

**THE SPANISH MOTOR INDUSTRY IN THE FIRST THIRD OF THE 20TH CENTURY:
A LOST OPPORTUNITY***

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Abstract

The Spanish automobile industry had a late start. Although the country proved capable of short production runs of high-quality vehicles during the first third of the century it never managed to build up its own industry, unlike Great Britain, France, or Italy. What then, were the critical shortcomings that prevented the establishment of large Spanish motor manufacturers? Put another way, why did all of the companies set up during the first half-century fail to survive? This paper attempts to shed some light on these questions, employing a wide-ranging analysis of both internal and external factors affecting the industry. A feeble internal market, lack of resources and production factors are usually adduced as reasons, as are Spain's general economic backwardness and the role played by the public authorities. However, this paper mainly focuses on the internal factors concerning company strategy and organisation. A comparison with the Italian case helps put the traditional arguments in proper perspective and highlights those covering business strategies. Finally, we argue that a broad range of factors needs to be analysed to fully understand why Spain failed to establish a motor industry.

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There has been little research on the history of the Spanish motor industry in the first third of the twentieth-century. This is not altogether surprising since the industry had relatively little impact on the national economy during that period. In fact, the industry did not really take off until the last quarter of the 20th century.¹ Furthermore, it is difficult to gain access to original material from the few important companies involved. This has naturally limited scholarly work on the origins of the industry. Our paper is therefore based on the literature provided by contemporary observers².

This work attempts to answer the question why no large Spanish Motor company established itself during the first third of the century. Put another way, why was it that all of the companies founded during this period ultimately failed? To answer this question we have split the history of the motor industry in this period into two sections. The first section covers from the turn of the century to the First World War. The second section focuses on the inter-war years. During the latter period, new companies wishing to enter the industry were no longer able to do so under the same circumstances as before 1914. The 1920s saw the world motor industry entering a period of maturity, however almost all of the companies on the scene had been founded before the war. The years before the conflict were ones of frenetic development and invention for the industry. The industry developed rapidly after the war and economies of scale and vertical integration posed almost insurmountable barriers to entry. In Spain, none of the firms involved managed to survive the first period, despite considerable inventiveness and product development. Local firms were therefore dealt a death blow by the outbreak of war, which marked the introduction of new manufacturing and sales methods. Spanish manufacturers sought direct support from the Primo de Rivera Government but this proved too little and too late to tilt the balance.

1. THE DEVELOPMENT OF THE MOTOR INDUSTRY AT THE TURN OF THE CENTURY

Throughout the first decades of the century there was practically no Spanish motor industry worth speaking of when compared with France, Great Britain, Italy, Germany, and even Czechoslovakia and Sweden. As the entrepreneur Arturo Elizalde pointed out, the lack of a motor industry was due to a combination of causes like: the high cost of importing special steels; high labour costs; unfavourable exchange rates (which made it relatively cheap to import vehicles in a country which had done little to protect its incipient domestic industry); and finally Spanish consumer preference for foreign vehicles, attracted by low prices and effective advertising campaigns³. Observers writing in the 1920s commented that "vehicles are employed almost exclusively by the well-to-do and are considered a luxury item, or are bought by rich companies. Beyond this there are only coaches (thanks to subsidies) and vehicles operated by the Royal Mail."⁴ They pointed to the high cost of petrol, expensive tyres and accessories, and punitive taxes as reasons for the low penetration of vehicles.

Promoting greater use of motor vehicles during the early years was no easy task given that cars were thought of as items for sports or leisure purposes, not as a form of transport. The poor state of the roads also did much to restrict their practical use while the small size of the domestic market and higher petrol prices hindered the production of certain accessories. In addition, large sectors of the population were less than enthusiastic about the new invention and the Government's blinkered tax policy did nothing to further the industry's development. Differences in the legal framework adopted by each country also strongly influenced the way the motor industry developed.⁵ Foreign governments took steps to reduce the taxes paid by motorists in countries where car ownership had shown

considerable growth. Thus owners in the United States and Great Britain paid a small annual sum which covered various taxes and duties and was sensibly based on motor size and vehicle weight. By contrast, in Spain (where motor-cars were still considered as a luxury item), it took several years for such changes to be made to the tax system. It should be noted that until 1919 vehicles were still covered by a Royal Decree dating from the 28th of September 1899 (amending laws of the 30th of June 1895 and the 28th of June 1898). The legislation naturally concerned horse-drawn wagons and the like.⁶

Manufacturers at the time clamoured for the government to increase tariff barriers in order to stem the tide of imported foreign vehicles. Indeed, at one point France forbade the import of foreign vehicles altogether. France slapped a 45 per cent *ad valorem* tax, and a 19 per cent luxury tax plus a 1.8 tariff coefficient on Spanish vehicles. The result was that a Spanish car costing 25,000 Pesetas had customs duties of over 18,000 francs levied on it, pushing up the sales price to over 75,000 Pesetas whilst a similar French vehicle cost between 35,000 Pesetas and 40,000 Pesetas. Moreover, the French government insisted that all public sector purchases be made from their national industry for several years. This policy ensured that weaker companies could soldier on without having to lay off their engineers and skilled workers. In Spain, industrialists lobbied for a reduction in taxes,⁷ complaining that the tariff regime did nothing to help the growth of the motor industry. It is particularly difficult to understand the Government's unsympathetic attitude since Spanish vehicle manufacturers still met only a fraction of national demand and their woes were nothing new.

Although local car companies were thin on the ground at the beginning of the 1920s, one should note that Spain had shown it had the technical know-how to produce automobiles.

2. OPPORTUNITIES AND FOREIGN EXPANSION (1900-1914)

Various reasons are given for the absence of an automobile industry, yet without doubt one of the most important ones was the small size of the market for goods and problems with production factors. The small Spanish market was incapable of producing companies geared up for serial production. A thin market meant paltry demand and a very unequal income distribution, posing serious obstacles to the establishment of large factories.⁸ In addition, Spain had few natural resources and raw materials had to be imported at much higher prices than those paid in other car manufacturing countries.

Exports represented an alternative growth strategy for the Spanish car industry. Several Italian companies successfully adopted this policy during the first stages of the industry's development.⁹ For example, almost two-thirds of Fiat's production was exported between 1905 and 1907 and the company's exports represented 60 per cent of total sales at the beginning of the 1920s.¹⁰

The international motor industry at the beginning of the century was characterised by its ability to offer extremely innovative products and cutting edge technology. Vehicles powered by the internal combustion engine represented a quantum leap in personal transport. The technology employed and the revolutionary aspects of the new means of transport gave considerable added value to its products which were eagerly snapped up by the wealthy. One can say that cars were an exclusive product aimed at wealthy individuals who were enticed by innovative, highly sophisticated products. In other words, the special features of these vehicles made them objects of desire by an extremely homogeneous set of consumers which scarcely varied across national boundaries.¹¹ Cars were therefore aimed at the wealthiest section of the population.

A second point which deserves highlighting is the relatively free international trade in cars during the early years of the industry. It was not until several years later that governments began to realise the economic, social, and military importance of motor vehicles. When the truth dawned on them, governments acted swiftly to protect their respective national industries. Thus Elizalde, writing in 1925, pointed out that "a powerful Spanish motor industry would help protect the country in case of war. It would not only provide transport of men, munitions and food but could also be easily converted to produce aeroplane motors, cartridges, and artillery pieces". Exports were therefore virtually an automatic aim for motor companies in their quest to take production out of the realm of craft skills and into mass production. This strategy was pursued up until at least the First World War and, in certain countries, after it. This was not an easy aim to pursue given logistic problems (distribution network, after sales service, stock levels, etc.).¹²

A third aspect concerns the capital requirements of the industry. Despite the highly technical and innovative features of automotive products, the capital needed to set up business did not initially present a serious barrier to entry. Although access to funds represented a significant advantage, production, based as it was on craft skills, could be started with slender internal resources which could be boosted later by ploughing back profits and obtaining outside finance.¹³ In addition, relatively low barriers to entry were favoured by the lack of interest in the new industry by big business. Probably existing industrial groups were too rigid in their approach to business to appreciate the pace of change in the car industry and the opportunities which it represented.

In Great Britain, for example, it was not particularly difficult to get into the industry in the early years. A general knowledge of technical engineering and a small amount of capital was all that was needed. Thus engineering companies, particularly those manufacturing bicycles, were well-placed to make cars. However, the first companies which entered the

industry failed to hit upon a system of standardised, interchangeable components - unlike their American counterparts. The first British company had to make their own components, which meant much higher capital requirements than would have applied if they had been able to rely upon ancillary industries for these items. This manufacturing approach meant short production runs and expensive products. Many of this first wave of manufacturers failed to keep abreast of the rapid pace of technical development or were wiped out by stiff competition. Nevertheless, most of today's important manufacturers were founded before 1914¹⁴. In Spain some of the leading companies, like *Hispano Suiza*, adopted a similar strategy to British manufacturers, opting for vertical integration and short production runs of luxury cars.

In Czechoslovakia (then part of the Austro-Hungarian Empire) exploitation of internal combustion powered vehicles began early. There, it was strongly linked with three industries: (1) railway wagon and carriage building; (2) bicycle manufacturing (*Laurin & Klement* in Mlada Boleslav, which later became the SKODA car factory; and (3) the PRAGA machine company.¹⁵ Car production in Czechoslovakia prior to the outbreak of the First World War represented an important industry. In the Spring of 1906 there were 208 cars in Bohemia alone (of which 69 were in Prague). There were 3000 cars in Bohemia and Moravia on the outbreak of war in 1914. During this period the Czech motor industry exported a large part of its total production, and its vehicles were exhibited with considerable success abroad. Czech vehicles also won many international races and rallies, particularly L&K's products. During the inter-war period companies began a process of concentration and firms like PRAGA, TATRA, and SKODA occupied leading positions in the industry, followed by smaller volume enterprises like AERO, JAWA, WALTER, WIKOV y CZ (Ceskoslovenska Zbrojovka). Around 1923 there was a growing trend to build smaller vehicles at which point cars came to be considered as a means of transport

rather than mere playthings for the rich. This trend became even more pronounced with the slump of the early 1930s.

Basically, entering the motor industry during the first decade of the 20th century seemed only to require boundless faith in future growth and the necessary technical skills for building cars. The corollaries of these technical skills were manufacturing flexibility and a commitment to technological experimentation – both vital if one was to stay abreast of the advances being made in the main producing countries (initially France and Germany, and later the United States).

The car industry had a strong international vocation from its inception, both with regard to supply and demand. From the supply side, vehicles represented a complex product which incorporated a whole range of contemporary technologies which underwent continual innovation and production improvements. No company could hope to stay at the forefront of the new industry in technological and productive terms unless it was prepared to keep abreast of the latest international advances. Companies needed to make the most of foreign know-how as part of a process of imitation favoured by international competition. Similarly, on the demand side, the impetus towards internationalisation stemmed from the small size of domestic markets and the homogeneous nature of customers. At this stage of the game, one could sell abroad if one had a good product. Furthermore, no expensive modifications were required to meet specific customer demands.

This two-pronged convergence towards an international market was particularly evident in Europe, given the strong links between sporting and commercial success. For example, *Hispano-Suiza's* promotion in the early years was based on advertising its products through participation in sporting competitions both at a national and international level.¹⁶ Sporting success was vital, given that the development of motor companies was strongly linked to

their ability to sell their goods abroad and thereby tap a sufficiently large volume of demand. Exports were important to Europe in general, but particularly so for Italy and Spain whose domestic markets were much smaller than those in England, France or Germany.

The clearest exponent of this international strategy was Fiat. Founded in 1899, Fiat was not only notable for being one of the first motor companies on the scene but also for its sound capitalisation and commitment to industrial production. It made substantial investments in plant and equipment and carried out a process of vertical integration which was entirely new in Italy. However, what really set Fiat apart from its Italian competitors was its commitment to competing in international markets. This strategy led Fiat to a stronger presence in international competitions and the production of a range of vehicles providing different features to suit every pocket. The company also took part in trade fairs and made contacts with foreign component producers since these were technically ahead of their Italian counterparts.

The difficulties involved in devising and executing a successful growth strategy became obvious, with some companies achieving rapid development and others succumbing quickly to the first serious setback. A kind of vicious circle set in for unsuccessful companies in which those unable to access the international market failed to achieve the production volume required to continue building vehicles. Firms which did not have a sound industrial base and commercial infrastructure simply lacked the wherewithal to reach international markets. *Fiat* was the only Italian company between the turn of the century and the outbreak of the Second World War which managed to meet this challenge. *Lancia* and *Alfa Romeo* also tried to attain this international dimension but without any great success. In Spain, no company managed to overcome this barrier. Thus *Hispano-Suiza*,

which on the eve of the First World War was the best-placed Spanish company to undertake mass production, nevertheless failed to make the grade.

It should be recalled that the history of the motor car in Spain began at the same time as in other countries. There was a rise in engineering industry in Catalonia towards the end of the 19th century and at the beginning of the 20th century. Cheaper energy provided greater industrial flexibility and reduced dependence on foreign energy sources. In addition, increasing incomes helped the development of consumer goods industries in Catalonia. As Maluquer de Motes notes: “growth in the metal industry during the first decades of the 20th century was higher than average and the sector was becoming increasingly important within the industrial sector.”¹⁷ *E. la Cuadra y Cía* was the first factory to produce electric cars in Barcelona, beginning its activities in 1900. The company failed but one of its creditors took over the firm's machinery and skilled staff to establish a new company, *F. Castro y Cía*, to manufacture petrol engined vehicles. It was from this company that *Hispano Suiza* emerged in 1904. The new company drew on the technical staff from the previous two companies, acquired new machinery, and successively extended its plant. The company built a car and aero engine factory in Barcelona in 1911. *Hispano Suiza* set up a French subsidiary at the same time, first in Levallois Perret (Seine) and later in Bois Colombes (Seine). Another plant was established in Ripoll (Catalonia), where forging, pressing, and stamping operations were carried out. A workshop making body panels was also set up in Barcelona. Other car brands manufactured in Barcelona at various junctures included *Ideal* (*Hereter* company); *David* (*David, S.A.*) *D y G* (*Díaz y Grill*); the *España* series (*F. Batlló y Cía.*); *Nacional Pescara* (*Fabrica Nacional de Automóviles, S.A.*); *Elizalde* models (*Badia, Elizalde y Cía.*, and later *Elizalde S.A.*). However, all these factories factors stopped making vehicles, even though some of them maintained their workshops. *Elizalde*, for example specialised in manufacturing aero engines from 1925 onwards. The same can be

said for the few companies based in other areas of Spain, such as *Lazzy*, *Rivas y Cía.* in Mallorca¹⁸, *Izaro* and *Grandier* in Madrid and *Bilbao*, and *Calvo y Cía* in Amorebieta.

Adopting a thoroughgoing international strategy meant that the whole technical and managerial culture had to take on an international dimension. Nevertheless, it was impossible for Spanish companies to imitate everything being done in France or Germany. The different economic and business climate abroad made certain initiatives much riskier and more expensive for Spanish companies than for their foreign competitors, thus ruling out certain options.

Many successful motor companies were founded by inventors whose technological research led them into entrepreneurial ventures aimed at commercially exploiting their work. However, sporadic industrial initiatives promoted by technicians in Italy and Spain proved unsuccessful. It is likely that these pioneers were hampered by their narrow technical orientation to the detriment of the industrial vision needed for business success. These technicians were often obsessed with producing the "perfect" car (in which they were no doubt influenced by their training), losing sight of vital production and commercial considerations in the process. Engineers tend to consider the technical challenges of building vehicles to the exclusion of everything else. Hence the danger of trying to produce original products at any cost and underestimating the problems involved of taking a vehicle from the prototype stage through to mass production.

Unlike Spanish companies and the majority of Italian ones, one of Fiat's strong points was precisely its commercial outlook. Put another way, the company's founders were more interested in selling cars than making them, thus while technical excellence and design were indispensable considerations, they came second to production and commercial issues. This focus gave the company a crucial lead in correctly identifying business priorities and in carrying out particular projects. Furthermore, Fiat's approach meant taking full advantage

of other companies' know-how. The firm was not interested in matching the originality of its competitors unless there were clear-cut commercial reasons for doing so.

Fiat could have manufactured vehicles under a foreign licence, imported chassis from France, or opted for complete technological independence. However, it chose to strike a balance between experiment and imitation, picking up new ideas from its more technically advanced competitors. From the outset, Fiat bought foreign vehicles, took them apart, and then copied them. The firm therefore took the most promising solutions found in foreign vehicles, keeping Fiat's technology where this yielded gave better operational results. The firm's creative copying policy produced optimum results which were swiftly reflected in the company's products. Fiat's success in sporting events (first in Italy and later abroad) bore eloquent witness to the effectiveness of this strategy and the company's cars competed directly with leading European and American makes. The company's capacity to break into foreign markets grew as it chalked up more competition victories. As a result, Fiat's exports rose steadily.

Education and training

Education is a key factor in the development of modern companies since it helps turn out well-prepared technical and managerial staff. During the first decades of the 20th century, industrial education addressed two basic issues: (1) the degree to which the technical training of the time was capable of contributing to the development of the metallurgical industry, and (2) the scope for improving the skills of workers and apprentices at their workplaces. Below, we will look at some of the observations which were made at the First National Congress of Metalworking Industries, held in 1913¹⁹. First we will examine the situation regarding the acquisition of industrial skills in Spain. Unlike

elsewhere in Europe, where large numbers of workers were required, Spanish companies did not employ special workshops-schools to impart the skills needed by workers in a modern metal working industry. Such schools carefully selected budding apprentices who had to pass a rigorous entrance examination. Apprentices also had to pass a probationary period lasting between three and six months before signing their indenture papers. This apprenticeship system was organised according to the needs of each craft skill and lasted between four, six, or eight half year courses. The salary increased on completion of each course until qualification, at which point the apprentice was put on the official scale. The relative absence of qualified workers led to the business failure of many metal working activities. The majority of modern metal working and mechanical techniques require an enormous range of skills and prior training. This knowledge covered handling of different types of steel; the maintenance and use of modern machine tools: applying systems for calibrating and controlling tolerances; modern transport and lifting systems: electrical applications, all of which were vital in an increasingly mechanised environment. There was little use in having modern state-of-the-art factories without skilled workers to run them properly. This need for a trained workforce implied a very different kind of education from that received by Spanish workers. Nevertheless, there were plans to set up workshop-schools and organise an apprenticeship system with the aim of reaping the benefits of these initiatives in under 10 years.

In addition to the system of training apprentices and highly skilled workers, one should also consider industrial teachers and workshop heads. The first group were selected for their management and organisational skills. However the second group required greater, more complex training, given that they were responsible for supervising teachers and therefore needed to know the work and special skills of their staff inside out. Training of this latter group therefore incorporated engineering knowledge of a more practical nature.²⁰

In order to modernise industry, it was necessary to correct the educational system's excessive emphasis on theoretical science at the expense of applied science by setting up a system of higher technical colleges similar to those which had long operated in industrialised countries. The second defect of higher education was its attempt to provide a broad-based education at the expense of specialisation. In this context, one should note the Spanish Government's long-standing failure to deal with educational problems. This lack of interest manifested itself in the slender public resources earmarked for promoting the applied sciences. This contrasted with the active role played by the German government in incorporating new bodies of knowledge and implementing the necessary reorganisation of the educational system. One should also bear in mind that metalworking technology, like computing science today, was essentially based on practical experience gained in the use of products, machines, and components. In the German model, universities acted as depositories of scientific and technological knowledge, providing technically trained specialists with new ideas. These ideas were eagerly picked up and put into practice by German industry.²¹

Work organisation and production

Scientific organisation developed slowly in Spanish companies. Spanish entrepreneurs were highly traditional and their management style was a hangover from the pre-mass production era when authoritarian methods were adopted in dealing with endless labour disputes.²² The First World War had a negligible effect on Spanish companies with regard to adopting scientific principles of work organisation. Unlike the combatant nations, neutral Spain was not forced to maximise industrial output to meet the enormous material demands made by modern warfare. Experiments in work organisation carried out in

various Catalan companies during the first decades of the 20th century were not based on Taylor's methods.²³

Spanish organisational methods, according to Guillén, were eclectic.²⁴ The main strands of this eclecticism appeared in Catalonia after 1910 and continued through to 1930. Businessmen were more interested in keeping the peace in their companies than obtaining productivity improvements (the period was one of industrial strife in Catalonia) and consequently the focus was of a humanistic and social reforming nature. In many cases mass production was rejected in favour of craft methods – a strong contrast with countries like Germany and the United States, where modern organisational methods were enthusiastically embraced. Companies were convinced that they could only obtain higher profits by employing such methods. A new class of employees sprang into existence in both countries: technical and organisational staff. Their task was to organise and manage accounting systems, sales, raw material stocks, semi-finished products, transport, manufacture, administration, technical offices, and all other aspects making up a modern industrial company whatever its size. By contrast, in Spain such ideas were virtually *terra incognita*, at least before the First World War. Modern organisation of a factory involved comprehensive manufacturing instructions passed down the chain of command so that everyone knew precisely what he had to do. The manufacturing specification for each component was fully detailed, as were the operations involved, the machines and tools to be employed, the time limits for making each item, tolerances, instructions for supplying the warehouses, assembly instructions, testing, packaging, transport, ensuring orders were met, checking machine performance, instituting productivity incentives, time and motion studies, etc. Suggestion schemes were instituted involving engineering, teaching, and management staff. In a nutshell, a rigorous system of control and inspection was applied at every level of the company and affected all its activities.²⁵

Proper work organisation and use of modern machinery meant knowing each and every stage of the production process inside out, the number of repeated operations involved, and the time taken and the components required to meet production targets. This scientific organisation of production processes was only possible where rigorous work specialisation was adopted. However, Spanish companies considered manufacture to involve a hodgepodge of processes and failed to establish qualitative or quantitative criteria, define the links between each stage, or demand tightly defined performance characteristics of their machines, operatives, or output. In such circumstances it was extremely difficult to invest in proper plant and equipment. Even where modern factories were provided, Spanish output and performance was poor.²⁶ Management innovation elsewhere was the result of organisational requirements stemming from standardisation, rationalisation, and measurement which were developed in and adopted by companies of all sizes.

The case of the “Iberia” car company

The *Iberia* motor company provides a representative case of an entrepreneurial venture which failed to outlive the early days of the car industry. When the car industry entered a boom in the 1920s, the field was still largely unexploited in Spain. Foreign makes invaded the Spanish market, taking advantage of low levels of domestic production. There was an enormous range of vehicles among foreign makes, but the sector for small economy cars was entirely dominated by manufacturers from abroad. In 1914, the *Iberia* company saw the opportunity of entering the market for small cheap vehicles. The owners thought that a completely Spanish vehicle would cope better with local roads. The choice of vehicle for starting the business during the first year was a small lightweight car powered by a 12-15 HP engine. The specifications included: a sheet metal chassis providing bodywork

dimensions of 220 x 70, a single block four cylinder motor (75mm bore), compressor valves, 1650 revolutions, "Zenit" automatic carburettor, Bosch ignition, siphon type water cooling, four forward gears and one reverse, forged steel front axle with ball bearing wheel mountings, double coupling drive shaft, metal hubs (760x90mm) and tyres (810x90mm). The vehicle was to be built and assembled in series of 12 to 24 units at the very minimum, with "torpedo" style bodywork, four seats, and an option to buy just the chassis should the customer so wish. The chassis reached a maximum speed of 90 kilometres per hour on the flat in a trip between Paris and Barcelona and made the journey in 36 hours. The vehicle was aimed at salesman, businessmen, doctors, etc and the chassis could easily take different types of bodywork, depending on whether it was to be used in city or rural areas. Its fuel consumption was a modest nine litres of petrol and one litre of oil per 100 kilometres.

Iberia was constituted with a capital of half a million Pesetas, comprising 1000 shares of 500 Pesetas each, 10 per cent of which was paid up on subscription, a further 40 per cent payable on receipt of the shares, and the remaining 50 cent over five years at 10 per cent a year. Distribution of profits was to be made from a fixed reserve fund constituting up to a third of the company's share capital. The dividend was set at eight per cent. Of the reserve remaining after payment of dividends, 10 per cent was to be paid to the Company Board and four per cent to the Managing Director.²⁷

The company's plans for manufacturing utility vehicles comprised various stages. The initial phase covered the first year of the company's existence, in which its activities were limited to vehicle assembly. To this end, various agreements were struck with Spanish and foreign companies for the building of vehicle components to specifications and drawings provided by *Iberia's* Head Engineer. The company merely carried out assembly and final adjustments. This strategy provided significant advantages for the company. It meant *Iberia* could test the water without having to invest in expensive machinery. In addition, the

Company Board could exercise effective control over the business and map out growth strategies for the following years. The company took further precautions to ensure a stream of income and reduce the risk of bankruptcy: i.e. they received pre-payment on sales and settled up with suppliers later. The motor company's organisation was extremely simple and there was no separation between ownership and management, both being in the hands of the Company Board. On the technical side, the company had an experienced Head Engineer who had worked at a big factory in Paris.

During the first year, the company premises were limited to rented space sufficient to assemble 24 vehicles a year. The Head Engineer himself checked the components for the first 50 units supplied by foreign manufacturers before these items were dispatched to Spain. This was to ensure there would be no problems in subsequent assembly operations. *Iberia's* orders to its suppliers were made through written contracts with a commitment to an initial series of 50 vehicles - the number needed to ensure target retail prices could be met. The pricing structure was calculated to provide profits on this volume. Moreover, the company stipulated that components were to be supplied once sufficient were available for 12 vehicles. This strategy helped generate rapid profits and ensure high market penetration. Both objectives would have been impossible if the company had undertaken manufacture of the whole vehicle during the first year of its existence.

Sales were made through a network of dealers, with representatives in each of Spain's provincial capitals. Each dealer was required to sell the company's vehicles at a low price and to meet annual sales targets for cars and chassis, set in accordance with the size of each provincial capital. However, dealers were not obliged to keep vehicles if they failed to sell them, given that *Iberia* only charged them a very small percentage on unsold cars. The idea was that dealers would feel a moral commitment to sell the vehicles. In addition, *Iberia* supplied tyres, parts, and accessories at cost price. Dealers distributed vehicles through a

network covering the 49 provincial capitals, with one dealer per province, except in Madrid and Barcelona (with five each) and Bilbao, Seville and Valencia (two each). The objective was to establish competition between these cities and to appoint a regional representative at the end of the first financial year. This representative would receive direct and indirect commissions on all sales made in his region. Lastly, dealers committed themselves to selling the following numbers of vehicles: Madrid 20; Toledo, Guadalajara, Cuenca y Ciudad Real, 2 each; Barcelona 20; Tarragona, Lleida and Girona 3 each; Bilbao 6; Vitoria 3; San Sebastián 4; Seville 6; other provinces in Andalusia 2 each; Valencia 6; Palma de Mallorca 5; and other Spanish provinces, 2 or 3 each – a grand total of 161 cars.

In addition, *Iberia* provided help to dealers through large scale advertising campaigns, promotional material, forms, price lists, etc. There was a big advertising drive in Madrid and Barcelona which brought in orders for half the annual sales target. In choosing regional representatives, the company took into account initiatives by dealers in, say, setting up a taxi company using *Iberia's* vehicles. In addition to the 12-15 HP car, the company also sold various types of trucks ranging from one to five tons. *Iberia* had reached agreement with a foreign factory specialising in goods vehicles and the trucks were sent to Spain in knocked down state and assembled by *Iberia*. The vehicles were modified slightly and bore the *Iberia* name – a badging policy designed to pave the way for production of the company's own trucks.

3. LOST OPPORTUNITIES AND STATE HELP (1918-1930)

Organising production

Spanish companies, particularly *Hispano Sui a*, were well-placed to escape from the vicious circle mentioned earlier. The war gave a new impetus to the motor industry. On the one hand, new companies sprang into existence, often as a result of transforming mechanical workshops or using industrial infrastructure hitherto unrelated to the motor industry. On the other hand, a series of changes took place in existing companies (like *Elizalde*) which invested large sums in plant and equipment and expanded factories. Nevertheless, according to Calvo, these investments were not the fruit of careful planning but rather the result of improvisation to deal with the drying up of supplies from war-torn Belgium. It is worth noting that *Elizalde* carried out Taylor-inspired changes to its production methods as well as spending money on plant.²⁸

Between 1914 and 1918, Spanish metalworking companies extended their premises, bought new machines, modernised their plant, and achieved substantial increases in output. The Spanish metalworking industry in general, and the Catalan one in particular, underwent a profound change between 1913 and 1918. Nevertheless, despite plant acquisitions and the general rise in production, the industry was still poorly placed to withstand foreign competition. Metal manufactures had more than doubled in price compared to 1914, despite the fact that tariffs remained unchanged until May 1921. Worse still, cost prices abroad had fallen more quickly than in Spain, not only because of cheaper raw materials but also because of shifts in the exchange rate. The new tariff structure hit the Spanish mechanical sector hard, with about 40% of production affected. Manufacturers therefore

sought greater Government protection and pursued co-operation agreements with other companies. These measures were thus designed to re-erect tariff barriers on the one hand, and to cut production costs by grouping manufacturers on the other.²⁹

Spanish support for the industry strengthened throughout the 1920s. Several plants turning out both cars and industrial vehicles were set up, encouraged by protectionist legislation. Many other component companies sprang up, gradually underpinning Spain's incipient motor industry. The industry's painfully slow development up until that point can be attributed to several causes. One of these was the country's lack of special steels. Virtually all car components used them and substitution with other types of steel was simply not a viable option. There were also few companies producing special components such as electrical equipment, radiators, carburettor, headlights, etc., most of which had to be imported. Indeed, manufacture of these components did not begin until the late 1920s and then only thanks to demand from Ford and General Motors' Spanish subsidiaries.³⁰

Despite the above-mentioned problems, many manufacturers considered it worthwhile entering the Spanish motor industry since Spain had (at least in the beginning) all the raw materials needed to make vehicles: bauxite for aluminium, iron copper, chrome, nickel, and vanadium for making special steels; water power; electricity to heat kilns, and skilled workers. However, the country's mining and metalworking industries also suffered from serious weaknesses: high prices, poor quality, low stocks, and problems in transporting supplies whether by land or sea. It is worth mentioning that these raw materials were 50 to 70 per cent dearer than in other European markets due to freight costs, customs duties, insurance, port fees, unloading costs, and a host of other expenses. Not surprisingly, Spanish companies found it very difficult to compete on equal terms with foreign companies whose raw materials were not subject to such heavy duties and costs.³¹ As if this were not enough, the Government also put punitive taxes on petrol.³²

While machine building reached a considerable scale in Barcelona, manufacturers were rarely able to specialise in particular areas simply because the market was such a thin one and there were few opportunities for competing abroad. The small market size meant short production runs which thus deterred investment in plant which might otherwise have increased profits by exploiting economies of scale. The virtual impossibility of specialising led mechanical workshops to diversify but this strategy was still based on short production runs. Local factories therefore found themselves very badly placed to compete in international markets. The need to import certain products like cast iron and steel components, as well as raw materials put domestic manufacturers at a further disadvantage. High Spanish customs duties on both semi-finished items and raw materials effectively prevented certain types of manufacturing activity. Hence, machine-builders adapted to circumstances rather than moulding them, setting up workshops to meet the specific needs of the moment. Most of these workshops were set up in dilapidated old buildings, some of which were rehabilitated for the purpose. Very few new workshops were built to meet modern manufacturing requirements.³³

The setting up of large scale motor industries in Spain was beset by seemingly insuperable difficulties in the first thirty years of the 20th century. There were simply no companies in a position to supply purpose-built precision machinery or sufficient special components. Given that no manufacturer had dared specialise in machine tools and related items (calibres, assembly jigs, templates, tools) these had to be imported in large quantities. Very few motor companies had precision machine tools and those that had them needed more.

By contrast, motor companies in the leading European countries grew from the simple workshops of the early days to larger factories, although without implementing the mass production techniques employed by Ford. Model development occurred through

successive modifications carried out at various production stages until the product matured. However, Spanish start up companies (which seldom used foreign patents) simply could not afford to spend the same amount of time and money on vehicle design, testing, and modifications as their foreign rivals. These companies, most of which were founded before the First World War, gradually developed and perfected their products.

Another important factor to bear in mind is that the appearance of some of the first motor companies was strongly linked to activities in related areas, particularly the manufacture, assembly, and repair of bicycles.³⁴ The know-how gained from bicycle manufacture, commercialisation, and distribution stood such companies in very good stead when they started making motor vehicles. Yet in Catalonia, the centre of the Spanish motor industry, there was no bicycle industry worthy of the name.

The inter-war period marked the establishment of multinational subsidiaries in Spain. Various foreign companies decided to set up in there in the 1920s given the combination of a growing market and weak domestic producers. These companies started up with assembly operations in Free Port areas. The two most important examples of this approach were the Ford and General Motors factories, both based in Barcelona, and the *Fiat-Hispania* factory in Guadalajara.³⁵ Ford set up in Cadiz in 1920 before moving its operations to Barcelona in 1923. GM first established a factory in Malaga and, like Ford, had second thoughts and moved to Barcelona. Fiat set up in Spain in 1919 through its subsidiary *Fiat Hispania* and the Italian company won a large share of the market in the 1920s. A surge in customs duties in July 1930 made Fiat decide to go into a joint venture with local manufacturers - *Hispano-Suiza*, and *Pescara y Ricart* – to set up a factory in Barcelona. *Ford Motor Ibérica* was founded shortly before this in 1929, with 40% of its share capital in local hands. These initiatives benefited from the tax deductions conceded by the Government for vehicles assembled in Spain using local components. Fiat, unlike the American

companies, decided to set up in Guadalajara rather than Barcelona. According to Bigazzi, the reason for this decision lay in the wave of labour disputes that swept Barcelona following the proclamation of the Spanish Republic in 1931. Fiat reorganised Hispano's factory in Guadalajara which had hitherto produced trucks and the modified plant was tooled up to produce the 514 model. The initial production was only two to three hundred vehicles a year. After the outbreak of the Spanish Civil War in 1936, the factory was dismantled and moved to Valencia.³⁶ Mention should also be made of Chrysler, which presented a project to assemble cars in Spain employing a high proportion of local components and raw materials. Lastly, there was *Sociedad Española de Construcción Naval*, founded in 1929, which built trucks in its workshops in Sestao (Vizcaya), in partnership with two other companies: *Somua* and *Sociedad Española de Importadores de Automóviles*, founded in 1936 in Zorroza (Vizcaya) as part of an agreement with Dodge.

In addition to these vehicle manufacturers, there was also an important ancillary industry. Tyres were made by Spanish subsidiaries of Pirelli, Firestone, Continental and Michelin. Pirelli set up in Spain at the beginning of the century, building a factory making electrical conductors in 1902 which was extended to provide tyres and inner tubes for vehicles in 1907. The factory covered 55,000 square metres, used 1,600 HP of motive power and employed 1500 staff. The plant belonged to *Productos Pirelli, S.A.* which, together with *Manresa de Nacional Pirelli S.A.*, were subsidiaries of *Comercial Pirelli, S.A. de Barcelona*, which was in turn owned by *Pirelli y Cía. de Milán*, through *Compagnie International Pirelli* in Brussels. Firestone's Spanish subsidiary, *Firestone Hispania, S.A.*, opened a tyre factory in Basauri (Vizcaya province) in July 1933 which covered 52,000 square metres. The main building was 250 metres long, 30 metres, and 12 metres high. Three years later, Continental built a factory in Torrelavega (Santander province), while Michelin built a plant in Usurbi (Guipúzcoa province).³⁷

The role of the Primo de Rivera dictatorship

A paper was presented to the Marquis of Estella in December 1925, signed by Ramón de la Sota, Damián Mateu and Arturo Elizalde, in which they set out the parlous state of the Spanish motor industry and asked the Government to step in and lend support. The Government's response was initially favourable and it was decided to set up an inter-ministerial commission to study the issue prior to calling a special motor industry congress. The congress was held in the Summer of 1926 and involved all those in the sector. The aim was to achieve production of a low-priced quality car. General interest in the question led to the creation of COMA (Official Commission for the Motor Industry). The body had two functions: (1) ensuring that official entities acquired Spanish vehicles, and (2) inviting companies to set up factories which fitted in with the Government's nationalisation policy. Companies were very lukewarm on the second count and this poor response made the Government seek other ways of achieving the same end. The outcome was a new programme whose broad nationalisation aims were to be implemented over eight to ten years. However, the provisions regarding exclusive use of Spanish raw materials were planned to take effect in just three years. The plan divided cars into three types: luxury, middle-range, and cheap. Based on the idea that the Spanish demand for vehicles could reach some 30,000 vehicles by 1928 (17,000 of which fell into the cheap category), the plans envisaged one or two factories turning out luxury vehicles (600 units a year) by June 1927, two factories producing mid-range vehicles (4,000 units a year), and two factories turning out "people's cars" (12,000 – 15,000 units a year). One should note that two quite different organisational approaches were advocated in the Commission – on the one hand the horizontal organisation put forward by Julio de Renteria, Managing Director of *Elizalde*

S.A., and on the other, the vertical organisation proposed by Captain Alejandro Sancho. The latter view prevailed, appealing as it did to the military minds running the government. The basic lines of the programme were later followed by another soldier-turned-leader of industry – Suanzes – during the Franco dictatorship.³⁸

The idea of local factories did not preclude importing foreign vehicles (which still accounted for the vast bulk of the market). However, the State's help in setting up plants did not rely on high tariff barriers alone. These barriers would be of little use if Spanish companies could not sell their products in the domestic market. The State therefore adopted "buy Spanish" quotas for government bodies. It was assumed that cars would be based on foreign designs which by then had won over Spanish customers. The idea was that these designs would gradually evolve into a more national model under foreign technical guidance. Companies tendering for car plants had to have at least 75% of their capital in Spanish hands and the same proportion applied to nationals on the Company Board which had to include a Spanish CEO and Secretary. Foreign technical staff, workers, and administrative staff were not allowed to exceed 20% of the total five years after the company began trading. The strongest national protection was applied to companies producing the "people's car" given that the motor might prove useful for agricultural applications and public transport, etc. Lastly, the State exercised fiscal control but without interfering in manufacturers' technical and commercial initiatives. The Government therefore devoted its efforts almost exclusively to: ensuring the use of genuine Spanish raw materials and components; making sure quality components were used; and checking the vehicle price was in line with the cost of the components employed.³⁹

Despite the apparent scope of this programme, industry generally enjoyed few practical benefits from either tariffs or the protectionist legislation. Thus the Spanish car industry often lost out in international accords, the 1931 agreement with France being a case in

point and under the terms of which the already low secondary tariffs were further reduced. Worse still, when it came to fleet purchases, both companies and ministries chose to ferry their bigwigs around in foreign vehicles.

Nevertheless, the early 1930s saw considerable development in the Spanish motor industry and various national companies armed either with their own patents or foreign ones were poised to begin production. Up until then, only fast expensive cars had been manufactured in the country plus a small number of industrial trucks but now factories for producing motorcycles, medium-sized cars, vans, and medium and heavy trucks were being built. The only part of the market left uncovered was that for a cheap “people’s car”. Unfortunately, plants turning out cheap cars required heavy investment in order to allow the long production runs needed to bring costs and prices down to reasonable levels. Greater organisation skills were also needed since the factory staff were not trained in mass production methods. Despite these problems, it seemed Spain could at last look forward to manufacturing and exporting its vehicles in the medium term, leaving behind the stigma of being one of the smallest European vehicle manufacturers with an output of just 325 cars in 1928.⁴⁰

The motor industry had begun by making small numbers of luxury vehicles. Although various attempts were made to make cheap Spanish cars, these all failed, as did attempts to produce foreign vehicles in larger quantities.⁴¹ Spain turned out just 800 cars and trucks in 1935 and imported over 22,000 vehicles. While there were 180,000 vehicles on the roads, a figure considered high enough to set up a national factory, no local manufacturer proved capable of mass-producing cars.⁴²

, *Euskalduna*, *SEFA* and others. Another company, *F.N. de A. Pescara* disposed of good technology but failed because of lack of financial resources.⁴³

The fact that all these initiatives enjoyed so little success was largely due to entrepreneurs' lack of know-how and their capacity for repeating the mistakes of others. Put bluntly, their strategies were ill-conceived on a technical, administrative, and financial level. Entrepreneurs' sparse technical knowledge and rank amateurism stemmed more from a wish to make cars bearing their names rather than a desire to make car manufacture a lucrative business. These entrepreneurs therefore looked at matters from a narrow viewpoint and jumped into immediate production, thus dooming the venture to commercial failure. This blinkered approach to business and the market prevented them from adopting realistic strategies. Most entrepreneurs started with enough capital to set up a design or project department, but lacked the wherewithal to undertake serial production – which some foolishly embarked upon as soon as they opened shop. Some even believed that a vertical organisation guaranteed success, without bothering to create, group, and promote ancillary industries.

Spanish companies also showed themselves incapable of reaching agreements to organise different manufacturing activities. One should recall that there were factories owned by *Hispano Suiza*, *Elizalde*, *Talleres España*, *Automóviles Ricart*, *Euskalduna*, and *Hispano Guadalajara*, as well as a large number of firms making coachwork, radiators, inner tubes, tyres, and body panels etc. One of the proposals (made by Elizalde) consisted in grouping these companies to form a kind of Spanish version of General Motors, formed by: *Hispano Suiza* in Ripoll which would make chassis; *Ricart* the engines; *Talleres España*, motors; *Elizalde*, body panels and brakes; *Euskalduna*, steering components; and *Hispano* in Guadalajara responsible for final assembly. This would have made it easier to attain the economies of scale needed to turn out serially-produced cars at an attractive price. The headquarters of the holding was to be responsible for model development and organising and distributing work between companies, with participating firms and their entrepreneurs

with stakes in the holding company. The project appeared viable if 1,500 vehicles could be built (a mere 6% of annual vehicle sales in Spain) at a price of 10,000 Pesetas per unit. The ideal vehicle specification was a five-seater powered by a 1500 cc (8-10 CV).⁴⁴

One can say that no Spanish companies capable of taking a substantial slice of the market appeared on the scene during the period studied in this paper. The structure of these companies was simply incompatible with large scale production of a cheap runabout. Although the firms followed different paths, all led to business failure. Even the longest lasting and possibly best endowed firm - *Hispano Suiza* - failed to outlive the first phase of the motor industry in which luxury models were turned out in short series.

As if the business errors committed by entrepreneurs were not enough, there was also lack of governmental support for the industry. None of the Government's initiatives bore fruit, whether it was the Cambó Tariff (the motor industry's interests were sacrificed in 1923) or the Official Commission on the Motor Industry (which thoroughly examined all aspects of car production and came up with viable solutions).

5. CONCLUSIONS

At the end of the first third of the century, the Spanish motor industry comprised family companies turning out short series of vehicles made with little more than craft skills. The bulk of the Spanish market was dominated by the subsidiaries of multinational companies assembling imported components.⁴⁵ The first family companies to make vehicles set up in Catalonia. The size of this sector in comparison with the industry as a whole was tiny. However, its mere existence was proof of the technical potential available which was not so different from that in the rest of Europe.⁴⁶ Fiat provides an enlightening contrast with the practices of Spanish manufacturers. The company had focused on economic and

commercial consideration from the outset, relegating purely technical aspects to second place. It had also carried out a process of vertical integration which was entirely new in Italy. In comparison, the attempts by small Spanish companies at vertical integration were not only doomed to failure but also presented a grave threat to their commercial survival, particularly given their chronic under-capitalisation. One way out of this morass would have been for them to have forged strategic alliances with one another. The formation of a Spanish motor industry would also have been much easier if various companies had merged to gain the necessary critical mass.

During the first stage of the industry's development, the sector was characterised by a host of small companies and swift technological change. However, a dominant design emerged later and entry barriers grew ever higher as economies of scale and capitalisation became increasingly important. The modest initial technical requirements grew stiffer and the learning curve became steeper for new entrants, thus giving the biggest companies in the sector a virtually unassailable lead over would-be competitors. Finally the sector ended up with just a few large companies.⁴⁷ In Spain local initiatives did not get beyond the first stage of the industry's development. As Sudrià comments, there were plenty of entrepreneurs and business ventures holding out bright prospects. Nevertheless, "what was lacking was the social and economic structure to facilitate the expansion of these companies."⁴⁸ Unfortunately, another vital ingredient missing from this heady brew was a sound business strategy.

Barcelona, CEAC.

² See, for example: Barret, J. (1913), "Primer Congreso Nacional de Industrias Metalúrgicas, Barcelona 6 al 13 de abril de 1913." Estudios Mineros, no. 21, pp. 139-165; Payá, J. (1913), "Memoria del Estado y estadística de las industrias mecánicas y eléctricas en La provincia de Estudios Mineros , no. 3; Cárdenas, F. de (1920), "El Automóvil en España. Su desarrollo", _____, pp. 52-8; Costa (1922), Elizalde, A. (1926), , "El testamento automovilístico de Elizalde. Notas analíticas sobre la situación de la industria del Stadium; Nicolau (1926), Rentería, J. (1926), "Ahora o Nunca" Stadium; Ruiz Ferry (1929), "Visiones de la industria nacional." Heraldo Deportivo, pp. 443-44; Ortíz, J. (1929), "El automovilismo y los impuestos." España Automóvil; Guiloche, E. (1930), "La fabricación de Automóviles en España" Heraldo Deportivo, no. 557, pp. 401-2; Errando, F. (1933), "A l'entorn del VI Saló de l'automobil" Industria Catalana; Borrell (1944).

³ Elizalde (1926).

⁴ Cárdenas (1920).

⁵ The term «motor industry» has here a more general meaning, which includes not only the industry itself, but everything related to the automobile which could mean an increase of the commercial and

industrial activity.

⁶ Ortíz (1929), pp. 30-32.

⁷ Elizalde (1926).

⁸ Sudrià (1996); Carreras, A. and X. Tafunell (1997), “Spain: Big manufacturing firms between state and market, 1917-1990”, in Chandler, Amatori and Hikino (eds.), Big Business and The Wealth of Nation, New York.

⁹ On the very first international evolution of the Italian auto industry, see Bigazzi, D. (1986) “Un’impresa italiana sul mercato mondiale: l’attività della Fiat fino al 1940”, Annali di Storia dell’Impresa, Vol. 2; Bigazzi (1988), Il Portello: Operai, tecnici e imprenditori all’Alfa Romeo 1906-1926, Milano; (1989), Volpato, G. (1983), L’industria automobilistica internazionale. Espansione, crisi e riorganizzazione, Padova; Volpato (1986), L’evoluzione delle strategie di marketing nell’industria automobilistica internazionale, _____, Vol. 2, Milano; Volpato (1993), “L’internazionalizzazione dell’industria automobilistica italiana” in _____ mercato mondiale dell’800 alla meta del’900, Torino: Fiat; Castronovo, V. (1971), Giovanni Agnelli, Torino; Castronovo (1999), Fiat 1899-1999, Torino.

¹⁰ Bigazzi (1986), p. 210.

¹¹ Volpato (1993), p.160.

¹² Volpato (1993), p.161.

¹³ Volpato (1993), p.161.

¹⁴ Church (1994): The Rise and Decline of the British Motor Industry, London, MacMillan.

¹⁵ Purs, J. “The Internal Combustion Engine and the Revolution in Transport: The Case of Czechoslovakia with some European Comparisons”, pp. 194-213.

¹⁶ Calvo (1985), p. 455.

¹⁷ Maluquer de Motes, J. (1991): “La revolución industrial en Cataluña” in Sánchez Albornoz, N.: La modernización económica de España 1830-1930, Madrid, Alianza Universidad, p. 223.

¹⁸ On Loryc, see Pujalte (1990).

¹⁹ Barret (1913).

²⁰ Barret (1913).

- ²¹ Nelson, R. R. (1997), The Source of Economic Growth, Cambridge, Mass. pp. 73-76.
- ²² Comín, F. and P. Martín Aceña (1996), La historia de la empresa en España, Madrid, p. 103.
- ²³ Guillén, M. (1994), Models of Management, New York, pp. 159-60.
- ²⁴ Guillén (1994), pp. 160-1.
- ²⁵ Barret (1913).
- ²⁶ Barret (1913).
- ²⁷ "Memoria del Proyecto relativo a la construcción de la Sociedad Automóviles 'Iberia'" (1914), Estudios Mineros, 19.
- ²⁸ Calvo (1985), p 456.
- ²⁹ Aguilera, J. (1923), "Informe sobre la crisis industrial de Cataluña." Revista Nacional de Economía.
- ³⁰ Guiloche (1930), pp. 401-2.
- ³¹ Barret (1913), pp. 139-165.
- ³² España Automóvil (1916), "Real Automóvil Club de España a la Junta de Aranceles y Valoraciones", pp. 32-34.
- ³³ Playá (1913).
- ³⁴ Saul, S. B. (1962), "The Motor Industry in Britain to 1914", Business History, no. 5; Harrison, A. E. (1981), "Joint Stock flotation in the cycle, motor cycle and related industries, 1882-1914" Business History, no. 23; Church, R. (1994), p. 1; Thomas, R. P. (1977), An Analysis of the Pattern of Growth of the Automobile Industry, 1895-1929, Nueva York, Arno Press; Langlois, R. N. Y P. L. Robertson (1995), Firms, Markets and Economic Change, Londres y Nueva York, Routledge, p. 48.
- ³⁵ In 1934, both companies assembled 12.000 vehicles, 9.500 for the domestic market and 2.500 for the foreign one (mainly France, Italy, Portugal and Africa).
- ³⁶ Bigazzi (1986), pp. 247-249. See also Volpano (1993).
- ³⁷ Borrell (1944).
- ³⁸ There were approximately an average of 169.000 vehicles circulating (8,5 vehicles per 1.000 inhabitants) much less than the USA (223,6), Canada (142,0), UK (58,0), France (54,0), Germany

(28,7) and Argentina (24,36).

³⁹ Ruiz Ferry (1929), pp. 443-44.

⁴⁰ Guiloche (1930), pp. 401-2.

⁴¹ Borrell (1944).

⁴² Borrell (1944).

⁴³ Errando (1933).

⁴⁴ Rentería (1926).

⁴⁵ Before the outbreak of the Civil War the only remaining manufacturing firms were Hispano Suiza, Elizalde, the Compañía General Civil de Autobuses, and the assembly firms: Ford Motor Ibérica, General Motors Peninsular, and SOMUA. Owned by the Constructora Naval. See Errando (1933).

⁴⁶ See for example the case of the UK, Church (1986, 1994).

⁴⁷ Dosi y Nelson (1994), p. 165.

⁴⁸ Sudrià (1996), p. 71.



