

The Transition From Multi-Domestic To Global Supply Chain Operations In The Automotive Industry Of Emerging Countries

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Abstract

The globalization economic process has brought a new competitive reality to industries present in emerging countries. This paper highlights some implications of this process regarding to the automotive industry, focusing on Central Europe, Latin America and East-Southeast Asia regions. Within this purpose, the different backgrounds, common characteristics and global trends, and relevant questions concerning the future of the auto industry in these three regions are presented and analyzed. It concludes not only by reconfirming the new series of challenges and risks, but also by highlighting the set of new opportunities being opened to the auto industry in emerging countries.

Key words: Automotive Industry, Emerging Countries, Globalization

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Introduction

The globalization economic process has led to the evolution of a new production and market environment. This new reality widens the geographical extent of companies, forcing their strategies to consider opportunities of new markets in a global scale. The current stage of the globalization process associated to the saturation of matured markets of the called Triad region - Western Europe, Japan, North America (USA and Canada) - has been influencing and changing the world's arena of the automotive industry, that is now turning its attention to the arise of markets in many emerging countries. Consequently, the emerging countries have now faced the possibility of becoming important players in the international environment of global operations, taking advantage of the local production opportunities to supply worldwide. On the other hand, they have taken the risk of becoming irrelevant or second-hand players, reducing themselves to small local markets and losing some of their skills in automotive (such as in design) acquired in the past.

In this context, this paper focuses mainly on the new scenario faced by the automotive industry in most of the significant emerging regions like Central Europe, Southeastern Asia and Latin America and its concern is primarily the automotive manufacturers rather than the component suppliers. The main purpose of this paper is to show that, in spite of having different backgrounds, currently the automotive industry in these countries faces similar opportunities, challenges and risks due to the world's new global trends created by the globalization process. Within this new scenario, this paper highlights the trends on production and design of the automotive industry in emerging countries. In order to achieve this goal, the paper first deals with the globalization process and its effects in the world's automotive industry and then briefly describes the background of this industry in the most expressive

emerging regions. The next section presents the common characteristics of these countries and the global trends that they are now facing. The effects of these characteristics and trends on the future of emerging countries will be analyzed and discussed next. Some final considerations are given in the final section.

The Globalization Process and Its Effects in the Automotive Industry

Globalization refers to the shift toward a more integrated and interdependent world economy (Hill, 1998). Commerce, finance, market and production are not more locally bound. The supplier of parts or raw materials, the service or manufacturing industry, and the consumer may be located anywhere in the world.

The planetary view of national strategies and business decisions is not new. It probably started at the turn of the XV century with the first trip of Columbus to America, soon followed afterwards by the Magellan's circumnavigation journey. A deeper integrated view of the world was underlined by the industrial revolution started in the XVIII century England. Historians recognize three waves of this revolution, each one heralding a specific way of using knowledge and a continuous decentralization process. The first wave was the beginning of the revolution itself. The second wave brought the shift to local decentralized mechanical power, due to the internal combustion engine. The third wave came recently with the decentralization of intelligence due to microcomputers (a concise description of the three waves is found in Warnecke, 1993).

Globalization, as an offspring of the recent third wave, became possible with the development of telecommunications and computer sciences, which enlarged the range of interactions. In the present stage, the area of activities reached the planetary size with global and integrated operations. According to Fleury (1999) and to Baumann (1996), the globalization process can be divided into three stages. The first one was the financial globalization. It started in the 70's and was a result of the deregulation of financial markets. The advance of computing and telecommunication technologies drove it. The second stage was the commercial globalization, which was intensified during the 80's with the reduction of barriers to international trade, and supported by the development of transportation technologies. The third, and current stage, is the productive globalization. In this stage, production and operations systems are organized following a globally integrated strategy.

The current stage of the globalization process implies in deep changes of patterns for companies of the automotive industry present in emerging countries, since they are local subsidiaries of Transnational Companies (TNC) or seldom independent ones. A protected environment, where the whole chain of this industry presents a high level of nationalization of its products, projects and production, will no longer be possible. Face to this new environment, the emerging countries should now find a significant place in the global automotive supply chain operations.

Past: Different Backgrounds

In order to analyze the possible future places of emerging countries in the global automotive operations it is necessary to understand their background in the automotive industry. This section gives an overall of this background in the most significant emerging regions dividing them into three groups: Central Europe, Latin America, and East and Southeast Asia.

Central Europe

The history of automotive industry in these countries starts at the end of the 19th century and can be divided in three periods before, during and after the Iron Curtin.

According to Kovaoik (1999), in 1897, the first automobile with combustion motor in Central Europe was produced in Nesselsdorf, today part of the Czech Republic. One year later, the

first truck was also produced in the same factory. From then on, many other automotive factories started to appear. In the very beginning of the 20th century, the first Hungarian home designed car was also produced. Poland began its automotive industry a bit later. It was more characterized with creations of joint ventures with foreigner companies, where the Italian Fiat played an important role.

During the Iron Curtin existence, the governments took control over the automotive industry of this region dividing it into state-owned companies. Most of the companies produced their own self-designed product, generally using a national supply base and selling their products mainly to the domestic market and/or to other east European country. The best example of this procedure was given by the Czech Skoda. However, there were exceptions among the automotive manufactures in the east European block, where companies like Fiat and Renault played important roles transferring technology to Polski Fiat and to Dacia, respectively.

Even though in less quantity, during the Iron Curtin, most of these countries had developed skills in automotive engineering and design with some technology imports from the west, but their products became increasingly obsolete. Early in the 90's these companies were too technologically and financially weak to compete with foreign companies, no longer being viable as independent companies. Most of them were sold to TNC or became part of joint ventures in order to be used as a main door entrance to their domestic market and to other emerging markets with cheaper vehicles. Skoda appears again as a good example of this strategy and nowadays it became an important brand of the Volkswagen group. Currently, a similar process is still happening in eastern European marketplace, where Renault intends to re-launch the Romanian Dacia. The independent Russian Lada is one of the exceptions, but its future success in the new world scenario is still blurry and unpredictable.

Latin America

The development of the industrial processes in the Latin American countries occurred in a completely different environment when compared to the Central Europe. These processes were completely built from abroad with foreign industries, and it was mainly developed in Argentina, Brazil and Mexico.

Before the 90's, the automotive industry adopted varied strategies to set up in the region. In the first decades of the XXth century, importation was the adopted strategy, but with the local markets growth in some countries during the 30's and 40's, the assembling of completely knocked down (CKD) vehicles was introduced. The introduction of CKD vehicles helped to develop the industrial sector of these countries that were inherently necessary to further produce completely built up (CBU) vehicles in the 50's. From the 50's to the 80's, economic policies inhibited importation, stimulating the establishment of local CBU vehicle plants by European and American vehicle manufacturing companies. The same was done by many automotive suppliers that had established a local supplier network since the government forced a constant growth of the number of components locally produced. In the 70's, this nationalization process reached almost 100% in countries like Brazil.

This period was characterized by autonomy of the foreign vehicle and auto-parts subsidiaries. Due to this autonomy, the subsidiaries developed and accumulated competencies especially in automotive engineering and design for the Latin American's domestic market, like the Brazilian vehicles VW Brasilia, VW Gol and Ford Corcel II. Many local independent auto-part companies also followed these steps. The way these countries acquired skills in automotive design was different from the way Central European countries did, but both ways worked out and succeed in producing and projecting vehicles.

The deep transformations conducted in the 90's affected most of the Latin American countries. The implementation of economic reforms, that stabilized and opened their

economies, and specific governmental policies, such as commercial agreements, were the political and economic bases for a new structure in the region's auto industry. These measures contributed to create new environmental factors such as the increase of their domestic market, the consolidation of trade areas like Mercosur (Common Free Market of the South) and Nafta (North American Free Trade Agreement) and the industrial modernization of some countries, necessary conditions for producing world class vehicles (Scavarda et al., 2000).

East and Southeast Asia

The analyses of the automotive industry's background of the Latin American and Central European regions can be discussed in a generic way, but it is impossible to do the same with Asia. Its countries have had different backgrounds and still have differences like the way their markets are opened or protected from foreign companies. In order to hit the main goal of this section, this region is briefly analyzed separately.

ASEAN (Association of Southeast Asian Nations): Until the 60's, the vehicles sold in their domestic market were imported from western countries. Within the 60's Japanese vehicle manufactures started to assemble locally CKD vehicles. With government polices that favored localization in the region, Japanese auto-part companies began also to set up operations in the region. The 80's and 90's were characterized by the increasing implementation of these policies and by the strong local presence of Japanese companies. The regional integration measures of ASEAN were accelerated with the new economic situation appeared after the crisis of 1997/98. The companies whose previous focus were on national markets are now forced to adopt regional integration measures (Guiheux and Lecler, 2000).

Korea: During the 60's and 70's it happened the initial grow phases of its automotive industry, which were aided by the use of existing designs and technology provided by foreign companies. Daewoo, Kia and Hyundai were benefited by their links with GM, Mitsubishi and Mazda, respectively. This helped the country to acquire the skills and knowledge necessary to develop its own products. In spite of its current economic crisis, which resulted in deep problems for this industry, Hyundai took over Kia and is today back on the global game of the automotive industry where it plays an important role with many global operations. However a new local scenario will appear, western trade bodies urge Korea to open its domestic market, one of the world's most closed for foreign companies.

China: The automotive industry of China was developed behind protective barriers and in the context of the state regulation of the economy. Since the mid 80's, Chinese government has adopted a relatively open policy, encouraging domestic companies to take advantage of the investment and advanced technologies provided by foreign companies in an effort to accelerate the modernization of the domestic automotive industry.

India: Until the 80's the Indian government controlled the local vehicle production and inhibited importation. Foreign companies were restricted to the components sector. Within the 80's this police was gradually relaxed, allowing joint ventures of local companies with foreign ones. In the 90's, with an even more relaxed policy, but always stimulating local production, foreign companies set up operations in India increasing its local capacity.

Despite the opening process of the Asian marketplace, the region is still very protected when compared to the other emerging regions described in this paper. This is one of the reasons why TNC have established joint ventures with local partners in order to develop and sustain entry in the region. This protection gives more time for the local companies to find a place in the global supply chain operations of the automotive industry. Today, this industry in Asia is formed by a combination of local independent companies, joint ventures and entirely owned TNC subsidiaries. Nevertheless, many of the independent companies are in various stages of transition into new forms, commonly joint ventures with foreign manufactures.

Present: Common Characteristics and Global Trends

In spite of having different backgrounds, as generically described before, most of the automotive industry in emerging countries presently face similar opportunities, challenges and risks that will strongly influence their role in the automotive global chain in the near future.

The main opportunities for these countries, emerged from a general improvement of their national economic situation that are transforming these regions into significant markets for the automotive industry. Some of these opportunities are listed below:

- *Potential markets for selling vehicles:* The recent growth of the emerging countries market is presented in Table I by the registration of new vehicles in selected countries. This growth was around 77%, while in countries from the Triad region it was about 8%.
- *Potential producers to supply local and world areas:* Many global companies are investing in emerging countries by virtue of the growth of these markets and saturation of the Triad markets, taking advantage, in many cases, of local tax-incentives and of the lower production cost in emerging countries. This has encouraged the increase of the production in these countries not only to supply their domestic market, but also to export worldwide, as represented in Table I by the worldwide vehicle production and vehicle exports. The production growth in emerging countries was around 60% and the growth in vehicles exports were around 266%, much higher than the growth from the Triad region.
- *Potential areas for productive and organizational innovations:* Many organizational innovations are taking place in emerging countries plants that include changes in supplier-automakers responsibilities, like the Volkswagen truck plant in Brazil and the Skoda's plant in the Czech Republic (Pires, 1998). Innovations like new experiments in outsourcing, flexible allocation of labor, and flexible working hours are also taking place in these countries. Sometimes, companies are forced to innovate by specific circumstances of emerging markets, like the new forms of supplier organization shared by Nissan and Toyota in the ASEAN region due to the impossibility to reproduce the system existent in Japan. This new form of supplier organization has been transferred back to Japan changing relations between firms (Humphrey et al, 2000).

The behavior of the automotive industry in emerging countries has also been significantly influenced by global trends that seek economy of scale and scope on production with a high standard of quality, reduced costs and globally competitive. Several of these trends are identified below:

- Reduction in the number of vehicle and auto-parts manufactures in order to spread vehicle development and production costs to both of them;
- Restructuring and reduction of the supplier base, with the introduction of system-supplier/integration and strong collaboration with system or module suppliers instead of parts suppliers;
- Outsourcing of activities which have historically been considered part of the automotive manufacturer's territory (Collins et. al., 1997);
- Adoption of global sourcing strategies that widens the market of suppliers and expands their geographical boundaries.
- Adoption of follow sourcing strategies that allow suppliers to geographically track the manufacturer in all the markets where the vehicle is sold (Salerno et al., 1998).
- Adoption of the carry over strategy that allows the use of the same project in all the regions and countries where the vehicle will be assembled without changes in the original characteristics and attributes of the project (Salerno et al., 1998).

- Adoption of platform engineering and strategies in order to enjoy the cost benefits of purchasing common parts and the engineering saving of sharing one vehicle among different models and brands instead of designing a distinct vehicle for each one.
- Changes in the technical development of new products with the increasing number of variants, shorter product life cycles, enhanced integration of functions, new joining techniques, increased complexity and need of high technology.

Future: Open Questions

This section opens the question about the future of the automotive industry in emerging countries as a consequence of their common characteristics and the global trends.

As many new investments have been made in emerging markets, it should be asked what division of activities is likely to be developed between the countries of this region and the ones from the Triad region. This is an open question that does not have yet an established answer. This section will analyze the aspects related to production and to design within the present scenario for the automotive industry, focusing on the different emerging countries.

The growth of the emerging markets did not increase as expected by the automotive industry due to the many and successive economic crisis that affected the emerging countries from the middle of the 90's to today. The investments in production capacity were mostly made by TNC with their local subsidiaries using very optimistic forecasts for these markets and on the fact that the new plants would increase their production with exportations as the domestic market of most of the emerging countries are not large enough to produce within scale of production. This situation appeared as excess of local capacity that could result in a possible shake-out process among the plants established in this region, among the emerging producer countries and among the companies acting in the region.

Within the shakeout process, there should be a production concentration on some emerging countries that could be able to manage large-volume production in a range of models for their domestic market and for exportation. This is the case of countries like Brazil, the Czech Republic, Korea and Mexico that are now achieving an important position in the global production of the automotive industry. This could mean the end of local production in many other countries that cannot produce within economic scale, restricting them to importation of CBU vehicles or CKD vehicles and/or semi knocked down (SKD) vehicles with no significant auto-part plants.

In spite of this fact, potentially there are other possibilities like the production of vehicles attending niches of market and the adoption of mini factories retailing (MFR). The concept of MFR places small factories within the markets they serve, eliminating the distinction between production and retailing, rather than seeking to match the high-volume, low-unit cost approach of traditional manufacturing and distribution (Wells and Nieuwenhuis, 2000). The factory is also the sales, maintenance, service and repair location. The use of a MFR does not mean that there would be no use for economies of scale, since these concepts would work together. Many components could be centrally produced in large-scale quantities in conveniently located, highly automated facilities, for distribution to decentralized assembly plants. MFR would be a production solution for small geographic markets adopted in places that would otherwise be considered non-attractive by economic arguments. The adoption of MFR involves low investments, which means low risks on these unpredictable markets, but this concept involves a different production technology and production processes which are not yet well developed.

Another point that should be considered here is the impact of global scale production in the independent companies from emerging countries. Most of them, with very few exceptions like

Hyundai, can not produce within economic scale and are now forced to find a global partner that can help them to reach this scale and to join the global trends.

Although the shakeout process, some emerging countries should play an important role as manufacturers in the future of the global automotive industry. This will happen mainly through the TNC's subsidiaries, but the independent companies of these countries, with few exceptions, should find difficult times due to the lack of production scale.

A further open question is: From the perspective of product design, will the emerging countries still play an important role in the global auto industry? As it was briefly described before in this paper, many of these countries have developed competencies on automotive product design. However, in the near future these skills can be lost. Possible reasons to this decline are the global trends described in the last section, associated to the scale production question and to the hard access to technologies that are needed to product design and its components, like 3D-CAD, virtual manufacturing/simulation, and communication. These factors are creating many entrance barriers for the independent industries of emerging countries that could avoid their presence as possible new comers to the global game and contribute to reduction of the number of these independent companies.

Emerging countries can normally develop design activities through their own independent companies or through the TNC subsidiaries present in their region. With the trend of reducing the number of local independent companies, the participation of emerging countries in automotive design would be mostly limited to the TNC subsidiaries. In the past, when these subsidiaries were inserted in a multi-domestic operation environment, they had enough autonomy to develop many of their own projects, but today these subsidiaries are becoming part of global supply chain operations linked to new global trends. The TNC subsidiaries possibly will be limited to be only "big producers", leaving all R&D activities to the parent companies, that are usually concentrated in the Triad region.

In this complex scenario of the automotive industry's R&D activities in emerging countries, anything from a pessimist (from the emerging countries point of view) to an optimistic vision may be presented:

- Concentration of the R&D activities in one or very few centers on the parent TNC countries with a constant reduction of the importance and participation of the emerging countries R&D local centers. All the design steps from conception to the launch, even the specific projects for the markets of the emerging countries would be done in these "global" centers. Ford, as an example, expanded the UK engineering center at Dunton that will be the main center to developed models for emerging markets.
- The TNC subsidiaries, through their R&D local centers, can still make important contributions to the parent companies main center, such as the customization of global projects to fit specific needs of emerging countries, the development of new organizational and social production systems, and supplying local expertise. A good example is the Brazilian subsidiary of General Motors. Apart from designing sedan, wagon and pick-up Corsa, it has played an active role in developing of the existing Opel Astra and of Celta, the new cheaper Brazilian car of GM.
- Development of specific projects to market niches with local technologies, like the development of alcohol engines in Brazil and the technology to produce petrol out of cool in South Africa. Another example is the Volkswagen knowledge on the R&D activities and manufacturing of trucks, acquired by its Brazilian subsidiary and now being transferred to the parent company in Germany.
- Creation of a national vehicle industry with benefits from the transfer of technology by multinational companies like the successful Korean model. The Malaysian Proton is

trying to fit into this case, by producing vehicles based on Mitsubishi models. At the same time, it is slowly trying to reduce its dependence on the Japanese company working in order to launch a new model designed and developed with in-house expertise. The acquisition of the British automaker Lotus was part of this strategy.

The future of automotive R&D in emerging countries is an open question. The trend for each of the four proposed scenarios depends on the speed at which local market niches grow – which is a parameter dependent on the overall economic growth – and also the speed at which applied research facilities and expertise can be established in the country.

Final Remarks

The globalization process created a strong pressure on emerging countries for a profound change in their productive processes. The local backward mechanisms that could survive when borders were closed to international competition, became useless in the current more competitive marketplace. Moreover, globalization has become a big challenge to companies that did not updated their practices, processes and technology in manufacturing. In this direction, globalization also became a challenge to many nations that still today not developed a suitable strategy for increase its competitiveness in the world's new economical context, either by increasing the country infrastructure as by improving and disseminating educational policies and programs.

The well-known Korean experience in developing an automotive industry shows how important it is to stick conscientiously to an appropriate industrial policy, and especially to encourage the transfer and appropriation of the foreign technologies which will enable local companies to develop step by step their own competencies. In the auto industry, this orientation requires that the foreign investments in fact represents and ensure an effective transfer of technologies to the local companies (Yannick, 2000).

Concluding, this article confirms and highlights important points regarding the current transition from multi-domestic to global supply chain operations in the automotive industry of emerging countries. Also, in spite of any fashionable contemporary discussion concerning the economic globalization process and its effects worldwide, the paper sustains a new set of challenges and risks to the auto industry of emerging countries. On the other hand, there also a series of new opportunities to be adequately explored by both auto industry and emerging countries governments in order to stay ahead of the game that is only beginning.

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Table I: General data comparing countries from the Triad region with emerging countries.

	worldwide vehicle production*			registration of new vehicles*			vehicle exports*		
	1990	1999	Change % (90/99)	1990	1999	Change % (90/99)	1990	1999	Change % (90/99)
Triad Region									
U.S.A	9737	13025	34%	14149	17415	23%	953	1219	28%
Japan	13487	9985	-26%	7777	5861	-25%	5831	4409	-24%
Germany	4977	5688	14%	3553	4127	16%	2766	3676	33%
France	3769	3180	-16%	2756	2582	-6%	2096	3255	55%
Spain	2053	2852	39%	1251	1752	40%	1250	2314	85%
Canada	1921	2735	42%	1298	1537	18%	1699	2117	25%
U.K.	1566	1973	26%	2302	2486	8%	501	1213	142%
Italy	2121	1701	-20%	2483	2536	2%	901	798	-11%
Sweden	410	489	19%	#	#		205	221	8%
TOTAL	40041	41628	4%	35569	38296	8%	16202	19222	19%
Emerging Countries									
S. Korea	1322	2843	115%	954	1273	33%	347	1510	335%
China	536	1804	237%	561	1719	206%	#	#	
Mexico	821	1518	85%	549	666	21%	276	1077	290%
Brazil	914	1351	48%	713	1252	76%	187	274	47%
CIS	1917	1249	-35%	#	#		#	#	
India	364	728	100%	357	858	140%	#	#	
Czech Rep.	238	376	58%	#	#		82	312	280%
Taiwan	349	350	0%	486	424	-13%	#	#	
Argentina	100	305	205%	96	380	296%	1	98	9700%
TOTAL	6561	10524	60%	3716	6572	77%	893	3271	266%

Not available * Thousand units
(based on ANFAVEA, 2000)