

11 Nissan Motor Ibérica in Spain and Japanese Production Systems

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INTRODUCTION

Globalisation of production processes in the automobile industry has increased competitiveness among firms. Some firms have responded by moving from the Mass Production System (MPS) to the Lean Production System (LPS), characterised by flexible manufacturing and Just-in-Time (JIT) inventory. This paper will focus upon the structural changes brought about by the shift from MPS to LPS in the automobile industry in Spain, examining in particular Nissan's Motor Ibérica (NMI) subsidiary. Analysis of trends in total production, exports, industrial structure and employment in NMI between 1975 and 1990 suggests that the subsidiary has transformed its production system, with LPS gradually replacing MPS since 1986, although the transition is still far from complete.

The objective of this paper is to show how examining one Japanese investment project in Spain can illustrate the global automobile producer's strategy of utilising the comparative advantages offered by particular countries. Changing production systems in the motor industry require new locational advantages in order to achieve the goal of cost minimisation (locational strategies), and these are intrinsically linked to productivity and efficiency. Furthermore, changing technologies are accompanied by the need to alter organisational and management systems. The Lean Production System (LPS) is only the latest example of manufacturing processes that adjust themselves to internal and external pressure for cost reduction and quality enhancement. This paper analyses the structural changes associated with this transition in the motor industry in Spain, which is emerging as one of the most important industries in terms of employment, value-added, productivity, export share and the balance of payments.

PRODUCTION SYSTEMS IN AUTOMOBILE MANUFACTURING

Changes in production systems do not appear suddenly. A new manufacturing system is the result of multiple changes in existing production methods. Technological improvements may be the basic factor, but other factors also influence shifts from one production system to another, such as cost reduction, production differentiation and changing demand. The development of LPS in Japan was the result of multiple changes in MPS, in order to adapt the latter to domestic productive conditions and conditions of demand.¹

Manufacturing is a complex system which works at different levels. The structure of the automobile manufacturing industry consists of several firms linked in a hierarchical manner, with the output of one type of firm constituting an intermediate input to the next level of the hierarchy. This division of function also has geographical consequences. In the system of production developed in the American automobile industry at the beginning of the twentieth century, following innovations by Ford, Taylor and Sloan, a majority of high value-added tasks such as management, design and distribution were retained by home country manufacturers. Production of parts and components were performed at geographically diverse locations and assembly was usually done close to final markets. Until the mid-1970s, this system (MPS),² was also the norm for most other leading industries.

The invention of a new and more flexible system in Japan by the Toyota Company allowed the automobile industry to respond to increased fragmentation of demand while maintaining scale economies.³ The Japanese system is called, among other things,⁴ the Lean Production System (LPS) in so far as it uses a minimum amount of resources and factory space. In the LPS, firms are becoming more and more dependent upon the resources of other firms to reach their level of output because an increasing share of the resources needed for production – intermediate outputs and knowledge (R&D and design of the car) – is provided by the joint effort of a network of firms.

Furthermore, in the LPS, the development of JIT⁵ deliveries further underlines the interdependence of firms, which require changes to be made by managers to organise relations with supply firms. Assemblers now require more efficient delivery systems, and there is increased demand for out-sourcing alternatives in an attempt to reduce vertical integration. This new arrangement demands specific investments from a subgroup of firms in the network and therefore presupposes longer-term commitment by the parties involved. Automobile firms find

themselves integrated into long production chains where coordination between firms within the chain becomes a requirement for more effective performance.

THE GROWTH OF THE SPANISH AUTOMOBILE INDUSTRY

In the 1980s, Japanese and European firms achieved the economies of scale required to challenge the competitive position that had been held by US companies in the world market since the first quarter of the century. The motor industry in Spain was at that time a relatively new industry, with production, value-added, employment, export shares and productivity in an expansive phase. In addition, the number of vehicles per person in Spain suggested that room for rapid growth existed, being considerably inferior to the average for the EC.⁶

By 1990, Spain occupied fourth position among European car producer countries behind Germany, France and Italy. This position clearly differed from the situation in 1950, when Spain produced only 0.02 per cent of European car output. By 1980 the proportion had reached almost 10 per cent, and in 1990 Spanish production was 12.5 per cent of European production. Similar trends were present in Spanish car exports, which were mainly destined for other European countries. While in 1970 Spain's car exports represented 8.2 per cent of domestic car production, in 1980 this figure went up to 47.8 per cent, and by 1989 it had reached 56.4 per cent.⁷

In the expansion period, Spain received new and important automobile investments, as joint ventures or greenfield firms, from countries like Germany, Japan and the US, which benefited from the comparative advantages offered by the country. These included strong domestic demand, a good strategic position with respect to Central European and Mediterranean countries, a well-established network of suppliers and an educated labour force familiar with automobile production. The advantage provided by Spain in the 1970s as a cheap labour force country disappeared at the beginning of the 1980s, and was taken up by other countries in Europe, as well as emerging industrial economies.⁸

The introduction of LPS in Spanish automobile firms began in 1986 in Nissan Motor Ibérica and, much later on, in 1990 and 1991, in SEAT-Volkswagen and General Motors España. One of the first changes introduced in the old production practices of the firms was the JIT inventory system. In addition, other developments in the system of production included an increase in group approaches to task work, in-

Table 11.1 Japanese investment in the Spanish automobile industry, 1987-93

Year	Pesetas (millions)	%
1987	28 877.51	70.45
1988	56.25	0.14
1989	1 337.29	3.26
1990	1 206.80	2.94
1991	2 007.20	4.90
1992	869.47	2.12
1993	6 637.40	16.19
Total	40 991.92	100.00

Source: Ministerio de Industria Dirección General de Transacciones Exteriores.

creasing workforce skills and academic qualifications, larger investments in flexible manufacturing systems and increasing efforts to monitor the quality of both intermediate and final products.

However, while important features of the LPS were introduced in Spanish automobile manufacturing firms, there were some established features of the Spanish economy and its motor manufacturing sector, which modified the introduction of the LPS in Spain.⁹ These mainly involved levels of unionisation and the size of the foreign-owned sector. The level of unionisation in Spain is not very high – 18 per cent of the working population in 1987 – compared to 44 per cent in Italy and 53 per cent in the UK and Portugal in the same year. Nevertheless, the number of days lost through strikes is much higher than in these other countries; and a longer process of discussion before labour will adapt to any new job practices seems to be needed. Additionally, many competitive assembly firms located in Spain are the subsidiaries of foreign multinational firms, where innovations such as LPS may be slower to emerge due to a lack of scope for local initiatives.

NISSAN MOTOR IBÉRICA

Even though Spain received a relatively small share of Japanese investment between 1982 and 1991 compared with some other European countries, data show a clearly increasing trend throughout the period. It was in the mid-1980s that Spain opened its doors wide to Japanese investment, particularly in the motor manufacturing sector, which received the highest proportion of inward investment (Table 11.1).

Table 11.2 Japanese passenger car import penetration levels: Selected countries

Year	Spain %	France %	W. Germany %	Greece %	Italy %	Portugal %	Switzerland %	UK %	USA %
1975	n.a.	1.5	1.7	10.8	n.a.	20.5	8.4	9.0	9.4
1980	n.a.	2.9	10.4	49.2	0.1	7.5	23.2	11.9	21.3
1981	1.3	2.6	10.0	48.2	0.1	11.9	27.2	11.0	21.8
1982	1.4	2.9	9.8	45.8	0.1	8.5	26.7	11.0	22.6
1983	1.2	2.7	10.6	39.9	0.2	8.1	27.4	10.7	20.9
1984	0.6	3.0	12.0	30.9	0.2	8.5	24.5	11.1	18.3

Source: World Motor Vehicle Data (1986, 1991).

On the demand side, although Spain imposed a limitation of 1200 direct car imports from Japan in 1992, there was a high demand for Japanese cars. Indeed, in January 1992, the demand for Japanese cars reached 36 600 vehicles. Japanese indirect car imports to Spain – Japanese cars assembled in the EU¹⁰ – equalled 12 860 units for the same year,¹¹ further indicating that there is a clear imbalance in the Japanese car market in Spain. High demand coincided with the 1987–91 period of economic expansion in Spain, but before this, data on Japanese car import penetration show quite low figures for Spain, reaching only 0.6 per cent in 1984, while Switzerland and Greece had reached totals of 24.5 per cent and 30.9 per cent respectively (Table 11.2).

Restructuring was the main theme at the Nissan plant in Barcelona during the 1980s. The goal of the management was to adapt the plant to the requirements of a new product and a new method of production.¹² In 1980 Nissan Motor Company, the second largest Japanese motor manufacturer, bought a share of a Spanish automobile firm called Motor Ibérica, renaming it Nissan Motor Ibérica.¹³

The Japanese company increased its share of NMI equity later in the decade, as restructuring continued. This was done in two ways, changing both the type of product and the system of production. First, until 1984, production was devoted to commercial and industrial vehicles, such as trucks and tractors. Then from 1984, NMI produced station wagons (the Nissan Patrol and Nissan Vanette, and more recently the Nissan Serena). Parallel to this product change, NMI also pioneered the introduction of LPS in Spain. In 1986, one of the main features of LPS – JIT distribution – was introduced at the NMI plant in Barcelona. With this new distribution system, NMI wanted to achieve two objectives: to diminish the amount of stock in the assembly plant and

Table 11.3 Nissan Motor Ibérica: R&D activities

	1975 %	1980 %	1985 %	1990 %
Assembly R&D is done:				
By the assembly firm	95.0	90.0	75.0	40.0
By other firms	5.0	10.0	25.0	60.0
Parts and components R&D is done:				
By the assembly firm	60.0	60.0	50.0	20.0
By the component firm	40.0	40.0	40.0	50.0
By other firms	–	–	10.0	30.0
Other type of arrangement	–	–	–	–

Source: Interviews conducted by M. Pallares-Barbera in 1992.

to introduce rigorous sequential order into component delivery to the assembly line.

The new supply system also initiated a completely new relationship between the suppliers and NMI, which was clearly reflected in a number of developments. The first of these was the diminishing number of suppliers (down from 1000 in 1983 to 290 in 1992), with the eventual goal of reaching 250 suppliers. The second was the establishment of a quality control filter for suppliers, which meant that the intermediate product goes through a process of quality control in the production plant before arriving at the NMI plant, and suppliers that do not reach required NMI quality levels have their contracts discontinued. Thirdly, supplier firms are to be responsible for new technology improvements and the new R&D demanded by NMI.

Consequences of this policy may be detected in the increased participation of other firms in vehicle design between 1975 and 1990, since 95 per cent of car innovations were made by the assembly firm in 1975, and only 40 per cent were made in 1990 (Table 11.3). This trend partly illustrates the change from MPS to LPS, in which R&D design under MPS is strictly the responsibility of the assembly firm, while in the LPS these functions may be undertaken jointly by the assembler and its suppliers.

As a consequence of this fundamental restructuring, internal characteristics of the firm, such as employment and capital investment, have changed, and production has increased. The rate of growth in production between 1984 and 1990 was 22.66 per cent; and while in 1984 productivity was 2.3 vehicles per worker, in 1990 it had risen to 12

Table 11.4 Nissan Motor Ibérica: vehicle production and employment totals

Year	Output (1000 Units)	Employment (1000s)	Productivity
1975	—	8.8	—
1976	—	10.3	—
1977	—	11.3	—
1978	—	11.9	—
1979	27.3	11.8	2.3
1980	27.1	11.4	2.4
1981	20.2	10.8	1.9
1982	18.2	10.1	1.8
1983	20.3	9.0	2.6
1984	19.5	8.6	2.3
1985	27.7	8.0	3.5
1986	42.7	6.5	6.6
1987	53.5	6.0	8.9
1988	76.1	6.8	11.2
1989	86.4	6.6	13.0
1990	81.3	6.8	12.0

Source: Nissan Motor Ibérica Annual Reports 1975–90; Chambre Syndicale des Constructeurs d'Automobiles, *Répertoire Mondial* (1983, 1985).

Table 11.5 Nissan Motor Ibérica: worker training levels

	1980	1990	1991
Number of courses per year	406	778	816
Number of hours per year		170 218	241 975
Number of participants	4 300	4 701	5 472

Source: Interviews conducted by M. Pallares-Barbera in 1992.

(Table 11.4). This increase was reflected in the declining number of workers, which suffered a negative growth rate of 1.57 per cent between 1975 and 1990. Otherwise, there was a noticeable increase in the skills of the labour force, a product of the continuous educational strategy of NMI between 1980 and 1991, which is evident from the data shown in Tables 11.5 and 11.6.

This process of restructuring also engendered some unexpected consequences for the study of NMI's production function. Due to massive investment by the parent firm in the plant, the elasticity of output with respect to capital was negative over this period.¹⁴ This result suggests

Table 11.6 Nissan Motor Ibérica: labour force skills and qualifications

Academic qualification	No. of Workers (1990)	% of Labour Force	No. of Workers (1991)	% of Labour Force
<i>A. Higher education:</i>				
Engineering graduates	136	2.0	150	2.2
Other graduates (Masters)	—	—	58	0.8
Technical engineers	225	3.3	223	3.2
Bachelors degree	155	2.3	126	1.8
<i>B. Secondary education:</i>				
Formación Profesional 1st year	701	10.4	751	10.9
Formación Profesional 2nd year	801	11.8	901	13.1
<i>C. Primary education:</i>				
	4744	70.2	2241	32.5
<i>D. Other</i>				
	—	—	2437	35.4
Total	6762	100.0	6887	100.0
Average seniority	12.9		13.9	
Average age	38.6		39.1	

Source: Interviews conducted by M. Pallares-Barbera in 1992.

that the expected returns to capital were not attained in the 1980s, and seems to be a manifestation of the Japanese business policy of looking for longer-term returns to capital and pursuing higher market share, rather than short-term profits.

Most NMI production has serviced domestic demand, with around 70 per cent of production in the period up to 1990 sold in Spain (Table 11.7). The cost structure of NMI's operation shows that the cost of materials was around 70 per cent of the total at the beginning and end of the 1975–90 period, with a value of around 60 per cent recorded between 1980 and 1985. The trend in labour costs moved in the opposite direction, however, rising from 22.7 per cent in 1975 to 30.2 per cent in 1981, before falling consistently to a figure of 15.9 per cent of total costs in 1990 (Table 11.8).

The picture given by these NMI figures suggests that, even though the firm was located in Spain in the middle of the economic expansion period of the 1980s, the main locational determinant was not the prospect of an immediate increase of a market share. The position of Spain was important relative to Mediterranean markets, and its place in Europe after accession to the EC in 1986 reduced problems of potential

Table 11.7 Nissan Motor Ibérica: domestic sales and exports
(thousands of units)

Year	Domestic Sales	Exports	Total Sales	% Domestic Sales	% Exports
1975	34.3	15.0	49.3	69.5	30.5
1976	33.8	14.3	48.1	70.3	29.7
1977	41.7	12.9	54.6	76.3	23.7
1978	43.0	13.9	57.0	75.6	24.4
1979	37.8	8.7	46.5	81.2	18.8
1980	34.3	6.2	40.5	84.6	15.4
1981	23.8	6.9	30.8	77.5	22.5
1982	25.5	8.6	34.1	74.7	25.3
1983	23.4	6.4	29.8	78.7	21.3
1984	20.5	8.1	28.6	71.7	28.3
1985	26.6	12.0	38.5	69.0	31.0
1986	31.9	14.8	46.7	68.3	31.7
1987	40.9	20.1	61.1	67.0	33.0
1988	53.1	24.7	77.9	68.2	31.8
1989	64.6	26.0	90.6	71.3	28.7
1990	60.4	31.3	91.7	65.8	34.2

Source: Nissan Motor Ibérica (1975-90).

market access. Furthermore, Barcelona's well-established component suppliers network was a major attraction, given that in 1992 Barcelona contained around 40 per cent of the Spanish car component industry, ensuring that NMI would continue to operate close to its suppliers, 42.9 per cent of which are located in Barcelona, over twice the number (19.3 per cent) of those located in Madrid.

Once the decision to locate in Spain was made, there nevertheless remain some questions concerning the decision of Nissan to acquire a company that required considerable restructuring. The most important factor may have been that Nissan wanted to locate in Barcelona close to the commercial port where shipments of finished products could be exported promptly to Europe and beyond. Given the shortage of industrial land in the city the good location of the old Motor Ibérica (in Barcelona's Zona Franca) was a determining factor in making the locational decision. In addition, Nissan may have wished to pre-empt any competing firms (Japanese or otherwise) from acquiring Motor Ibérica and establishing themselves in Spain first.

Table 11.8 Nissan Motor Ibérica cost trends: percentage breakdown,
1975-90

Year	Labour Cost	Material Cost	External Services	Capital Depreciation	Total
1975	22.7	69.7	4.1	3.5	100.0
1976	23.4	67.9	5.0	3.7	100.0
1977	24.7	67.5	5.0	2.8	100.0
1978	23.4	69.1	5.5	2.0	100.0
1979	26.5	68.3	3.5	1.7	100.0
1980	28.4	62.9	6.5	2.2	100.0
1981	30.2	57.8	9.1	2.9	100.0
1982	27.2	60.4	8.9	3.5	100.0
1983	24.3	59.2	12.3	4.2	100.0
1984	22.3	59.5	13.0	5.2	100.0
1985	19.0	60.5	12.6	7.9	100.0
1986	19.0	64.2	9.0	7.8	100.0
1987	16.9	65.6	8.9	8.6	100.0
1988	14.8	68.8	9.5	6.9	100.0
1989	14.6	69.0	9.3	7.1	100.0
1990	15.9	72.9	10.3	0.9	100.0

Source: Nissan Motor Ibérica (1975-90).

CONCLUSION

From a spatial perspective, changes in industry breed changes in the wealth and prosperity of regional economies. Changing technologies of production are an important means of effecting these regional changes. The health and survival of regional economies depend upon the ability of enterprises to adjust to changing production technologies and changing consumer preferences. Supply adjustments to the fluctuations of market demand are crucial to the well-being of firms and the regions in which they are located.

The introduction of flexible specialisation and the initial stages of the lean production system have been necessitated by changes in demand. Automobile assemblers found that they could no longer compete successfully by offering a standard product, but had to adjust to new demand characteristics. Changing the manner of production in an effort to maintain scale economies and adapt to global competition seem to be the only mechanisms available to a firm wishing to survive in the changing international division of labour. The drastic restructuring

of NMI illustrates this process of adaptation and demonstrates how inward investment, in this case involving a major Japanese motor manufacturer, can effect structural changes in regional economies in Europe.

NOTES

1. 'U.S Auto Makers Reshape for World Competition', *Business Week* (1982), pp. 58-63; D. Hounshell, *From the American System to Mass Production 1800-1932. The Development of Manufacturing Technology in the US.* (Baltimore: Johns Hopkins University Press, 1975).
2. Other terms found in the literature are Fordism, Taylorism, and Standard Production System.
3. P. Bianchi, 'Nivells de Política i Naturalesa de la Competència Post-Fordista', *Revista Econòmica de Catalunya* 14 (1990), pp. 94-102; E. Toyoda, *Toyota: Fifty Years in Motion* (Tokyo: Kodansha International, 1987); P. Wells and M. Rawlinson, 'New Procurement Regimes and the Spatial Distribution of Suppliers: the Case of Ford in Europe' *Area*, 24, 4 (1992) pp. 380-90.
4. Just-In-Time, Toyotism or Flexible system.
5. Just-in-Time systems involve a sequential, frequent and timely delivery of parts and components in order to satisfy the immediate demand of each step of the production process. This also implies a reduction of inventory, and a change in the ways of delivering intermediate goods.
6. Spain's average car density in 1988 was 263 vehicles per 1000 inhabitants, while the EC's average was 359 (Econ. Commission for Europe, *Annual Bulletin of Transport Statistics for Europe* (1994); EUROSTAT 1994).
7. M. Pallares-Barbera, *The Structural and Spatial Adjustments of the Automobile Industry in Spain: 1975-1990*, Ph D thesis (Boston University, 1993).
8. R.B. Cohen, 'The New Spatial Organisation of the European and American Automotive Industries', in Noulart and Wilson Salinas, eds., *Regional Analysis and the New International Division of Labour* 1983) pp. 135-43.
9. SEAT-Volkswagen (Martorell, Barcelona), opened in 1991, and Nissan Motor Ibérica opened a warehouse logistic centre 15 minutes away from its factory in the Zona Franca (Barcelona) See 'Nissan Motor Parts España S.A.', *La Vanguardia* (27 January 1995).
10. There is doubt as to whether cars made in the EU and cars made by the Japanese transplants in Europe are exactly the same product. The Certificate of Origin of Goods concept states that 'goods will originate from a country when they are produced entirely in this country or when the last justified transformation or substantial elaboration is done in this country' (*Diario Oficial de las Comunidades Europeas* 1968).

11. Interbask S.A. (1992).
12. Nissan Motor Ibérica, *Annual Reports* (1975-90).
13. This is a factory with a long history. What started in 1920 as a Ford Motor Company plant in 1933 changed its name to Ford Motor Ibérica; and in 1959 it became Motor Ibérica.
14. Output elasticity with respect to labour was also negative. Moreover, labour costs, consisting of wages and social security benefits per worker, increased rapidly in this period.