THE RELATIONSHIP BETWEEN HUMAN CAPITAL, INNOVATION AND INTERNATIONALIZATION OF MICRO AND SMALL ENTERPRISES: THE CASE OF TAGUS VALLEY AGRI-FOOD SUPPLY CHAIN

A relação entre capital humano, inovação e internacionalização das micro e pequenas empresas: O caso da fileira agroalimentar do Vale do Tejo

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RESUMO

Este artigo visa contribuir empiricamente para uma melhor compreensão da relação entre a formação de capital humano nas micro e pequenas empresas e os respetivos comportamentos em inovação e internacionalização. Baseado numa revisão de literatura sucinta acerca do capital humano e dos sistemas territoriais de inovação, bem como em resultados obtidos num estudo por inquérito, o artigo revela que o reduzido 'stock' de capital humano neste segmento de empresas pode inibir o seu potencial de inovação; contudo, tal não impede que alcancem mercados externos. Existe evidência de que estas empresas fazem uso de parcerias estáveis com agentes económicos intermediários e organizações promotoras, demonstrando quão eficazes se revelam os ativos não mercantis (de natureza territorial, especialmente) para a competitividade da fileira agroalimentar do Vale do Tejo, no quadro da Política Agrícola Comum.

Palavras-chave: capital humano, inovação, internacionalização, Vale do Tejo

ABSTRACT

This paper aims to contribute empirically to a better understanding of the relationship between human capital formation in micro and small enterprises and the respective behaviors in innovation and internationalization. Based on a brief review of literature on human capital and regional innovation systems, as well as in results obtained in a survey, the paper reveals that the reduced stock of human capital in this corporate segment can inhibit their potential for innovation; but this does not impede access external markets. There is evidence that these firms make use of stable partnerships with intermediary economic agents and promoting organizations, demonstrating how effective are non-market assets (of territorial nature, specially) to the agri-food supply chain competitiveness of Tagus Valley, in the framework of Common Agricultural Policy.

Keywords: human capital, innovation, internationalization, Tagus Valley

1   INTRODUCTION

This paper aims to contribute for a better understanding of the relationship between human capital formation in micro and small enterprises and their innovation performance and internationalization degree, considering as geographical reference a rural territory (Tagus Valley).

Based on a brief literature review about territorial systems of innovation and author's empirical work previously published, opportunely cited, in this paper we argue that stock of human capital contributes to boost (or depress) the innovation capacity of that type of firms; nevertheless, that does not inhibit their capacity to reach external markets. There is evidence that these make use of long term partnerships with intermediate business agents and public promoting organizations, showing how effective are non-market assets – including those of territorial nature – to sustain agri-food supply chain competitiveness.

Following the literature based on innovations systems in this article we seek to show that human capital formation within micro and small enterprises belonging to a localized agri-food complex (such as the one existent at Tagus Valley) exerts influence in a positive manner over rural innovation performance.

Besides that, our research since 2013 has shown that innovative capacity of micro and small firms depends critically on their territorial embeddedness. In fact, it is proven that the more involved entrepreneurs are in regional knowledge networks, in cooperation with higher education institutions and R&D laboratories, through formal and/or informal relations, the better will be their ability to innovate and mainly to expand their business to international markets.

This paper has the following structure. After an introduction, we develop a theoretical and empirical framework about human capital (section 2) and the relationship between innovation and territory (section 3), through the lengths of territorial systems of innovation (section 3.1) followed by characterization of the territory (section 3.2). Then, it follows the resume of evidence from empirical research based in a survey (produced in 2011) divide into: sample's description (section 4.1); the performance of human capital (section 4.2); innovation dynamics versus investment in human capital (section 4.3); and innovation dynamics and agribusiness' internationalization (section 4.4). The paper ends with the conclusion's section, synthetizing main contribution, limitations and pointing out future challenges for empirical research.

2   HUMAN CAPITAL

The modern concept of human capital has origin in the seminal work of Gary Becker (1964, 1975, 1994) in which the Nobel Laureate[1] argues that there is a positive association between the level of individual's education, personal earnings and income share, technological innovations at organizations' level, and the sustainable economic growth. In fact:

"Economic analysis has no trouble explaining why, throughout history, few countries [USA and some European countries] have experienced very long periods of persistent growth in income per person. For if per capita income growth is caused by the growth of land and physical capital per worker, diminishing returns from additional capital and land eventually eliminate further growth. (…) The systematic application of scientific knowledge to production of goods has greatly increased the value of education, technical schooling, and on-the-job training as the growth of knowledge has become embodied in people - in scientists, scholars, technicians, managers, and other contributors to output." (Becker, 1964, 1975, 1994, pp. 23-24).

Defining the concept, Becker states that "human capital refers to the knowledge, information, ideas, skills, and health of individuals". He even admits that:

"This is the "age of human capital" in the sense that human capital is by far the most important form of capital in modern economies. The economic successes of individuals, and also of whole economies, depend on how extensively and effectively people invest in themselves" (Becker, 2002).

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[1] Becker was awarded the Nobel Memorial Prize in Economic Sciences in 1992 and received the United States Presidential Medal of Freedom in 2007.

In fact, the last decade of 20th century was marked by a clear change in the pattern of competitiveness of the economies of the Triad (USA, European Union, and Japan), pressured by trade competition exerted by BRICS[2], towards a paradigm of the "knowledge-based economy". This refers to a model of economy based on production, distribution and use of direct form of knowledge and information about to assert that knowledge, imbued in humans (human capital) and technology, takes a central role in economic development (OECD, 1996).

Later, also OECD recognized the existence of a linkage between individual and social well-being and human capital defining this as the knowledge, skills, competences, and attributes intrinsic to individuals that facilitate the creation of personal, social and economic well-being. It is distinguished from the labor force by the fact that it captures the human resources' quality instead of quantity, as such depending on the educational and training levels of workers (OECD, 2007).

Thus, human capital is developed in the contexts of (OECD, 2001, p.18):

- Learning, within family and early childcare settings.

- Formal education and training including early childhood, school-based compulsory education, post-compulsory vocational or general education, tertiary education, public labour market training, adult education, etc.

- Workplace training as well as informed learning at work through specific activities such as research and innovation or participation in various professional networks.

- Informal learning "on-the-job" and in daily living and civic participation.

As a corollary, we may say that human capital enrichment demands personal development through teamwork and engagement with organizational and social values. For this reason, many scholars have admitted that intangible and non-mercantile assets - such as proximity, interactive learning, relational and/or social capital, bounded rationality, institutional thickness, territorial embeddedness, and knowledge networks – are crucial to sustain dynamic and sustainable competitive advantages in globalized supply chains – see Oliveira (2013) for a survey of literature and empirical work.

3   INNOVATION AND TERRITORY

3.1   Systems of innovation: a territorial approach

The concept of interactive learning, within an open system of knowledge flows is at the cornerstone of micro and small firms' innovation performance. In the context of collaboration, contemporary literature sustains that this type of firms faces a double challenge: firstly, it is broadly recognized their lack of internal resources in R&D activities, but innovation activities are crucial for their survival (Acs & Audretsch, 1988); (Cohen & Klepper, 1996); (Rogers, 2004); secondly, their spatial agglomeration ('cluster') can work out both as a source of knowledge spillovers and strategic alliances with other competitors to reduce risk of business, including export activities (Gu, Jiang, & Wang, 2016); (Lööf & Nabavi, 2015); (Bjerke & Johansson, 2015); (Yang, Zheng, & Zhao, 2014).

This kind of concerns motivated a huge vortex of theoretical and empirical contributions around the territorial systems of innovation literature. Our dissertation will nevertheless follow through a quite short review of this.

As mentioned by (Morgan, 1997), innovation – *latu sensu*, including not only product, process and organizational innovation in the firm but also the social and institutional nature in the sphere of an industry, region and/or nation – has assumed an ever more central role in the theories of economic development.

The innovation capacity varies from company to company but also from country to country and from region to region. Both at firm and the territorial level, such capacity is determined by a complex

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[2] "The term "BRICS" - which refers to the bloc of emerging economies in Brazil, Russia, India, China, and South Africa - was coined years ago by Goldman Sachs analyst Jim O'Neill, who saw the countries as promising markets for finance capital in the 21st century." – cited from Rosa Luxemburg Stiftung. Published in April, 2015; accessed at (May, 2017): https://www.rosalux.de/en/publication/id/4047/the-brics-competition-and-crisis-in-the-global-economy/.

mixture of factors, internal and external to the unity of analysis, inducing (or limiting) knowledge spillover effects, which promote a significant impact on the innovation process and on localized dynamics of innovation.

A territorial innovative capacity depends on institutional efficiency, based on the commitment and performance of the institutions, their national culture, human capital, innovation's workers skills and technological intensity. However, it also depends on financial resources for innovation, and the linkages and cooperation networks used to stimulate the innovation capacity (Oliveira & Natário, 2016b).

The main concern of territorial (or regional) approach is to understand the mechanisms of interaction and cooperation among the different institutional and business actors, which shall stimulate the knowledge flows necessary to generate both regional innovation and competitiveness in a sustainable manner.

Regions have distinct characteristics of governance and cultural characteristics that make them peculiar and unique. As such, the system of innovation at the regional level (or regional system of innovation, RIS) "allows a greater formatting and adequacy of national policies to regional contexts, since there is a higher proximity between the various actors and a greater cultural homogeneity and, also, because the intensities and the dynamics of innovation are sometimes more different among regions than among nations" (Oliveira & Natário, 2016a, p. 1464).

To conclude, the RIS can be defined as a network of players and institutions attached to the region directly related to the generation, distribution, and ownership of knowledge (Chung, 1999). It encompasses the set of players and organizations (companies, universities, research centres) systematically involved in the development of innovation and interactive learning through common institutional practices.

3.2 The territory: Tagus Valley

Consisting of two NUTS 3 statistical region, Tagus Plains ("Lezíria do Tejo", in Portuguese designation) and Middle Tagus ("Médio Tejo"), as illustrated in Figure 1, the Tagus Valley territory (contiguous at southwest with the metropolitan area of Lisbon) has a strong rural nature which is shown by its high potential for agriculture and forestry.
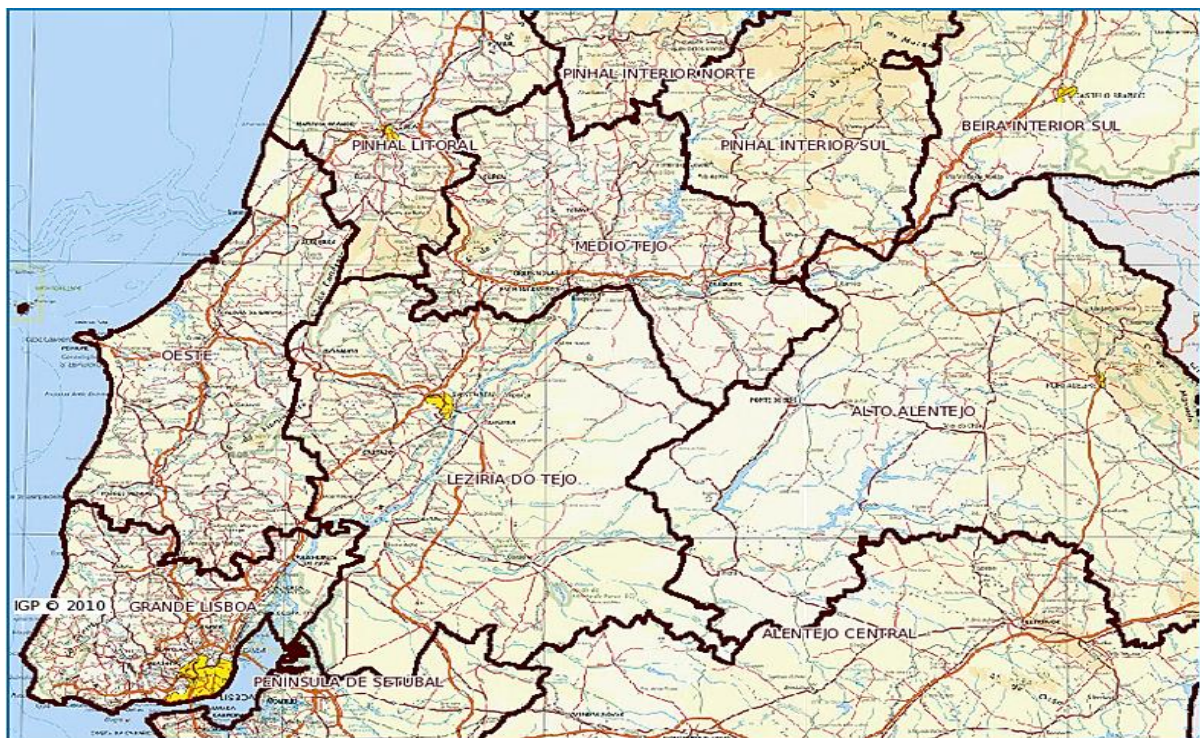

Figure 1: Tagus Valley map and contiguous NUTS 3 regions. Source: Portuguese Geography Institute (2010)

In the Portuguese mainland's context, by using quotients of location we may prove that this region has a significant spatial agglomeration of agriculture and agroindustry activities (including winery industry) – as shown in Oliveira and Natário (2016b), Tables A-1 to A-4 (pp.120-121).

The Tagus Plains is part of Alentejo (a NUTS 2 Portuguese region), while the Middle Tagus belongs to Centro (idem). Considering its municipalities, the Tagus Valley – a region created for territorial administration purposes – includes a total of 21, administratively divided into the Tagus Plains (Almeirim, Alpiarça, Azambuja, Benavente, Cartaxo, Chamusca, Coruche, Golegã, Rio Maior, Salvaterra de Magos and Santarém) and the Middle Tagus (Abrantes, Alcanena, Constância, Entroncamento, Ferreira do Zêzere, Ourém, Sardoal, Tomar, Torres Novas and Vila Nova da Barquinha).

The population density, according to Portuguese 2011 Census, is about 71 inhabitants per squared kilometre for a total surface of 6.581 km2; substantially lower than metropolitan area of Lisbon's (931 inhabitants per squared kilometer). This groups two NUTS 3 sub-regions: Great Lisbon (including Lisbon and medium-sized cities like Amadora, Loures, Odivelas and others) and Setúbal's Peninsula (at the south bank of Tagus' estuary). Its territorial area is about 3.015,24 km2. The data are accessible at Statistics Portugal's website.

4 EVIDENCE FROM THE SURVEY

4.1 The sample's description

The statistical units considered were companies with headquarters in the Tagus Valley since more than 3 years (by the time they were inquired, between 2010 and 2011), of any dimension but exercising at least one activity embedded in the agri-food supply chain. Such means that at least one of main or secondary activities performed by the firm must be classified within one of these divisions (according to Portuguese classification of economic activities, CAE Rev.3): agriculture, animal production, hunting and related service activities; industries of food and beverage of raw agricultural materials origin (including wine); wholesale of agricultural products and its derivatives. The sample analyzed, representative of the firms' population under analysis, was the following[3].

Table 1

Sample's composition by category of agent in agri-food supply chain, and size of enterprises

	Micro		*Small*		*Medium*		*Large*		**Total**	
Supplier	1	1,9%	0	0.0%	0	0.0%	0	0.0%	1	0,9%
Producer/farmer	34	63,0%	23	56,1%	5	41,7%	0	0,0%	62	56,4%
Producer organisation	12	22,2%	4	9,8%	0	0,0%	0	0,0%	16	14,5%
Agricultural Cooperative	3	5,6%	2	4,9%	0	0,0%	0	0,0%	5	4,5%
Cooperative winery	1	1,9%	4	9,8%		0,0%		0,0%	5	4,5%
Agri-food Industry	2	3,7%	8	19.5%	4	33,3%	3	100,0%	17	15,5%
Agri-food wholesaler	0	0,0%	0	0.0%	3	25,0%	0	0,0%	3	2,7%
Producer Association	1	1,9%	0	0.0%	0	0.0%	0	0,0%	1	0,9%
Total	54	49,1%	42	37,3%	12	10,9%	3	2,7%	110	100%

Note: The percentages along each column show the relative weights of each supply chain category in the respective size. The percentages in bottom line are relative to the weights of each size in total inquired.

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[3] The sampling strategy combined snow ball and convenience selection, as explained in doctoral research (Oliveira, 2013; chapter 6).

4.2 The performance of human capital

To assess the level of human capital in 110 business units surveyed, 3 indicators were used concerning either the organizational routines, or the level of academic training and/or certification of professional competence: i) periodicity of the internal training; ii) number of newspapers or scientific publications subscribed/regularly consulted; iii) proportion of employees with higher or vocational training courses.

The results obtained for the set of inquired enterprises, presented in Table 2, allowed to infer that the periodicity of the internal training is predominantly annual (40.0%). The absence of internal (and external) training was detected in 14 cases. For this group, it is possible to draw the following profile: farmers/producers, in a large majority (85.7%); about two-thirds are micro-firms and the rest are small firms; only 29% sell exclusively at the regional market; almost 21% are exporters.

From descriptive statistics used in the study cited (see Table XX-23) applied to a truncated sample considering the index of endowment of human capital at least equal to 75 (labelled as excellent), it is evident that the medium and large enterprises are more intensive in the formation of human capital: among companies with excellent performance in accumulation of human capital (figure 2), the proportion of those (23.1%) is 10 p.p. greater than the assigned to them in the whole sample (13.6%)[4].
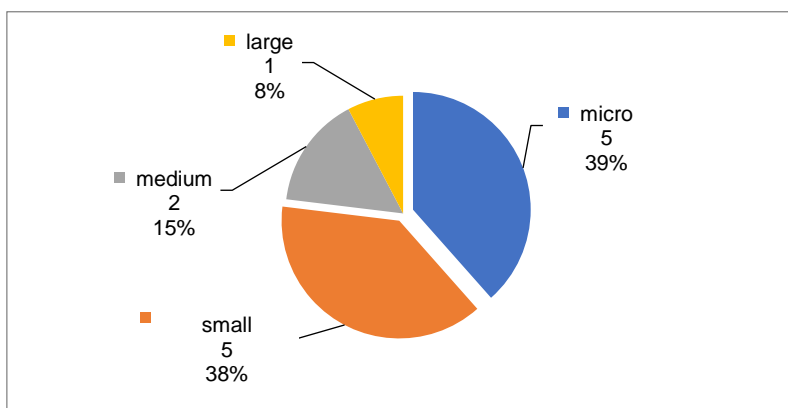

Figure 2: Sample distribution by size of enterprise, under the condition of excellent human capital endowment

In summary, we found that the 'stock' of human capital tends to be concentrated at the medium-sized and large companies because these are the ones who most intensively promotes excellency in personal development.

Table 2

Sample results for human capital performance

Variable/item	n	%
Training of employees outside the company:		
Nonexistent	46	41.8
Annual	45	40.9
Every six months	5	4.5
Every three months	9	8.2
Monthly	3	2.7
Training of employees inside the company:		
Nonexistent	24	21.8
Annual	44	40.0
Every six months	11	10.0
Every three months	12	10.9
Monthly	14	12.7

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[4] The classification of 'excellent' is given with respect to the "state" of each (indexed) variable according to an ordinal scale for quartiles: too modest, modest, good and excellent.

	n	%
Training within the enterprise is given by the firm's managerial staff:		
Never		
Few times	12	10.9
Half of the time	11	10.0
Most of the time	12	10.9
Always	38	34.5
	13	11.8
There is no training, inside or outside the company:	14	12.7
Category in the supply chain:		
Farmer/producer	12	85.7
Producers' organization	1	7.1
Agricultural cooperative	1	7.1
Size (number of employees):		
Micro-enterprise	9	64.3
Small enterprise	5	35.7
Regional market strict dependence:		
Not dependent	10	71.4
Dependent	4	28.6
Competing in foreign markets:		
No	11	78.6
Yes	3	21.4
Newspaper or scientific publication subscription:		
None	40	36.4
One	27	24.5
Two or more	43	39.1
Proportion of staff employees with higher education or professional training:		
Less than half	78	70.9
Half	9	8.2
More than half	19	17.3

4.3   Innovation dynamics versus investment in human capital

The hypothetical relationship between innovation and the effort made by micro and small firms to rise their 'stock' of human capital remits to the functions exercised by the local environment ('milieu') in reducing the uncertainty inherent in any process of innovation (Camagni, 1991) – see the following table.

Table 2

The role of local milieu in reducing uncertainty inherent to the innovation process (relational synergies of knowledge)

Function	Construct
Search	Through the informal exchange of information, the local milieu provides tracing of success stories related to the discovery of new markets and the implementation of new technologies useful to the company, and "memorize" the channels that best disseminating these successful experiences.
Signalling	It signalizes the market in benefit of the image and reputation of local companies, acting as a sort of certifying entity of the quality of goods produced by these companies.
Transcoding	It facilitates collective learning by providing access to privileged information, which is embedded in people and transmitted by personal and organizational proximity. The mechanisms are: a) inter-organizational mobility within the region (but almost interregional immobility) of qualified human resources; b) contacts between customers and suppliers; c) imitation processes and reengineering, spread among local companies of appropriate technologies; d) effects of informal "coffee shop"; e) provision of specialized services within the region.

Selection	It stimulates personal contacts through which are obtained efficiency/effectiveness gains in the circulation of vital information at the level of decision making conducive to innovation; in particular, through the mobility of managers in the local labour market, by imitation, cooperation actions within the framework of associations and industrial and trade organizations and complementary processes of innovation.
Control	Through "face-to-face" ties (belonging to the same family/clan, club, associations), the local environment facilitates the sharing of relevant information in the decision-making process behind the innovation, strengthens the "ties" between the financial sector and the productive system, and promotes a similar "cultural context" among entrepreneurs, managers and other decision makers.
Transformer	It promotes positive externalities appropriable by local companies, particularly important in the spheres of labour market, human capital and education.

Source: Camagni (1991:121-144)

As suggested by Oliveira and Natário (2016b), such functions rely largely on the assumption that there is a proper endowment of human capital in the host territory of agri-food supply chain. The theoretical argument is given both by regional and urban scientists - as Florida (1995 and 2003), Landry (2000) and Scott (1996) - and the evolutionist perspective of Teece (1988), when explaining the polarization effects (or urban agglomeration) of creative industries and/or knowledge intensive businesses and services. Another important contribution comes from the agropolitan district perspective (Friedmann & Douglass, 1976).

The authors recognize that the accumulation of knowledge through localized collective learning and social interaction will develop "naturally", resulting in successive innovations. These will lead to the modernization of the agricultural sector (with growing insertion in commercial circuits of modern distribution) as well as agroindustry sector – tending to spread through the countryside thanks to the multiplication of family businesses (micro-enterprises fundamentally) targeting the regional market.

The stronger relations between farmers, on one side, and food industries and wholesalers on the other – through formal associations - will work, then, as a valuable vehicle for learning and innovation (non-market interdependencies). These are of crucial importance in a globalized agri-business world where human capital accumulation is a driver for sustainable competitive advantage in any organization, anywhere it is located (Camagni, 1991 and 1995; Lundvall, 1992; Torre & Wallet, 2014).

Considering the statistical results mentioned in section 4.2 there are two main findings. First, the endowment of human capital is modest for the reason of most enterprises inquired be micro or small firms. This is consequence of two main reasons: i) staff training is sporadic; ii) there is a lack of higher education in most entrepreneurs.

Therefore, we may expect modest innovation's performance for the whole enterprises inquired. This is a realistic expectation as it is shown by a significant and positive (non-parametric) correlation between both variables (Table 3). Once that the level of human capital is modest in overall, so shall be the global innovation index (Table 4).

Table 3

Spearman's rank-order correlation coefficient between each innovation dimension and human capital endowment

Innovation dimension	Human capital	
	r_s [(1)]	p-value
Product	+0.19	0.030*
Process	+0.36	0.049*
Organizational	+0.40	0.071
Marketing	+0.45	<0.001***
Investment in innovation activities	+0.48	<0.001***
Global innovation index	+0.49	<0.001***

Notes: *** p-value<0,001; ** p-value<0,01; * p-value<0,05
[(1)] Spearman's rank order correlation coefficient.

Notice that the overall measure of innovativeness of an enterprise (global innovation index) is obtained by taking a simple average of the scores along the inputs (product, process, organizational and marketing) and output (investment in innovation activities) – following the good practices recommended by the Oslo Manual (OECD, 2005).

Table 4

Descriptive statistics for innovation and human capital

Innovation dimension	$\overline{X}$	Med	s	x_{min}	$x_{máx}$
Product	44.63	54.55	31.41	0.00	90.91
Process	51.26	53.85	24.20	0.00	92.31
Organizational	58.64	66.67	32.85	0.00	100.0
Marketing	38.38	44.44	34.38	0.00	100.0
Investment in innovation activities	39.59	38.75	20.66	2.50	92.50
Global innovation index	46.50	45.96	21.62	2.72	86.69
Human capital	42.17	46.15	23.48	0.00	84.62

Furthermore, the Chi-Squared test (Table 5) gives statistically significant results in favour of the alternative hypothesis of no rejection of differences in averages of innovation performance depending on firm's dimension. Looking at the descriptive statistics it is evident that innovation performance increases with firm size.

Table 5

Descriptive statistics for innovation and human capital. Differences between groups averages.

Innovation dimension Firm size	N	$\overline{X}$	Med	χ^2	p
Innovation of product					
Microenterprise	54	36.36	36.36	9.036	0.011*
Small enterprise	41	46.78	63.64		
Medium/large enterprise	15	67.88	72.73		
Innovation of process					
Microenterprise	54	45.00	46.15	12.491	0.002**
Small enterprise	41	54.78	61.54		
Medium/large enterprise	15	66.15	69.23		
Organizational innovation					
Microenterprise	54	54.72	66.67	2.893	0.235
Small enterprise	41	62.20	66.67		
Medium/large enterprise	15	65.56	83.33		
Marketing innovation					
Microenterprise	54	24.53	11.11	18.214	<0.001***
Small enterprise	41	47.43	55.56		

Medium/large enterprise	15	61.48	66.67		
Investment in innovation activities				12.703	0.002**
Microenterprise	54	32.55	30.00		
Small enterprise	41	45.79	47.50		
Medium/large enterprise	15	48.50	52.50		
Global innovation				16.959	<0.001***
Microenterprise	54	38.63	39.32		
Small enterprise	41	51.40	56.57		
Medium/large enterprise	15	61.91	66.96		

Notes: *** p-value<0,001; ** p-value<0,01; * p-value<0,05

4.4. Innovation dynamics and agribusiness' internationalization

In the first place, we base our research in a somewhat simplistic concept of internationalization, understood in a very narrow way as the capacity to sell systematically abroad, measured through company's variety of external markets (including, also, possible branches with headquarters abroad)[5]. So, the research proposition is: companies with higher degree of internationalization are those with best overall performance in innovation.

The degree of internationalization is measured through an ordinal scale (Likert's type) in which the scores (from 1 till 5) are given as the enterprise exports to one or more continents - e.g. while the case of an enterprise without any export activity is scored with *0, 5* means that we are in presence of a global company (which exports to all continents, whatever the number of countries or diversity of products involved) – graphed in Figure 3.
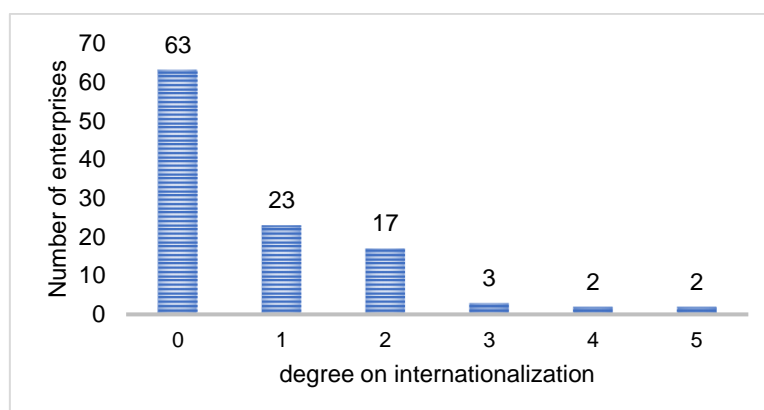

Figure 3: Sample distribution by enterprise's degree of internationalization.

Extracting a truncated sample according to the criterion of exporter enterprise, and then calculating the ratios of weights for each category of enterprise in both samples (last column of Table 1, and Table 6), it becomes clear that farmers/producers and their organizations (including agriculture cooperatives) have less propensity to export (Table 7). On the contrary, agri-food companies/industries and winery cooperatives have a stronger ability to diversify markets abroad.

Table 6

Absolute and relative frequencies for exporting enterprises (by degree of internationalization, size and category of agent in agri-food supply chain).

Variable	n	%
Degree of internationalization:		
1	23	48.9
2	17	36.2
3	3	6.4

[5] It is worth of notice that: "In spite of both positivistic and instrumental research, the reliability of measuring the degree of internationalization of a firm remains speculative." (Sullivan, 1994, p. 325).

	4	2	4.3
	5	2	4.3
		47	100%
Size (nr. employees):			
	Micro (0 – 9)	12	25.5
	Small (10 – 49)	22	46.8
	Medium (50 – 249)	10	21.3
	Large (≥ 250)	3	6.4
Category of agent:			
	Producer/farmer	23	48.9
	Producer organisation	6	12.8
	Agri-food Industry	10	21.3
	Agri-food wholesaler	2	4.3
	Agricultural Cooperative	2	4.3
	Cooperative winery	4	8.5

Table 7

Internationalization performance by category of agent

Category	*QI*	*Propensity to internationalize*
Producer/farmer	0.86	-
Producer organization	0.88	-
Agri-food Industry	1.38	+
Agri-food wholesaler	1.78	++
Agricultural Cooperative	0.96	-/+
Cooperative winery	1.89	++

Caption: - weak; -/+ neutral; + strong; ++ very strong.[6]

Once that agricultural activities are typically based on small structures, when compared with the downstream activities, it is intuitive to show the existence of an association between firms' dimension and their degree of internationalization. The explanation can be found in the type of expertise (marketing managers and sellers with a high degree of knowledge, meaning high salaries and expenditures of negotiation) – undoubtedly needed to get reputation in abroad markets and trust from foreigner intermediary agents.

This is particularly evident in the very recent speeches of two wine business professionals - the president of Tagus' Wines Regional Commission (a regulatory institutional agent with the mission of promoting at abroad the regional wines); and a marketing director of a major Portuguese exporter, established at Setúbal district). Both specialists recognize the extreme difficulty for single entrepreneurs to get in successfully at international market, without enough scale of production, high quality standards, trade fairs' experience and administrative personal able to communicate with clients in effective manner[7].

Statistically, these qualitative elements of research are corroborated by an evident correlation between degree of internationalization and innovation in its multiple dimensions (Table 8).

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[6] The symbol "+" means that the respective category has a weight in the exporting companies sample greater than that in the main sample with a overplus below 50% ($1 < QI < 1.5$); "++" is the case when the positive deviation exceeds the "neutral" value (1) by at least 50% ($QI ≥ 1.5$). In the case of a negative deviation but not below to 50%, we admit that category as being more focused at national market (at most).

[7] Their testimonies were given during two workshops, performed respectively in May, 10th and 24th, 2017, at Santarém Polytechnic Institute, Higher School of Management and Technology (in the context of the *First Conference of International Business*).

Table 8

Non-parametric correlation coefficient between each innovation dimension and degree of internationalization

Innovation dimension	Degree of internationalization	
	r_s [1]	p-value
Product	+0.21	0.030*
Process	+0.19	0.049*
Organizational	+0.17	0.071
Marketing	+0.44	<0.001***
Investment in innovation activities	+0.38	<0.001***
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Notes: *** p-value<0,001; ** p-value<0,01; * p-value<0,05.
[1] Spearman's rank order correlation coefficient.

To synthetize, there is a strong dependence of the regional market for micro and small firms, deeply engaged in business relations with producers' organizations/associations – an almost inevitable consequence of scarce organizational resources, but also induced by the European Community Regulations because of food security and the need to reduce the ecological footprint of agriculture activities, as well as the agroindustry (Oliveira, 2013; section 5.4.2).

Considering the question raised at the beginning of this section, the use of linear (versus quadratic) regression analysis on the index of internationalization (originally designed) allowed realize that the purpose-built indicator to measure innovation fits best a trend in the form of inverted parabola (Tables 9a and 9b).

Table 9a

Results of linear regression for global innovation index

Model specification	parameters		T-Student test for individual regressors		R-squared adjusted	Model's test	
Dependent variable: *Global innovation index*	B	β	t	p		F	p
Constante	41.747	---	17.544	< 0.001***	0.095	12.436	0.001**
Internacionalization	6.223	0.321	3.526	0.001**			

Notes: *** p-value<0,001; ** p-value<0,01; * p-value<0,05

Table 9b

Results of quadratic regression for global innovation index

Model specification	parameters		T-Student test for individual regressors		R-squared adjusted	Model's test	
Dependent variable: *Global innovation index*	B	β	t	p		F	p
Constante	40.267	---	15.995	<0.001***	0.11	7.746	<0.001***
Internacionalization	12.585	0.650	3.026	0.003***			
(Internacionalization)^2	-1.857	-0.362	-1.686	0.095			

Notes: *** p-value<0,001; ** p-value<0,01; * p-value<0,05

Such results suggest that innovation is not the main driver for highest degrees of internationalization, weighing more the reputation of the wine-producing region and the management competences than enterprise innovativeness. Such territorial and organizational assets are mirrored in strengthening of personal and social ties with abroad trading partners. Thanks to the natural and cultural heritage, jointly with dense social and industrial atmosphere, we are in presence of a *system of value* (Porter, 1998) considering the integration with other value chains - such as tourism (including ecotourism

and wine tourism), forest (where the 'montado' of cork oak plays a strategic role for territory sustainability) and religion - having the Tagus River as nuclear element.

5   CONCLUSION

This research aimed to demonstrate that human capital is a driver of firms' innovative capacity, having also a clear influence in the internationalization considering the expertise that is embodied in international business managers and consultants.

From empirical evidence a central idea emerged: ties between individual entrepreneurs (especially farmers) and sectorial organizations and social relations inside the rural communities of Tagus Valley are crucial as sources of tacit knowledge, which is vital to run their business according to standards of quality and trading requisites imposed by Common Agricultural Policy. The implementation of such standards has been a hard challenge for most enterprises, particularly those of minor dimension, considering the demanded investment in innovation activities.

As a major limitation, this research was based in secondary data (taken from a previous research, performed between 2010 and 2012), replicating some ideas drawn by then but now with a reinforcement in face of renewed qualitative information, enriched with new insights coming from recent literature.

Finally, we may conclude there is a territorial dependence for agri-food supply chain sustainability at the level of agricultural activities, because of the lack of human capital in micro and small firms, helping them to resist competitively in regional market. For future research, we suggest a larger study considering the national panorama of such types of firms, enlarging to other industries and services; as well as use more robust indicators about human capital, innovation and internationalization.

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