

Global Car Industry: Options for Developing Countries

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Abstract

This paper traces the origins of the global car industry and charts its evolution during the 20th century. The focus is on the main drivers of the globalisation of the industry with emphasis on the position of developing countries in this process.

Key Words: Global car industry, FDI, technology transfer, transnationals in LDC

INTRODUCTION

According to Dicken (1998, p316) MVI was the key manufacturing industry for most of the middle decades of the twentieth century. Peter Drucker (1946, p149) called MVI “the industry of industries”. The reason Drucker made this statement is clear if we consider the industry’s scale, the share in total manufacturing employment, GDP and exports as well as its numerous forward and backward linkages with the rest of the economy .

According to Maxton and Wormald (1995) MVI today is the largest manufacturing activity in the world. By 1993, there were approximately 470 million cars in operation in the world, of which 75% were in the USA and Europe (p.77). ‘Three quarters of the vehicles produced are cars, the remainder vans, trucks and buses’, (p.78). When the effects on other industries (e.g. feeder industries) are considered, the impact is phenomenal. ‘Of the 50m vehicles produced in 1990, each contains at least 5000 individual parts of widely varying materials (p.78). But the impact is not just limited to feeder industries. Apart from the industry that produces spare parts, there is also industries supplying fuel, finance, insurance as well as car distribution and sales companies (p.78).

MVI has often been described as a ‘mature’ industry and the car as a ‘mature’ product. This perception of the industry has often been linked with Vernon’s product cycle model of FDI, which suggests that a mature product will eventually be produced in the developing world where lower costs of production will help the industry to stay competitive (Vernon, 1973).

However, a five-year study at MIT, i.e. MIT International Motor Vehicle Program, tends to differ from this perspective for a number of reasons that include technological change (the rise of lean production technologies) and consumer preference (Womack et. al. 1990). We will deal with these issues later. In what follows we will chart the evolution of MVI world-wide, consider the options (strategies) in technology transfer in the sector to the developing countries and speculate about the future of MVI.

THE EVOLUTION OF MVI

At this stage we are not concerned with the origins of MVI. But it is clear that early stages of this industry involved craft production. For instance cars were made in small workshops, in small batches and were custom-made. The volume was low, the product was customised and worker skill requirements were high. Variety of product range was high and supplier-producer relations were close geographically. This state of technology and demand accounts for the fact that in Britain and the USA there were hundreds and perhaps thousands of car makers. By 1910's the industry began to evolve in a dramatic way.

THREE TRANSFORMATIONS OF THE CAR INDUSTRY

According to Altshuler *et. al.* (1984) the spread of the car industry over the world can be best seen in terms of three transformations from the early 20th century to the 1980's (also see the summary and analysis provided by Gwynne, 1990, chap. 10).

These transformations are distinguished from each other by three variables: process/product innovation, geographical area of rapid market growth and the nation or region where the transformation occurred (Ibid. pp11-45).

I. The first transformation, 1902 – 1920's, involved mass production, using standardised parts. Ford's Model T was the product of such technology. Initially it used the USA as an area of rapid growth and was obviously associated with the USA as the country of origin. This was a significant development as the emerging of mass production techniques using the assembly line changed the nature of industry for ever. It created a mass market for cars in the USA and led to the growth of other industries including the service sector. As this development led to production of affordable cars, quality and customization which characterised pre-Ford state of the industry were compromised. Also the flexibility of previous craft-like production system was lost.

II. The second transformation, 1950's – 1960's involved product differentiation with emphasis on product technology, but also to some extent process technology. The home of this transformation was Europe and the regional market consisted in Western European countries.

This transformation was necessitated by different income levels, road conditions, etc. compared to the USA. Thus small 4-cylinder cars were the norm. This transformation had significant implications for the future of the car industry, not only in Europe but also in the USA and the rest of the world. The oil price rises of the early 1970's and increasing concerns about the environmental consequences of using 6-8 cylinder cars, led to an increasing desire by consumers to go for 4-cylinder cars. Thus by the late 60's and early 70's there was a potential market in the US for these cars which was quickly filled first by European and later Japanese cars.

III. The third transformation is associated with the rise of the Japanese auto industry. This involved both product, process technology as well as management technology.

Basically one can see here the origin of lean production involving Just-In-Time production and Total Quality Control. Initiated by the Toyota Corporation the rise of lean production spread all over the world due to its higher productivity. Lean production technology not only offers high productivity but also involves greater flexibility which enables car makers to offer greater variety of models to the market.

IV. The Fourth and Fifth Transformation

Altshuler *et. al.* identify a fourth transformation in the auto industry with a question mark (Ibid. p.12). They conjecture that by the late 1980's and 1990's there may be a shift to LDC's of car production, possibly to Brazil, Mexico and Korea. The study seems uncertain, both about location and technology of auto industry in the 1990's and beyond.

This paper will try to consider these questioned unanswered by Altshuler *et. al.* It will also consider and evaluate in historical terms the four factors (Ibid. pp.182-83) believed to be shaping the future of the auto industry. Let us now go back to the first three transformations.

The first transformation began a slow process of internationalisation of car industry initially through Ford Company investments in the UK in 1920s. The interwar period

and Second World War slowed down the process considerably. It was only after World War II that we see an immense increase in the pace of globalisation of car industry. It is clear that both changes in technology and the rise of post war international arrangements leading to greater liberalization of trade and investment flows facilitated the second and third transformations in the car industry.

In the USA two of the world's largest producers GM and Ford led the way. Japan and Europe followed suit in the 1970s and 80s. The process of internationalization has, however, been uneven as the following discussion on German car makers will attempt to demonstrate.

While VW was the first company in German car industry to go multinational (e.g. investments in Latin America and North America, 1960-70s) it took a lot longer for other two major German car makers, i.e., BMW and Daimler Benz to seek globalization. BMW's attempt in widening its market by moving into compact mid to down market cars, led it to acquire the British Rover Group in the mid 1990's. This move ended in failure, for a complex set of reasons that may not concern us here. BMW eventually divested from Rover. One point, however has to be mentioned. BMW did not Germanize the Rover brand.

By contrast, Daimler introduced smaller, mid-priced vehicles with the promotional message that "you don't have to be rich to own a Mercedes". But by late 1990's it was clear that his strategy was not going to work in export markets. The eventual merger with the US Chrysler (1998) represented a watershed. Chrysler too in contrast with Ford and GM had only internationalized its activities regionally (to Latin America).

The reason for the success of VW as an early globalizer as opposed to BMW and Mercedes has largely to do with the fact that VW was set up initially (under Hitler) to produce small affordable cars. This became a tradition and thus VW excelled in producing compact quality cars, which were fuel-efficient and appealed to low-mid market. The production process involved mass production. In contrast BMW and Daimler had a different tradition. They were basically family owned businesses founded by brilliant Austro-German engineers who excelled in quality and master craftsmanship. Their production was of high quality and thus high price, appealing to rich and middle class in both developed and developing country markets. However, the realities of expanding world markets, particularly in LDCs, point the way to an expanding market in the lower ranges of market.

BMW's and Mercedes cars are still attractive to rich in developed markets. But the latter are at saturation point or dwindling. These carmakers will still find expanding markets among the rich in the LDCs. But there is a limit. The labour costs and transportation costs of producing in Germany and exporting to LDC make Mercedes cars unaffordable to the rich in these markets. Hence the assembly of Mercedes in Egypt as an export platform to Arab rich countries.

The latest information on German carmakers (see Lane 2002 in Morgan, et. al. 2002) shows that all these companies have expanded rapidly in North America, South America and Asia Pacific. Although VW leads the way BMW and Mercedes are not far behind.

THE FUTURE OF CAR INDUSTRY AND STRATEGIES FOR LDCS

Altshuler *et. al.* (1984, pp.182-83) mention four factors that they believe would shape the future of the car industry. In what follows those factors will be discussed and then evaluated in the light of the most recent developments in MVI.

i) The Lowering of the Minimum Efficient Size (MES) in Car Assembly

At the time they were writing the MES was 240,000 cars on a two-shift working day.

The authors predicted that use of flexible automation would reduce this in future.

The implication of this prediction, which has become a fact now, is that countries with small markets (e.g. some LDC's) may be chosen by MNC's for the final assembly stage.

ii) New Product Technologies

These product technologies are able to offer not only small size fuel-efficient cars but also larger fuel-efficient and safe models. The authors argue that new product technologies make 'commodification'.... Neither evident nor inevitable' (p182). In fact the trend in the 1990's has been towards greater customisation (see below).

The implication of this second factor is that the auto industry is able to cater to a variety of tastes and incomes all over the world. Thus the scenario predicting that MVI will eventually move to low cost locations (LDC's) is ruled out.

iii) MVI moves away from mass production methods to lean methods

Lean technologies first pioneered by Toyota in Japan (Just-In-Time) involves greater flexibility, higher productivity partly due to minimisation of inventories and higher

quality due to Total Quality Control associated with JIT. The move away from mass to lean production methods has already taken place as more auto manufacturers world wide have embraced these technologies.

iv) The Market for Cars Demands a Variety of Models

This point has been partially explored under factor (ii) above and will be discussed below.

Gwynne (1990) identifies two models for the future of car industry: the world car concept based on Gooding (1979) and 'technological divergence' model based on the Altshuler (MIT Report).

THE WORLD CAR

This involves a basic model with standardised parts and components, which can be produced anywhere in the world (e.g. LDCs) with parts and components outsourced to many countries to take advantage of locational factors and economies of scale. This concept has materialized on a regional basis, e.g. Ford's outsourcing of parts to 15 countries in its European operations. However it has not been realized on a global scale.

As a consequence of the basic uniform design, and outsourcing to low cost locations and large economies of scale, prices can be kept at low levels and thus the product can compete more effectively in world markets. According to this scenario then, LDC's, especially NIC's would become major producers of cars.

TECHNOLOGICAL DIVERGENCE

The rival view has been most influentially presented in the above-mentioned study by MIT. It envisages a future for the car industry based on both the location of demand for cars (notably rich countries) and high level of technological change in both product and process technologies.

The conclusion drawn by Gwynne is that the second model is a better predictor of the future of car industry compared with the first model. As cars are demanded for a variety of reasons, specially in richer countries, it is the world's major car producers mostly located in rich countries, which will be in possession of productive capacity and required technologies to meet the market demand. As far as LDCs are concerned, the future is bleak. Gwynne (p.149) suggests, further, that the expansion of car industry to LDCs faces difficulties, with the exception of countries such as Brazil which offers a large market, Mexico as a country close to core markets (USA) or South Korea which houses dynamic MNCs.

The contrast between the two models of the future of the car industry is dubious for the following reasons:

- 1) As the experience of Egypt (Taha, 2002) shows the spread of car industry to LDCs is driven primarily by market factors rather than technology.

- 2) Assembly of luxurious cars have already moved to LDC's as is the case with Mercedes in Egypt. Thus the cost advantage offered by LDC's at assembly

stage and the proximity to rich Arab countries (locational factors) are important.

- 3) The outsourcing activities of MNC's imply that LDC's may attract FDI in the car industry at most stages of production with the exception of R&D.

THIRD WORLD CAR INDUSTRY: STRATEGIES FOR GROWTH

According to Gwynne (pp. 148-49) within the context of declining per unit costs due to new process technologies and organisational methods introduced by the Japanese companies, the factor of low labour costs in LDC's holds less and less attraction for the MNC's. He identifies three strategies that developing countries could follow in terms of export-oriented growth:

1. Technological and financial link between a domestic company of NIC and a Japanese MNC.
2. Joint ventures between domestic corporations and 'world car' MNC's.

Examples: Korean conglomerate Daewoo and Kia linking with GM and Ford to produce a 'world car'. But there is also a Japanese connection due to the involvement of Ford and GM in Japanese car producers.

3. Export incentives for car MNC's. Examples include Brazil and Mexico.

The Experience of Egypt shows that many other companies such as Mercedes which link up with LDC producers in order to serve both domestic and regional export markets (e.g. Mid-East and North Africa).

The main problem with Gwynne's analysis is static assumptions about LDC income growth. Also the dynamic relationship between FDI and host country income growth leading to market expansion, which induces further FDI, is ignored. Both China and Middle East have attracted massive FDI in car industry in 1980-90s.

THE MOST RECENT DEVELOPMENTS IN MVI

Altshuler et. al. were almost prophetic in their prediction and Gwynne's analysis was true for 1980's, but both missed a number of significant factors that are playing an increasing role in the global car industry. These factors have been more favourable to the movement of the industry to LDCs, e.g. the growing importance of international outsourcing of components in MVI.

In what follows the above factor, among others, will be discussed.

First on the technological front there are two recent developments in MVI, one of which concerns a further development of lean technologies, i.e. modularisation, the other concerns the design of cars.

The first development that has been described as 'contracting out the assembly line' involves the fact that what used to be an essential part of car assembly, i.e. using parts and components to assemble a car, is now supplied by system makers. These companies specialise in supplying subassemblies e.g. a car front panel complete with fender, headlights, etc. This implies that what was used in the various stages in the

continuous assembly line in car production can be broken down into subassemblies supplied by companies specialising in the provision of subassemblies. This development is in line with lean methods of production because it allows car makers greater flexibility, i.e. they can choose a variety of subassemblies supplied by system maker companies rather than design their own (Time Magazine, 1999a).

The second development concerns design of cars. Market research on what consumers want in a car has led to a situation where most car designs converge leading to impersonal, mass-produced designs. The attitude to design in car making, however, is changing. More and more car manufacturers (e.g. Ford) are employing top designers to design cars that would appeal to the imagination of customers (Time Magazine, 1999b).

This is understandable from the industry's point of view, especially as far as rich country markets are concerned. Excess capacity is rampant in MVI in the North, which is one of the main reasons for recent mergers (e.g. Daimler-Chrysler). It is clear that the main car makers' strategy in rich markets is to appeal to customers who do not necessarily want to replace their old car with a new one, but those who may wish to own an attractive, custom-designed car.

The analyses by both Altshuler and Gwynne above are based on static conditions in world economy. The last two decades of the 20th century witnessed rising incomes in Asia, South America and Middle East. Furthermore, locational factors (including lower costs) in these regions have become prominent in the outsourcing decisions of car

multinationals. Thus FDI in car industry is both market and cost driven. Also, although global car business remains dominated by a few large transnationals, increasing international competition in all industries since World War II (Auerbach 1988) has continued unabated. Thus in recent years Ford has increasingly served its home market (USA) from assembly operations in Mexico due to the presence of Japanese car makers in the US.

The following most recent developments in global car industry will demonstrate the accuracy of the analysis above.

Japanese carmakers which until recently limited their operations to Japan or high income markets are increasingly moving to Asia and South America. Toyota and Nissan are prominent examples. There is an increasing trend for both outsourcing of components and final assembly to China and South America to take advantage of lower costs and large potential markets (FT 2003, Jan 18, p. 29).

Even in luxury car divisions in spite of the significance of R&D as well as product and quality technology, there is a marked tendency to move to lower cost locations, particularly if these places also offer large markets. Mercedes assembly operations in Egypt to serve the rich Gulf markets (Taha 2002) is a good case in point. Daimler-Chrysler has also been moving to Asia. As Ford has been losing money in its flagship business portfolios acquired recently, i.e. Volvo, Jaguar and Landrover, leading to attempts at restructuring them (FT 2003, Feb. 14, pp 21 and 28) it would not be

surprising if they also move some of their operations (including assembly) to low cost countries.

THIRD WORLD CAR PRODUCTION

We can distinguish two different strategies in MVI in LDC's pursued since the 1950's.

We shall call them the Latin American Model and the Asian Model.

The Latin American Model has involved import-substitution industrialisation through massive FDI primarily from the US and Europe. By contrast, the Asian Model has involved joint ventures with Japanese and American car makers, with strong export-orientation.

In the 1960's, the Latin American Model was considered as the norm by most economists and policy-makers. It involved FDI (e.g. Ford Motor Company investments in Brazil), high domestic content requirements by the host government, primary orientation to serving domestic markets with the possibility and desirability of servicing some foreign markets. The 1960's-1970's were the golden age of ISI, particularly in MVI in Latin America. For instance, Brazil attracted massive FDI in this sector, which managed to service both domestic markets and to some extent foreign markets. Brazil became the source of exports for some VW models to the US market. But the success of the Latin American Model came to an end in the 1970's. In spite of government incentives and subsidies to the sector with a view to export cars from Brazil, MNC's such as Ford stopped investing in Brazil. The main reason was the strict domestic content required by the government.

The 1970's witnessed the breakdown of the Bretton-Woods system of fixed exchange rates. The flexibility of exchange-rates that followed the collapse of the Bretton-Woods system had significant implications for the pattern of industrialisation and technology transfer to LDC's. One such consideration involved the fact that auto parts could be outsourced more economically from countries with devalued exchange rates.

Apart from this fact, it is also apparent that countries that pursued strict ISI policies fostered inefficient (highly protected) feeder industries. MVI uses thousands of parts in assembling cars, trucks, etc. In the 1970's MVI in the USA and Europe were attempting to meet the challenge from Japanese car makers. The strategy adopted, e.g. by Ford, was to outsource its parts, components and subassemblies from single suppliers located in a large number of countries.

This strategy basically invalidated the transitional models of technology transfer. Thus the feeder industries would not necessarily be located in a host country where cars are assembled. It would be spread around the globe to take advantage of both lower costs of production and economies of scale. This strategy by Ford effectively challenged traditional models of technology transfer (see Shamsavari, et. al., 2002)

STRATEGIES OF HOST COUNTRIES AND OPTIONS FOR LDC

According to Gwynne (1990) the only options available to LDC are wither joint ventures between LDC private sector/government and MMC. S. Korea, Malaysia or export incentives to MMC (Brazil).

The Egyptian experience (Taha, 2002) shows that there are a multitude of routes that a LDC can acquire technology in the car industry apart from joint ventures and export incentives. There is for example turnkey contract. Under a turnkey contract a country may acquire a car assembly plant that will show 20-40% domestic contract (Mercedes in Egypt). This may seem like very little technology transfer (assembly only). But if one considers the potential of export earnings from such a contract, the benefits are too evident. The country will have good foreign exchange earnings which help the foreign debt servicing. This will release resources for imports that are vitally needed to further technology/knowledge transfer, etc.

Yet there is another route for LDCs. First experienced in Mexico, a country may excel in producing parts, components and subassemblies for car industry, a circumstance which may lead to transfer technology at a basic level (feeder/ supplier industries). This transfer of know how can take place under a licensing agreement or may involve FDI (for example GM, Ford, Daewoo, etc. in Egypt).

The increasing importance of both strategic and locational networks implies that LDCs can play a significant role in integrating into networks. For instance, it is clear that the

activities of car MNC's in Egypt is aimed at creating a regional (North Africa) network, which will serve that region.

Thus options for LDC in technology transfer from car MNC's are quite wide. However, LDCs should not lose sight of their long-term development objectives by adopting an open door policy towards MNC's. The Chinese experience shows that a planned and orderly approach towards MNCs has significant payoffs. The Chinese government has been able to attract massive amounts of FDI (including joint ventures, e.g. VW) by creating EPZs and a host of other policy measures to ensure that FDI and other MNC routes of market entry serve China's long term development needs.

In the light of the above discussion there are a number of strategies that a host country can adopt (see Gwynne, chap.10; Malecki, chaps.2, 7 & 8; Howells & Wood, chap. 9):

- 1) Improve the skills and educational standards of the work force and ensure that MNC's are committed to the education of the domestic labour force. As education and technical training is essential to the diffusion of transferred technology in the economy a systematic educational programme with co-operation among the host government, host companies and the MNCs is essential
- 2) Ensure that MNCs are committed to export competitiveness and thus export growth. As one of the most beneficial effects of FDI in host countries is its contribution to export growth in the latter, export competitiveness remains crucial for this strategy (UNCTAD 2002).

- 3) As far as possible, discourage cross border mergers and acquisitions (M&As) by MNCs and encourage greenfield investments, as the first path does not lead to fresh capital formation, a process that is badly needed in LDCs (UNCTAD 2000).
- 4) Survey the technological capabilities of the country and establish a strategy to enhance existing capabilities. Without such a policy initiative there will be a lot of duplication of effort and investment and foreign exchange loss by the LDC.
- 5) To insist on domestic content requirement only to the extent that domestic feeder industries meet international standards in quality and price (see point 8 below).
- 6) Encourage domestic research and development in MVI that is most relevant to the specific conditions of the country and develop links between research establishments, universities and domestic and foreign companies.
- 7) Ensure that MNC's are transferring appropriate technologies. Appropriateness here refer to both factor endowments in the host LDC and the cost for the host country in foreign exchange.
- 8) Encourage MNCs to invest in supplier industries. UNCTAD (2001) shows how important the linkage between MNCs and domestic host country firms is for economic development in LDCs. As indicated in Taha (2001) investment by multinationals in domestic suppliers companies is vital for establishing such linkages. Why is this important? One of the reasons that an MNC may outsource parts and components for assembly operations outside the host country may be the low quality of these parts produced domestically. By investing in a supplier company the MNC will be able to help the supplier

company to achieve a better quality at a lower price. The gain for the host country can be immense as the process will involve enhanced technological capability. As mutual investments by customer and supplying companies are quite common in many industries, there is no reason why this cannot be practised in developing countries. Taha (ibid) identifies feeder/supplier industries in Egypt as one of the main arenas for technological transfer in MVI. Encouraging collaborative, long term relationships between MNCs and domestic firms, leading to strategic alliances is key to both technology transfer and development of the host developing country.

Another point that enhances the argument above is the fact that any supplier firms in car industry are more labour intensive than assembly operations. Thus investment in feeder industries is important for the employment situation in developing countries.

The most likely scenario for car MNC's in the South is to select a number of countries that offer favourable advantages in terms of tax breaks, low cost, trained and disciplined labour, good infrastructure, political stability etc. From this perspective they wish to be free from domestic content requirements and enjoy export subsidies and incentives. They may wish to engage in joint ventures with domestic companies and transfer technology at various levels depending on the technological capabilities of the host country and global considerations, e.g. the availability of low cost sources of raw materials and parts, components and subassemblies.

As for the car MNC's strategy for expansion to the South, one thing is clear: as the customers in countries in the South are not as much concerned with design and

personalised aspects of a car, the strategy would be to assemble cars in selected locations for home consumption and export markets.

CONCLUSION

In this paper we have reviewed changes in MVI world-wide since its beginning, which has involved changing technologies and world economic conditions. We have also discussed the shift of technology from North to South and options for LDCs in the transfer of technology and policies to maximise the benefits of MNC investment and other activities for host LDCs.

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