

# Internationalization Approaches of the Automotive Innovation System – A Historical Perspective

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## 1. Introduction

Innovation has long been recognized as one of the main pre-requisites for the sustainable development of firms, regions and nations. It is the outcome of fruitful collaboration and interaction between business firms and a wide variety of institutional actors. This interaction is so important that a systemic approach was put forward in order to identify and deal with all relevant actors (Carlsson et al., 2002; Cooke & Memedovic, 2003).

The literature on innovation systems is embedded with different conceptualizations: National Innovation Systems (Lundvall, 1992; Nelson, 1993; Porter, 1990), Regional Innovation Systems (Cooke et al., 1997), Sectoral Innovation Systems (Malerba, 2002; Breschi & Malerba, 1997) and Technological Systems (Carlsson 1995; Carlsson et al., 1995); though used extensively, they are hard to operationalize (Rondé & Hussler, 2005).

The importance of Regional Innovation Systems (RIS) stems from the increasing interaction of regional actors on the outcome of the innovation process. Although they have similar economic and industrial backgrounds, RIS are far from homogeneous (Heidenreich, 2004). In a similar way, Innovation Systems need to take into account the different spatial and technological levels of their actors (Arocena & Sutz, 2000; Carlsson, et al., 2002).

Heidenreich (2004) argues that local experience-based, context-bound knowledge, trust-based patterns of cooperation and the path dependent accumulation of competencies are crucial for a RIS to prosper. Heidenreich (2004) has also found that the governance structure of a RIS may, to some degree, limit the innovation process of the region. Finally, substantial differences are expected between large and small regions in terms of economic performance and in the functioning of the RIS.

Taking into account that RIS stem from cooperation and the accumulation of path-dependent competencies, it is expected that small regions in less-favored countries – with a limited number of developed industries and with a historical governance structure of strong centralization patterns – to be naturally disadvantaged in terms of regional innovation systems.

Although sectoral-oriented studies have been quite disseminated, due to Porter's (1980) five-forces model dealing with the firm's external threats (competitors, substitutes, newcomers, purchasers and suppliers), they have normally been focused on understanding industry dynamics.

Departing from a systemic approach to innovation, Malerba (2002) managed to overcome classical sectoral studies and included the following actors:

- individuals (consumers, entrepreneurs, scientists, etc);
- firms (users, producers and input suppliers);
- organizations such as universities, research institutes, financial agents, syndications and technical associations;
- groups of organizations.

It is the interaction between these actors that generated a Sectoral Innovation System (SIS) structured around knowledge, technology, inputs and demand related to a specific economic sector. Although mediated by the national or regional system, due to its narrow focus the SIS is much more suited to study the sector's innovation, learning and production processes (Malerba, 2002).

Malerba (2004) used three dimensions to characterize and analyze sectoral systems of innovation: technological knowledge, actors or networks, and institutions.

Although the sectoral approach has been used to analyze innovation at a regional base (Moreira et al., 2007; 2008), the evolution of a sectoral system of innovation has not been characterized. As a consequence, one of the main objectives of this chapter is to characterize the historical evolution of the automotive innovation system in Portugal following a sectoral perspective.

Internationalization is a complex phenomenon that has been extensively researched in the last decades (Ruzzier et al., 2006). It has been defined in various ways (Benito & Welch, 1997; Chetty, 1999; Chetty & Hunt, 2003; Welch & Luostarinen, 1988; Calof e Beamish, 1995) according to several understandings.

In essence, internationalization could be understood as the process by which a firm starts developing its main operations abroad. Although the majority of studies have been focused on the firm perspective, this study will be focused on the automotive sector as a unit of analysis.

Due to the diversity of approaches, (Moreira, 2009) this study is mainly focused on the internalization theory (Morgan e Katsikeas, 1997), the transaction cost analysis (Williamson, 1975; Gilroy, 1993), the eclectic paradigm (Dunning, 1988) and the Uppsala model (Johanson & Wiederheim-Paul, 1975; Johanson & Vahlne, 1990).

Due to the economic importance of the automotive industry in Portugal, it is our intention to analyze the evolutionary perspective of internationalization. The objective is therefore, to analyze how the main theories of internationalization are related to the milestones of the automotive innovation system as well as, the factors that led to the internationalization of the auto industry.

In this sense, this analysis is focused on the six historical steps of the automotive industry, comprised between 1937 and 2011. In this manner, we seek to understand how the internationalization perspective of the sectoral system has been constrained over the years.

Methodologically, this chapter is based on historical data of the auto industry and is framed according to the sectoral innovation perspective and internationalization theories. Therefore, a descriptive approach is used as we try to match the main internationalization theories with the historical perspective of the auto industry.

The chapter is divided in six sections. After the introduction, the second section addresses the theoretical underpinning of innovation systems. The third section describes the main internationalization approaches. The fourth section describes the main historical evolution of the automotive industry. The fifth section, based on the concepts put forward in the last three sections, relates the automotive innovation system with the internationalization theories during the six most important phases of Portuguese automotive production. Finally, in the sixth section the main conclusions and future perspectives are drawn up.

## 2. Innovation systems

The term *National Innovation System* (NIS) was first mentioned by Freeman (1987) regarding the complexity and dynamics of the innovation process. Freeman (1987) defines NIS as a set of public and private institutions whose activities and interactions generate, import, change and diffuse new technologies.

An innovation system is composed of elements and relationships that interact in the production, diffusion and use of new knowledge (Lundvall, 1992). According to Nelson and Rosenberg (1993), the crucial part of an innovation system is the set of institutional actors that underpin a differentiating innovative performance.

Lundvall (1992) differentiated between *narrow* and *broad* innovation systems. The former approach identifies institutions that promote acquisition and dissemination of knowledge. The broad approach recognizes that innovations can be generated in every part of an economy and that practical, cultural and economic differences may determine the sources of innovation.

Although there is some controversy with the systemic perspective, the concept of NIS has been extensively used as an analytical tool by several important institutions such as, the European Commission, the OECD and the United Nations Conference on Trade and Development (UNCTAD). As a result of the growing number of articles, Edquist (1997) has put forward the concept of *Innovation Systems* based on the following features:

- Innovation, intrinsically linked to learning, which is at the center of the analysis;
- Its holistic and interdisciplinary perspective, as it comprises economic, institutional, organizational, social and political determinants;
- Its historical and path dependent perspective;
- The lack of an optimal system;
- The important role given to institutions and their linkages in the search of a systemic order;
- The interdependence among actors, which plays a key role in new knowledge creation process.

Edquist (1997) defends the relevance given to NIS, based on the fact that it captures important aspects of the policy of the innovation process. In fact, a NIS addresses governmental policies of science, technology and innovation, R&D competencies of both

public and private institutions, educational systems and financial support institutions. The key issue of an innovation system is that its ability to generate innovations does not depend on how individual actors perform, but rather on how they interact (Gregersen & Johnson, 1996).

Although the initial analysis of innovation systems has been applied to a national reality, Cooke *et al.* (1997) carried out the same framework on a regional perspective giving rise to *Regional Innovation Systems* (RIS). As stated by Cooke & Morgan (1998), national innovation systems have been influenced by two different drivers: globalization and regionalization. Accordingly, and based on the fact that some regions have managed to prosper more than others, the thriving regions can become important development centers – as the actors as well as their linkages are important for generating and disseminating new tacit-based knowledge and specific knowledge spillovers, difficult to access outside the system – for capturing new foreign direct investment and thus foster the pervasive nature of innovation.

RIS and NIS are not all alike as they depend on the location and flow of knowledge between actors. Asheim & Isaksen (2002) have put forward three types of RIS: (a) the territorially embedded regional innovation networks; (b) the regional networked innovation system; and (c) the regionalized national innovation systems.

Geographical, social and cultural proximity play an important role in the generation of firms' innovative activities in territorially embedded regional innovation networks. Learning-by-doing and learning-by-interacting are the main knowledge generating mechanisms as the presence and interaction with knowledge providers is relatively modest (Asheim & Isaksen, 2002). Although knowledge flows interactively among actors, the probability of producing radical innovations is low due to the modest presence of knowledge providers.

In regional networked innovation systems, the regional institutional infrastructure is more systemic than in territorially embedded regional innovation networks (Asheim & Isaksen, 2002). As regional networked innovation systems are regarded as ideal-typical, RIS local firms have a higher probability of generating radical innovations than in the previous situation, which is a consequence of the strong networking activities of the regional cluster of firms.

In regionalized national innovation systems, outside actors are involved in regional firms' innovative activities. As a consequence, knowledge providers are located outside the region, which to some degree limits the innovation process of the region.

Asheim & Isaksen (2002) point out that in regionalized national innovation systems, the interaction between knowledge organizations and firms are based more on specific research work between knowledge providers outside the region and the local industry, than on integration and continuous involvement of all actors.

On a different note, Heidenreich (2004) introduced two types of RIS: the Entrepreneurial and the Institutional. The latter is characterized by an industrial structure with a strong position of low and medium technology, a governance structure dominated by formal, and in general, public institutions and, by a business structure characterized by the important role of multinational companies. The former, on the other hand, is characterized by a solid bed of strong knowledge-based SMEs, creative entrepreneurs in new technological fields and, by a strong position in knowledge intensive services.

Following a spatial, social, material and chronological dimension of regional innovation processes, Heidenreich (2004) addressed the different innovation dilemmas and regional governance of 15 regions. He put forward the following four dilemmas:

- Firms must take advantage of local experience-based, context-bound knowledge to face world-wide oriented competition;
- Trust-based patterns of cooperation between actors (firms, schools, R&D institutions, authorities and users) must facilitate the recombination of technical knowledge and the embeddedness of new technologies;
- The coupling of scientific, economic, political, technical and cultural actors in order to facilitate the reciprocal adjustment of perspectives and actions;
- The accumulation and path-dependent development of competencies in order to (re)generate regional competitiveness.

For Heidenreich (2004), these dilemmas pose different challenges to innovation governance. In the case of *Grassroots* regions, the main challenge is to overcome the highly fragile institutional order threatened by firms' individualistic behavior and weak local authorities. In *Dirigiste* regions, the main challenge is to overcome the stability of institutional order and to generate regional cooperation among actors. Finally, in *Networked* regions, the main challenge for governance structures is to maintain entrepreneurial interests and to match regional R&D, technology transfer and economic policy to the new global challenges of the knowledge-based economy.

Clearly, the specificity, complexity and interdependence of different RIS depend on both the technological knowledge of actors and the type of innovation system governance.

### 3. Theories of internationalization

The internationalization of firms can be analyzed according different theoretical approaches. Although there is no single approach to comprehend and explain the internationalization process, some of them might be used complementarily. As many theories have been put forward to explain firms' internationalization, this chapter only addresses four of the most important theories in international business.

#### 3.1 Internalization approach

The internalization theory is centered on the notion that firms aspire to develop their own internal markets whenever transactions can be performed within the firm itself with the minimum possible cost and, that such transactions will be maintained as long as the internalization benefits are larger than the internalization costs (Buckley & Casson, 1993).

According to this theory, organizations internalize transactions that are inoperative or costly in the market by identifying an efficient mode of transfer that minimizes costs. Firms evolve from simple internationalization processes (exportation) to more complex ones in order to guarantee that shared resources and knowledge are kept inside the firm (Buckley & Casson, 1976).

This theory congregates all the studies that analyze the internationalization of firms from the point of view of the transaction cost economy (Williamson, 1975). A company is

extended abroad when the transactions are internalized beyond national borders (Buckley & Casson, 1976; Casson, 1979) because the costs within the company are smaller than those in the market. Accordingly, an important part of this theory addresses “how” firms decide to internationalize. In this way, it is possible to compare the establishment of foreign branch offices (vertical integration) with other forms of internationalization such as licensing (Hennart, 1982, 1989).

Intangible assets, such as technology and know-how (Buckley & Casson, 1976; Teece, 1986) or specific assets (Anderson & Gatignon, 1986) play an essential role in the decision to internationalize as well as in the selection mode (“reason” and “how”). Technology and know-how endow firms with the necessary competences for entering new markets. Furthermore, firms protect themselves against opportunism from possible partners, internalizing international operations when asset specific resources are important for international competitiveness.

This positive relation between firm internationalization and the existence of intangible assets has been extensively supported (Buckley & Casson, 1976; Caves, 1982; Denekamp, 1995; Dunning, 1980; Pugel, 1978; Wolf, 1977). Some studies support a similar relation between intangible assets and the vertical integration of distribution channels in foreign markets (Anderson & Coughlan, 1987; John & Weitz, 1988; Klein et al., 1990.), as well as the integration of innovation activities (Caves, 1982; Kamien & Schwartz, 1982).

Internalization involves one form of vertical integration that brings new operations and activities, previously carried out in intermediate markets, under the control of the firm, specifically in imperfect markets (Ruzzier et al., 2006).

The internalization process is very attractive for firms that tend to desire a tighter control over their operations. This is especially important when firms try to exploit their competitive advantage based on technology and knowledge. Multinational companies can explore their advantages through franchising and licensing, for example, but the internalization of their activities allow them to maintain direct control of their assets and the dilution of their property.

### **3.2 The eclectic paradigm**

Dunning’s (1988) eclectic paradigm, also known as the OLI paradigm, is based on the internalization theory and seeks to explain the different forms of international production as well as the selection of countries for investing abroad.

According to Dunning (1988), the internationalization of economic activity is determined by the achievement of three kinds of advantages. Firstly, ownership advantages (O) which are firm specific and are related to the accumulation of intangible assets, technological capabilities or product innovations. Accordingly, firms operating in foreign markets take advantage of these essential competences to outperform their competitors in international markets.

Secondly, the location advantages (L) are related to productive and institutional factors of certain geographical areas. These advantages are a consequence of the exploitation of location advantages, such as, cheap labor, raw materials, and smaller transportation costs, among others. Locational advantages are those which are specific to a country.

Thirdly, internalization advantages (I) derive from the firm's capacity to manage and coordinate activities throughout its value chain thus, generating more added value than its competitors. These advantages are related with the integration of transactions inside multinational hierarchies through foreign direct investment. In short, internalization advantages are the benefits that derive from internal markets and that allow firms to bypass external markets and the costs associated with them.

This model is an attempt to integrate existing theories into one universal model. It exposes the "why", "where" and "how" of a firm's internationalization. If advantages do exist, the company should explore its assets through international production, as opposed to exporting, joint ventures, licensing or franchising.

As mentioned above, the eclectic paradigm is a synthesis of other approaches that concentrate on trade or international production, possession of superior technology or imperfect market structures. Accordingly, there is neither swift perspective on the competitive nature of international production, nor any consideration of collusion and/or market power.

### 3.3 The Uppsala theory

The Uppsala internationalization model suggests that internationalization is sparked by an evolutionary and sequential commitment through time. Johanson & Vahlne (1977) developed this process model, which proposes a sequential learning step-by-step process, based on the study of four Swedish companies. This model proposes four sequential phases that represent higher degrees of international commitment:

1. No regular activities or indirect exports;
2. Direct exports through agents or independent representatives;
3. Direct exportation through own subsidiaries abroad;
4. Foreign direct investment through the establishment of production or commercialization units abroad.

The firm initiates its process with non-regular export activities to neighboring countries or countries with low psychic distance, therefore, avoiding uncertainties and high risk-taking. In this phase firms rely on foreign direct investment as they lack relevant information about the market. In the second phase, the company begins selling its products abroad through independent representatives, creating a channel of information between the company and its foreign market. Thirdly, with the establishment of an international subsidiary, the firm tries to create its own information channel in order to obtain a larger control of operations abroad. Finally, the establishment of assembly plants and subsidiaries abroad give companies control over their production and sales (Morgan & Katsikeas, 1997).

It is important to note that these phases are not mandatory and that knowledge plays an important role in this evolutionary process. Depending on the way that they gain experience during their interaction in foreign markets, firms do not always follow all the phases.

This model is based on the concept of psychological distance. In this way, firms enter foreign markets where and when they spot opportunities and look to diminish the uncertainties they face in their international expansion. Accordingly, firms gradually extend their activities to new, more distant markets from the psychological point of view (Hansson et al., 2004).

This model suggests that the absence of knowledge about foreign markets is the main barrier for a larger international commitment; this obstacle can only be overtaken by experiential learning.

### 3.4 The internationalization network theory

Based on the Uppsala model, Johanson & Vahlne (1990) continued their study on internationalization, applying the network perspective to their theory. The extension of the model involves investments in networks that are new to the company, seeing that international penetration means developing positions abroad and increasing resource commitments in the network in which the company has developed its positions. The integration of this network can be understood as the coordination of different national networks the company is involved with (Ruzzier et al., 2006). Therefore, the relationships among firms are seen as networks; firms then internationalize because other firms of the (inter)national network do. Within the industrial system, firms involved in the production, distribution and use of goods and services are mutually dependent on their specialization patterns. Given the configuration of the world economy, certain industries or kinds of markets are more inclined to be internationalized (Buckley & Ghauri, 1993; Andersen, 1993).

Johanson & Mattsson (1988) suggest that company success upon entering new international markets is more dependent on its position in the network and its relationships in present markets, than in the cultural characteristics of international markets. Johanson & Vahlne (1992) demonstrated that entering foreign markets is the result of a gradual interaction process among the parties and, of the development and maintenance of the relationships throughout time. The network perspective goes even further than incremental internationalization models, suggesting that the firm strategy arises as a behavioral pattern influenced by the range of relationships within the network (Rundh, 2003).

The network approach, including the micro and macro perspective defined by Johansson & Mattsson (1992), considers that networks are constituted by the businesses that firms maintain with their clients, distributors, competitors and governments. Johanson & Mattsson (1992) argue that, as firms internationalize, the number of actors and interactions increase and, as a consequence, the relations among them become narrower.

During the internationalization process, firms create and develop commercial relations with their counterparts abroad. This process evolves in different ways: first, creating relations with partners in countries new to the firm - international expansion -, secondly, enhancing the commitment in the networks the firm is already involved in - international penetration - and finally, connecting the existing networks in different markets - international integration (Hansson et al, 2004).

The strength of the internationalization network model lies in the explanation of the process and not in the existence of multinational or international firms. From the network point of view, the firm internationalization strategy can be characterized by: the need to minimize the development of new knowledge; the need to minimize the adjustment to new realities; and the need to explore the firm's positions in established networks (Johanson & Mattsson, 1992).

In this way, network activities allow the company to maintain relationships and to underpin the access to new resources and markets. The network in which the firm is most active is the

main engine of the firm’s internationalization process. This was not the reality in the Uppsala model, which contended that the internationalization process depended on firm specific advantages or on the psychic distance of the market (Hansson et al, 2004).

The main contribution of the network theory lies in recognizing that a firm’s internationalization process is not the effort of a single company, but the result of the relationships among many firms. Table 1 summarizes the main concepts of the different theories analyzed.

Theory	Main Authors	Key concepts
Internalization theory	Buckley & Casson	<ul style="list-style-type: none"> <li>• The choice of the transaction mode varies according to specific cost;</li> <li>• Internalization of activities the market performs expensively or poorly, through vertical integration;</li> <li>• Larger firm control;</li> <li>• Monopolization of knowledge.</li> </ul>
Eclectic Paradigm	Dunning	<ul style="list-style-type: none"> <li>• The internationalization of firms is explained by three factors:                             <ol style="list-style-type: none"> <li>1. <i>Ownership</i> – The firms invests in a foreign market using its core competences as a competitive weapon vis-à-vis its main competitors.</li> <li>2. <i>Location</i> – The firm internationalizes choosing the market with the best conditions for the firm.</li> <li>3. <i>Internalization</i> – The firm invests in facilities abroad in order to internalize the operations that were performed by the market.</li> </ol> </li> </ul>
Uppsala Theory	Johansson & Vahlne	<ul style="list-style-type: none"> <li>• Internationalization is seen as a process that integrates a gradual, continuous evolution through which firms acquire experience and knowledge by progressing in their involvement and commitment in foreign markets.</li> </ul>
Network Theory	Johansson & Mattsson	<ul style="list-style-type: none"> <li>• The internationalization of a firm is the result of the development of a network of (internal and external) contacts with individuals or firms that possess resources and knowledge/experience, in which the access to information and knowledge is more accessible and less costly.</li> </ul>

Table 1. Synthesis of contributions of the internationalization theories covered

#### 4. Historical evolution of the automotive industry in Portugal

##### 4.1 The special EDFOR case (1937-1952)

The first milestone of the Portuguese auto industry took place in the first decades of the XX century, as in the rest Europe. In 1937, Eduardo Ferreirinha and Manoel de Oliveira – who were fans of car races in Portugal – invested in the foundry of car components. As a result of this passion, they managed to develop a sporting vehicle, with a Ford V-8 engine, the body and skeleton melted in an aluminum league, with a driver-control suspension mechanism,

named EDFOR. Its production included several foreign components, foreseeing the current platform concept (Féria, 1999). Although the first steps were quite promising for the national auto industry, the mass production of the EDFOR prototype never took place due to the beginning of World War II.

#### 4.2 Automotive assembly lines (from 1950s to 1960s)

In the beginning of the 1950s, Portugal lived in a closed economy. The protectionist mentality dramatically influenced the Portuguese industry, which was protected from competition by strict customs regulations, by *industrial conditioning*<sup>1</sup> and by cheap labor that reflected negative growth year after year (Féria, 1999).

Following this protectionist mentality, the Portuguese government adopted strict measures, similar to those that occurred in several developing countries. Such measures imposed import quotas and closely followed the policies that had been implemented in Spain in order to achieve a national car brand. These stringent policies affected mainly passenger vehicle manufacturers that did not assemble their products on national territory. By this time, the development of the Portuguese auto industry was quite widespread as the producers of the main commercialized brands present in Portugal were forced to introduce their assembly lines in order not to lose market share (Féria, 1999).

Several investments took place in Portugal at that time: among other, factories from GM/Opel, Ford, Citroën, Fiat, Barreiros and Berliet. Investment in heavy vehicles also took place. Although the auto industry investment was thriving, the market was far from working properly, due to the abovementioned reasons as well as strict regulations imposed by the government. Likewise, as referred by Féria, (1999: 11) the assemblers, with one exception, “never invested on improving the local supply chain, barely investing in the promotion of the national components industry”.

The greatest consequence of this policy was the high final price of the vehicles. This was the result of added production costs based on insufficient critical mass and lack of production competences, which hindered productivity. During this era, the Portuguese auto industry experienced several successful cases – the Ford P-100 is a clear example –, with pervasive consequences in terms of exports until 1974-75. This success managed to deploy the creation of industrial jobs, although with poor levels of qualification (Féria, 1999).

During this era, as a result of the policy implemented, several assembly lines were created. One of them is still in operation – in Ovar – assembling several commercial Japanese vehicles for Toyota.

In parallel, as a consequence of several investments in the auto industry, the production of components – glass, upholstery, car seats and other interior components – took place in order to supply auto assemblers.

Afterward, this police revealed itself as inadequate to the growth of the auto industry in Portugal, following other unsuccessful attempts to produce “made in Portugal” vehicles.

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<sup>1</sup> During the *industrial conditioning era*, the government only authorized the creation of new firms if they did not jeopardize the economic behavior of firms already competing in the Portuguese economy.

It is important to notice that this period, although based on the stringent policy implemented during the 1950s, underpinned an industrial change that managed to transform the national automotive industry.

#### **4.2.1 FAP – Fábrica de Automóveis Portuguesa (1959-1965)**

Towards the end of the 1950s, in parallel with the frustrated attempt to encourage the builders of the most traded brands in Portugal to install their assembly plants in the country – in order to stimulate the development of the national industry, a nationalistic initiative – “the men of the establishment – takes place. Although they had little knowledge about the automotive industry and all its industrial complexity, they were enthusiastic about the production and commercialization of an economic family vehicle, produced under the license of an assembler. They set up a new factory – Fábrica de Automóveis Portugueses (FAP) – and after the initial investments in land and infrastructure, they initiated their research for potential licensors interested in their vehicle (Féria, 1999). Soon after, they realized the complexity of such achievement – due to a narrow market segment, lack of industrial tradition and very unlikely international penetration of their product – and that their project was doomed, given to clear economic inferiority of the feasibility of the factory.

In 1963, there was a strategic change and FAP started to plan the production of agricultural tractors, substituting the original idea of producing commercial vehicles. Concentrating their effort in this new direction, FAP obtained a licensor for assembling tractors, investing in training the employees and bargaining state subsidies and financing. However, FAP rescinded its functions without ever producing a single vehicle or having started scale production of tractors (Féria, 1999).

This landmark, although apparently of little relevance for the Portuguese car industry, reveals the importance of understanding the complexity of the car industry as part of a broader, global industry.

#### **4.3 Protected market (1961-1974/76)**

##### **4.3.1 Public industrial policy**

In 1962, imports substitution marked the political orientation of the automotive industry (Felizardo et al., 2003). The “Assembly Law” influenced industry dynamics, which were characterized by strong state intervention. This law imposed the assembly – in Portugal – of all vehicles commercialized in the domestic market as well as, the restraining of imports to a maximum of 75 units per manufacturer of Completely Built Up (CBU) units. This law also imposed that the national added value increase should be at least 25% for the units assembled locally (INTELI, 2003). Given the focus on the supply of the domestic market through domestic production, the liberalization of imports of Completely Knocked Down (CKD) units was kept. According to these impositions, international manufacturers were allowed to import merely 75 CBU units per year and unlimited CKD units. However, the national manual labor incorporation rate had to be at least 15% of the cost of the complete unit (Felizardo et al., 2003).

Given the stringent limitations imposed by the legal framework, car manufacturers were ruled by a specific and restricted program of national incorporation. On the other hand, one

step back in upstream activities in the value chain, components producers were receiving indirect incentives to develop subsidiaries according to the degree of the national incorporation of their activities (INTELL, 2003). This was an indirect way of supporting the national automotive industry.

This legislative setting, which represented the first sectoral legislation in the automotive industry in Portugal, was kept until 1972. However, there were some slight changes, such as the authorization to import more than 75 CBU units for manufacturers from EFTA member countries in 1968 and, the increase of the rate of mandatory national incorporation to 25% of the value of the complete unit in 1969 (Felizardo et al., 2003). Afterwards the sectoral legislation was altered as a consequence of ineffective productivity of assembly lines and of the commitments the national government intended to fulfill in the international arena.

The “Assembly Law” constituted a milestone in the automotive industry sectoral policy during the 1960s and 1970s, introducing in Portugal, for the first time, a model of industrialization in the assembly of vehicles (Felizardo et al., 2003). Throughout time, the national legislation changed to “serve” the automotive industry as well as the car components industry, according to the evolution of the sectoral fabric.

The external recession – based on the first oil crisis – and the national social and political revolution – originating from the Revolution of the 25 of April of 1974 – did not bring about a new sectoral policy or legislative setting (Felizardo et al., 2003). Although legislation during this turbulent period was erratic, unstable and incoherent, only in the next decade did new sectoral law emerge.

#### **4.3.2 Assemblers strategic line**

As a consequence of the sectoral policy, which imposed limits on imports to the Portuguese market, there was a proliferation of assembly units due to foreign direct investment and licensing contracts. In an attempt to face the legal framework imposed, the biggest car manufacturers decided to invest in Portugal, opening new factories on Portuguese territory in order not to lose their market. The majority of the assemblers present in Portugal granted assembly licenses to importers or other national companies. BMC, Citroën, Ford, GM, Renault and Fiat were the six multinational subsidiaries of the auto industry that initiated production, especially of commercial units, in Portugal (INTELL, 2003). This behavior had a pervasive effect on the diffusion of assembly units, on the number of traded brands and, on the range of models produced, driving the expansion of the national output of vehicles and the growth of the market, as presented in Table 2.

Through time, the number of companies operating in Portugal began to increase substantially – as well as the number of produced units, reaching a peak of 101,406 units in 1974 and clearly reflecting the limited size of assembly lines operating in the Portuguese industry (Felizardo et al., 2003).

This industrial setting led to a fragmented demand based on low scale volumes, low-technology and low-complex piece parts in which the economic added value was predominantly based on cheap manual labor. This situation did not contribute to the improvement of the endogenous characteristics of Portuguese automotive industry. Only during the mid-1970s could indigenous incorporation be measured in function of units produced in Portugal. However, and due to the very limited number of vehicles produced

Year	Number of assembling units
1962	2
1964	17
1970	18
1974	21
1976	20

Source: Selada and Felizardo (2002)

Table 2. Number of assembling units: 1962-1976

on each assembly line, the production of piece parts was inefficiently based on limited production volumes, even when considering the aftermarket indicators (INTELI, 2003).

The assembly of vehicles in Portugal was destined basically to the domestic market, in the segment of light vehicles – until the end of the 1970s – and commercial vehicles – until the end of the 1980s. The strategies of assembly units were particularly focused on commercial objectives, assembling a wide range of brands and models with industrial units characterized by producing – intermittently and inefficiently from the economic point of view, due to the lack of economies of scale – small series. However, despite all those adverse factors, at the end of the decade, the automotive industry was responsible for approximately 25,000 jobs, including assembly lines and their suppliers (INTELI, 2003).

#### 4.3.3 Strategic lines of auto components

During the protected market era, the majority of assemblers in the Portuguese auto industry – with the few exceptions of GM/Opel, Ford and Citroën – did not possess a deep knowledge on how to improve their relationships throughout the value chain, relegating the components industry to a secondary place in industrial policy. This situation was aggravated by the absence of direct mechanisms to support to the development of the components industry, such as legal framework regarding the incorporation of indigenous piece parts. On the other hand, the poor labor productivity, the lack of modern industrial capital equipment and, the disposal of valuable material were inhibiting factors for the assemblers to source their components from the local car components industry. Parallel to this situation, the legislation at that time did not allow auto assemblers to produce components, which indirectly imposed to assemblers a clear dependence on their supplying subsidiaries (Felizardo et al., 2003).

By the end of 1970s, 170 components manufacturers operated in Portugal, supplying the existing assembly lines. However, they were not exclusively focused on the auto industry, complementing the production of components and piece parts with the development of other businesses. The auto components suppliers employed around 15,000 people (Felizardo et al., 2003).

The auto components industry was characterized by a myriad of small artisanal, inefficient firms, with low levels of quality and limited organizational, commercial and technological competences. The industry was exclusively oriented to the domestic market and focused on manufacturing traditional technology parts – metallic pieces, batteries, glasses, tires, seats

and other nonmetallic parts - of low added value. Due to the protectionism of the national market, production was limited and intermittent, which inhibited investment and specialization. Moreover, and as a consequence, the prevailing technologies were rudimentary characteristics emphasizing simple production processes (Felizardo et al., 2003).

In parallel, the auto components industry did not attract foreign direct investment until 1979 (Felizardo et al., 2003).

#### **4.3.4 Alfa-Sud project (1972)**

In the end of the 1970s, Alfa Romeo was owned by a prestigious manufacturer producing several car models with luxurious and sporting characteristics, targeted to the European high purchasing power elites.

In order to expand its activities to other market segments - in particular younger public and middle and upper social classes -, Alfa Romeo developed, during the last years of the 1960s a concept car: Alfa Sud. This concept was designed with Alfa Romeo's traditional sporting lines and with less opulent aesthetics. The objective was to place Alfa Sud in the European market, with very a competitive final price thus, crushing main competitors in the small family vehicles segments (Féria, 1999).

In order to achieve this objective - and in an attempt to increase its competitiveness and lower the unit costs of production facilities - Alfa Romeo planned to delocalize Alfa Sud's production. Portugal was part of the selection short list of potential locations due to the cheap cost of labor (Féria, 1999).

In 1972, Portugal was living the first years of a more liberalist government, opening a window of promising social, political and economic opportunities. The industrial policy was trying to unleash the power of foreign direct investment and cool down the protectionist vein of the *industrial conditioning era*. Accordingly, the government received the Alfa Romeo's proposal enthusiastically and realistically, creating, at once, a multidisciplinary team to analyze the national capabilities of supplying fundamental key components to the project. In fact, for the very first time, a structuralist approach was addressed taking into account the whole value chain and not a situational perspective towards a foreign direct investment possibility.

Several characteristics - namely those related to the supply chain of the Alfa Sud - were analyzed as determinant factors for the project to be successful: organizational and managerial styles, technology and existing production equipment and, the existence of quality processes and products. Given the absence of these key characteristics in the Portuguese industrial arena, mainly those related to the quality standards required by Alfa Romeo, the Alfa Sud project was not located in Portugal. Although, there were several firms supplying auto assemblers with very high quality products, Portugal, as a location, was senseless as it would force Alfa Sud to import almost all the components, creating unusually complex logistics at the time (Féria, 1999).

The Alpha Sud experience was, according to Féria (1999), very insightful as it gave Portuguese industrial planners the opportunity to analyze the auto components suppliers' capacities, knowledge and technological potential. Accordingly, this attempt, although not a

prominent milestone in the history of the Portuguese auto industry, constituted an insightful and fruitful opportunity with important repercussions for future projects – to address the auto industry from a systemic perspective.

#### **4.4 Sines Flop (1979-82)**

In 1979, the Ford Motor Co. European Board analyzed the possibility developing a new project in the Iberian Peninsula. In search of increased competitiveness and based on the aftermath of a successful investment carried out in Valencia, Spain, the board was looking for geographical areas to underpin Ford's delocalization strategy, and decrease production costs. The board entrusted the site selection team with the responsibility of finding a location for the production of the new *mini Extra* (Féria, 1999).

Portugal came out as one of the potential locations, since one of main Portuguese policy objectives was to avoid losing another manufacturing implementation to neighboring Spain. Following the contacts of the selection team, national industrial authorities attributed maximum priority to Sines on the South of Portugal due to the strong investment carried out in the Sines industrial park. Ford intended to increase its foothold in the European market and Portugal would perform an important role in this expansion. However, the site selection team cast some doubts about the Sines location due to the lack of trained labor and technology endowed suppliers. Even though negotiations were kept, in 1982 the final negative decision was released: Ford was not committed to invest due to the lack of technologically driven supply and the changing European market conditions. Eventually, this decision led to wide scale success the *Fiesta* – the main vehicle produced in Valencia, Spain. Ford definitely abandoned the *Extra* project, collapsing the Sines automotive industrial dream (Féria, 1999).

As in previous failures, this experience allowed the Portuguese authorities to have contact with the reality of the automotive industry, namely, with the inherent demands of this sector.

#### **4.5 The renault project (1977-1986/88)**

##### **4.5.1 Public industrial policy**

During this period, the automotive sectoral policy orientation was marked by the promotion of exports, due to a specification of a production quota to all assembled CKD units with less than 2000kg. The legal framework created barriers to auto assemblers and all new investments were subject to applications. However, there were some exceptions: those in which the State was the largest shareholder. Subsequent legislation widened the range – to CKD and CBU units – of exportable products and an additional contingent of CKD products could be obtained by exporting products manufactured in the same manufacturing unit. The promotion of exports was also encouraged for other Portuguese products that were destined to vehicle assemblers and to the auto components manufacturers produced by Portuguese firms and supplied to exporting assemblers (Felizardo et al., 2003).

This new regulation, destined to the auto industry, was complemented with incentives to foreign direct investors – based on quality of human resources, cheap labor and geographical location – in order to create the endogenous condition for the automotive industry to flourish (INTELI, 2003).

State interventionism led to the creation of the Cabinet for the Automotive Industry Studies (1974) and to the Automotive Industry Commission (1976). With this deep change in the Portuguese auto industry, in 1977 the Portuguese authorities invited several international car manufacturers to invest in manufacturing facilities in Portugal (Felizardo et al., 2003). Renault and Citroën were among the short list of candidates. Renault was chosen and in February of 1980 the foreign investment deal was signed with the *Régie Nationale des Usines Renault* (RNUR). According to Féria (1999), this was a politically-based decision. According to Felizardo et al. (2003), Citroën's proposal was excluded because of low national components incorporation.

Before the Renault project started, the government published new legislation for the automotive industry (Felizardo et al., 2003) restraining the import of CBU vehicles and establishing quotas for the incorporation of national components in CKD vehicles. Clearly, industrial policy's intention was to create a critical mass of assemblers, to create jobs and to underpin the technological development of the auto components industry. From the international business perspective, the main objective was to abandon the import substitution policy Portuguese governments had been using and to embark on an export promotion policy.

New incentives were established for the industrial conversion of assembly lines as most of them lacked technological conditions to adequately compete in the market. Initially, the incentives were targeted to car manufacturers producing units with less than 2000 kg and the conditions were very simple: those implementing the change would be granted the possibility to transfer their import quotas - CBU units - to their production - CKD units - and export quotas. Afterwards, commercial units were also included (Felizardo et al., 2003). In summary, inefficient assembly lines and components producing units were shut down or reconverted. At the same time some new firms were created - in order to meet the European market dimension (INTELI, 2003).

After the conversations with the European Economic Community (EEC) authorities - with Portugal seeking to enter the EEC - the end of the protection was stalled and a new protocol (31/12/1984) was negotiated that basically ratified the principles and the underlying mechanisms of the legal framework at the time (Felizardo et al., 2003).

On the other hand, the corporate institutionalization of components manufacturers was more difficult and less powerful than that of auto assemblers of the auto industry. Hence, AFIA (Association of Automotive Industry Manufacturers) was created in 1979 (Felizardo et al., 2003).

The legal framework ceased its validity in 1984. During the same year law n° 405/84 was set up aiming to regulate the auto industry until the definite entrance of Portugal into the EEC. Portuguese protectionism ended in December of 1987. Although between 1984 and 1987 there was a change in the state of mind of all players in the Portuguese automotive industry, 1988 brought about the complete liberalization of the car market (Felizardo et al., 2003).

#### **4.5.2 Assemblers strategic line**

The exports promotion policy represented an opportunity to reconfigure inefficient assembly lines. As a consequence, Portugal witnessed a shrinking number of manufacturing

units as well as a decrease in the quantity of models and brands manufactured in Portugal. The closure of assembly lines affected: a) the licensed units more than the branches of multinational units, and b) the companies producing passenger cars more than those producing commercial vehicles.

While between 1979 and 1982 there were 19 assemblers operating in Portugal, in 1984 the number of assemblers decreased to 16, in 1986 to 13 and in 1988 only 12 units were in operation. According to Table 3, between 1979 and 1988 ten companies either closed down or reconverted their assembly lines.

Assemblers	Closure date
A.C.P. de Motores e Camiões	1979
Garrido e Filho	1983
Imperex	1983
IMA	1984
Comotor	1984
Montavia	1984
Somave	1986
Entrepasto	1986
Proval	1987
UTIC	1988

Source: based on Selada and Felizardo (2002)

Table 3. Firms that closed down their facilities

The change of mind in industrial policy drove some firms to reinforce their presence in Portugal; namely GM, founded in 1963. GM focused its strategy on exporting components to other European GM units, which gave the GM local unit an unprecedented scale. In order to increase its national market share, GM decided to import CBU vehicles, increasing the added value and the relationship with Portuguese suppliers (Felizardo et al., 2003).

The Renault project was a major turnaround as Renault invested, for the first time in Portugal, in the creation of a complex, modern infrastructure. This project was one of the most important in the Portuguese industry, whose investment was composed of three units:

- The setup of a car manufacturing unit in Setúbal, with an output capacity of 80,000 vehicles/year and with a level of national incorporation between 50% and 60% of this output;
- The creation of a mechanical components factory, in Cacia, with an output capacity of 80,000 gearbox/year and 220,000 engines/year, with a national incorporation level between 60% and 80% of the output;

- The turnaround of the Guarda factory, in order to shape this industrial unit to an export oriented unit;
- The setup of a foundry unit - FUNFRAP - to supply the engines and gearboxes unit.

In 1980, Renault started the production of its R5 model in Setubal and, in 1981, they initiated production of car components in Cacia. In the meantime, after some change processes, the Guarda factory was subsequently sold. The foundry unit started its activity in 1985, producing melted parts for engines (Felizardo et al., 2003).

According to Table 4, the factory went through a significant increase in its output since the beginning of its activity. The level of output components, which initially was based on gearboxes and subsequently widened to engines and mechanical components, is displayed in Table 5.

Year	Output of Renault Factory (units)
1980	3.006
1981	27.895
1985	28.123
1988	44.475

Source: based on Felizardo et al. (2003)

Table 4. Output of Setubal Renault's factory

Year	Production of components	
	Gear boxes	Engines
1981	6.699	-
1982	53.525	47.787
1988	82.695	226.885

Source: based on Felizardo et al. (2003)

Table 5. Renault's components production units

During the 1980s, the Portuguese auto industry changed extensively after an initial reduction of the number of vehicles produced, reaching 75,675 units in 1979. Due to an economic crisis, the beginning of Renault's operation meant that the number of cars manufactured in Portugal reached a peak in 1982: 118,958 units. However, between 1982 and 1986 the output diminished again to 96,006 units. Even with the evolution of the Renault project, national and international conditions limited the development of the automotive industry in the first half of the 1980s. From 1986 to 1988, the auto industry witnessed the recovery of output production, which reached 136,524 units, in 1988, being most of them for the foreign market (Felizardo et al., 2003)

### 4.5.3 Strategic line of auto components suppliers

One of the main objectives of industrial policy was the promotion of exports, which was achieved due to a heavy investment (and openness) in the auto components industry. The possibility of compensation in the exporting of components underpinned the creation of new firms and jobs, which created new industrial dynamics.

The Renault project sparked the development of the auto components industry in Portugal, as it paved the way for high levels of incorporation of Portuguese manufactured components and the establishment of some companies associated to the French manufacturer.

The positive effects related to the Renault project that influenced the development of the Portuguese components industry are the following:

- Suppliers quality certification;
- Product certification and homologation;
- The introduction of modern production management processes;
- Human resource qualification;
- The introduction of new marketing, organizational and technological learning processes;
- The introduction of the auto industry *modus operandi*;
- The promotion of exports and contacts with the global auto industry;
- The promotion of foreign direct investment in Portugal.

The components industry evolved positively for a long time based on the external market, which in 1986 overtook the domestic market (Felizardo et al., 2003).

Of equal importance, the Portuguese auto industry could rely on several domestic components suppliers embedded in the “auto industry culture”. These were concerned with delivering products that competed in terms of quality, costs and time delivery. The firms had the capability of widening their product range. Furthermore, they could produce technologically complex products due to their investments in emerging technologies as well as in process innovation technologies. The knowledge generated by their relationship with more technologically oriented clients also contributed to the dissemination of the of specialization processes and to the adaptation of a new and demanding environment. Some components suppliers that managed to improve their performance in the domestic auto industry were invited to internationalize their activities and, consequently, had the chance to acquire the first contacts with the global auto industry. Some of them managed to progress from transactional relationships to relational partners (Moreira, 2005).

From the beginning of the 1980s, Portugal witnessed a strong increase of foreign firms entering the auto components industry, providing their suppliers with an excellent opportunity to have a foothold in the Portuguese market as well. Due to the international economic turmoil, the number of auto components firms diminished though their production output increased (INTELI, 2003).

In the end of 1980s, Portugal had a competitive fabric of suppliers with a strong set of production process competences, having cheap labor as its main asset (Felizardo et al., 2003). In the following years, the national firms’ investments and turnarounds started to show very good results due to the exports boom in 1985 (INTELI, 2003).

In 1988, Portugal completely opened its markets to products from the EEC and a new phase of development in the Portuguese automotive industry took place. In spite of the imports growth, the exports of vehicles and of the production of components continued to grow (INTELI, 2003). In the same year, the first Specific Program for the Development of the Portuguese Industry (PEDIP) was launched in an attempt to diminish the gap between Portugal and the developed European countries. The program involved several actions in a wide range of areas, such as R&D, international business and financial support to all firms competing in the market. In addition, it offered incentives for the creation of new foreign companies (INTELI, 2003).

For the Portuguese Government, the establishment of an original equipment manufacturer would be a unique opportunity for the development of the Portuguese auto industry as well as for the auto components industry (INTELI, 2003).

#### **4.6 The UMM project (1977-1993)**

In 1977, a new firm was created in Lisbon - UMM. This firm's main objective was to produce and commercialize all-terrain vehicles. In fact, UMM developed niche vehicles (Féria, 1999) - CPE (model with "narrow door"), CPL (model with "wide door"), ALTER I and ALTER II - and its main clients were the Portuguese army, the Fiscal Guard, the police - Republican National Guard (GNR) - and Electricity of Portugal (EDP), one of the main Portuguese target audience at the time. Nevertheless, the remaining branches of the army did not purchase the UMM vehicles, even after strong technical improvements were implemented. As a consequence, the UMM output never reached the scale it could have achieved if the public fleet could have been sourced by UMM (Féria, 1999).

According to Féria (1999), in spite of its technical problems and its failure, this project could have reached an interesting development if the Portuguese authorities had invested more thoughtfully in R&D activities (the technical problems should not have hindered UMM's market pervasiveness).

This landmark of the Portuguese auto industry reflects a bipolar culture: on the one side, a nationalist culture focused on the development of a national brand - with plenty of supporters, at the time - and, on the other hand, a pragmatist culture in which the project did not succeed due to the lack of strong technical competences. In fact, with Portugal's entry in the EEC and its free market approach, international competitors ended the "national brand" dream.

#### **4.7 The golden period of foreign investment (1987)**

After a long bitter period of in which large multinational firms ignored Portugal (due to the revolutionary period and the dismantling of international players) in 1987 foreign direct investment (FDI) began to occur.

Several investments took place. Ford Motor Co. Electronic Division, Continental, Delco-Remy (GM), Samsung, COFAP (Brazil), to PEPSICO (U.S.A.) are some examples of FDI that the Portuguese government managed to persuade with several types of subsidies. These projects, directly or indirectly, were related to the auto industry. Their approval and development paved the way for the Autoeuropa project, a joint-venture between Ford and Volkswagen (Féria, 1999).

## **4.8 Autoeuropa project (1989-2011)**

### **4.8.1 Public industrial policy**

In this phase, the auto industry policy was marked by the reopening of the market. The liberalization of the market took place in 1988, after a 25-year period of protectionism. With this new legal window, the importing of vehicles from the EEC, EFTA and other preferential countries (Yugoslavia, Cyprus, Malta and Lomé Convention countries) was liberalized. Furthermore, new restraints were created to import vehicles from other countries such as Japan, South Korea, U.S.A. and Brazil, despite total freedom for importing CKD vehicles from those countries (Felizardo et al., 2003).

The strong increase of foreign direct investment reflected State intervention – based on heavy investments in technological development and innovation – that attributed direct subsidies and conceded fiscal emoluments. At the heart of this industrial policy, PEDIP, PEDIP II and POE programs were created to grant incentives for the companies investing in developing their competences – technology, innovation, quality, training, management, marketing, among others.

In 1989 Portugal learned of Ford Motor Co. and Volkswagen's intention to establish a new joint manufacturing unit in Palmela, Setúbal (Féria, 1999). After a long period of negotiations, the investment and incentives contracts were signed in July of 1991; the launch of the Autoeuropa project took place (Felizardo et al., 2003).

The National Institute Supporting Small and Medium-sized Firms and Investment (IAPMEI) created a Cabinet (GAPIN) in order to stimulate and develop the supply potential of the auto components suppliers. The Autoeuropa project was used to diffuse joint-ventures opportunities among foreign and national firms and to promote the development of new competences and capabilities. It was also used to improve product quality in upstream activities throughout the supply chain (Féria, 1999).

In April of 1995, Autoeuropa was inaugurated. Four years later, the end of the joint-venture between Ford and Volkswagen was announced. Autoeuropa took Ford's position and continued production of Ford's multi-purpose vehicles (MPV) until the end of 2004. When the agreement with the Portuguese State finished, industrial incentives accounted for approximately 490 million euros. A new agreement was signed and the State committed to another 12 million Euros of incentives. Ford Galaxy's MPV ceased its production in February of 2006. Autoeuropa now produces the EOS and Scirocco (Felizardo et al., 2003).

The Center for Excellence and Automotive Industry Innovation (CEIIA) was created in 1999 in order to promote networking activities between all stakeholders of the auto industry (Felizardo et al., 2003).

### **4.8.2 Auto manufacturers strategic axes**

With the reopening of the market, the rationalization and conversion of assembly lines was intensified due to the limited market size and to the trade liberalization in EEC countries.

There were 10 assembly lines operating in Portugal 10. This figure decreased to 8, in 1994, and to 7 in 1997. Since 2002 until 2004 only five assemblers operated in Portugal:

Autoeuropa (Palmela), PSA Peugeot Citroën (Mangualde), Mitsubishi Spindle Trucks Europe, Opel Portugal (Tramagal) and Toyota Caetano Portugal (Ovar). As shown in table 6, those firms that operated under license agreements closed down their facilities and several multinational subsidiaries decided to assemble only commercial vehicles, less demanding from the technical point of view and with less economies of scale.

In what concerns to the closing of industrial units, the Renault factory, in Setubal, assumes special importance by its structural impact on the Portuguese auto industry, as seen above. The slow demand growth of international markets and the possibility to supply the market from other European factories (producing the Clio) forced Renault, from 1992, to slow down its output in Portugal, leading to a significant reduction of employees. In fact, Renault's strategic interests in Eastern European markets as well as its factory located in the Slovenia, discouraged RNUR to continue its involvement in the Setubal's factory. Social and economic difficulties led Renault to close down its manufacturing facility in Setubal in 1995 (Felizardo et al., 2003).

Manufacturing units	Closure date
Reicaab	1991
Soma	1992
Movauto	1993
Baptista Russo	1995
Movar	1995
Renault/Sodia	1998
Ford Lusitana	1999

Source: based on Felizardo et al. (2003)

Table 6. Factories that closed down: 1991-1999

The Autoeuropa project - with the aim to produce three brands: Ford Galaxy, VW Sharan and Seat Alhambra - came out as the new engine of the Portuguese auto industry, with a production capacity of 180,000 vehicles/year. This project attracted at once 22 new foreign units; eleven of them set up their facilities nearby Autoeuropa's industrial park, in order to be able to implement just-in-time methodologies (INTELI, 2003). The 225 million Euros of investment enabled the creation of 5,200 direct jobs and between 7,000 to 10,000 indirect jobs. According to Felizardo et al. (2003) the national incorporation reached the 45%.

The Autoeuropa's production reached its peak in 1998 - 138,890 units - and has been decreasing every year since. Table 7 presents some Autoeuropa's indicators for the year 2008.

#### 4.8.3 Strategic lines of auto components suppliers

The opening of the Portuguese economy, the accession to the EEC and the Autoeuropa's investment in Portugal brought about quantitative as well as qualitative changes to the

Indicators	2008
Number of units produced	93,609
Sales (Millions of Euros)	309.4
% Portuguese Exports	10%
% PIB	1%
Number of workers	3,028

Source: Volkswagen Autoeuropa (2008)

Table 7. Autoeuropa's indicators and its impact on the Portuguese economy

Portuguese auto components industry. Autoeuropa had an extremely important role in the consolidation of the car components industry as it represented a window of opportunities towards international markets to several Portuguese suppliers. The specialization pattern of the Portuguese industrial structure changed not only as a consequence of the investments of multinational firms, but also because the Portuguese auto industry had the opportunity to conquer new markets, though suffering the consequences of international competition.

According to Felizardo et al. (2003), the presence of Autoeuropa's project paved the way to a deeper involvement between the international fabric of Autoeuropa's network and the indigenous auto suppliers - in 2008, they were more than 60 -, leading them to competitive advantages that otherwise would not have acquired.

The levels technological demand imposed by Autoeuropa impelled a positive reaction from Portuguese suppliers, which was the result of consolidated knowledge acquired with the Renault experience. Throughout time the number of Q1 certification increased; today is a basic, fundamental pillar for competing in the market.

Autoeuropa, in the heart of its network of suppliers, created a lean production environment at several levels, managing to transfer technological, organizational, relational and managerial know-how to Portuguese suppliers. Moreover, the creation of joint-ventures between foreign firms and indigenous suppliers created conditions for some of them not only to supply components to Autoeuropa, but also to internalize know-how and technical support, which opened the possibility of exporting to new markets and to be integrated in international networks (Moreira, 2005).

Autoeuropa's investment dynamics generated a new wave of investments in Palmela, with positive impact on the auto industry as well as on the Portuguese economy.

As a consequence of Autoeuropa's investment in Portugal, between 1989 and 2001, the components industry evolved positively increasing its sales volume in 3,229 million Euros, representing a growth on exportations from 584 to 2,642 million Euros. As a consequence, the components industry started to play one of the main roles in the Portuguese economy, side by side with textile and the clothing industries. The components industry evolved towards an integrated and consolidated network of firms, involving indigenous and foreign firms supplying assemblers in Portugal as well as abroad (Felizardo et al., 2003).

The main products manufactured by the sector are the following ones: engine components, transmissions, brakes and electronic components (Felizardo et al., 2003). In the components sector there is a predominance of metal-mechanic firms, metal stamping firms, plastic components firms and electronics components firms. There was a strong investment in process innovation technologies as well as in the control and organizational integration, within and between firms, led by lean production Autoeuropa and other foreign firms (Felizardo et al., 2003).

In this phase, some components firms started investing abroad, though most of them kept their exporting policy. Indigenous countries realize they need to be close to international OEM's decision centers, supplying good quality products and improving constantly.

In 2002, the auto components sector was thriving. It managed to develop strong process technological competences, it was heavily export oriented and it was investing the development of new competitive areas – namely on research, development and engineering – in order to improve its international competitiveness (INTELI, 2003). However, the auto components industry still needs more investments in research capabilities, new product development and design competences as well as on human resources to be competitive in the global arena.

## 5. Analysis

The origin of the auto industry in Portugal was characterized by a strong importing of foreign components and units and by the lack of foreign direct investment. Although importing activities involve contact with international markets, this first phase is not explained by any internationalization theory analyzed above. Although several innovation activities took place, based on passionate entrepreneurs, a sectoral systemic perspective is totally absent, as the auto industry is totally dependent on foreign companies.

In the 1950s, Portugal lived in economic isolation with a strong industrial protectionism. The imposition of importing quotas attracted foreign investments and imposed the diffusion of the industry at national level. This second phase is marked by the development of the national industry based on an imports substitution policy deployed to promote production activities in Portugal. As a consequence, foreign companies establish their activities in order to expand their market share. Faced with their potential of growth, those firms internalize the Portuguese market based on ownership and location advantages they possess *vis-à-vis* indigenous competitors. It is possible to apply the internalization theory and the eclectic paradigm to explain why foreign firm took a foothold in Portugal. In terms of innovation, dirigiste strategies are followed based on strong policy regulations as Portugal lacks technological infrastructures.

The “Protected Market phase” is marked by strong imports substitution policies. Auto manufacturers were governed by a specific and restricted program of national incorporation. As a consequence, there is a proliferation of assembly units, based on foreign direct investments and on licensing contracts. Auto components firms were not involved on this legal framework. The stream of investments in this phase can be explained by ownership and location advantages of the eclectic paradigm (based on an inward

perspective, as indigenous firms were not yet internationalized). The assumptions of Uppsala's evolutionary theory are not explicit in this phase. As in the previous phase, Portugal is still a very closed country in economic terms. Despite all efforts of national authorities to attract investment and to underpin its indigenous supply base, Portugal still follows a dirigiste perspective. All foreign investments so far attracted only account for a very narrow innovation system perspective.

In the 1980s, the auto industry began its consolidation. By that time, the sectoral policy was marked by exports promotion, with incentives to foreign firms to invest in Portugal, based on quality of human resources, labor comparative advantages and geographical location. Multinational firms operating in Portugal underpinned their exports strategy on their relationships with corporate centers. Accordingly, the network approach could be used to explain, in part, the internationalization of the auto industry. The "Renault Project" had a pervasive influence in the whole value chain, influencing auto components suppliers in their first contacts with a more global perspective of the auto industry. The Portuguese auto industry managed to gain credibility; its industrial fabric was recognized by its production process competence and by its comparative labor advantage. The Renault project underpinned the development of a narrow (sectoral) innovation system based on the relationship throughout the value chain.

Renault's project is very important as it created the condition for a technologically embedded innovation networked system as it worked as a gravitational center for the technological development of the components center. Despite all structural efforts, industrial authorities still follow a dirigiste perspective.

This phase was followed by the "Golden Period of Foreign Direct Investment" - based on heavy direct foreign investments - that paved the way for an unprecedented economic growth in the auto industry as well as in the components industry. The underlying theories explaining the international behavior of foreign firms are the internalization theory, the eclectic paradigm and the network approach.

Finally, the sixth phase was marked by the reopening of the market followed by a complete liberalization. The industrial policy was based on attracting foreign direct investment and in the development of technological and innovation competences. In this period is signed the joint-venture between Ford and Volkswagen - Autoeuropa - and other joint-ventures between foreign and national firms. Autoeuropa's project allowed indigenous suppliers to have broader, international horizons and to network with new players in new international markets. The eclectic paradigm and the internalization theories are the most interesting theories to explain the foreign firms' internationalization. On the other hand, the network theory gains support, due to the internationalization of the auto industry base of suppliers.

Autoeuropa's project complemented Renault's in such a way that - and taking into account all foreign investments - the components industry managed to be involved on a regional networked innovation system, based on Autoeuropa's supply chain. Portuguese authorities have heavily invested on institutions that are able to supply strong technological demands at international level.

Table 8 synthesizes the findings throughout the different phases.

	International performance	Main theories of internationalization	Home country specific factors for foreign firms	Industry-specific factors influencing operations and market behavior	Impact on indigenous firms	Innovation System perspective
<b>Phase 1</b> <b>The special EDFOR case (1937-1952)</b>	<ul style="list-style-type: none"> <li>Essentially domestic</li> <li>Inward oriented</li> </ul>	<ul style="list-style-type: none"> <li>Imports substitution and the eclectic paradigm with an inward focus</li> <li>Internalization theory</li> </ul>	<ul style="list-style-type: none"> <li>Size of domestic market</li> <li>Low development of domestic market</li> <li>Role of government</li> </ul>	<ul style="list-style-type: none"> <li>Lack of technological development</li> <li>The beginning of product/industry cycle</li> <li>Weak supplier base</li> </ul>	<ul style="list-style-type: none"> <li>“Follow the herd” reaction</li> <li>No network externalities</li> <li>Opportunistic strategies</li> </ul>	<ul style="list-style-type: none"> <li>No innovation system</li> <li>Portugal as a grassroots country</li> </ul>
<b>Phase 2</b> <b>Automotive Assembly Lines (1950s to 1960s)</b>	<ul style="list-style-type: none"> <li>Essentially domestic</li> <li>Inward oriented</li> </ul>	<ul style="list-style-type: none"> <li>Imports substitution and the eclectic paradigm with an inward focus</li> <li>Internalization theory</li> </ul>	<ul style="list-style-type: none"> <li>Role of government</li> <li>“Follow the herd” reaction</li> <li>Foothold on domestic markets</li> <li>Opportunistic strategies</li> </ul>	<ul style="list-style-type: none"> <li>Lack of technological development</li> <li>Product/industry cycle in its infancy</li> <li>Search for first mover advantage</li> <li>Foreign firms as an opportunity</li> <li>Weak supplier base</li> <li>Imports seen as a threat</li> </ul>	<ul style="list-style-type: none"> <li>“Follow the herd” reaction</li> <li>No network externalities</li> <li>Learning phase</li> </ul>	<ul style="list-style-type: none"> <li>No innovation system</li> <li>Portugal as dirigiste region</li> </ul>
<b>Phase 3</b> <b>Protected Market (1961-1974/76)</b>	<ul style="list-style-type: none"> <li>Essentially domestic</li> <li>Inward oriented</li> </ul>	<ul style="list-style-type: none"> <li>Imports substitution and the eclectic paradigm with an inward focus</li> <li>Internalization theory</li> </ul>	<ul style="list-style-type: none"> <li>Booming of assemblers activities</li> <li>Adapting product to local markets</li> <li>No involvement in upstream activities in the supply chain</li> </ul>	<ul style="list-style-type: none"> <li>Increasing product technological development</li> <li>Product/industry cycle in its infancy</li> <li>Inefficient indigenous suppliers</li> <li>Foreign firms as an opportunity</li> </ul>	<ul style="list-style-type: none"> <li>Search for first mover advantage</li> <li>Some network externalities</li> <li>Size of domestic market</li> <li>Learning phase</li> </ul>	<ul style="list-style-type: none"> <li>No innovation system</li> <li>Portugal as dirigiste region</li> <li>Narrow system of innovation</li> </ul>
<b>Phase 4</b> <b>The Renault Project (1977-1986/88)</b>	<ul style="list-style-type: none"> <li>Winds of change</li> <li>Inward and outward oriented</li> <li>The beginning of internationalization</li> </ul>	<ul style="list-style-type: none"> <li>Exports promotion and the eclectic paradigm with an inward focus</li> <li>Network approach</li> </ul>	<ul style="list-style-type: none"> <li>Restructuring perspectives for assemblers</li> <li>Adapting product to local and international markets</li> <li>Increasing relationships suppliers in upstream activities in the supply chain</li> <li>Auto components industry increases in importance</li> </ul>	<ul style="list-style-type: none"> <li>Product/industry cycle in its growing stage</li> <li>Growing market</li> <li>Portugal as exporting platform</li> <li>Strong comparative labor advantages</li> <li>Good product quality</li> </ul>	<ul style="list-style-type: none"> <li>Strong production process technological development</li> <li>Qualification of human resources</li> <li>Good product quality</li> <li>Strong technology and organizational learning</li> <li>Good network externalities</li> </ul>	<ul style="list-style-type: none"> <li>Territorially embedded regional innovation networks</li> <li>Portugal as dirigiste region</li> </ul>

Table 8. Continued

	International performance	Main theories of internationalization	Home country specific factors for foreign firms	Industry-specific factors influencing operations and market behavior	Impact on indigenous firms	Innovation System perspective
<b>Phase 5 The Golden Period of Foreign Investment (1987)</b>	<ul style="list-style-type: none"> <li>• Inward and outward oriented</li> <li>• Changing period</li> </ul>	<ul style="list-style-type: none"> <li>• Eclectic paradigm with an inward focus</li> <li>• Network approach</li> </ul>	<ul style="list-style-type: none"> <li>• Deep restructuring of auto and components industry</li> <li>• International market perspective</li> <li>• Integrative perspective of auto and components industry</li> </ul>	<ul style="list-style-type: none"> <li>• Economic opening phase</li> <li>• Growing (European) market</li> <li>• Portugal as exporting platform</li> </ul>	<ul style="list-style-type: none"> <li>• Outward perspective</li> <li>• Good product quality</li> <li>• Strong technology and absorptive capacity</li> <li>• Good network externalities</li> </ul>	
<b>Phase 6 Autoeuropa Project (1989-2011)</b>	<ul style="list-style-type: none"> <li>• Outward oriented</li> <li>• Outward seeking internationalization</li> </ul>	<ul style="list-style-type: none"> <li>• Network approach</li> </ul>	<ul style="list-style-type: none"> <li>• Auto and components industry immersed on a global perspective</li> <li>• Product focus on international markets</li> <li>• Holistic perspective of the value chain</li> </ul>	<ul style="list-style-type: none"> <li>• European industry perspective</li> <li>• Growing market</li> <li>• Portugal as exporting platform</li> <li>• Strong comparative labor advantages</li> <li>• Good product quality</li> </ul>	<ul style="list-style-type: none"> <li>• Strong product and process technological development</li> <li>• Qualification of human resources</li> <li>• Good product quality</li> <li>• Strong absorptive capacity</li> <li>• Strong network externalities</li> </ul>	<ul style="list-style-type: none"> <li>• Portugal in search of a networked region</li> <li>• Regional networked innovation system</li> </ul>

Table 8. Synthesis of internationalization and systemic perspective

## 6. Conclusions and limitations

As mentioned in the introduction, the main objective of this chapter was to analyze how the main theories of internationalization are related to the milestones of the automotive innovation system as well as, the factors that led to the internationalization of the auto industry.

There are eight phases that influenced the internationalization of the Portuguese auto industry. It is clear that the inward perspective of the automobile industry paved the way for the outward perspective of the components industry. From a closed economy with weak endogenous (technological, managerial, strategic and operational) capabilities, Portugal managed to evolve throughout time to a competitive position in the international auto industry arena.

Departing from an absent innovation systemic perspective, Portugal faced the difficulty of creating endogenous technological conditions in ill endowed industries. As described in the previous sections, foreign direct investments underpinned the transfer of technological competences to the Portuguese auto industry as well as the components industry. It was not an easy task as it involved the development of strong absorptive capabilities of indigenous firms.

The path towards more international perspective also needs a strong involvement in the creation of a dynamic innovation system that underpins the efficiency of all the players of the system.

Although Portugal is still strongly dependent on Autoeuropa's factory, and international comparisons could dictate Portugal is still lagging behind their European competitors - with stronger resources and capabilities in the auto industry -, it is possible to conclude that the internationalization of the economy/industry plays a role in the development of the innovation system. This can be explained by the networking activities most players have with international, more demanding players, which fosters the development of competitive advantages based on strong absorptive capabilities.

The main limitation of this research is that it was based on a single country and followed a historical perspective. Future research should address, thus, the relationship between the country's degree of openness and the degree of its innovatory capacity.

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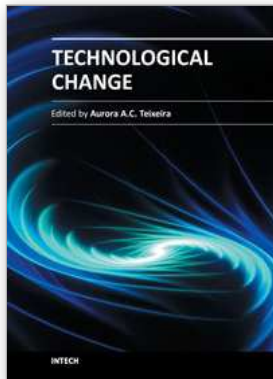
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Technological change is today central to the theory of economic growth. It is recognised as an important driver of productivity growth and the emergence of new products from which consumers derive welfare. It depends not only on the work of scientists and engineers, but also on a wider range of economic and societal factors, including institutions such as intellectual property rights and corporate governance, the operation of markets, a range of governmental policies (science and technology policy, innovation policy, macroeconomic policy, competition policy, etc.), historical specificities, etc. Given that technology is explicitly taken up in the strategies and policies of governments and firms, and new actors both in the national and international arenas become involved, understanding the nature and dynamics of technology is on demand. I anticipate that this book will decisively contribute in this regard.

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