foresight studies, within RACE2050 and beyond. We should emphasize that today by "foresight studies" we mean *systematic* studies, which use well-established foresight/futures studies methods. This is important, because we should remember that although systematic *technology foresight* studies were conducted in several countries

since many years ago, only since the early 1990s foresight became more widely used as a tool for supporting policy making at national or international levels (Da Costa O. 2011).

However, even after many years of experience, the issue of impact assessment seems to remain a weak spot in the foresight arena. Foresight experts pointed out that, unfortunately, *"as regards the various functions of foresight, little is known so far in terms of impact assessment. While the policy-informing function is generally acknowledged (though little hard evidence provided), the policy-counselling and -facilitating functions are still comparatively novel concepts, and have thus not yet been subject to deeper investigations."* (Havas A. 2010, 92).

So even the policy-informing function of foresight is not yet sufficiently supported by hard evidence. Even stronger recent statement was that, although plenty of foresight studies do exist, this anticipatory intelligence is hardly used in policy making; "Or it is used primarily to support choices made for other reasons and/or based on other knowledge" (van der Gießen 2012, 24). Many experts agree that there is "a serious bottle-neck in the connection between the world of foresight and the world of policy making" (Ibid.).

Another study on the impacts and implications of foresight projects on policy (Könnöla 2011) provides the following useful typology of foresight studies:

- **Visions Foresights** that can be characterized as consensual and informative processes. Such projects lead to an understanding of priorities and challenges but specific actions are not expected after the projects end.
- **Priorities Foresights** – consensual and instrumental processes that also support decision-making. (One example is the 8th Technology Foresight of NISTEP, Japan, which supported the 3rd Japanese basic plan for science and technology.)
- **Agora Foresights** – informative processes with diverse future perspectives without a specific contribution to decision-making and policy.
- **Innovation Foresight** that leads to instrumental outcomes with diverse future perspectives. Such projects generate many ideas, which support specific foreseen decision-making.

Hence, different classes of foresight projects may have different impacts on policy and society. A more recent study (Harper 2013) describes different generations of foresight and provides some insights about important factors that contribute to the impact on policy making: strong links to policy makers, the ability to attract key players, and transparent process and results.

A very important issue and one of the key activities in long-term foresight projects that can contribute to impact on decision makers is communications. The question is how we can effectively communicate the results of foresight projects to decision makers. These decision makers are often politicians burdened by short-term issues such as getting re-elected in the next elections. An inherent difficulty is that democratic governments are usually not "foresight-friendly". They are too much affected by daily politics, which does

not support long-term thinking. Furthermore, the time horizon of foresight studies is often far beyond the interest of the governmental decision makers (UNIDO 2003, 12).

The evaluation of the reaction to the American threat shows that in the past, it took a successful writer such as Servant-Schreiber to make a high impact on the public at large as well as on politicians. Today (and in the future), the ways to influence the public and government decision makers are also through smartly using a strong narrative and the power of the Internet. The widespread use of the Internet and social media brought about new methods, such as influencers marketing, which exploit these new communication technologies. Few key types of people play an important role in pushing an idea, or a product forward – connectors, mavens and salesmen (Gladwell 2000). An important group of people that may facilitate the proliferation of new products and ideas is called "influentials" or "agents of change". If we wish to use these new techniques in future foresight projects we need to take advantage of these influentials that can enable the communication process and convey the main scenarios to decision makers.
In the domain of transport-related foresight studies, it has been recently pointed out that despite several foresight exercises within the transport sector, "the business of transport and mobility futures is still widely in the hands of transport economists and transport engineers" (Giesecke 2012, 2).

In order to evaluate to what extent did past foresight studies influence the European transport industries and how, it would have been beneficial to ask this question the actual actors, namely the decision makers who were in key positions in the industries and governments during the relevant periods, and whose decisions actually shaped the changes in response to the perceived external threats. This was however beyond the scope of this report. It was also difficult to find such interviews in the available literature. But as a general conclusion these three threat periods and their respective foresights can be claimed to have generated an overall positive effect on the European transport sector. They pushed for learning, for adapting and for overcoming competitive challenges with the result of mostly retaining competitiveness and world leadership. If Europe faces external economic pressures future foresights play a key role in highlighting and learning how to renew economic or political conditions. In the course of the three threat periods Europe has gradually integrated and consolidated politically and economically, or in other words, Europe without external pressures would not appear the same as it is today. Moreover, Europe's transport industry might essentially need new warning future foresights that address upcoming external pressures in a strong, believable and narrative way. This report has shown that such foresights might have decisively assisted to learn how to reorganize properly and how to benefit from those efforts. As a result, in contrast to other European industries the European transport industry remained at large competitive and strong on a global level.

In this respect, a key success factor for a sustainable growth of the European Transport industry therefore might rely on the ability and the competence to both setting up normative future studies and to thereby gradually readjusting to the ever-changing global framework conditions.

7. References

Adams, F. G., B. Gangnes, and Y. Shachmarove. "Why is China so Competitive? Measuring and Explaining China's Competitiveness." *The World Economy*, 29(2) 2006: 95–122.

Airbus Company. *Proven Concepts.* 2011. http://www.airbus.com/innovation/proven-concepts (accessed March 10th, 2013).

Altshuler, A., Anderson, M., Jones, D., Roos, D., Womack J. *The Future of the Automobile.* Cambridge: MIT Press, 1984.

Bailey, David, Alex de Ruyter, Jonathan Michie, and Peter Tyler. "Global restructuring and the auto industry." *Cambridge Journal of Regions, Economy and Society*, 3(3) 2010: 311-318.

Bannister, Judith, and George Cook. "China's employment and compensation costs in manufacturing through 2008." *Monthly Labor Review*, March 2011: 39-52.

Bloomberg. "Airbus Weighs Chinese A320 Future as Competition Gains." *Bloomberg News.* 13 June 2012. http://www.bloomberg.com/news/2012-06-13/airbus-explores-future-of-tianjin-jet-plant-as-competition-gains.html (accessed May 28, 2013).

—. *Longest High-Speed Railway to Compete With A380s in China.* 14 December 2012. http://www.bloomberg.com/news/2012-12-14/longest-high-speed-railway-to-compete-with-a380s-in-china.html (accessed May 30, 2013).

Booth, Tazmin. "Here there and everywhere." *The Economist.* 19 January 2013. http://www.economist.com/printedition/ specialreports (accessed May 13, 2013).

Bronfenbrenner, K, and S. Luce. "The Changing Nature of Corporate Global Restructuring: The Impact of Production Shifts on Jobs in the US, China and Around the Globe." Report, US-China Economic and Security Review Commission, Washington, 2004.

Bustelo, Pablo. "China's Emergence: Threat or Peaceful Rise?" Edited by Real Instituto Elcano. 1 12 2005. http://www.realinstitutoelcano.org/analisis/850/Bustelo850.pdf (accessed May 10, 2013).

Camuffo, Arnaldo, and Guiseppe Volpato. "Making Manufacturing Lean in the Italian Automobile Industry: The Trajectory of Fiat." In *One Best Way? Trajectories and Industrial Models of the World's Automobile Producers*, edited by Michel Freyssenet, Andrew Mair, Koichi Shimizu and Guiseppe Volpato, 311-337. Oxford: Oxford University Press, 1998.

Carson, Rachel. *Silent Spring.* Boston: Houghton Mifflin Company, 2002.

Ceglowski, Janet, and Stephen Golub. "Just How Low are China's Labour Costs?" *The World Economy*, 30(4) 2007: 597-617.

Chiappini, Raphaël. *Offshoring and export performance in the european automotive industry.* Bordeaux: Université Montesquieu-Bordeaux IV, 2011.

Cisco. "AUTOMOTIVE EUROPE: ADAPT!" *http://www.cisco.com.* May 2013. http://www.cisco.com/web/strategy/docs/manufacturing/whitepaper_automotive_europe_adapt.pdf (accessed June 28, 2013).

Da Costa O., Warnke P., Cagnin C., Scapolo F. *The Impact of Foresight on Policy-Making: Insights From The Forlearn Mutual Learning Process.* Sevilla: Institute for Prospective Technological Studies, Joint Research Centre / European Commission, 2011.

Daems, Herman. "The Strategic Implications of Europe 1992." *Long Range Planning*, 23(3) 1990: 41-48.

Dauth, Wolfgang, Sebastian Findeisen, and Jens Suedekum. *The Rise of the East and the Far East: German Labor Markets and Trade Integration.* Discussion Paper, Bonn: Institute for the Study of Labor, 2012.

Davies, Ken. *Inward FDI in China and its policy context. Columbia FDI Profiles.* New York: Vale Columbia Center on Sustainable International Investment, 2010.

De Cugis, Carlo. "A Commentary on Jean-Jacques Servant-Schreiber's book The American Challenge." *Business and Economy History*, 1(5) 1969: 123-145.

Dennis Tao Yang, Vivian Weijia Chen, Ryan Monarch. "RISING WAGES: HAS CHINA LOST ITS GLOBAL LABOR ADVANTAGE?" *Pacific Economic Review*, 15(4) 2010: 482–504.

DER SPIEGEL. "Bye, bye 'made in Germany'." *DER SPIEGEL*, 25 October 2004: 94-109.

—. "Donnernde Eintracht." *DER SPIEGEL*, 19 June 1963: 70-71.

—. *Divided Europe: Car Industry Winners and Losers Drift Apart.* 13 February 2013. http://www.spiegel.de/international/business/european-car-industry-winners-and-losers-drift-further-apart-a-882694.html (accessed June 27, 2013).

Donnelly, Tom, Kemal Mellahi, and David Morris. "The European automobile industry: escape from parochialism." *European Business Review*, 14(1) 2002: 30-39.

Enerdata. *Sluggish growth of World energy demand in 2011.* 24 May 2012. http://www.enerdata.net/enerdatauk/press-and-publication/energy-press-releases/sluggish-growth-world-energy-demand-in-2011.php (accessed May 18, 2013).

ERRAC. "Answer to the questionnaire for STTP Stakeholders' Hearing on Rail Transport." 14 February 2011. www.errac.org/IMG/pdf/sttp_errac.pdf (accessed May 25, 2013).

—. "Rail Route 2050. Towards a competitive, resource efficient and intelligent Rail Transport System for 2050." 2012. http://www.errac.org/IMG/pdf/railroute2050_errac_final_v2.pdf (accessed May 27, 2013).

European Commission. "Aeronautics and Air Transport. Beyond Vision 2020 (Towards 2050)." 2010. http://ec.europa.eu/research/transport/pdf/acare_background_2010_en.pdf (accessed May 27, 2013).

—. "Car 21 final report." 2012. http://ec.europa.eu/enterprise/sectors/automotive/files/cars-21-final-report-2012_en.pdf (accessed May 31, 2013).

European Commission. *Committee on the Realization by Stages of Economic and Monetary Union in the Community.* Report to the Council and the Commission on the Realization by Stages of Economic and Monetary Union in the Community., Luxembourg: Bulletin of the EC, 1970.

European Commission. *European Competitiveness Report.* Brussels: Commission of the European Communities, 2004.

European Commission. *European Competitiveness Report.* Brussels: Commission of the European Communities, 2012.

European Commission. *Future of the European Automobile Industry.* Brussels: European Commission, 1976.

—. "Leadership 2015. Defining the future of the European Shipbuilding and Shiprepair Industry - Competitiveness through excellence." 2003. http://ec.europa.eu/enterprise/sectors/maritime/files/shipbuilding/leadership2015_en.pdf (accessed April 10, 2013).

—. "Report to the Council and the Commission on the realization by stages of economic and monetary union in the Community." 1970. http://ec.europa.eu/economy_finance/emu_history/documentation/chapter5/19701008en72realisationbystage.pdf (accessed June 8, 2013).

—. "Study on Competitiveness of the European Shipbuilding Industry." 2009. http://ec.europa.eu/enterprise/sectors/maritime/files/fn97616_ecorys_final_report_on_shipbuilding_competitiveness_en.pdf (accessed April 16, 2013).

European Commission. *The Community and the car industry.* Brussels: European Commission, 1984.

European Commission. *The European Motor Vehicle Industry: Situation, Issues at Stake, and Proposals for Action.* Brussels: European Commission, 1992.

European Commission. *The future of the car industry.* Brussels: European Commission, 1982.

European Parliament. 1969. http://www.europarl.europa.eu/factsheets/1_1_2_en.htm (accessed June 8, 2013).

European Union Chamber of Commerce in China. *Study: Chinese Outbound Investment in the European Union.* 15 January 2013. http://www.europeanchamber.com.cn/documents/download/start/en/pdf/10 (accessed June 24, 2013).

Fasse, Markus. "Deutsche Düsen nach China." *Handelsblatt*, 9 November 2011: 21.

FAW. *International Cooperation.* 2013. http://www.faw.com/international/volkswagen.jsp?TM=FAW-Volkswagen (accessed May 12, 2013).

Financial Times. *High-Speed China Changes Rail Landscape.* 16 March 2010. http://www.ft.com/intl/cms/s/0/a04d14cc-310b-11df-b057-00144feabdc0.html#axzz2Xo7CRvKF (accessed May 30, 2013).

Forbes. *Winners And Losers In China's Passenger Car Industry.* 11 December 2012. http://www.forbes.com/sites/jackperkowski/2012/11/12/winners-and-losers-in-chinas-passenger-car-industry/ (accessed June 27, 2013).

Forrester Research. *3.3 Million US Services Jobs To Go Offshore.* TechStrategy™ Research Brief: Forrester Research, 2004.

Freyssenet, Michel, Andrew Mair, Shimizu Koichi, and Guiseppe Volpato. “Conclusion: The Choices to be made in the Coming Decade.” In *One Best Way? Trajectories and Industrial Models of the World’s Automobile Producers*, edited by Freyssenet M., Mair A., Shimizu K. and Volpato G., 452-462. Oxford: Oxford University Press, 1998.

Geary, Michael J. “The Process of European Integration from The Hague to Maastricht, 1969-92: An Irreversible Advance?” *Debater a Europa, Periódico do CIEDA e do CEIS20 em parceria com GPE e a RCE*, January/June - Semester Issue 2012: 6-23.

Giesecke, S. *From Transport Forecasting to "Mobility Science".* EFP Brief No.220, European Foresight Platform, 2012.

Gladwell, M. *The Tipping Point: How Little Things Can make a Big Difference.* London: Little, Brown and Company, 2000.

Goldman Sachs. “Dreaming With BRICs: The Path to 2050. CEO Confidential.” October 2003. http://www.goldmansachs.com/ceoconfidential/CEO-2003-12.pdf (accessed April 26, 2013).

Guzzetti, L. *Science and Power: the Historical Foundations of Research Policies in Europe.* Firenze: Istituto e Museo di Storia della Scienza Firenze, 1994.

Hager, Wolfgang. “EC 1992 and Japan.” In *Europe, Japan and America in the 1990s*, edited by Theodor Leuenberger and Martin E.Weinstein, 17-37. Berlin: Springer, 1992.

Hanabusa, Masamichi. *Trade Problems between Japan and Western Europe.* London: Royal Institute of International Affairs, 1979.

Harper, J.C. *Impact of Technology Foresight: Compendium of Evidence on the Efectiveness of Innovation Policy Intervention.* Manchester: Manchester Institue of Innovation Research, 2013.

Havas A., Schartinger D. and Weber M. “The impact of foresight on innovation policy-making: recent experiences and future perspectives.” *Research Evaluation*, 19(2) 2010: 91–104.

Hedberg, Håkan. *Die japanische Herausforderung.* Hamburg: Hoffmann und Campe, 1969.

Hiraoka, Leslie S. “Japan’s increasing investments abroad.” *Futures*, October 1985: 485-508.

Houghton, JT., Callander, BA., Varney SK. *Climatic change - The supplementary report to the IPCC scientific assessment.* Cambridge: Cambridge University Press, 1992, 4–20.

Hughes, W. Christopher. “Japan in Europe: Asian and European perspectives.” In *Political Economy of Japanese Globalization*, edited by Glenn Hasegawa and D. Hook Harukiyo, 52-64. London: Routledge, 2001.

ILO . *Labour and Social Trends in ASEAN 2007 Integration, Challenges and Opportunities.* Bangkok: Labour and Social Trends in ASEAN 2007 Integration, Challenges and Opportunities International Labour Office, 2007.

IPCC. *IPCC IS92 Scenarios.* 22 July 2004. http://mms.dkrz.de/pdf/klimadaten/static/IPCC_DDC/html/is92/ (accessed May 10, 2013).

ISF. “The World is Flat.” *Sustainable Internationalization as the Answer to the Challenges of a Global Service Economy. Working Paper 3.* August 2007. http://www.isf-muenchen.de/pdf/ExportIT_Arbeitspapier3_englisch_final.pdf (accessed April 26, 2013).

Jones, Daniel T. *The Maturity and Crisis in the European Car Industry.* Sussex: Sussex European Research Centre, Univ. of Sussex., 1981.

Jürgens, Uwe, interview by Robin Kellermann (TU Berlin). *Interview made on 9 Nov 2012 in Berlin* (12 November 2012).

Kahn, Herman. *The Emerging Japanese Superstate: Challenge and Response.* Englewood Cliffs: Prentice-Hall, 1970.

—. *The Emerging Japanese Superstate: Challenge and Response.* Englewood Cliffs: Prentice-Hall, 1970.

Kahn, Herman, and Anthony Wiener. *The Year 2000: a framework for speculation on the next thirty-three years.* New York: The Macmillan Co, 1967.

Kennedy, John F. "Address at Independence Hall, Philadelphia, 4 July 1962." 1962. http://www.jfklibrary.org/Asset-Viewer/RrjaDhW5B0OYm2zaJbyPgg.aspx (accessed February 27, 2013).

Kenney, M., and R. Florida. *Beyond Mass Production: The Japanese System and Its Transfer to the U.S.* Oxford: Oxford University Press, 1993.

Kirkegaard, Jacob Funk. *Outsourcing and Offshoring: Pushing the European Model over the hill, rather than off the cliff!* Working Paper 05–1, Washington, DC: Institute for International Economics, 2005.

Könnöla, T. et al. "Foresight tackling societal challenges: Impacts and implications on policy-making." *Futures*, 43(3) 2011: 252-264.

KPMG. "Overcapacity: A Potential 'Speed Bump' in the World's Largest Automotive Market." *http://www.kpmg.com.* 2012. http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Documents/China-Automotive-Market-201206.pdf (accessed June 25, 2013).

Kwan, Chi Hung. "The Rise of China and Asia's Flying-Geese Pattern of Economic Development: An Empirical Analysis Based on US Import Statistics." NRI Papers Nr.52 2002. http://www.nri.co.jp/english/opinion/papers/2002/np200252.html (accessed August 26, 2013).

Lardy, Nicholas R. "China: The Great New Economic Challenge?" In *The United States and the World Economy: Foreign Economic Policy for the Next Decade*, edited by C. Fred Bergsten, 121-141. Washington: Institute for International Economics, 2005.

Lashley, Nikola. "Billion-dollar investment in China's transport industry." *GBTIMES.* 19 February 2013. http://gbtimes.com/focus/economy/news/billion-dollar-investment-chinas-transport-industry (accessed May 4, 2013).

Lehmann, Jean-Pierre. "France, Japan, Europe, and industrial competition: the automotive case." *International Affairs*, 68(1) 1992: 37-53.

Lehmann, Jean-Pierre. "Mutual Images." In *Japan and Western Europe*, edited by Loukas Tsoukalis and Maureen White, 14-30. London: Frances Pinter, 1982.

Lewin, A. Y., and V. Couto. *Next generation offshoring: The globalization of innovation.* Booz Allen Hamilton Report, Durham: Duke University CIBER, 2007.

Macrae, Norman. "Consider Japan." *The Economist* Part 2, October 8th (1962): 913-917.

McDermott, Michael C. "The revitalization of the UK automobile industry." *Industrial Management & Data Systems*, 96(5) 1996: 6-10.

Meadows, Donella H., Meadows, Dennis L., Randers, Jorgen and Behrens III, William W. "Limits to Growth: A Report to The Club of Rome." *http://www.clubofrome.org.* 1972. http://www.clubofrome.org/docs/limits.rtf (accessed March 5, 2013).

Nester, William R. *Japan's Growing Power Over East Asia and the World Economy: Ends and Means.* London: MacMillan Press, 1990.

Newhouse, John. *Boeing versus Airbus.* New York: Alfred A. Knopf, 2007.

News Week. "The Rise of Japan." *News Week Japanese Edition*, May 1991.

NewsAsia. *Proposed high-speed rail network a high investment for Laos.* 21 May 2013. http://www.channelnewsasia.com/news/asiapacific/proposed-high-speed-rail-network-a-high-/682812.html (accessed May 29, 2013).

Nørgård, Jørgen Stig, John Peet, and Kristín Vala Ragnarsdóttir. "The History of The Limits to Growth." *Solutions* 1, no. 2 (February 2010): 59-63.

OECD. *OECD Economic Surveys: China 2013.* OECD Publishing, 2013.

Organization, International Labour. *Labour and Social Trends in ASEAN 2007 Integration, Challenges and Opportunities.* Bangkok: International Labour Office, 2007.

Parker, Andrew. *Two-Speed Europe: Why 1 Million Jobs Will Move Offshore.* Cambridge, MA: Forrester Research Inc., 2004a.

Pecht, Michael, and Zuga Leonard. "China as Hegemon oft he Global Electronics Industry: How It Got That Way and Why It Won't Change." 2009. http://insidertalk.net/documents/Hegemon.pdf (accessed May 10, 2013).

Plowden, Lord. *Report of the Committee of Enquiry into the Aircraft Industry.* Cmnd. 2853, HMSO, London: Ministry of Aviation, 1965.

Pries, Ludger. "Emerging New Production Systems in the Transnationalisation of German Carmakers: The Case of BMW/Spartanburg and DaimlerChrysler/Tuscaloosa." October 2001. http://gerpisa.org/ancien-gerpisa/actes/30/30-2.pdf (accessed March 14, 2013).

Renault. "Annual Report 2012." 2013. http://www.renault.com/en/lists/archivesdocuments/renault%20-%202012%20annual%20report.pdf (accessed May 31, 2013).

Renner, M., and G. Gardner. *Global Competitiveness in the Rail and Transit Industry.* Washington: Worldwatch Institute, 2010.

Reuters. "Mexico hourly wages now lower than China's-study." 4 April 2013. http://www.reuters.com/article/2013/04/04/economy-mexico-wages-idUSL2N0CR1TY20130404 (accessed May 10, 2013).

RFE. *Minutes of Rail Forum Europe's 4th Event. European rail industry, latest trends in international rail markets and the way forward. 11 January 2012.* 2012a. http, //www.rail-forum.eu/wp-content/uploads/2012/01/120111_Minutes_RFE.pdf. (accessed May 25, 2013).

Roegner, Harry. "Key issues facing European car manufacturers and their strategic responses." *Business Economics*, 29(4) 1994: 18-21.

Sachwald, Frédérique. "The Automobile Industry: The Transplantation of the Japanese System Abroad." In *Japanese Firms in Europe – Studies in Global Competition*, edited by Frédérique Sachwald, 169-210. Luxembourg: Harwood Academic Publishers, 1995.

Samson, Rene. "Competing with the Japanese - Strategies for European Business." *Long Range Planning*, 26(4) 1993: 59-65.

Saxton, Peter. "Prestige and sunk costs – lessons from Concorde." 12 July 2010. http://www.capsticksaxton.com/index.php?option=com_content&view=article&i

d=133:prestige-and-sunk-costs-lessons-from-concorde&catid=40:latest&Itemid=120 (accessed June 5, 2013).

Scharnagl, Wilfried. *Die konzertierte Aggression.* München: Ehrenwirth, 1969.

Schüller, Margot and Turner, Anke. „Global Amibtions: Chinese Companies Spread Their Wings.“ *Journal of Current Chinese Affairs*, 34(4) 2005: 3-14.

Schwab, Klaus. *A Partner in Shaping History. The First 40 Years 1971 – 2010.* Geneva: The World Economic Forum, 2009.

Schwartz, P., and D. Randall. “Ahead of the Curve: Anticipating Strategic Surprise.” In *Blindside: How to Anticipate Forcing Events and Wild Cards in Global Politics*, edited by Francis Fukuyama, 93-108. Washington DC: Brookings Institution Press, 2007.

Servant-Schreiber, Jean-Jacques. *The American Challenge.* London: Hamish Hamilton, 1968.

Shepherd, Geoffrey. “The Japanese Challenge to Western Europe’s New Crisis Industries.” *The World Economy*, 4(4) 1981: 375-390.

Sklair, Leslie. *Assembling for Development: The Maquila Industry in Mexico and the United States.* New York: Routledge, 2011.

Stoll, Mark. *Rachel Carson's Silent Spring, A Book That Changed The World.* 2012. http://www.environmentandsociety.org/exhibitions/silent-spring/overview (accessed May 5th, 2013).

Stoltenberg, Gerhard. “Die amerikanische Herausforderung - ABENDLANDS UNTERGANG (II)?” *DER SPIEGEL*, no. 11 (1968): 154-157.

Strauss, Franz Josef. *Speech at the first Roll-out of Airbus A300.* Paris, 28 October 1972.

Sturgeon, Timothy J., and Richard Florida. *Globalization and jobs in the automotive industry.* Final Report, Massachusetts Institute of Technology, Cambridge: Alfred P. Sloan Foundation, Center for Technology, Policy, and Industrial Development, 2000.

The Economist. “Here, there and everywhere.” 19 January 2013. http://www.economist.com/news/special-report/21569572-after-decades-sending-work-across-world-companies-are-rethinking-their-offshoring (accessed May 4, 2013).

THE TIMES. “Into Europe with Industry's Help.” *THE TIMES*, no. 56789 (15 November 1966): 1.

Turner, Graham. *A Comparison of the Limits to Growth with Thirty Years of Reality.* Canberra: CSIRO Sustainable Ecosystems, 2008.

Tyson, L. D., and P. H. Chin. “Industrial Policy and Trade Management in the Commercial Aircraft Industry.” *Berkeley Working Papers.* 1992. http://brie.berkeley.edu/publications/wp%2055.pdf (accessed June 5, 2013).

UNIDO. “Technology Foresight for Organizers.” 2003. https://www.unido.org/foresight/registration/dokums_raw/volume1_unido_tf_manual.pdf (accessed May 15, 2013).

UNIFE. *Annual Report.* Brussels: UNIFE, 2012b.

UNIFE. *Annual Report 2009.* Brussels: UNIFE, 2009.

—. *World Rail Market Study forecast 2012 to 2017.* Brussels: UNIFE, 2012a.

van der Gießen, E. and Marinelli, A. “The Value of FLA for Strategic Policy Making.” In *The role of forward-looking activities for the governance of Grand Challenges*, edited

by Susanne Giessecke, Annelieke van der Gießen and Stephan Elkins, 22-31. Paris: European Foresight Platform, 2012.

von Brockdorff, Thilo. “The Japanese Challenge for Europe: "Ambiguous Relations".” In *Europe, Japan and America: Cooperation and Competition*, edited by Theodor Leuenberger and Martin E. Weinstein, 9-16. Berlin: Springer, 1992.

Womack, James P., Roos, Daniel and Jones, Daniel T. *The Machine That Changed the World: The Story of Lean Production.* London: Simon&Schuster, 1990.

World Economic Forum. “A partner in shaping history.” 1971. http://www3.weforum.org/docs/WEF_First40Years_Book_2010.pdf (accessed June 8, 2013).

World Meteorological Organization. “Declaration of the World Climate Conference.” 1979. http://www.dgvn.de/fileadmin/user_upload/DOKUMENTE/WCC-3/Declaration_WCC1.pdf (accessed April 14, 2013).

Zimmermann, Hubert. “Western Europe and the American Challenge: Conflict and Cooperation in Technology and Monetary Policy, 1965-1973.” *Journal of European Integration History*, 6(2) 2000: 85-110.

8. Annex

8.1 RACE2050 basics

Project acronym	**RACE2050**
Project title	**Responsible innovation Agenda for Competitive European transport industries up to 2050**
Call identifier	FP7-TPT-2012-RTD-1 [Prospects for transport evolution: challenges for the competitiveness of the European transport sector in the long term]
Grant Agreement no.	314753
Starting date	01/09/2012
End date	28/02/2015
Funding Scheme	Coordination and support action

RACE2050 consortium partners are:

Partner acronym	Partner name	Logo
TUB	TU Berlin, Zentrum Technik und Gesellschaft, Berlin, Germany	
RCAB	Ritchey Consulting AB, Stockholm, Sweden	
ZHAW	Zurcher Hochschule für Angewandte Wissenschaften, Zurich, Switzerland	
ICTAF	Interdisciplinary Center for Technological Analysis and Forecasting, Tel Aviv, Israel	
TOI	Transportokonomist Institutt, Oslo, Norway	
VTM	VTM Consultores em Engenharia e Planeamento Lda, Lisbon, Portugal	

8.2 Deliverable basics

Deliverable no.	D2.1
Document name	RACE2050D2.1FINAL
Deliverable name	Report on transport foresights since the 1960s: strategic warnings, visions and outlines
Work Package	WP2
Nature	Report (R)
Dissemination	PU (Public)
Editor	Robin Kellermann
Contributors	Aharon Hauptman, Robin Kellermann, Massimo Moraglio, Roey Tzezana
Due date of submission	30th June 2013