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# Community Responsible Innovation in Portugal: Building the Country's Competitive Advantages

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The history of industry in Portugal is tangled. In the early 1990s, the government was letting non-viable, uncompetitive companies collapse while targeting those bolstered by European funds for their “success stories.” One of the findings of a study on Portugal's competitive advantages emphasized the importance of the country's traditional industries for the development of new technologies and industrial sectors. This article is a historical account of community innovation in Portugal during the 1990s. It analyses two illustrative case studies: the Portuguese automobile cluster and the AutoEuropa development in Setúbal; and the Portuguese science and technology sector exemplified by the Taguspark – a science and technology park in Oeiras near Lisbon. It is argued that Portuguese industry had to develop strong links and establish viable R&D relationships with science and technology institutions in order to help strengthen the country's competitive advantages in an increasingly globalized economy.

Regional planning; industrial development; cluster development; automobile sector; science and technology.

The history of industry in Portugal has evolved over more than a century to the point where contradictory processes of high-tech innovation co-exist with processes of decline and de-industrialization.<sup>1</sup> This is a complex socio-economic and public policy entanglement, which was already taking place in the 1990s. In fact, at the beginning of the last decade of the twentieth century, the government was letting non-viable, uncompetitive companies collapse while targeting those bolstered by European funds for their “success stories.” One of the findings of a study on Portugal's competitive advantages commissioned for forty Portuguese companies and institutes by Michael Porter emphasized that “Portugal need[ed] its traditional industries for new technologies and industrial sectors”.<sup>2</sup> In different words, economically, Portugal's older urban-industrial regions were suffering from the decline of the heavy industries that had occurred since the 1960s, while industrial growth had been strongest in small

firms specializing in semi-skilled labour-intensive industries, producing for highly competitive European and US markets.<sup>3</sup> Reliance on exporting such a narrow band of manufactured goods was contributing to making the industrial export sector highly dependent on a variety of market factors. Rising labour costs within Portugal were also eroding the country's traditional comparative advantage in low skilled labour costs, while membership in the European Community (EC) presented the possibility of import penetration of domestic markets, which had until then enjoyed a strong level of protection.<sup>4</sup>

Portugal has a long history of pioneering the application of science and technology to commercial endeavours starting in the 15th century when Prince Henry the Navigator created what would become later known as the Sagres School of the Discoveries.<sup>5</sup> Leading astronomers, shipbuilders, and cartographers were challenged to make scientific breakthroughs that laid the technological foundation for the European Age of Discoveries.<sup>6</sup> The situation was rather different in the early 1990s. Industry, protected from competition and dependent on captive colonial markets for most of the twentieth century, had made little effort to move beyond unsophisticated, low-cost products. Scientists, relatively unchallenged by businesses, turned to academic research or worked for foreign companies with a higher capacity to apply their findings.<sup>7</sup>

The purpose of this article is to review the business plan for Portuguese industry made by TCM, under the supervision of Harvard University's professor Michael Porter: *The Building of Competitive Advantage of Portugal*.<sup>8</sup> It is argued that Portuguese industry had to develop strong links and establish viable R&D relationships with science and technology institutions in order to help strengthen the country's competitive advantages in an increasingly global economy (Figure 1).<sup>9</sup> On the one hand this positionality required audacious industrial R&D policies and simultaneously a regional planning approach aimed at fostering and sustaining community innovation;<sup>10</sup> while on the other it posited the elimination, or reduction, of the territorial imbalances between the sprawling metropolitan areas and littoral region and

the depopulating interior part of the country.<sup>11</sup> Recently, it has been recognized that Porter's "development model attracted high attention and had positive repercussion in academic and business circles, while some of the objectives were achieved, albeit at a slower pace than it would have been desirable."<sup>12</sup>

>Insert Figure 1 around here<

The article is in six parts. Part One provides a conceptual framework for the history of industrial districts and community competitiveness based on industrial development, while also introducing the article's materials and approach. Part Two is an overview of economic development in Portugal during the 1990s. Part Three is an analysis of the business plan for industry "*Construir as Vantagens Competitivas de Portugal*." Part Four is an analysis of the Portuguese automobile cluster illustrated by the AutoEuropa case study. Part Five is an analysis of Portuguese science and technology public policy illustrated by the Taguspark case study. And finally, part Six makes some concluding remarks on the results of the diamond and clusters approach to the Portuguese economic competitiveness and the country's regional development.

### **Conceptual Framework, Materials, and Approach**

The policy of fostering industrial districts led to the development of interconnected conglomerates of specialized industry in privileged locations, initially near raw materials, then navigable water bodies, later railways and highways, and more recently near universities and leading-edge research-oriented institutions.<sup>13</sup> The presence of endogenous resources and the capacity to stimulate and attract exogenous developmental factors have been pointed out as responsible for giving places and countries a competitive advantage in creating more valuable products and exporting them to other destinations.<sup>14</sup>

If the reasons for such a competitive edge become apparent with an initial scrutiny, over the years researchers, policy analysts, decision makers, and investors have all searched long and hard for effective models capable of creating lasting benefits for their entrepreneurial endeavours. Even after identifying suitable and time-tested models and theories, implementation has traditionally required risk-taking, a proactive vision, funding, and committed partnership arrangements in order to help materialize a set vision, create quality jobs, and turn investments into revenue generating enterprises.

Michael Porter's thesis was that while "high-intensity domestic competition breeds international success" there are key elements of domestic competitive conditions expressed in a diamond-shaped chart that must all be fostered if success is to be sustained; and those categories are: "company strategies, structure and rivalry; factor conditions; demand conditions; and related and supporting industries."<sup>15</sup> The Porter diamond and clusters model was contextualized mostly within a national perspective. Other competitiveness models have been proposed and adopted at sub-national scales, including Johnson's which relies on the notion of "enhanced community competitiveness" by specifying six types of "community capital" assets: polity, physical, financial, human, cultural, and social.<sup>16</sup> In Johnson's model, a healthy competitive community results from the joint actions of government officials, for-profit and non-profit civic entrepreneurs working together for job creation, community development, and poverty alleviation goals. This Civic Entrepreneurship model was devised to be applied mostly to U.S. cities.

Other authors have taken Porter's global competitive advantage of nations model and studied the competitiveness of a sample of countries in different stages of development.<sup>17</sup> They discovered that "beyond the institutions, infrastructure and regulation of the markets, higher education and training, the technological readiness, the business sophistication and innovation contribute greatly to explain the competitive advantage of economies." Since innovation plays such an important role in sustaining competitiveness, it is opportune to understand how learning is connected to the promotion of endogenous

regional development, the scale in-between the national and the local. In the Portuguese context, it was argued that “sustainable regional strength is built on a continuously upgraded knowledge base, rather than on general factor endowment.”<sup>18</sup> And that “by stimulating localized learning, the regional innovation systems have an important role to play and offer possibilities of producing regional competitive advantage.”<sup>19</sup>

These observations were made over an almost two-decade history of research on industrial innovations, which saw in “High-Tech Fantasies: Science parks in society, science and space”<sup>20</sup> and “Technopoles of the world: The making of 21st century industrial complexes”<sup>21</sup> some of the first treatises on how industrial complexes were gaining renewed prominence in the form of science parks, and even completely new towns centred on privileged relationships between institutions of higher education and leading-edge technology firms aimed at creating more competitive territories.

More from a from a science and technology perspective, a competitiveness model, called the Triple Helix of university-industry-government relations, was conceptualized in 1996.<sup>22</sup> This model places emphasis on the communicative relationships between the three “helices” in order to endogenize new knowledge to the advantage of society. To a certain extent, it is driven more than the others identified above by institutions of higher education via their entrepreneurial spin-off activities, increasingly in science and technology research parks.

In order to assess the Porterian model, the paper reviews two case studies implemented in Portugal during the 1990s: the AutoEuropa development, a minivan plant for Ford-Volkswagen, and the Taguspark, a science and technology park located in Oeiras near Lisbon. The selection was based on the author’s knowledge of these two priority areas and the possibility of making a contribution to knowledge in terms of understanding how innovation percolated within one economic cluster, while helping to bolster Lisbon’s territorial advantages by giving emphasis to the relationship between innovation and higher

education in a brand-new science and technology park. The central question pertaining to the AutoEuropa case study is based on the trickle-down approach applied to industrial development: To what extent do highly sponsored transnational subsidiaries in peripheral regions establish important relationships with local and regional producers in order to leverage significant territorial dynamics? The question guiding the Taguspark case study focus more on the role of science and technology: Can a science and technology park influence positively its regional innovation ecosystem in the long run?

It is important to keep in mind that this is a planning history article and not necessarily an evaluative assessment of territorial impacts at the regional and country level. Above all, the use of these case studies aims to illustrate innovative public policy interventions applied to changing industrial realities at the turn of the millennium. Although two decades have elapsed and we now have a degree of historical perspective on the industrial policies developed in Portugal in the 1980s and 1990s, one ought to be cognizant of the many changes that have occurred in the country, and in the world for that matter, since then. These have ranged from changes in governmental orientations due to different political ideologies, to the degree of openness of territorial borders, the integration of regional markets due to for instance the consolidation of the European single market, and a pro-environment mindset connected to climate change concerns.<sup>23</sup> The next section explains how the Portuguese economy evolved in the post-war period, initially as a direct consequence of its inward orientation towards its African colonies and later as a result of its adhesion to the European Economic Community (EEC) in 1986.

### **Portuguese Economic Development - the Evolution Towards Innovation**

One of the most striking features of change in Portugal at the end of the 20th century was the country's increased integration into the world capitalist system.<sup>24</sup> Generally, the development of Portuguese industrialization within the global economy could be characterized in terms of a transition from low-wage

industrial export economy (*primitive Taylorization*) towards increased import-substitution production (*peripheral Fordism*); however, in reality, economic development in Portugal was considerably more complex than a simple characterization of processes.<sup>25</sup> As had occurred elsewhere in southern Europe, the Portuguese economy was becoming ever more interconnected with the world economy, through the progressive specialization of productive structures. Although there had been limited specialization in agricultural products, notably wine and some horticultural products, overall, the agricultural sector was characterized by a lack of development, which meant that in the early 1990s, Portugal was importing around fifty percent of its food requirements.<sup>26</sup>

Given the multiple and convoluted democratic arrangements in the period immediately after the political revolution of 1974, it is easy to realize how advanced manufacturing had little time to develop in Portugal. The main cause for this situation was the fact that for almost half a century, the country was governed by a dictatorship regime led by António Salazar with a strong autarchic economic-orientation focused almost exclusively on internal and protected markets.<sup>27</sup> António Salazar, inspired by a neo-Ruskinian view of rural society and traditional values, did what he could to preserve traditional agricultural values, and this political orientation extended through the mid-1970s.<sup>28</sup> In fact, not until the late 1950s did industry get much encouragement, and it was that of a protected, import-substituted sort. The industrial output then increased at more than 14% a year for most of the 1960s from a minuscule base. After 1974, vast swathes of the economy were nationalized, including virtually all the financial institutions, steel, shipbuilding, chemicals, and even beer production (Figure 2).<sup>29</sup>

>Insert Figure 2 around here<

A significant aspect of industrial development in Portugal during the 1970s and 1980s was the growth of small firm industrialization, sometimes organized in the form of flexible production systems. In terms



of size, the Portuguese economy was characterized by the dominant role of small firms (up to 50 employees) and very small firms (less than 5 employees), which accounted for 95% of all enterprises.<sup>30</sup> Small firm industrialization experienced economic growth through the restructuring of existing industrial areas and through new industrialization in formerly less developed, often semi-rural, industrial regions.<sup>31</sup>

It has been claimed that the emerging economic geography of Portugal was marked by a north-south divide, which tended to create almost two distinct countries,<sup>32</sup> with the northern part (the area from Aveiro to Braga) holding around three-quarters of Portugal's industrial firms, three-fifths of its exports and most of its private sector.<sup>33</sup> This regional cluster was the centre of the textile and shoe industries, which accounted for two-fifths of the country's exports, ceramics and wine. External developments in international markets, particularly in tourism, but also in financial industries since the 1960s, has also stimulated the expansion of service sector employment.<sup>34</sup>

The agricultural sector was central to processes of restructuring in the Portuguese economy. It was a sector, which was poorly developed and critically interrelated to processes of migration and industrialization. As the poorest member state of the EC, with severe economic problems,<sup>35</sup> when it joined in 1986, Portugal found itself as the recipient of massive amounts of EC aid. Between 1986 and 1990, Portugal received 2.9 billion European Currency Unit (ECU), representing 1.6% of its Gross Domestic Product (GDP), in structural funds alone. The EC agreed to a doubling of its total economic aid to Portugal to 18 billion ECU 1994–1999, which meant that Portugal would receive about \$10 million a day until the year 2000. The total amount of funds had a dramatic impact on the country's infrastructure<sup>36</sup> – irrigation systems, highways, and airports, for instance – on training and living standards.<sup>37</sup>

GDP per capita grew from 51.4% of the EC average in 1985 to 64.5% at the end of 1993. Portugal nearly caught up with the rest of Europe at a rate of 0.88% a year above the average European growth rate since it joined the EC – this represented the strongest era of growth in Portugal's modern history. However,

it was estimated that at its rate of growth, Portugal would take yet another 40 years to reach the average economic strength of other EC members.<sup>38</sup> The hopes raised in Portugal in the mid-1980s that the country would be enjoying living standards comparable to those of most other Europeans by the year 2000 were considered unrealistic.

Despite all the EC economic aid, Portugal's backward agricultural sector, which employed 12% of the labour force, had proved unable to compete successfully within the Single European Market. Reduced earnings had left the majority of farmworkers living at subsistence level on incomes, for instance, only a third as big as those of their Spanish neighbours.<sup>39</sup> Industry was also suffering the effects of increasing competition. Traditional sectors such as textiles, which accounted for 30% of exports, footwear, ceramics, and metallurgy were under a radical restructuring process involving widespread closures and dismissals. The mid-1990s revealed a shift from heavy manufacturing and agriculture to light manufacturing and services.<sup>40</sup> However, services were still poorly organized, and facilities were often rudimentary.<sup>41</sup>

According to the then minister of industry and energy, Mira Amaral, Portuguese industry was facing two main problems: Firstly, the older generation of industries such as shipbuilding, steel, fertilizers, textiles, and clothing were open to competition from non-community countries; and secondly, the Single European Market had further opened up what had been a fairly protected sector. It was recognized that the government was letting non-viable, uncompetitive companies die while saving those that were being considerably bolstered by EC funds to demonstrate its own "success stories."<sup>42</sup>

The Portuguese government policy for meeting the industrial challenges was based on four premises: (i) using EC funds to support viable, modern companies in all sectors, including the traditional industries, (ii) deriving the maximum industrial benefit possible from Portugal's natural resources (forestry and mining), (iii) making a special effort to modernize and develop the electro-mechanical industries including vehicles, components, transport materials and non-electrical machinery, and (iv) encouraging foreign

investment.<sup>43</sup>

Portugal benefited economically from its ascension to the European Economic Community (EEC),<sup>44</sup> with an inflation of only 4.5% in 1995, falling from 11.5% in 1991. The budget deficit had shrunk to 5.9% of GDP in 1994, and unemployment stood at around 7%.<sup>45</sup> The 1998 World Exposition EXPO'98 was perceived as instrumental in attracting more foreign investment.<sup>46</sup> The selected theme, "The Oceans," was critical to attracting the support and participation of many countries. The number of visitors to the EXPO'98 was projected at 9 million, and the exposition site along the Tagus River was expected to create not only a permanent fair and educational centre but also to bolster residential and business development (Figure 3).<sup>47</sup> After this general overview of how the country's economic development evolved, the next section introduces the initiative aimed at building Portugal's competitive advantages known as "*Construir as Vantagens Competitivas de Portugal*."

>Insert Figure 3 around here<

### **The Competitive Advantages of Portugal**

One of the findings of the study on Portugal's competitive advantages commissioned by forty Portuguese companies and institutes to TCM and Michael Porter emphasized that "Portugal need[ed] its traditional industries for new technologies and industrial sectors."<sup>48</sup> "*Construir as Vantagens Competitivas de Portugal*," a twelve-month study paid by the Portuguese private sector with the objective of contributing to the development of the Portuguese competitiveness, was in two parts: (i) the analysis of the competitiveness, looking for the context in which the Portuguese firms operated, and (ii) the definition of eleven initiatives for action. Based on the results of a large number of interviews, the consulting firm identified a sevenfold general consensus as being that Portugal: (i) had to identify its strategic industries

and to orient the resources to where they were most necessary, (ii) needed to develop high-technology industries (e.g., robotics, computers, biotechnology), (iii) the Portuguese industrial base was dependent on a narrow group of industries, such as agriculture and traditional products, mainly textiles and footwear, (iv) Portugal needed big firms that could be engines of growth in the Portuguese economy, (v) the Portuguese entrepreneurs had weak basic capabilities, mainly in marketing, (vi) Portugal needed to solve its infrastructure problems, and finally (vii) Portugal needed a stronger government commitment.<sup>49</sup>

Furthermore, the study also stated that Portugal needed to challenge traditional knowledge in order to build a new paradigm for stimulating the country's competitiveness.<sup>50</sup> It was stated that Portugal could not compete in the same ways that were successful during the twentieth century. Moreover, Portugal needed to find a new paradigm based on the necessity to identify and develop what was unique to Portugal instead of mimicking other countries' strategies.<sup>51</sup> The foreign advisers considered ways of competing in the 21st century based on optimized management of the country's human resources as an alternative to the inadequate classic theories that advocated solutions with high-technology or macroeconomics policies.<sup>52</sup> It was understood then that productivity did not depend so much on the type of industries that the country was competing in but more on how the firms in those industries attempted to compete.<sup>53</sup>

Based on the Portuguese performance on the external commerce, it was suggested that Portugal needed to focus on a handful of clusters and one service sector: material and metals, forest products, petroleum and chemicals, transportation, food and beverages, housing and household goods, textiles, and the service being tourism.<sup>54</sup> These sectors already accounted for almost 90% of exports and represented important strengths on which Portugal could build upon. The lead consultant of the study argued that the government's role was not a fifth independent determinant, but was important in influencing the country's competitiveness – enhancing the character of the first four determinants, in particular through education and training, capital market regulation, and through its status as a major buyer.<sup>55</sup> After analysing

Portuguese public policies, the study concluded that it was a long journey to get Portugal away from the *laissez-faire* extremes and to place it in the European Union.<sup>56</sup> The principle on which the new paradigm for action was conceptualized required that only a limited number of initiatives be chosen for further action.

“*Construir as Vantagens Competitivas de Portugal*” culminated with eleven initiatives for action – six in these economic clusters: Automotive, footwear, textile, tourism, wine and wood products, and four public policies initiatives: Education, management capacities, financing and science, and technology. This article analyses only the automobile cluster and the public policy on science and technology policy initiative. This is done with the help of two case studies: the AutoEuropa development, a minivan plant for Ford-Volkswagen, and the Taguspark, a science and technology park located in Oeiras near Lisbon.

### **The Automobile Cluster**

The diagnosis of the Portuguese automotive cluster conducted for the study “*Construir as Vantagens Competitivas de Portugal*” revealed that the country needed to resolve a number of specific weaknesses if it wanted to increase its future competitiveness:

(i) *Resolve its demand conditions which had been historically weak and overcome the access to the vehicle constructors*, mainly by demanding a national value-added to be imposed on the constructors in Portugal. Later, agreements on import compensation forced the foreign vehicles constructors to buy Portuguese parts to sell their vehicles in the Portuguese market. This would let local constructors frequently help the suppliers increase their performance in price and quality by providing them with technical programs. However, limited knowledge in terms of design and a certain lack of integrated services proved to have a negative impact on the number of contracts with suppliers.<sup>57</sup>

(ii) *Insufficient cooperation between firms* – the small dimension of the Portuguese parts firms was a

result of past protectionism. This was another weakness that limited the capacity of firms to fulfil minimum orders, to develop marketing at an international level, or to have access to raw materials of quality. The independent attitude of the Portuguese managers or their internal rivalry were other factors commonly used to justify the absence of cooperation between firms.<sup>58</sup>

(iii) *Low productivity* – the low wages, inferior to the European average more than repaid the inferior productivity. However, the rapid growth of the Portuguese salaries and the demand for cheap parts outside occidental Europe, in countries with even lower wages, was threatening to eliminate what until the mid-1990s was the main competitive element of the Portuguese industry.<sup>59</sup>

(iv) *Difficulties to offer complete service* – The dependency on selling products with specific details from buyers resulted in a sub-development in design knowledge. To illustrate this situation, almost half of the Portuguese parts firms were dependent on their clients in technical specifications and product conception.<sup>60</sup> In the auto-parts cluster, the unfavourable firm's strategy, structure and rivalry, and the weak demand conditions led to a weak competitive situation. In offering low price products, the firms did not promote innovation or the development of infrastructure and knowledge skills, which could help them. In the same way, the existing production model in Portugal limited the development of the design capacities and the implementation of laboratorial facilities. Furthermore, the lack of vital knowledge and infrastructure limited the capacity of firms to abandon strategies based on costs and to adopt more sophisticated strategies.

Finally, the study of the main characteristics of the international automotive cluster and their relation to the Portuguese automotive cluster showed that sophistication and cooperation were the most important dimensions responsible for the low competitiveness in the early 1990s. All this enabled the study's authors to conclude that Portugal needed cooperation to serve sophistication and that two particular initiatives for action had to be carried out: Firstly, mutual communication and learning between clients and suppliers,

with the promotion of supplier clubs; and secondly, the sharing of information and services to all members of the cluster, with the creation of databases and infrastructure to help the suppliers and the development of financing mechanisms.<sup>61</sup>

### **The AutoEuropa Initiative**

The district of Setúbal south of Lisbon is an area that has been transformed by foreign investment (Figure 4).<sup>62</sup> This is where the Ford-Volkswagen minivan (Ford Galaxy) plant was constructed within a cluster of other big foreign projects. The plant was launched in April 1995, and at the time, it was the biggest foreign investment ever made in Portugal (\$2.8 billion). This development project was estimated to account for more than 15% of Portuguese exports and 4% of GDP. It was intended to create 4,500 direct jobs and an additional 1,500 at the firm's suppliers.<sup>63</sup> The AutoEuropa received more than \$800 million in development funds (adding up to around 30% of the cost) from the European Community and the Portuguese state because the factory was to locate in an economically depressed area. By contrast, only about \$400 million was divided among Portuguese companies in traditional sectors.<sup>64</sup>

>Insert Figure 4 around here<

Although the study on the competitive advantages of Portugal suggested that Portugal needed to pursue niche markets in basic industries' clusters; according to various Portuguese leading economists, going back to basic industries presented a predicament. Already new competition from abroad, including Eastern Europe, Southeast Asia, and Latin America, had forced most of Portugal's traditional industries to restructure their production processes and supply networks. Steel, textile, and footwear producers were already cutting costs and idling thousands of workers. Unemployment had climbed to 7.4% in the first

quarter of 1995 from 4.2% at the end of 1992.<sup>65</sup> Therefore, almost any foreign investor promising jobs was eagerly courted, and government officials touted AutoEuropa as the way forward.<sup>66</sup> Although the jobless rate in Setúbal was higher than in the rest of the country – shipbuilding, steel, and heavy chemical industries had been closing down – the workers over 45 years of age were made redundant finding themselves unemployable by the new industries that were springing up around them.<sup>67</sup>

According to the Minister for Trade and Tourism, “AutoEuropa [was] a structural investment because it [would] contribute to the strength of the auto cluster in Portugal, and it [would] totally change the car industry, not only because of its size but because of its impact on the parts industry.”<sup>68</sup> While 4,500 workers may seem a high number to build 180,000 vehicles a year, the trade-off was lower automation, which meant lower investment and less complexity.<sup>69</sup> Because of the three new elements – a green workforce, a totally new product, and a greenfield factory – AutoEuropa was to utilize only proven technology; there was no place for experiments. In building this lean-production factory, both partners were to bring lessons they had learned from throughout the world. AutoEuropa’s benchmark was a Ford’s Hermosillo plant in Mexico, which built Ford Escorts and Mercury Tracers for the North American market.<sup>70</sup>

The subsidized AutoEuropa plant expected the European minivan market to grow to 500,000 units by the year 2000, and it hoped to control more than 30% of the segment. However, there was a school of thought that the minivan market was not going to grow as projected.<sup>71</sup> The doubt then was whether the country was devoting too much hope to only one project and whether it needed to subsidize it or not? Critics contended that Portugal needed to build on traditional strengths such as pulp, paper, textiles, and tourism. In the past, some big foreign investments, such as a Renault SA factory in the Setúbal region, had not succeeded as expected. Although foreign investment, particularly in the car industry,<sup>72</sup> could help build up local suppliers and train workers, in the long run, these companies were proved to be extremely



mobile, closing down plants and relocating when the host countries lost their competitive edge.<sup>73</sup>

When Portugal entered the European Union in 1986, it was one of the “hottest bets” in Europe for expanding multinationals. It was still emerging from five decades of dictatorship and offering low wages, long workweeks, and deep-sea harbours.<sup>74</sup> However, the fall of the Berlin Wall in 1989 shifted Europe’s attention to the East, where skilled-manufacturing wages were only about half of those in the Iberian Peninsula. Direct foreign investment in Portugal plunged to \$1.03 billion in 1994 after peaking at \$2.21 billion in 1991, while it more than doubled in Eastern and Central Europe to about 7 billion.<sup>75</sup> In conclusion, Portuguese economists warned that the main weakness of the AutoEuropa project was “putting all eggs in one basket” because exports from this one factory would be equivalent to those of the whole textile industry. And in 2000, the AutoEuropa total sales represented 2.5% of the country’s GDP and 11% of the country’s total exports.<sup>76</sup>

In 1999, Volkswagen took over Ford’s position and ceased the production of Ford Galaxy vehicles in February 2006. This took place as the German carmaker needed to increase capacity with a new production line, the Scirocco sports model. This production line was soon thereafter dismantled in order to start a more flexible multi-product approach to manufacturing multiple models on the same shop floor.<sup>77</sup> It is opportune now to attempt to answer this case study’s research question of the extent to which highly sponsored transnational subsidiaries in peripheral regions establish important relationships with local and regional producers in order to leverage significant territorial dynamics. All in all, it has been proven that AutoEuropa illustrated the new productive strategy of transnational corporation subsidiaries that ended the “cathedral in the desert” stereotype associated with former inward investment projects in peripheral regions.<sup>78</sup>

Even though this conclusion applies mostly to AutoEuropa’s supply chain up to 2004, more recent research on the same case study published in 2016 concluded that trickle-down economics, involving large

international collaborations, requires new policy frameworks capable of increasing even more the relevance of research and technology organizations and technology-based firms as part of re-industrialization strategies.<sup>79</sup> The evolution of science and technology policy in Portugal during the 1990s is addressed in the next section with the analysis of Portugal's largest science and technology park (Taguspark), also in the Lisbon metropolitan area; however located on the opposite bank of the Tagus river from the AutoEuropa industrial complex.

### **The Science and Technology Policy**

An early analysis of the Portuguese science and technology sector had been conducted in the early 1990s.<sup>80</sup> The study "*Construir as Vantagens Competitivas de Portugal*" found that the Portuguese science and technology problem stood on the fact that the three representatives – firms, institutions, and government – tended to act rationally when considered individually, but the system as a whole did not work efficiently.<sup>81</sup> The problems that each representative faced were inter-related and had a systemic nature<sup>82</sup>. The five main problems identified in the study included:<sup>83</sup> (i) *Low educational level in the Portuguese firms* – The difficulty in the development of science and technology as a competitive advantage in Portuguese firms was a result of the country's low educational levels.<sup>84</sup> Because Portuguese firms tended to be mainly family firms, when the senior managers, who usually keep all the vital functions, were faced with a variety of new responsibilities they only "*safam-se*"<sup>85</sup> (i.e. creatively unravel a situation). This "lack of functional knowledge" could simply be explained in terms of restricted capacity for dialogue with the institutions that developed science and technology, such as universities. Without a constant flow of information between firms and institutions, they did not understand what strategic possibilities and technologies were available;<sup>86</sup> (ii) *Difficulties in financing the investments* – The weak organization and management of the small family firms led to a short run perspective and little to no

investment in new technologies. The difficult access to alternative sources of financing restricted this particular type of investment and prevented firms highly dependent on low wages to compete in the international marketplace. Basically, instead of using technology as a competitive advantage, these economic actors stood still. Their efforts to become more competitive were mostly directed towards changing production processes based on imported foreign technologies;<sup>87</sup> (iii) *The problems of firms worsen institutional problems* – because firms did not conduct activities of high value-added and consequently lacked the incentives to collaborate with R&D institutions. The research conducted by the R&D institutions was highly dependent on public funds to survive. This fact reinforced the weak comprehension of the real needs of firms and pushed the institutions towards theoretical areas of research, which normally had little application in industry;<sup>88</sup>

(iv) *Continuous lack of understanding of the particular research needs of industry* – The theoretical nature of the research done by R&D institutions proceeded from a combination of individual incentives and a weak understanding of what firms needed. The result was that institutions would hire qualified people to do theoretical research and not hire qualified people from the industry to make applied technological development;<sup>89</sup> (v) *Insufficient integration between ministries* – An insufficient coordination of efforts of different ministries had limited the definition of a clear vision for science and technology policy.<sup>90</sup> At an individual level, the ministries had clear visions where they needed to base their policies and programs for science and technology; however, when they developed policies according to their different visions, the financing tended to be split among a high number of programs which did not centralize investment on the crucial problems related to the competitiveness of firms.<sup>91</sup>

The main conclusion of the science and technology policy diagnostic was that the problems of Portuguese firms, institutions, and the government for public policy were inter-related. The vision for those problems was basically that science and technology activities needed to help the competitiveness of

the Portuguese industries. To overtake those weaknesses that prevented the reaching of the vision, the foreign consulting company recommended these four actions: (i) Increase the awareness of science and technology benefits, (ii) develop a continuous technical education system, (iii) increase the mobility of the human resources, and (iv) create partnerships for innovation and research.<sup>92</sup>

### **The Taguspark – A Science and Technology Park**

The Sagres School of the Discoveries was during the Renaissance Period equivalent to Cape Canaveral in the U.S., providing a scientific framework that helped launch Portugal into an era of expansion and wealth. Taguspark was created with decidedly more modest aims, however, it nonetheless hoped to build a bridge between science and enterprises that would foster science-informed development.<sup>93</sup> Taguspark is a science and technology park launched in Oeiras in 1997 (Figure 5). The Taguspark was projected to be an investment of about \$321 million, which would create an educational, scientific, and business community of about 10,000 people. The emphasis was on providing support for technological development by the small and medium companies that were critical to the economy.<sup>94</sup> The mistrust and misunderstanding that impaired the relations between companies and universities in Portugal could be seen as a market disadvantage for a country competing in a Single European Market, where technological innovation was quite critical for success.

>Insert Figure 5 around here<

In the mid–1990s, Portugal was investing only 0.8% of its GDP in research and development compared with the European Union’s average of 2.5%. Little more than a quarter of the total was invested in industrial research compared with about three quarters for the most successful European economies.<sup>95</sup> The

first phase of Taguspark launched in 1992 was projected to occupy an area of 114 hectares.

The facilities included a business and innovation centre designed as a small company incubator, as well as a scientific and technical information centre, a congress and an exhibition hall, a hotel, various residential areas, and services.<sup>96</sup> Strong emphasis was to be given to education, with one university and three institutes of higher education planning to open faculties in the science park. Large companies were also interested in installing research and development centres in the Taguspark. Once again, European funds would help develop Portugal, but this time in a more consensus-based initiative that promised to be a fertile new environment for the interchange of ideas between science and industry.

In one of the first and most comprehensive studies of science and technology parks and business incubators in Portugal published in 2010, it was concluded that the performance of science parks can be examined according to the number of university links (i.e., scientific production in terms of institutional engagement with knowledge production institutions) and the type of management practices put in place (i.e., vision, strategy and value-added services available to tenants).<sup>97</sup> According to this study, Taguspark hosted 164 companies, had a campus of the Technical Superior Institute – Technical University of Lisbon, and three main R&D institutions: ISQ – Quality and Welding Institute, INESC – Computer and System Engineering Institute, and IEFEP – Training and Employment Institute. And the main sectors of activity comprised: IT and related 48%; universities, R&D centres and public institutions 21%; services 13%; and others 10%.<sup>98</sup>

Even though this breakdown of the park's composition is not enough to help us answer the research question of whether a science and technology park can influence positively its regional innovation ecosystem in the long run, it provides hints about the evolution of the innovation policy in the country, while enabling an understanding of the sensibility of the entrepreneurial ecosystem to technological innovations. The science park has matured now over a 25-year period and has established strong

entrepreneurial links with the university system and the business community. It has also served to expand the science and technology vision to broader concepts such as the “City of Knowledge” and the “Oeiras Valley,” known in the industry as the aspiring Silicon Valley of Portugal. Taguspark threefold orientation of: (i) a multifunctional urban project centred on a wider regional development plan, (ii) having a campus within its premises and also being home to joint-venture laboratories, and (iii) a business orientation towards markets via anchor companies, such as the Portuguese headquarters of Microsoft,<sup>99</sup> shows, at least in part, a growing degree of support to innovation and progress; an aspect which Michael Porter strongly emphasized as needed to help the Portuguese economy become more competitive.

### **Coda – Does the Porter Diamond and Clusters Framework Make History?!**

This article provided an overview of community economic development in Portugal during the last decade of the 20th century. One of the most striking features at that time had been the country’s increased integration into the world capitalist system.<sup>100</sup> The total funds received from the European Community had a considerable impact on the country’s economic performance. However, despite all that European aid, Portugal’s agricultural sector was unable to compete successfully within the Single European Market. The industry was also suffering the effects of increasing competition. The government was letting non-viable, uncompetitive companies die while saving those considerably bolstered by EC funds for the “success stories.” The image of Portugal was nonetheless transitioning from heavy manufacturing and agriculture to light manufacturing and services.<sup>101</sup>

One of the most important conclusions from the analysis of the business plan for industry “*Construir as Vantagens Competitivas de Portugal*” was perhaps that Portugal needed its traditional industries for new technologies and industrial sectors to generate their own idiosyncratic innovations, instead of the traditional views in Portugal that considered that the country needed to build (ready-made) high-tech

industries such as robotics, computers, and biotechnology.<sup>102</sup> The study of the automobile cluster showed that sophistication and cooperation were important dimensions that characterized its competitiveness. Furthermore, Portugal also needed cooperation to serve sophistication.<sup>103</sup> The AutoEuropa case study illustrated well the Portuguese government's policy of encouraging foreign investment in the country. This article has argued that the Portuguese industry had to develop strong links and establish viable R&D relationships with science and technology institutions in order to help strengthen the country's competitive advantages in an increasingly ever more globalized economy. Based on the analysis of the science and technology recommendations of "*Construir as Vantagens Competitivas de Portugal*" (1994) as well as the Forum for Competitiveness (*Forum para a Competitividade*), the stakeholders' taskforce responsible for ensuring the eventual continuity of the project, the overall guidance provided appeared reasonably sound and timely.

Michael Porter returned to Portugal in 2002 and made a rather critical judgment about the country's evolution since the release of the TCM's report. The main claims were that the lack of skilled workforce and management, and the low level of scientific and technological infrastructure hindered the country from building upon past successes. The private sector was asked to take action without depending exclusively on the government.<sup>104</sup> Some of the study's recommendations were executed while others were simply disregarded by successive governments, which based their assessments on distinct political ideologies (see Table 1).

>Insert Table 1 around here<

Overall, it is believed that "the Porter report allowed a focus on the diamond production factors, but had only a medium impact on the demand conditions and a low effect on the context for firm strategy and rivalry."<sup>105</sup> Moreover, Portugal's failure in accomplishing the proposed goals resulted partly from the fact

that investments in competitiveness take time to produce results, and may even only occur in the medium to long term, as the growth of companies with fewer than 50 employees in the 1992–2009 period demonstrated (i.e., 49% of employment in 1992 and 64% in 2009).<sup>106</sup>

In summary, this does not invalidate the Porterian guidance nor its applicability to small and peripheral economies, such as the Portuguese, as a cluster approach to industrial re-industrialization is ensuing at the European level, with smart specialization strategies and the pursuit of core clusters by the European Cluster Observatory exemplifies. However, as the two case studies analysed above reveal, and in spite of EU-funded regional planning programs,<sup>107</sup> the prioritization of large industrial and science and technology investments in the Lisbon metropolitan area still requires more fine-grained public policies to help reduce the country's chronic macrocephalic concentration of wealth on the littoral regions between Lisbon and Porto, and Algarve, and resolve its structural regional imbalances with the interior of the country.

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### **Declaration of interest statement**

none



**Table 1** Evolution of the selected cluster and policy dimension since the Porter report and until 2014<sup>108</sup>

	<b>Main challenges</b>	<b>Situation in 2014</b>
<b>Automotive cluster</b>	The agreement signed with AutoEuropa in 2003 enabling a new investment in the sector	The automobile cluster maintains high importance in the Portuguese GDP
<b>Science and Technology</b>	Considerable public investment leading to Porter in 2002 to focus the problem on the private investment and the role of large companies in R&D	An approach to reaching European standards had been conceived (and reached) in certain parts of the country

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Figure 1 Location of the developments in the Lisbon Metropolitan Area discussed in the paper.

Figure 2 *Estado Novo Quimigal* industrial complex in Barreiro.

Figure 3 Expo'98 Site on the Tagus riverfront.

Figure 4 The AutoEuropa complex in Palmela.

Figure 5 Taguspark convention centre.

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