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**Innovation assessment in a local branch of a rail transport  
manufacture industry - A case study**

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# **Innovation Assessment in a local branch of a rail transport manufacture industry - A case study <sup>1</sup>**

## **Abstract**

In the context of the revitalization of the Portuguese railway sector with the construction of the high-speed railway network, the working paper proposes an analysis of the results found from the application of an innovation scoring to the Portuguese branch of a global multinational in the railway business. The aim of this exercise is to learn on the innovation management flow between the global corporation and the local branch in Portugal. It also aims to assess the degree of local innovation multinationals generate in view of such type of mega public investments.

The working paper is structured in five chapters. In chapter one introduces the innovation scoring tool, instrument of work; chapter two covers the methodology used; the chapter three presents the case study, subject of research; chapter four presents the findings; and chapter 5 closes with concluding remarks.

**Key words:** railway sector; Portugal; innovation scoring; global corporation

**JEL codes:** M16, R42

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<sup>1</sup> Based on a poster submitted to CONCORD 2011 - Conference on Corporate R&D: The dynamics of Europe's industrial structure and the growth of innovative firms, Sevilla, IPTS, 6 Out. 2011, Seville, <http://www.eventisimo.com/concord2011/recibido.html>

## 1. Theoretical reference

The present paper anchors in Aalborg school “interactive learning-based” innovation systems which emphasis the concept of knowledge-based economy. Where “(...) in order to obtain relevant knowledge, firms tend to engage in cooperative interactive learning relationships with a wide range of other actors, such as suppliers, users of new technologies, public research institutes and other organizations”, as Castellacci *et al.* (2005, p97) explains.

Within the same line of thought, the innovation scoring questionnaire, applied in this paper, according to Caraça *et al.* (2006: 4-5) is based on the “chain-linked” model of Kline and Rosenberg (1986), extending the technology innovation concept to organizational marketing and innovation (OECD Oslo Manual 2005), and targeting industry and services within their context.

The innovation scoring questionnaire also draws on the concept of systemic innovation as presented by Smits *et al.* (2008:1), where systemic innovation is “a process involving a heterogeneous set of actors who are inspired by both the potential that science and technology offer and by the context in which they have to function”. These actors are involved in a complex decision making process that leads to innovative activity.

The innovation scoring was developed to assess innovation capabilities and performance in companies operating in Portugal, aiming at improving their competitiveness in a knowledge-based economy. The tool was developed by the Portuguese business association dedicated to raise innovation awareness – Cotec<sup>2</sup>, designed to contribute to a strategic reflection on internal innovation processes of companies. It allows for an inclusive understanding of the different dimensions sustaining innovation processes, and it points to areas of potential improvement.

Cotec developed the innovation scoring model in two stages. The first, held from 2006 to 2008, consisted on observing worldwide best practices, such as in Singapore, USA, Canada and Belgium. The second phase started in 2008 and will go on until December 2010, aimed to enlarge this free tool application to a substantial number of companies in Portugal<sup>3</sup>, to internationalize the innovation scoring and to disseminate, nationally and abroad, the use of the Portuguese normative framework. The latter normative framework<sup>4</sup> was created to help, integrate and manage Research & Development and Innovation (R&D+I) in Portuguese companies. However, these set of norms do not fully comply with the Frascati Manual guidelines, they were adapted broadly to finance innovative Portuguese companies and to raise awareness in society.

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<sup>2</sup> COTEC Portugal - Associação Empresarial para a Inovação, created in April 2003, following an initiative of the President of Portugal. Link: [www.cotecportugal.pt](http://www.cotecportugal.pt)

<sup>3</sup> The questionnaire was tested in a group of 15 pilot Portuguese large companies, such as Amorim Revestimentos, Brisa Auto-Estradas de Portugal, Efacec Sistemas Electrónicos, Nokia Siemens Networks, Martifer Energia - Equipamentos para Energia and Sonae Indústria.

<sup>4</sup> NP4456:2007 – Research, Development and Innovation (RDI) Management: Terminology and definitions of RDI activities; NP4457:2007 - Research, Development and Innovation (RDI) Management: Management Requirements of RDI systems; NP4458:2007 - Research, Development and Innovation (RDI) Management: RDI project management requirements; and NP4461:2007 - Research, Development and Innovation (RDI) Management: Competences and evaluation of Auditors of RDI Management systems and Auditors of RDI projects.

## 2. Methodology

The sample of study was the railway branch of a Portuguese subsidiary of a foreign multinational. The subsidiary is present in a wide range of business areas, such as transport, producing and supplying trains, trams and metros, signalling and engineering solutions. The authors have chosen the railway business area, because is the most active in Research & Development (R&D) inside the Portuguese subsidiary company.

It was agreed not to reveal the identity of the company, by replacing its name with Tech-Train when referring to the railway business branch, Tech Portugal SA when referring to the subsidiary in Portugal, and Tech Group when referring to the multinational or motherhouse.

The answers to the questionnaire refer to 2009, resulting from informal and unstructured interviews conducted with privileged informers from Tech-Train and with the international technical director from Tech Group, conducted in a random order and in some cases referring to more than one question.

The questionnaire<sup>5</sup> is supported by guidelines<sup>6</sup> clarifying with examples and explaining the use of ratings and scoring formulas. It is structured in four different dimensions: Conditions, Resources, Processes and Results (for details see annex 1). Each dimension has different themes. The 13 themes present in the questionnaire are Culture, Leadership and Strategy (in the dimension of Conditions), Human Capital, Competences, External relations and Structures (in the dimension of Resources), Management of R&D+I activities, Systemic learning and improvement, Protection and assessment of results (in the dimension of Processes), and Financial and operational, Market and Society (in the dimension of Results). Overall, the questionnaire has 43 questions.

The innovation scoring is based in two criteria for evaluation: the Approach (e.g. what is envisaged by the company), and the Implementation, (e.g. what is practice by the company). Most questions are evaluated through a quantitative indicator regarding its Approach and Implementation score within the company (annex 1). The sole exception to this is in the dimension of Results, which considers only the Implementation quantitative scoring.

The Approach evaluation has a quantitative scale based on its different qualitative levels: non-existent with 0 points, reactive with 1 point, defined with 2 points, integrated with 3 points and excellent with 4 points. The Implementation scores have also different attributions: weak with 0 points, less developed with 1 point, reasonable with 2 points, highly developed with 3 points and excellent with 4 points. The final innovation scoring results from the weighted sum of the lowest classified answers between the Approach and the Implementation (annex 1 presents the quantitative results, weights and totals).

In order to focus on analytical issues, the authors will refer only to the reply to the questions considered the most relevant to the purpose of the analysis of this paper. Consequently, a ranking with the highest and the lowest scores was elaborated to select the most relevant ones, resulting from the application of the innovation scoring, and is presented in the following

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<sup>5</sup> Available online at <http://www.innovationscoring.pt/>

<sup>6</sup> The Guidelines - Innovation Scoring Manual de Apoio ao Preenchimento, COTEC, March 2009 - can be downloaded from COTEC website at [http://www.innovationscoring.pt/images/conteudo/manual\\_innovation\\_scoring\\_projecto.pdf](http://www.innovationscoring.pt/images/conteudo/manual_innovation_scoring_projecto.pdf)

Chapter, Figure 2. The ranking was then divided in four categories (colours) in order to highlight the different levels of scores in a comparable percentage scale: From 0 percent to 25 percent using red, from 26 percent to 50 percent using blue, from 51 percent to 75 percent using green and from 76 percent to 100 percent using black.

### 3. Case study

#### 3.1. Characterization of the company

Tech-Train is the railway branch of Tech Portugal SA, the Portuguese subsidiary of a foreign multinational here named Tech Group<sup>7</sup>.

Tech-Train today reflects the multinational history in Portugal, which started in the 1940's with a series of acquisitions within the metallurgic sector. Today, Tech Group through its subsidiary Tech Portugal SA, has a significant market share in different business areas, exporting 80 percent of its factories' production. With a volume of sales of 88 billion € in 2009, Tech Portugal has about 300 employees, of which 174 graduates from high school, 67 from university (ISCED<sup>8</sup> 5) and two with a master degree (ISCED 6).

The Portuguese branch registered a sales volume of 5.7 thousand million€ in 2009, with orders growing nine percent per year, employing 12 persons of whom six have tertiary education: Four are engineers and two have non-engineering university degrees (ISCED 5). One engineer and one non-engineering employees have also a masters degree (ISCED 6).

The branch sells and maintains rolling stock, signalling, rail infrastructures and engineering rail systems solutions. Its main clients are rail operators such as the public CP<sup>9</sup>, the private Fertagus, public transport companies, such as Carris and Metro do Porto, and infrastructures managers such as the public Refer. Tech-Train has a joint business with CP's maintenance company named EMEF<sup>10</sup>.

Tech-Train's main mission is customer satisfaction, customizing its global solutions to the local market needs, in all segments of the rail market. In order to gain market position against its major competitors, Tech-Train anticipates its costumers' needs through collaborative R&D projects and Innovation (R&D+I) at a pre-market stage. In fact, Tech-Train launched its Railway Knowledge Centre, to foster joint research between industry, universities and component suppliers on a project based approach. Its strategy for R&D+I is developed in 3 axes: 1) Network: protocols with universities and R&D cooperation agreements with component suppliers; 2) R&D projects; and 3) Education and training.

Recently the Portuguese law imposing a one percent of R&D investment in Portugal for each public contract above 25 million € (in place since 2008 by Decreto Lei 18/2008 and Portaria 701-J/2008) to suppliers contributed to increase Tech-Train R&D+I activities in Portugal. As a result, the branch established protocols with the main Portuguese universities

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<sup>7</sup> As mentioned above, the names used are fictitious, to preserve anonymous the company identity.

<sup>8</sup> ISCED, International Standard Classification of Education, Paris, UNESCO Institute for Statistics (1997), pp. 49

<sup>9</sup> Caminhos de Ferros de Portugal.

<sup>10</sup> Empresa de Manutenção de Equipamento Ferroviário.

(for example, the University of Porto and Technical University of Lisbon), is an Industry Affiliate to MIT<sup>11</sup> and has two significant R&D projects supported by the national funding scheme QREN<sup>12</sup>, one on innovative maintenance and the other on bio-materials. In 2009 Tech-Train launched a design challenge to 200 students from six Design Schools, to decorate the interior of its latest model of trains. Tech-Train announced in 2009 a 12 million € leverage investment on R&D for the next five years in Portugal. Given the R&D+I activities described above, the knowledge flows is summarized in the following figure.

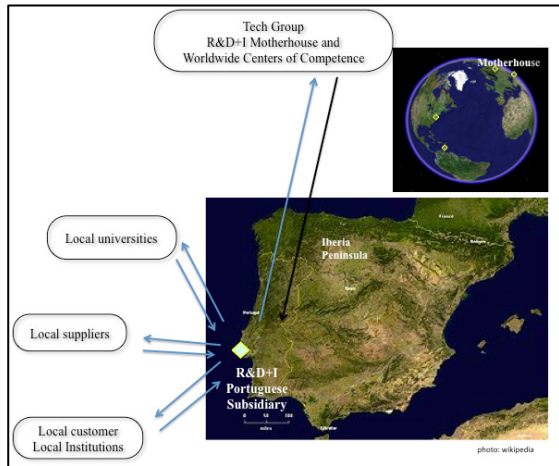


Figure 1: Knowledge relations in the Portuguese railway branch

Figure 1 illustrates Tech-Train’ knowledge relationship (input and output) with its motherhouse and centres of competences spread around the world, as well as with its network of Portuguese universities, suppliers, customers and national institutions. The different arrows illustrate knowledge flows. The black arrow represents the dominance of the mother-house.

### 3.2. Most significant results

Tech-Train innovation strategy is part of the global innovation strategy of the multinational motherhouse. It follows a bottom-up approach to innovation, axed on the collaboration with its network partners and on a project-based approach, regulated bilaterally by cooperation and confidentiality agreements, as well as by consortia agreements when more than one partner is involved. This strategy aims to satisfy local market needs or to find local competitive innovative solutions, to integrate in their worldwide products. However, such operational innovation strategy takes place within a quite complex management business structure, which seems to justify some difficulties that delayed the implementation of the innovation scoring.

<sup>11</sup> Massachusetts Institute of Technology

<sup>12</sup> National Strategic Reference Framework.

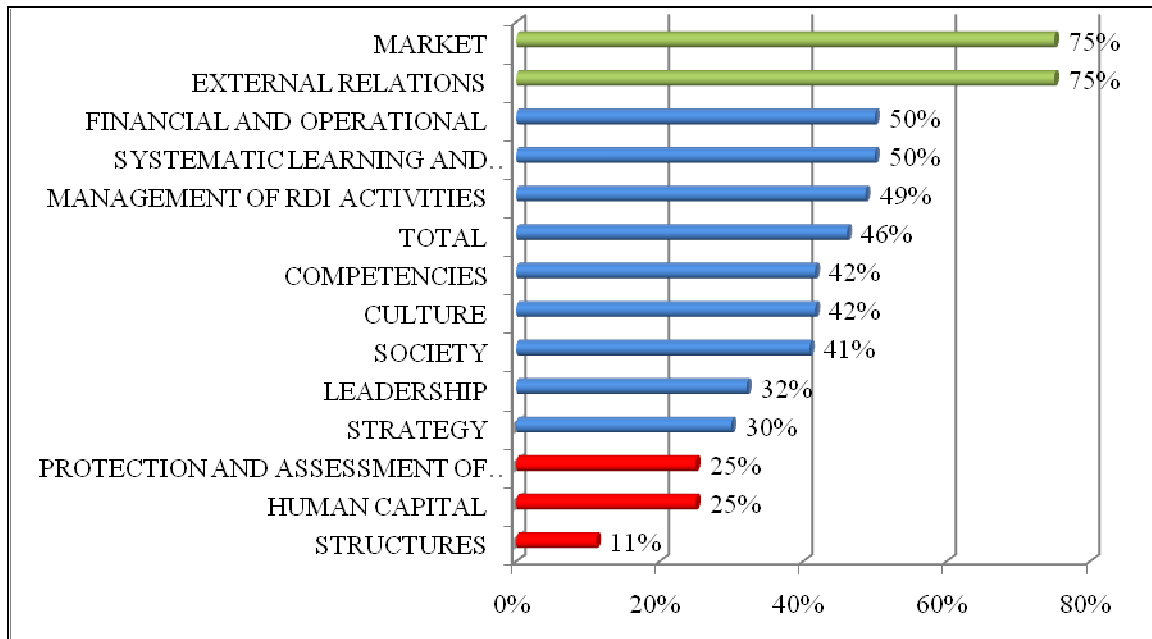


Figure 2: Ranking of the results by themes found through the application of questionnaire to Tech-Train.

This Figure 2 summarizes the results of the application of the questionnaire to the Portuguese branch. The following paragraphs discuss the Tech-Train most relevant responses to the innovation scoring questionnaire, collected and scored by the authors, selected from the ranking of the results found in Annex 1.

The analysis of Figure 2 points to two main conclusions: first, Tech-Train scored the highest on market and external relations both with 75 percent; secondly, the worst scorings were primarily the existence of R&D+I Management Structures with 11 percent, followed by protection and assessment of results and human capital both with 25 percent.

These results are consistent with findings showing that Tech Group has mainly a commercial strategy towards Portugal in its railway business area. In fact, the two best results were in themes linked to a commercial strategy, namely market and external relations of the company. On the contrary, the worst results were in areas more related to organizational management of innovation, such as R&D+I management structures, protection and assessment of results and human capital.

Given the analytical value of the answers in the best and worst rated theme to the innovation assessment of Tech-Train, it seems productive to focus specially on these questions. Therefore, given that the highest ratings of 75 percent concerning Market (Results) and External Relations (Resources), Tech-Train reply was as follows:

In the Market theme, all the four questions scored 3 points on the Implementation:

Question 38 was “Has the innovation a positive impact on the market share of the organization and on its expansion to new markets?” In this question Tech-Train was rated as Highly Developed Implementation (3 points). The justification for this score was that, in fact, Tech-

Train is being successful using innovation to increase its market share. It has been a valuable tool to conquer market from competition and to enter into new market segments.

Question 39 was “Has the development of the weight of new products and services in the total business volume been positive?” Tech-Train was rated as Highly Developed Implementation (3 points). The justification for this score was that Tech-Train embeds its motherhouse culture, where innovation is the key to increase business volume. Tech Group incorporates the latest high-tech solutions. In Portugal, Tech Group is involving its customers and bringing in its suppliers to the Group's innovation activities and processes. The results are not yet seen in the Portuguese railway market, as it is quite static with a small volume of orders, while it is notorious in other markets where Portuguese component suppliers contribute to Tech Group increase of its market share. Until now, no metric system was given to calculate the effective relation between innovative products and business volume, as Tech-Train sales of trains is calculated on the formula given by the client in the tender, which does not include innovation (usually it is based on cost, technical quality of the product, guaranty and the quality of the engineering team).

Question 40 was “Has the contribution of innovation to the image and reputation of the organization and its products been positive?” Tech-Train was rated as Highly Developed Implementation (3 points).

The justification for this score was that innovation is a key factor in Tech-Train image and branding, both for the Group and for the subsidiary. Tech Group image and main driver is the product of environmental and design innovation. Tech Group is the sole railway company with a design department often referred in magazines, and often releases new products in railway trade shows, such as Innotrans.

Question 41 was “Have the innovation activities of the organization had a positive impact on the activity sector?” Tech-Train was rated as Highly Developed Implementation (3 points). The justification for this score was that Tech Group is considered a leader in railway technology, not only due to its own developments but also by bringing suppliers from other sectors into its value chain, such as in aeronautics, in automotive and in information technology. Good examples of implementation of innovation are, for instance, its trains which are 95 percent recyclable, as well as its tram-trains recovering 90 percent of their breaking energy into power energy. In Portugal, Tech Group introduced the concept of having end-users designing the interior of their own trains, involving schools, professional designers and interior suppliers working together. The Group is also involved in launching PRIA<sup>13</sup> promoting the integration of the Portuguese component suppliers in the rail supply chain.

In what concerns External Relations, both questions scored 3 points on the Approach and the Implementation:

Question 21 was “Does the organization develop systematic cooperation actions on innovation with external entities?” and Question 22 was “Does the organization boost many ways of networking? In both questions Tech-Train was rated as Integrated Approach (3 points) and Highly Developed Implementation (3 points). Tech-Train R&D+I activity in Portugal is open and relies on joint projects and networking. Due to increase in outsourcing and need to customise its global solutions to the local market, Tech-Train often promotes research

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<sup>13</sup> PRIA - Portuguese Rail Industry Association



activities with its suppliers, universities and customers as means to find innovative solutions improving the performance of its products and market acceptance. The recent Portuguese law imposing 1 percent of R&D reinforced such an approach. Therefore, Tech-Train is looking for greater involvement with R&D+I stakeholders, such as component suppliers, universities and customers, at a pre-market stage, developing a more systematic cooperation with them and expecting to follow to the market stage.

In contrast, Tech-Train worst ratings of 25 percent goes to the themes Protection and Valorization of Results (Processes) and Human Capital (Resources) and 11 percent goes to R&D+I Management Structures (Resources).

In what concerns Protection and Valorization of Results, the single question was rated one point in both Application and Implementation.

Question 35 was “Has the organization defined processes for evaluating and deciding on the protection and assessment of its intellectual capital and the results of R&D+I activities?” Tech-Train was rated as Reactive Approach (1 point) and Less Developed Implementation (1 point). Tech-Train has no formal evaluation processes or autonomy of decision. It is centralized in its motherhouse. Tech Group technical director has in hands the procedure to assure its conformity with the company’s overall strategy, confidentiality policies, property rights and available resources. Tech-Train suppliers only has to report.

Furthermore, in what concerns the theme Human Capital, the three questions were rated 1 in both Approach and Implementation, except for the last question rated as 2 points in the Approach.

The following two questions refer to: Question 13 “Has the organization a Human Capital policy oriented to innovation?” and Question 14 “Has the organization a training policy for its staff, oriented to innovation?” In these questions Tech-Train was rated as Reactive Approach (1 points) and Less Developed Implementation (1 points). Last, Question 15 was “Does the organization stimulates and supports creativity and innovative initiative from its staff?” In this question Tech-Train was rated as Defined Approach (2 points) and Less Developed Implementation (1 point).

The answer to these questions can be aggregated in a single reply, as Human Resources in the Portuguese branch has no particular orientation on this matter. It is up to the rail Customer Director to manage and organise its team, in what concerns activities on innovation. The rail team in Portugal has about 12 persons (2 have a master degree) with 4 engineers and 2 with non-engineering university degrees. Innovation activities depend on individual initiative, spread between Commercial and Marketing Department, Maintenance and technical support staff. There is one person working full-time on innovation, acting as project officer supported by the other colleagues, according to the technical capabilities needed for the specific R&D project. This person's job title is Market Development, and it reports to the Costumer Director in Portugal and to the motherhouse’s Technical Department. The annual Employee Evaluation Assessment released by the Human Resources is the only mechanism where employees can be evaluated for their contribution to the company's innovation culture, in item “others”.

In the R&D+I Management Structures theme, two of the three questions were rated 0 points in both Application and Implementation, and one was ratted with two points also in both Application and Implementation.

In Question 23 “Has the organization an organizational structure dedicated to R&D+I activities?” and 24 “Has the organization an adequate structure for managing knowledge?”, Tech-Train was rated as Non Existent Approach (0 points) and Weak Implementation (0 points). In Question 25 “Has the organization information and communication systems enabling innovation?” Tech-Train was rated as Defined Approach (2 points) and Reasonable Implementation (2 points).

According to the information collected, Tech-Train has no defined internal structure for R&D+I activities. The team of R&D+I changes according to the technical skills needed for the project, and often involves the technical leadership of the motherhouse. However, it is always the same person who usually manages the R&D project and the external network. As patents are centralized in the motherhouse, Tech-Train protection mechanisms are confidentiality agreements and consortium agreements. However even these ones have to comply with the motherhouse procedures and to be approved by its legal and technical departments. Share of know-how and communication are held on a project base demand, and limited to the duration of the project.

## **4. Findings**

### **4.1. Findings from the case studies**

The study revealed that R&D activities are driven from exogenous factors to the Portuguese branch. In fact Tech-Train R&D strategy was set by the mother-house weighted by market expectations of growth, and influenced by the new Portuguese law requiring one percent of research and development investment for bids above 25 million €. On one hand, the national law provides a good framework to retain knowledge, although much remains in the hands of the government to be negotiated with multinational groups. On the other hand, the technological driver created by this kind of public investment depends on the multinational’s policy for innovation, and its knowledge strategy towards non-core activities of their high-speed trains, particularly in relation to small markets like the Portuguese one.

From this exercise it was found a significant difference between innovation Approach and Implementation, resulting from the pure commercial activity of the branch in Portugal (selling trains, maintenance services and railway engineering solutions). Tech-Train had no structured research activities, mostly resulting from the individual initiative of its collaborators and its top management, strongly controlled by the Group and central engineering platforms. The research activities were mostly collaborative with local stakeholders such as Portuguese suppliers, universities and clients, involving necessarily an engineer expert from the group.

It was also found that the innovation activities of the rail branch reflected the different degrees of openness determined by the multinational. In core technical areas (e.g. structures, bogies, cables and energy conversion) R&D activities are highly protected, and tend to be held in the mother-house by the core team of engineers of the Group. In a slightly different way, on technical areas relevant to the Group but outside its core engineering competences (e.g. communications, signaling and monitoring of maintenance), R&D activities are subject to restrictive innovation controlled by worldwide centers of competences and protected by confidentiality agreements. At this level it was found that were few the Portuguese companies

and universities involved in research activities, mostly on a bilateral basis, in which the Portuguese partner worked either with the core team of engineers at the mother-house or with a centre of competence anywhere in the world. Lastly, in areas that can be subject to outsourcing (e.g. panels, seats, windows, toilets, refrigeration, information technology systems, etc), R&D activities tend to be fully shared with local suppliers invited to co-develop innovation activities, ruled by consortium agreements.

Finally the study confirmed the enrolment of the Portuguese branch in established type of R&D+I activities, such as networks, collaborative research, bilateral research and human factor. The branch was the responsible to set and maintain the Portuguese rail knowledge network, which the group's platforms of engineers could access and look for partners. The branch was also promoting collaborative research projects, involving Portuguese suppliers, universities and clients, making use of national funding, mostly to capacitate local suppliers to the high requirements imposed by the rail industry and to anticipate Portuguese client specifications. The Techn-Train was also facilitator for bilateral research projects with the motherhouse or the group platforms of engineers aiming to integrate local solutions into the multinational global product, in the particular case the high-speed train. It also assured training sessions on the Group technology solutions and capacitated locally human resources from universities, suppliers and clients like traineeships, Mari Curie actions<sup>14</sup> and job-shops.

#### **4.2. Findings from the application of the innovation scoring**

The questionnaire meets its purpose. It was a useful tool to get acquainted with Tech-Train, to understand its innovation processes and it provided a good source for R&D+I diagnosis. It represents a fine instrument to assess a company innovation capability. Besides, the tool allows for an internal reflection on where the concerned organisation is and where it wants to be, in terms R&D+I.

However, the questionnaire is time demanding if it has to be applied by employees with heavy workloads, and it requires a high degree of inter-department coordination. Therefore, the innovation scoring risks to be left aside when difficulties arise, such as other job obligations or poor inter-department communication.

Furthermore, it seems that the questionnaire was designed for companies which have a single decision centre in Portugal and direct report lines. Therefore, an organisation like Tech-Train, with multi-decision centres and asymmetric management interactions, might find the questionnaire unadjusted and complex to a certain extent.

In order to overcome the abovementioned barriers, it could recommend to companies to use a consultant or any other external third party, to steer this process assisting the employees on this task. In addition, workshops and training sessions could be made available, depending on the degree of difficulties and barriers. This strategy would allow for language harmonisation, decrease misinterpretations, overcome emotional replies and avoid relational or hierarchical constraints.

The reduction or comprehension of the 43 questions to minimize the initial negative impact of its load could also be suggested. Very often employees are under pressure with their everyday

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<sup>14</sup> [http://ec.europa.eu/research/fp7/understanding/marie-curieinbrief/home\\_en.html](http://ec.europa.eu/research/fp7/understanding/marie-curieinbrief/home_en.html)

tasks, and R&D+I staff usually are not administrative or bureaucratic oriented. Such reduction of questions can be overcome if the questionnaire is held by consultants or any other external entity.

Moreover, it might be interesting to add the questionnaire a product profile and evaluation, since this would empower the tool with a complete assessment of the innovative technology included in the products of the company. However, this might be a difficult task since it can cross core competences of the company.

## **5. Concluding remarks**

Results confirm the Portuguese branch enrolment in research and development activities, subordinated to its motherhouse strategy, supporting its commercial activity of selling trains to the national market, in particular the high-speed train. Such activities were mostly in non-core technical areas, reflecting a certain degree of openness in the multinational innovation strategy, motivated as referred by the perspective of market growth and a new national law imposing one percent of investment in research and development for public contracts above 25 million euro. The study also confirms the usefulness of the innovation scoring tool, leaving open some suggestions for improvement such as tailoring the questionnaire for multi-decision centres, implementing it through a third party, reduction of the number of questions and introduction of a product innovation scoring.

The present paper presents some weaknesses leaving open field for future research. The methodology used to quantify and weight the indicators and to construct the final composite indicator, needs to be critically addressed; Moreover, the working paper misses a theoretical reflection on the technology transfer pattern of the railway sector to frame its findings; Finally, the working paper presents an incomplete view on the innovation management flow between the global corporation and its local subsidiaries and branches, as it only studies the case of the Portuguese one. For a complete picture a comparative analysis is required by extending this research exercise to others around the world and to the mother-house. Such could also be done in comparison with its direct competitors supplying the high-speed train and later with other sectors such as aeronautics or chemical industry.

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# Annex 1 - Innovation Scoring questionnaire results

				approach					implementation			weight	total	
				non-existent	reactive	defined	integrated	excellent	weak	less developed	reasonable			highly developed
CONDITIONS	<b>CULTURE</b>													
	1	Do the values of the organization promote adaptability, experiment, learning and continuous change?			2					1			20	20
	2	Do the values of the organization promote international openness?				3						3	15	45
	3	Does the internal communication of the organization integrates various perspectives, using formal and informal mechanisms of circulating information and sharing knowledge?				3					2		20	40
	4	Does the organization's culture stimulates entrepreneurship and the capacity to take risks, without penalizing failures?			2						1		20	20
	<b>LEADERSHIP</b>													
	5	Do top-management transmits an innovative vision that orients the definition of purposes and the strategy of the organization?			2						2		20	40
	6	Do top-management systematically promotes the adaptation of leadership structures, in order to deal with change?			2						1		15	15
	7	Do leadership structures promote the appearance of leaders for developing innovative activities through the responsibility and autonomy of its staff?			2						1		15	15
	8	Do top-management makes an effort and assume responsibility in the management of innovation?			2						1		20	20
	<b>STRATEGY</b>													
	9	Has the organization a clear and shared innovation strategy, engaging the staff in its definition?			2						1		20	20
10	Does innovation strategy appear as a plan of action with quantitative purposes and targets on medium and long term?			2						1		20	20	
11	Has the organization a marketing strategy that supports and values the activity of innovation, consistent with the business model and processes?			2						1		20	20	
12	Has the organization a business-intelligence monitoring system, and uses it in the definition and implementation of its innovation strategy?				3					2		15	30	
RESOURCES	<b>HUMAN CAPITAL</b>													
	13	Has the organization a Human Capital policy oriented to innovation?		1							1		20	20
	14	Has the organization a training policy for its staff, oriented to innovation?		1							1		15	15
	15	Does the organization stimulates and supports creativity and innovative initiative from its staff?			2						1		20	20
	<b>COMPETENCIES</b>													
	16	Does the organization systematically proceeds to the identification, consideration and planning of the development of its organizational competencies?			2						2		20	40
	17	Has the organization specific competencies in the management of R&D+I?		1				0					20	0
	18	Has the organization has the adequate technical competencies for performing R&D+I activities?		1							1		20	20
	19	Has the organization specific competencies related to activities concerning production and/or services?					3					3	15	45
	20	Has the organization specific competencies related to its marketing activities?					3					3	15	45
	<b>EXTERNAL RELATIONS</b>													
	21	Does the organization develops systematic cooperation actions on innovation with external entities?					3						20	60
22	Does the organization boost many ways of networking?					3					3	10	30	
<b>STRUCTURES</b>														
23	Has the organization an organizational structure dedicated to R&D+I activities?		0						0			20	0	
24	Has the organization an adequate structures for managing knowledge?		0									15	0	
25	Has the organization information and communication systems enabling innovation?			2							2	10	20	
PROCESSES	<b>MANAGEMENT OF RDI ACTIVITIES</b>													
	26	Does the organization develop systematic processes for planning, organizing, monitoring and controlling R&D+I projects?		1							1		35	35
	27	Does the organization develop systematic processes for understanding needs, expectations and market opportunities?					3					3	30	90
	28	Has the organization systematic processes for generating, identifying and selecting ideas and concepts of new products, processes, services and business and/or organization models?			2						2		30	60
	29	Does the organization develop systematic processes for interdepartmental co-operation?		1							1		25	25
	30	Has the organization well-defined routines for building and defining tasks concerning the project teams?					3					3	20	60
	31	Has the organization processes for systematic management and evaluation of innovation activities?		1							1		25	25
	32	Does the organization develop systematic processes of innovation concerning the management of chain/value system activities?					3					3	25	75
	<b>SYSTEMATIC LEARNING AND IMPROVEMENT</b>													
	33	Does the organization incorporate into its activities all the learning obtained?			2							2	25	50
	34	Has the organization systematic devices for adopting good practices?			2							2	20	40
	<b>PROTECTION AND ASSESSMENT OF RESULTS</b>													
35	Has the organization defined processes for evaluating and deciding on the protection and assessment of its intellectual capital and the results of R&D+I activities?		1							1		25	25	
RESULTS	<b>FINANCIAL AND OPERATIONAL</b>													
	36	Do R&D+I activities make a positive contribution to the financial development of the organization?									2		60	120
	37	Does the intellectual capital of the organization make a positive contribution to financial development?									2		25	50
	<b>MARKET</b>													
	38	Has the innovation a positive impact on the market share of the organization and on its expansion to new markets?										3	60	180
	39	Has the development of the weight of new products and services in the total business volume been positive?										3	40	120
	40	Has the contribution of innovation to the image and reputation of the organization and its products been positive?										3	30	90
	41	Have the innovation activities of the organization had a positive impact on the activity sector?										3	30	90
<b>SOCIETY</b>														
42	Has Innovation of the organization a positive impact in terms of qualified job creation and generation of externalities?								0			25	0	
43	Has innovation of the organization positive implications concerning Sustainable Development?										3	30	90	
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