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*STI & DUI INNOVATION ACROSS  
FIRMS AND THEIR POLICY  
IMPLICATIONS*

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## Recent policies for the production system

- At the end of the 1980s the Basque Country suffered a deep economic crisis linked to the crisis of traditional industries, such as steel, paper, ship-building, etc.; Unemployment was at its peak of about 20%.
- From the early 1990s the Basque Government has supported the creation of '**cluster associations**' as a means to promote the cooperation among firms in the same cluster of production; in this way **14 cluster associations** were created, including the following sectors.

## **Recent policies for the regional innovation system**

- From the early 1990s, the Basque Government approved five Innovation Plans for the region.
- It was formed a significant **RIS** that includes: four universities, 4 C&T parks, 21 technology and sectoral centres, 8 excellence centres, plenty of R&D firms, many business incubators, among others.
- The majority of them are associated in the Basque network of agents of the RIS, **SARETEK**, and to another 'soft' network called **INNOVANET**.
- More recently, the government introduced public programmes for the promotion of innovation across firms, such as the programme **ALDATU** and the programme **INNOVA EMPRESA** (SMEs).

## **The Current Crisis**

- It is affecting both Spain and the Basque Country; industrial production has been declining (though now it is increasing again);
- A significant number of firms are closing down or downsizing and unemployment is soaring (10% in the Basque Country and 20% in Spain);
- Though the Basque Country is the manufacturing base of Spain, it cannot compete with cheaper productions from Asia;
- Leading Basque firms have been setting operations in China (e.g. MCC-Fagor, Irizar, Gamesa, etc.).

# STI & DUI Innovation Profiles: Implications for Public Policy

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	Period	2009	2008	% variat.
<b><u>ECONOMIC ACCOUNTS. INDEX OF RELATED VOLUMES</u></b>				
Datos corregidos de efectos estacionales y de calendario				
VAG INDUSTRY	II Trimestre	3.908.606	4.379.709	-10,8
VAG SERVICES	II Trimestre	9.816.838	9.568.787	2,6
TOTAL EMPLOYMENT	II Trimestre	990.673	1.031.801	-4,0
VAG TOTAL	II Trimestre	16.534.878	17.125.758	-3,5
INDUSTRIAL EMPLOYMENT	II Trimestre	238.532	255.866	-6,8

## **Current Public Policy**

- Innovation is the new driver of competitiveness in advanced economies;
- Recently, programmes have been set up to promote innovation across firms. It is the case of *Innovate Enterprise*, set up to support innovation within small firms; this programme focuses on the promotion of:
  - The process of innovation management (generation, selection and development of ideas, R&D, ICTs and knowledge management, tools for innovation management);
  - The culture of innovation (i.e. training, communication, participation, empowerment).

## **Relevant Literature**

- Traditionally, innovation promotion has been based upon science and technology inputs (R&D, human capital) and output (patents) (Griliches, 1979; Cohen & Levinthal, 1989; Romer, 1994; Greunz, 2005);
- In the early 1990s other scholars emphasized the role of experience and tacit knowledge flows based on user-producer interactions, learning by-doing (Arrow, 1968; Lundvall, 1993; Johnson and Lundvall, 1994);
- More recently, a stream of scholars have identified the experiential, by-doing-using-interacting mode of learning and innovation as a way to complement and strengthen the effect of the first mode of innovation (Jensen et al., 2007; Arundel et al. 2007; Lundvall, 2010; Asheim, 2010; Isaksen & Karlsen, 2010).

## **Hypothesis and Analysis**

- The effectiveness of public policy (and the programme *Innovate Enterprise*) should increase once we also focus on the DUI mode of innovation (STI+DUI) and incorporate it in the programme.

Methodologically, we analyzed 409 small firms (SMEs) from four substantial sectors in the Basque Country and:

1. analyzed the correlation between STI elements and innovations (None, NTF, NTM);
2. then analyzed the correlation between the DUI elements and innovations (None, NTF, NTM).

## **Variables**

- For this analysis, we considered the ‘innovation management’ variables and the ‘culture of innovation’ variables as STI drivers. This is because they are proposed as formal structures and activities targeting first the flow of codified knowledge;
- We had then to re-consider the two groups of variables in order to select some which involve interactive knowledge flows including informal exchanges. These represent our DUI, or better, our STI+DUI set of variables to test.

**Management Practices and Innovation Output**

			Inn. Management Practices (levels of adoption)			
			0	1	2	Total
Innovation Results	0 (No inn.)	Count	<b>110</b>	6	3	119
		% of Innovation	<b>92,4%</b>	5,0%	2,5%	100,0%
		% of total	<b>26,9%</b>	1,5%	,7%	29,1%
	1 (NTF inn.)	Count	33	<b>169</b>	22	224
		% of Innovation	14,7%	<b>75,4%</b>	9,8%	100,0%
		% of total	8,1%	<b>41,3%</b>	5,4%	54,8%
	2 (NTM inn.)	Count	13	7	<b>46</b>	66
		% of Innovation	19,7%	10,6%	<b>69,7%</b>	100,0%
		% of total	3,2%	1,7%	<b>11,2%</b>	16,1%
Total		Count	156	182	71	409
		% of Innovation	38,1%	44,5%	17,4%	100,0%

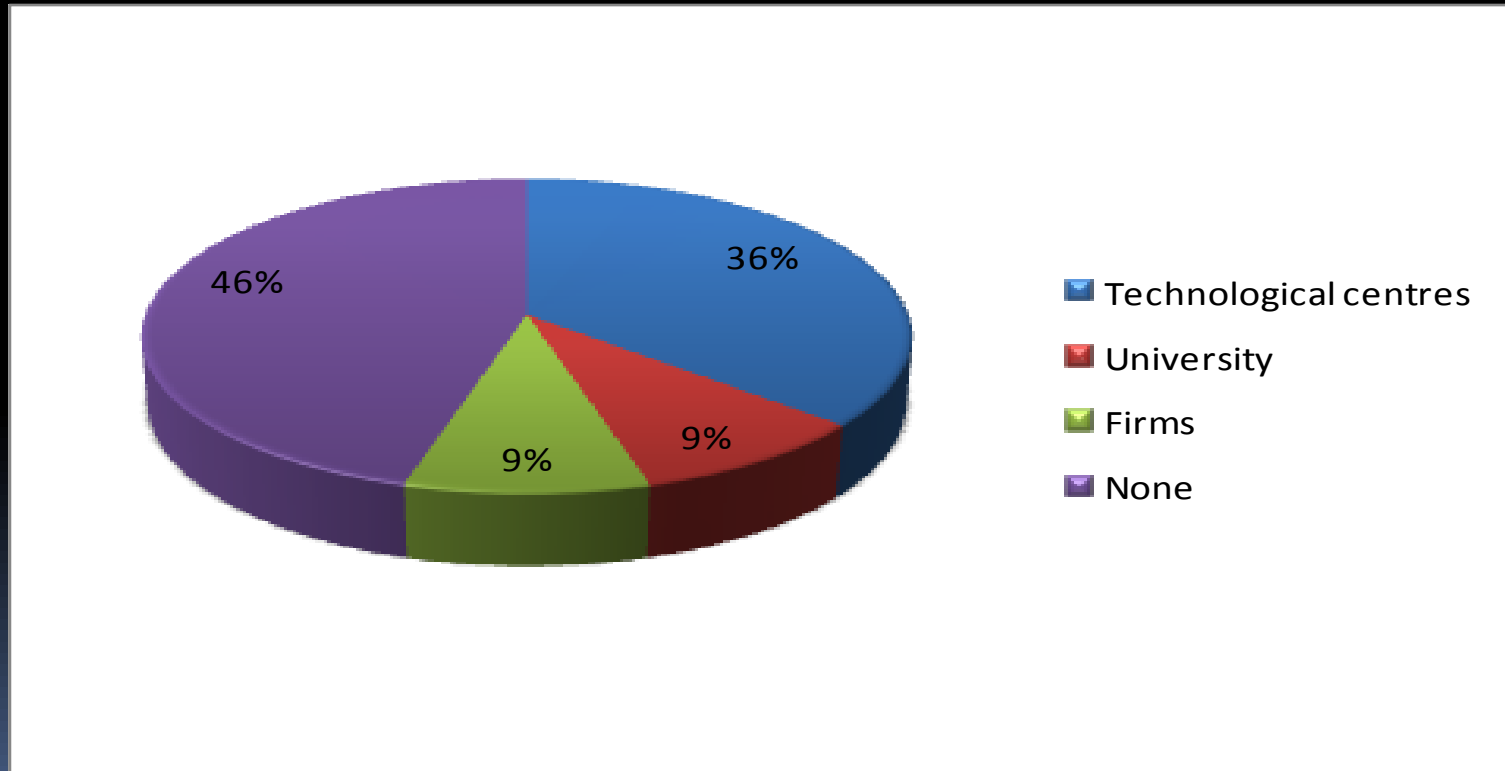
**‘Innovation Culture’ - ‘Innovation Outputs’**

			Culture of Innovation (levels of adoption)			
			0	1	2	Total
Results of Innovation	0 (No inn.)	Count	<b>62</b>	43	14	119
		% of Innovation	<b>52,1%</b>	36,1%	11,8%	100,0%
		% of total	<b>15,2%</b>	10,5%	3,4%	29,1%
	1 (NTF inn.)	Count	39	<b>140</b>	45	224
		% of Innovation	17,4%	<b>62,5%</b>	20,1%	100,0%
		% of total	9,5%	<b>34,2%</b>	11,0%	54,8%
	2 (NTM inn.)	Count	18	20	<b>28</b>	66
		% of Innovation	27,3%	30,3%	<b>42,4%</b>	100,0%
		% of total	4,4%	4,9%	<b>6,8%</b>	16,1%
Total	Count	119	203	87	409	
	% of Innovation	29,1%	49,6%	21,3%	100,0%	

**Table 3: Contingency Table 'Interaction' - 'Innovation Outputs'**

			Interaction (Levels of involvement)			
			0	1	2	Total
Results of Innovation (No inn.)	0	Count	78	34	7	119
		% of Innovation	65,5%	28,6%	5,9%	100,0%
		% of total	19,1%	8,3%	1,7%	29,1%
1 (Ntf inn.)	1	Count	136	72	16	224
		% of Innovation	60,7%	32,1%	7,1%	100,0%
		% of total	33,3%	17,6%	3,9%	54,8%
	2	Count	28	24	14	66

**Figure 1: Innovation in Collaboration with other Agents**



## **Main Results**

- The programme got it right in focusing on STI drivers such as those involved in the ‘management of innovation’ and the ‘culture of innovation’.
- It may (should) also focus on DUI elements such as promoting more intense interactions across firms; though it seems that their impact is significantly lower;
- **However, it is ‘qualified interaction’ with agents of the innovation system, within and outside the regional boundaries, that seems to be more important than generic interaction (DUI).**

## **In-Progress Alternative Interpretations**

Three main interpretations come out of such results:

1. These SMEs are not so small (37 employees each); they are structured companies that can invest in R&D and in formal innovation management practices;
2. The DU part of DUI is more important than the I part, and since that is missing in this analysis, this outcome follows suit;
3. In spite of the general recognition that the DUI drivers explain a big part of the success of SME-based economies over the past decades, things are now changing and also SMEs have realized they need targeting the next stage of development on the basis of a stronger effort/investment in STI drivers.