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## INNOVATIVE BEHAVIOUR IN SOCIAL ECONOMY: THE ANDALUSIAN CASE<sup>i</sup>

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### Abstract

*In a globalized context (characterized by high product mobility) with imperfect mobility of technology and productive activities, innovation increasingly becomes an essential element for business survival and for economic development of regions, both to follow or maintain leaders' rhythm, and/or to maintain followers' absorptive capacity to be able to remain in the market in spite of increasing concurrence by globalization.*

*The aim of this paper is to present a cognitive model on innovative behaviour of Andalusian Social Economy (or third sector) enterprises, useful for researchers, business administrators, public administrators and policy makers. To reach it, after an introduction to define the context and importance of social economy in Andalusia, we define a theoretical model in which decision to innovate depends on internal and external aspects and its interactions; this model is estimated by an econometric dichotomous Probit model applied to a sample of 515 Andalusian firms of social economy.*

**Key words:** Social economy, Innovation, Third sector, ICT, Probit models. Andalusia, Regional studies.

**JEL classification:** O30, O31, O32, P13, P19

### 1. Introduction

Perception and understanding of technological change and innovation has considerably evolved from Classical economists, passing by Schumpeterian analysis, Solow's residual effect on growth and exogenous consideration of technical change, and modern theories of

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endogenous growth, until present consideration in which we enhance new geographical economy [Krugman and Venables, 1995] on imperfect mobility of innovation, technology and knowledge, and industrial economics [Sutton, 2002] who underlines the necessity to develop a continuous innovative process in order to maintain into “viability window” of the market.

In general, as main indicators and several works shows<sup>ii</sup>, in Andalusia there is a relative gap (and high difficulties to innovate) in relation with the overall level of Spain and a higher gap in relation with more advanced Spanish regions (Madrid, Catalonia) and respect EU and OECD levels. Within Andalusia, there are the smallest enterprises (predominant in Social Economy) that have the main difficulties. To show a little data set<sup>iii</sup>: less percentage of innovative enterprises in Andalusia (6.45% versus 6.77% in Spain), less individual expenditure (220 thousand Euro versus 337 in Spain) but at the same time more effort or intensity in innovation (2.97% of sales versus 2.75% in Spain); this underlines a lower size of Andalusian enterprises. Global results are fewer activities of R&D and innovation, carried out with lower frequency, less cooperation activities... and, briefly, a weaker and less structured innovation system.

On the other hand, third sector or Social Economy sector (SES) is very important in Andalusia<sup>iv</sup>: 1.14 firms of SES per a thousand of population (clearly higher than 1.01 as overall values in Spain) and near 430,000 people working in more than 8,600 SES firms, the first score in Spanish regions. In addition, in economic terms, Social Economy Sector generates in Andalusia 12% of GDP and nearly 14% of employment. So, the importance of SES in Andalusia is in both dimensions, social and economic.

This paper is structured as follows: first, we describe methodological aspect (both theoretical and econometrical models); second, we show empirical results, and finally we present main conclusions and future research lines.

## 2. Methodological aspects

### 2.1. Theoretical model

Characteristics of innovative process (cumulative, path dependence, permanent evolution, risk, uncertainty...) award it extreme complexity. For our purposes, it is enough to remember Archibugi and Michie (1998) description: it is appropriable, diverse (product, process, commercial, organizational, managerial...), incremental or radical, in tacit or codified knowledge (with differences in conditions and possibility of transfer and diffusion), involves several forms of cooperation and collaboration, generates uncertainty, and is cumulative. But there are firms the economic agent who take the final decision to innovate or not (and when to innovate), that means, there are firms who perform innovative activities and “put into the market” the results of these innovations. What are the factors in which this last decision depends on?

*Table no. 1 – Variables of theoretical model*

**External factors (opportunities):**

- Regional System of Innovation, public or private.
- Interface system.
- Regional productive structure.
  - Sectoral specialization.
  - Overall size of firms.

<ul style="list-style-type: none"> <li>○ Regional technological level.</li> <li>● Endowments of infrastructures and equipment (I+E).</li> <li>● Human capital and qualification of human resources.</li> <li>● Regional research effort.</li> </ul>
<p><b><u>Internal factors (capacities):</u></b></p> <ul style="list-style-type: none"> <li>● Aptitude to assume risk             <ul style="list-style-type: none"> <li>○ Availability of resources (owned and external)</li> <li>○ Diversification of production or activities</li> </ul> </li> <li>● Size (employees, sales, market share)</li> <li>● Belonging to a potentially innovative or technological sector</li> <li>● Innovative culture</li> <li>● Access to and use of ICT</li> <li>● Propensity to export</li> <li>● Qualification of HH.RR. (managers, directors, other)</li> <li>● Organizational culture</li> <li>● Perception of environment by director or president</li> </ul>

Source: self elaboration.

There are a considerable number of works about determinants on innovation, but it is not our target to review them in this work<sup>v</sup>; our theoretical model tries to incorporate an overall reflexion of main aspects issued from this literature. We develop a model in which a firms' innovative behaviour is analyzed by our dependent variable, "firm's propensity to innovate"; so we accept the idea that a favourable or unfavourable attitude to innovation precedes the final decision to adopt it or not [Waarts et al, 2002]. Innovative behaviour (final decision to innovate or not) depends on several factors, both internal (controlled by firm) and external (with reduced -or even null- ability of firm to control or influence them); and on the other hand, some factors could have a positive effect in innovation while others could have just a negative one. All these factors are represented by our independent variables, showed in Table no. 1.

In reduced form, our model can be represented as:

$$\text{Innovative propensity} = f(\text{internal factors, external factors})$$

### 2.2. Econometric model

As suggested by Cohen and Klepper (1992), there exists a key factor in innovative activity that is unobservable, which Lee (2002) has identified with several factors grouped in which he calls "technological competence", and can be understood as an index representing benefits derived from innovation. In practice, we are not able to know the values of index; we only observe a dichotomous variable with value 1 if the index is positive (an innovating firm) and 0 if it is negative (a non-innovating firm). We can assume that this index depends on observed variables and an error term, and can be approximated by a linear function; if we suppose (as usual) an error term with normal distribution with mean 0 and variance 1, we arrive at Probit model:

$$\Pr(I = 1) = \int_{-\infty}^{\beta'x} \phi(t) dt = \Phi(\beta'x)$$

where  $\Phi$  is normal distribution function.

### 2.3. Sample selection and description

We use primary data coming from a specific, cross sectional and external survey, not existing before our process of data collecting. We used qualitative techniques (groups dynamics) and quantitative (structured query passed to each firm) during 2002. Once redacted a preliminary version of query we proceed to realize a pilot poll in order to determine the most suitable sample size and to perform the questionnaire.

*Table no. 2 – Technical description of our sample*

Technical aspect	Level
Variance (max)	0.5
Probability of error	0.05
Confidence level	1.96
Error	0.058
Sample size	515
Population	5806

*Source: self elaboration.*

We established a sample with a confidence level of 95%, a maximum admissible error of 5% and maximal sample dispersion in relation with variables. Extraction of sample elements (515 firms) was made by random simple sampling, based at random and implemented by using tables of random numbers. In Table no. 2 the technical data is shown.

### 2.4. Selection of variables

As told before, endogenous variable is “propensity to innovate”, defined as a dichotomous variable taking value 1 if firm has realized some innovative activity in the last three years and 0 if not. Exogenous variables are defined in Table no. 3 which also shows the theoretical variable that is intended to measure with them.

*Table no. 3 – Independent internal determinant variables*

Variable	Units	Definition	Theoretical variable measured
NEMPLEA	Nº	Number of employees	Size
FACTURAN	10 <sup>6</sup> Euro	Sales in last year	Size
FONDOSPR	%	Proportion between owned and external financial funds	Resources availability
NORDENAD	Nº	Number of working computers	Access and use of ICT
NAPLICACI	Nº	Number of software applications used	Access and use of ICT
MANTENIM	0/1	Having or not having a contract with a service for hardware and/or software maintenance	Access and use of ICT
INTERNET	0/1	Having or not having connection to Internet	Access and use of ICT
ORGANIGR	0/1	Having or not having a defined organization chart	Organizational structure
NDEPARTA	N <sup>a</sup>	Number of departments	Organizational structure
MDOEXTER	%	Percentage of total sales in foreign markets	Propensity to export
CUALPERS	1-7	Level of formation of workers (mean	Qualification of Human Re-

		values)	sources
CUALRESP	1-7	Level of formation of director (or equivalent firm's main responsible)	Qualification of Human Resources
CUALDIR	1-7	Level of formation of direction team (mean values)	Qualification of Human Resources
AVERSIÓN	0/1	Showing or not risk aversion	Organizational culture
NEUTRAL	0/1	Showing of not neutrality to risk	Organizational culture
PROPENSO	0/1	Showing or not risk propensity	Organizational culture

*Source Survey of Social Economy enterprises in Andalusia*

In addition to these variables related to internal determinants, we have information about the Andalusian provinces in which firms are located. That means we have eight dichotomous variables as approximation (with logical restrictions) to external determinants in our model.

In the next section, we present our main results of our research.

### 3. Empirical findings

We start with a revision of descriptive statistics analysis carried out for previous works dealing with innovation in social economy in Andalusia. Borra, García and Espasandín (2005), found that in general, mean values are higher for innovative firms than for non innovative ones; but, the case is just the contrary for location variables and for organizational culture variables. This supports pertinence of theoretical variables to explain differences in innovative behaviour for Andalusian Social Economy firms, both internal and external; but variables about organizational culture needs additional attention.

In mentioned works, they find main differences in those leading with risk position of firms. Neutrality doesn't show differences between innovative and non innovative firms; which can be interpreted as an adaptive or imitative strategy: firms look at their environment before deciding to innovate or not to avoid risks associated with differentiation. On the other hand, risk propensity is higher in innovative than in non innovative firms: so, availability to assume risk (in every entrepreneurial action and specifically in innovative ones) is present in higher proportion in innovative firms.

We present now in Table no. 4 the econometrical results of our Probit analysis. The final version of our model is designed to avoid correlation problems and to enhance the model's accuracy both on McFadden R-squared (adjusted and non-adjusted) and Akaike Information Criterion.

*Table no. 4 – Results of Probit model*

Dependent Var. = INNOVA		N Obs.=389		
Log Likelihood = -159,685		McFadden R-squared = 0,377		
Restricted log Likelihood = -256,371		R2 McFadden corrected R-squared = 0,338		
LR (9) = 193,372		Akaike I.C.= 0,872		
Prob>LR = 0,000				
Var.	Coef.	Std. Err.	z	P>z
_CONS	-0,90763	0,30572	-2,97	0,003
FACTURAN	0,00052	0,00031	1,70	0,089
FONDOSPR	0,00196	0,00374	0,52	0,601
NAPLICACI	0,18437	0,03074	6,00	0,000

ORGANIGR	0,29015	0,19224	1,51	0,131
NDEPARTA	0,17289	0,06041	2,86	0,004
CUALPERS	0,09250	0,06428	1,44	0,150
PROPENSO	0,31485	0,22850	1,38	0,168
CORDOBA	-1,00453	0,23828	-4,22	0,000
ALMERIA	-1,09970	0,23935	-4,59	0,000

*Source Self elaboration.*

As Table no. 4 shows, general adjust is acceptable and the null hypothesis (all the coefficients of the model are simultaneously zero) is clearly rejected. In general, estimated data show, as expected, positive sign, and they are significant. Negative sign of the constant indicates a non innovative inertial tendency for firms; it is as expected in a peripheral region with an economic structure based on traditional and mature sectors, deficient human resources formation, very small firms, sparing innovative culture, and scarcity of firms doing R&D (or belonging to high technological intensity sectors). In this context, firms maintain an unfavourable tendency to innovate, that is only brooked (scantily and hardly) when there appears, with some relative strength, some factors enhancing innovation.

A positive sign of variable representing sales data indicates that, as in general for small Spanish firms [Molero and Buesa, 1996; Fonfría, 1999; Alonso and Mendez, 2000], propensity to innovate increases with firm size. So, in the debate<sup>vi</sup> on size effect on innovation (better access to resources for big enterprises versus more flexibility and dynamism for small and medium sized ones) we find evidences of positive effect of size in small firms, predominant in Andalusian Social Economy.

A positive sign of own funds will point out in a similar way: while size increases, it increases self financing (proportion of investment financed by own funds) and this enhances innovation. Nevertheless, because this variable is not significant, we must conclude that self financing doesn't matter in the innovative decision. At this point, we ask ourselves if, for small firms with very scarce own funds, the decision to innovate is perhaps more related with access to external financial funds (both public and private) than with own funds.

Also, a positive sign of variable measuring the extent of software applications used by the firm was expected. It points out a multiplicative effect of use and access of ICT on future innovation. We interpret this fact in the line of "path dependence" (in a broad sense, of course) of innovation: in one firm, having incorporated ICT, it generates an important "push effect" to maintain a certain innovative activity, both by updating installed technologies and/or incorporating new technologies or applications. On the other hand, this is also compatible with epidemiological models of diffusion of innovations: having more software applications and more use of ICT increases frequency and intensity of contact (interaction or exchange) with other firms (especially in its environment), and so contributes to access to information of innovations and of their adoption.

Looking at the positive sign of having an organizational chart and number of departments, it can be inferred that more structured and organized firms are more likely to be innovative. This points out on character of innovation: cumulative organized and structured.

Qualification of human resources also has a positive effect on propensity to innovate, similar to what was found in other context by Ahmed and Abdalla (1999) and Ong et al (2003). So workforce skill, training and characteristics can generate a higher absorptive capacity and receptivity for innovations; especially to the extent that knowledge becomes a key element not only for innovation but also for productive activities. This result is consistent with Borra, García and Espasandín (2005), who found two important effects. First,

moving the mean level of formation of firm's human resources to High School degree or to University degree enhances approximately 10% the probability to innovate. Second, establishing relationships with universities enhances this probability approximately 20%.

In the same line are placed results obtained for organizational culture: positive effect of propensity to risk indicates that innovation activities are favoured in those firms that facilitate (let able or not restrict) managers, professional staff and/or workers to assume risks derived from their individual (or cooperative group) decision related to productive activities, innovation or any kind of improvement. In this line, Espasandín, García and Borra (2008) found that perception of environment by managers influences propensity to innovate (negatively in absence of perceived pressure to innovate) and propensity to risk enhances innovativeness.

To go beyond the sign interpretation we must calculate marginal effects<sup>vii</sup>, shown in Table no. 5: calculated data represents the marginal effect on probability to innovate of a unitary improvement in each variable, others remaining constant. While own funds have a very residual effect (even negligible), organizational structure has an important effect: to have an organizational chart enhances 10% the probability to innovate and to better design a firm's structure with departments definition enhances 6% this probability. With a similar marginal effect (more than 6%), past innovativeness (number of software applications introduced by firms) enhances present probability to innovate. By approaching an "optimal" size threshold in sales (augmenting sales by 1 millions of Euro) probability to innovate increases 3%. An improvement of a year in mean level of qualification of human resources increases probability to innovate more than 3%. Nevertheless, higher effect is due to cultural and location variables (environment and sectoral productive structure by provinces): the fact to have propensity to assume risk increases more than 10% probability to innovate, while the fact to be located in Almeria or Cordoba decreases this probability around 40%.

Table no. 5 – Marginal effects of Probit model

Var.	dy/dx	Std. Err.	z	P>z
FACTURAN	0.030615	0.00011	1.71	0.086
FONDOSPR	0.000684	0.00131	0.52	0.602
NAPLICACI	0.064509	0.01056	6.11	0.000
ORGANIGR*	0.101316	0.06706	1.51	0.131
NDEPARTA	0.060491	0.02099	2.88	0.004
CUALPERS	0.032364	0.02247	1.44	0.150
PROPENSO*	0.103771	0.07007	1.48	0.139
CORDOBA*	-0.380318	0.08733	-4.35	0.000
ALMERIA*	-0.414016	0.08595	-4.82	0.000

Source Self elaboration.

#### 4. Conclusions

An inertial non innovative behaviour was found in Andalusian Social Economy firms. This points out on a general vision of innovation as an external aspect (innovating by incorporated technology in capital goods) without a strategically planned innovative behaviour. This inertia is only broken in firms with higher values of factors enhancing innovation.



As expected, innovative behaviour is more probable on firms having a larger size (measured by sales data), a higher level of use of TIC, a better and more formalized organizational structure, more qualified human resources, and a higher risk tolerance.

Because some characteristics of microenterprises (very scarce own funds), the decision to innovate or not depends mainly on president or director personal implication with innovative project and ability to assume risk derived from it and on accessibility to external financial funds and public aids. Capacity of self financing these kinds of projects (own funds) doesn't matter in this decision.

For policy makers, public administration and for firms' associations (or federations), some policy implications can be extracted for helping them in their target to promote innovativeness in Social Economy firms:

- a) It doesn't matter to increase a firm's own funds, but enhancing its access to external funds, both private and public, including development of credit cooperatives and credit unions, and venture capital.
- b) Federations and associations of firms and firms' networks are useful for both, changing organizational culture (to become more favourable to innovation and to enhance the level and intensity of inter firms contacts) and to provide a more structured context and organizational structures that can be "learned and imitated" by member firms.
- c) Continuous formation programs enhance absorptive capacity and receptivity for innovations.
- d) In specific contexts with very scarce technology previously incorporated, public or associative (network) programs designed for finance a first (initial) incorporation and use of technologies (especially ICT) could have a future "push effect" in a firms' innovativeness.
- e) While personal risk positioning is difficult to be changed by public or associative actions, programs dealing with risk reduction and helping (including formation, consultancy and advice) to risk management are helpful for any firm but especially in risk averse and risk neutral.

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## Notes

<sup>ii</sup> For a detailed analysis of Andalusian Innovation System, see García, Palma and Martín (1994), Pomares (1998b and 1999), Coronado and Acosta (1999a, 1999b, 2000 and 2001), Aguado, Pomares and Palma (2000),

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García, Palma and Pomares (2002).

<sup>iii</sup> For more details see: Spanish National Institute for Statistics (INE) "Innovation Activities Survey".

<sup>iv</sup> For more data and for specific aspects of Social Economy enterprises see Barea and Monzón (1996), Monzón (2001), Grávalos (2001a, 2001b, and 2002), Espasandín, Casanueva and Ganaza (2003), Espasandín and Ganaza (2003), Borra, García and Espasandín (2005).

<sup>v</sup> In the literature of innovation and technical change we find seminal works of Dosi (1984 and 1988); they has been followed by an important number of studies, focusing in different aspects or groups of determinants. We can find important bibliographical revisions in García and Molero (2006) and López et al (2008); please see them for an exhaustive analysis of this literature.

<sup>vi</sup> In spite of the huge number of studies made about this topic, the current situation is that there are no conclusive results allowing us to assert the sign and intensity of the impact size has to induce innovation. You can see within these works Barceló et al. (1992), Buesa (1996), Molero and Buesa (1996), Buesa and Molero (1998), Fonfría (1999), Alonso y Méndez (2000), Cohen y Klepper (1996), Masurel et al. (2002), both, for international case and for the Spanish one. Perhaps because size "certainly influences what kind of projects can be attempted in terms of technology, complexity and costs but does not in itself determine the outcome" [Freeman and Soete 1997, p.193] and in fact, mainly after controlling by sector, the association seems to follow a growing trend (the larger the size the more intense is R&D effort) but just to a certain extent; from this point onward the dominant relation is a proportional one (Cohen, 1995).

<sup>vii</sup> See Dunne (1984), Greene (1999, pp. 753-755) and Cabrer et al (2001, p. 117) for a detailed description of how calculate marginal effects.