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Abstract

Innovation in the services sectors has been a rather neglected research area under the commonly held view that manufacturing firms are the main drivers of innovation in developed economies. The rise of the service economy has redirected the research agenda towards the potential of services firms to adopt innovation activity. Here we analyze the determinants of innovation activity in the tourism industry, which is one of the fastest growing service industries in the world. Our analysis builds upon the theoretical notion of entrepreneurial culture in order to suggest that entrepreneurs possess such culture when they actively and consciously seek information in order to underwrite the risk and ambiguity inherent in actions such as innovation activity. At the empirical level, entrepreneurial culture is approximated by active engagement in networking activity. Our results indicate that both internal and external to the firm social capital generation processes, determine innovation activity in tourism and provide evidence over the selective nature of information networks.

1. Introduction

Empirical research in the field of innovation has focused on the innovation activity of manufacturing firms leaving other sectors of the economy, like services largely unexplored (Nordin 2003). As Hirsch-Kreinsen et al. (2003) argue, little is known regarding the innovation activity of almost all low-tech industries. And this is observed despite that first, the service sector constitutes one of the core economic activities of contemporary economies (EC 2006) and second, the fact that the innovation systems of Europe and other countries are strongly influenced by low-tech industries, while their products are growing rapidly as a consequence of quality improvements and technological upgrading (Hirsch-Kreinsen et al. 2003). In short, as Nordin (2003) argues, there is little chance to the idea that services are not innovative.

Our aim here is to analyse the determinants of innovation activity in the tourism industry, which is one of the fastest growing service industries in the world. Analysing innovation activity in the tourism sector is of particular importance. First, the distinctiveness of innovation in the tourism industry (Hjalager 1997, Sundbo et al. 2007) calls for a more thorough analysis of its determinants. Innovativeness in tourism is not to the same extent, or not at all associated with research and development as in manufacturing. The central elements of innovation activity in tourism are generally human resources, such as people, competence and knowledge as well as access to networks (Hjalager 1997). Secondly, despite that tourism is the fastest growing industry in the world[1], it is also an extremely competitive sector that undergoes significant transformations and faces important challenges (UNWTO

[1] Tourism and travel is the world's largest industry. According to the World Tourism Organisation (WTO) travel represents 35% of the world's export of services, while in 2006, 846 million international travelers were recorded and international tourism receipts amounted to 733 billion US dollars (UNWTO 2007).

2007). Improving the competitiveness of tourism at the destination level has emerged as a locus of attention for theorists in the field (Ritchie and Crouch 2003) while recent evidence suggest that innovation activity is a prerequisite for the successful performance and survival of tourism firms (Sundbo et al. 2007).

Our main hypothesis is that entrepreneurial culture determines innovation activity especially in low-tech industries such as the tourism sector. Our analysis builds upon the hypothesis that entrepreneurs possess such culture when they actively and consciously seek information in order to underwrite the risk and ambiguity inherent in actions such as innovation activity (Wennekers et al. 2007). At the empirical level, entrepreneurial culture might be manifested by active engagement in social capital generation processes. The applied methodology involves the estimation of several probit models, which are used to test the effect of different sets of variables approximating social capital generation processes. Empirical data are drawn from a cross-section questionnaire survey conducted in Patras, Greece. Empirical results indicate that both internal and external to the firm social capital generation processes, determine innovation activity in tourism and provide support over the selective nature of information networks.

2. Entrepreneurial culture and innovation activity

The 'ability to create and use knowledge' is the distinctive characteristic of development in the era of the so-called knowledge economy (Viginier 2002: 5). The term 'knowledge-based' economy emerged to describe those economies in which the production, diffusion and use of knowledge are the main drivers of growth and competition. A wide and useful conceptualization of the meaning of 'knowledge-based' economy, which leaves room for a discussion over the diversity of industries

and the different behaviors regarding innovation activity and knowledge creation, is provided by the Organization for Economic Cooperation and Development (OECD) according which:

> '*a knowledge-based economy is not simply one that emphasizes new technologies or even new knowledge. It is the one in which all sectors are knowledge intensive, are responsive to new ideas, are innovative and employ high skilled personnel engaged in on-going learning. Generated knowledge and skills have to be usable and used in the production of all goods and services*' (OECD 2001: 11).

Furthermore, OECD gives a clear view of what might be considered as innovation activity by suggesting that:

> '*innovation is the search for, and the discovery, development, improvement, adoption and commercialization of new processes, new products and new organizational structures and procedures*' (OECD Report: 17).

Innovation is thus used to quantify the 'target' of most developed nations that is the built up of a knowledge-based economy. At the micro level, innovation is the key to business survival and growth and encompasses the knowledge that is linked to entrepreneurship as defined by Schumpeter (1939). Further, innovation addresses the need to sustain industrial diversification and the low-tech sectors, in particular. The study of entrepreneurship then must focus on how knowledge, know-how and systematic innovation are managed by entrepreneurs, as this might be an important source of the observed differences in the field of entrepreneurship (Julien 2007).

Whereas potential for success is what all innovative firms are aiming at, uncertainty and ambiguity co-exist with any such potential. In a rapidly changing and increasingly competitive environment, the ability to manage information properly and deal effectively with uncertainty might explain why some small businesses succeed

where others fail, while indeed operating in the same local environment (Julien 2007). The ability to create and use social capital leads to improved economic activity, i.e. the area in which some firms gain success compared to their competitors.

Social capital is related to the existence of networks, i.e. of forms of voluntary co-operation wherein entrepreneurs exchange information and other resources (Galaskiewicz et al. 1985). In that sense, social capital is a process that depends on the structural and relational aspects of an activity (Anderson and Jack 2002) embedded in the operation and behaviour of local actors such as firms (Boschma 2004). Social capital is inherently linked to innovation activity the latter involving a wider set of internal to the firm transformations that need to be accommodated in order for innovation activity to be successful. More specifically, social capital generation processes are information-gathering processes that derive from networks (Guiliani 2007) and materialize within the production process, in order to reduce risk and uncertainty about future actions (Castells 2004). In other words, information is an economic value process originating from networks (Van Alstyne and Bulkley 2004).

Here, the term social capital is used in order to denote the networks of relations that are directly or indirectly linked to the operation of an industry and in that sense it refers to enterprise-based social capital as defined by Westlund (2006). As Westlund (2006) argues the enterprise-based social capital might be broken down to what he identifies as internal to the enterprise social capital, and the external to the enterprise social capital. The social capital that is internal to the enterprise refers to links / relations which create and distribute attitudes, norms, traditions, etc within the firm in the form of company spirit, climate of cooperation, etc. The external to the enterprise social capital is composed of the production--related social capital, i.e. links / relations to suppliers, product users, partners in cooperation and development, the

environment--related social capital, i.e. links / relations to the local / regional environment, to political decision makers, universities and other enterprises, and market-related social capital which refers to general customer relations built through marketing, customer clubs, programs, etc (Westlund 2006). Formally stated the following hypothesis is formulated and tested:

H1: Innovation activity is positively affected in the case of owners / managers possessing entrepreneurial culture, which is created through the purposeful engagement in social capital generation processes.

3. Statistical Model and Data

As explained in the previous part, the aim is to identify those factors that will enhance the probability of a firm adopting an innovation. Consequently, a firm's choice regarding innovation activity may be modeled as $(Y=1)$ in the case that a firm adopts an innovation and as $(Y=0)$ if it doesn't. Thus, a set of factors gathered in the $\mathbf{x}$ vector can explain the decision, so that:

$$\begin{aligned} \text{Prob}(Y=1) &= F(\boldsymbol{\beta}'\mathbf{x}) \\ \text{Prob}(Y=0) &= 1-F(\boldsymbol{\beta}'\mathbf{x}) \end{aligned} \tag{1}$$

where the set of parameters $\boldsymbol{\beta}$ reflect the impact of changes in $\mathbf{x}$ on the probability (Greene 1997).

For dichotomous variables the use of a typical OLS regression model is not appropriate. In principle, any continuous probability distribution defined over the real line will suffice as to obtain consistent predictions of the probability of the outcomes expressed in equation (1) (Greene 1997). Using a normal distribution we get a probit model of the form:

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

where the function $\Phi(.)$ indicates the standard normal distribution, $\mathbf{x}$ is a vector of explanatory variables, i.e. social capital variables and other factors, and β is a set of corresponding parameters that reflect the impact of changes in $\mathbf{x}$ on the probability of y^*. Alternatively, if we use a logistic distribution we get a logit model of the form:

$$\Pr ob(Y=1) = \frac{e^{\beta' x}}{1+e^{\beta' x}} = \Lambda(\beta' x)$$

where the notation $\Lambda(.)$ indicates the logistic cumulative distribution function. The two distributions are expected to give similar predictions unless the sample contains very few responses/non-responses (i.e. very few *Y*'s equal to 1 or *Y*'s equal to 0) and/or there is wide variation in an important independent variable (Amemiya 1981). Thus, in general either of the two distributions may be chosen in the absence of such reasons. Differences in the two models might arise in terms of the estimated marginal effects. After testing for the magnitude of these effects the results of a probit specification are reported here. More specifically, the probability model is a regression model of the form (Greene, 1997):

$$E\left[y|\mathbf{x}\right] = 0\left[1-F\left(\boldsymbol{\beta}'\mathbf{x}\right)\right]+1\left[F\left(\boldsymbol{\beta}'\mathbf{x}\right)\right] = F\left(\boldsymbol{\beta}'\mathbf{x}\right)$$

To estimate the parameters of the model we take:

$$\frac{\partial E\left[y|\mathbf{x}\right]}{\partial \mathbf{x}} = \left\{\frac{dF\left(\boldsymbol{\beta}'\mathbf{x}\right)}{d\left(\boldsymbol{\beta}'\mathbf{x}\right)}\right\}\boldsymbol{\beta} = f\left(\boldsymbol{\beta}'\mathbf{x}\right)\boldsymbol{\beta}$$

where $f(.)$ is the density function that corresponds to the cumulative distribution, $F(.)$. For the normal distribution this is,

$$\frac{\partial E\left[y|\mathbf{x}\right]}{\partial \mathbf{x}} = \phi\left(\boldsymbol{\beta}'\mathbf{x}\right)\boldsymbol{\beta}$$

where the $\phi(t)$ is the standard normal density. The marginal effect of any independent variable, say x_k, is estimated as $\phi(\boldsymbol{\beta}'\mathbf{x})\beta_k$ (Greene 1997). It should be noted that, the interpretation of probit coefficients is not analogous to the corresponding coefficients obtained by linear regression models. Actually the interpretation of a probit coefficient, β, is that a one-unit increase in the predictor leads to increasing the probit score by β standard deviations. In other words, the marginal effects show how much the probability of a firm adopting an innovation will change if the independent variable changes by a marginal amount from its sample mean. For dummy independent variables the marginal effects are analyzed as discrete or relative changes when the respective dummy takes its two different values, 0 and 1, respectively (Greene 1997).

As regards the statistical properties of the estimated model, the null hypotheses that individual coefficients are zero can be calculated based on the usual *t* tests. The null hypothesis that all the parameters associated with the explanatory variables are equal to zero is tested with a joint chi-square test based on the maximized likelihood (Wooldridge 2002). The goodness of fit measures usually reported are the percent correctly predicted and various pseudo-R squared measures, the most often cited being the likelihood-ratio test statistic suggested by McFadden (1974). However, it should be noted that goodness-of-fit measures in the case of binary response models is not as important as statistical and economic significance of the explanatory variables (Wooldridge 2002). Finally, specification test analysis involved a test for heteroskedasticity based on generalized residuals and a test for omitted variables using predicted values of the dependent variable (Maddala 1995).

The used data refer to a cross-section questionnaire survey conducted in tourism firms located in the Patras region. Patras is the largest urban center of the

Western Greece region (NUTS II level) and the capital city of the Prefecture of Achaia. It concentrates more that half of the prefecture's population and the vast majority of the services that the wider area provides and depends heavily upon tourism. The survey has been undertaken during a six months period in 2005. It resulted in a random sample data set of 95 usable questionnaires containing information about three different types of businesses, namely tourist agencies, hotels and restaurants. The recorded information regards firm specific characteristics, human resources variables and social capital generation links. The sample consists of micro and small-sized businesses, according to the Commission's definition of Small and Medium-sized enterprises (SMEs) in terms of employment and turnover (CEC 2003).

The dependent variable of the model refers to the innovation activity of firms and has been constructed based on owner/managers' answers as to whether they have recently adopted an innovation. Thus the dependent is a binary coded variable *Innovation Activity* that takes the value of 1 if the firm has recently adopted an innovation, either a new process or a new product, service, etc, and 0 otherwise. Five sets of explanatory variables are used referring to knowledge base variables, and enterprise-related, production-related, environment-related and market-related social capital. See Table 1 for a description of the used variables and Table 2 for the descriptive statistics of the used variables.

4. Results

After testing for the effect of the different sets of explanatory variables, model 6 is the final model analyzed here. The goodness-of-fit measures shown in the lower part of Table 3 indicate the very satisfactory fit of the estimated model. The likelihood ratio test is highly significant (49.42), and the corresponding goodness-of-fit ρ^2 measure

indicates a very satisfactory fit. The model correctly predicts 82.11 per cent of the cases.

Results on the statistical significance of the explanatory variables show that four explanatory variables have been found statistically significant at the standard statistical levels. More specifically, the variables indicating that innovation activity has resulted from cooperation within the firm, financial links, institutional links and market links are statistically significant. The sign of the estimated coefficients shows the direction of the change in the probability that a firm reports innovation activity. As expected, all of the statistically significant variables positively affect the probability that a firm undertakes innovation activity.

Marginal effects are reported only for the statistically significant variables. As shown in the last column of Table 3, the most important variable is inside cooperation. Firms that report inside cooperation have an 83.9 per cent higher probability of reporting innovation activity. Financial links increase the probability of a firm undertaking innovation activity by 39.1 per cent, while institutional links increase the probability of innovation activity by 23.8 per cent. Finally, market related links increase the probability of innovation activity by 26.1 per cent.

5. Conclusion

Overall, the results of the present study support the hypothesis that social capital generation processes, i.e. the voluntary exchange of information within networks, influence innovation activity in tourism. Both internal and external social capital processes are at play suggesting that indeed it is specificity of networks that enhances their effectiveness. Westlund's (2006) classification has been found a useful basis for deconstructing specificity of network linkages (Guiliani 2007). The effect of the

knowledge base variables has not been found to affect innovation activity but it can reasonably be assumed that the effect of variables depicting the knowledge that is possessed from entrepreneurs and their employees is subsumed by internal social capital variables and especially the variable depicting the source of innovation activity.

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Table 1. Definitions of used variables

Variable Name	Definition
Dependent variable:	
Innovation activity	Dichotomous variable, binary coded, 1 if the firm has adopted an innovation and 0 otherwise
Explanatory variables:	
Knowledge base	
Management experience	Dummy coded variable, 1 if the entrepreneur has previous management experience and 0 otherwise
Work experience	Dummy coded variable, 1 if the entrepreneur has previous work experience and 0 otherwise
Family entrepreneurship	Dummy coded variable, 1 if at least one of the entrepreneur's parents owned / owns a firm and 0 otherwise
Knowledgeable entrepreneur	Dummy coded variable, 1 if the entrepreneur owns a university degree and 0 otherwise
Knowledgeable workers	Dummy coded variable, 1 if the firm employees personnel with a university degree and 0 otherwise
Firm age	Control variable, natural logarithm of the firm's age, in years
Type of firm dummy	Control variable, dummy coded, 1 if the firm is a tourist agent and 0 otherwise
Enterprise (Internal) social capital	
Employees' experience	Natural logarithm of employees' within firm experience, in years
Inside cooperation	Dummy coded variable, 1 if the innovation has been proposed by both employees and the owner and 0 otherwise

Production – related (External) social capital	
Suppliers links	Links to local suppliers pool approximated by the percentage of inputs from local suppliers
Customers links	Links to local sales pool approximated by the percentage of sales to local businesses or customers
Services links	Links to local support pools approximated by the percentage of costs for technical advice and support paid to local businesses
Employees links	Links with the local employees pool approximated by the percentage of employees residing in the area
Finance links	Dummy coded variable, 1 if the firm has stable relations with local financing institutions and 0 otherwise
Environment – related (External) social capital	
Institutional links	Natural logarithm of the number of public bodies the firm cooperates with
Public promotion links	Dummy coded variable, 1 if the firm cooperates with public authorities for the promotion of tourism in the area and 0 otherwise
Social links	Dummy coded variable, 1 if the firm sponsors cultural, athletic or other type of social activities in the area and 0 otherwise
Market – related (External) social capital	
Sectoral links	Dummy coded variable, 1 if the firm officially belongs to chambers and other sectoral bodies and 0 otherwise
Promotion links	Dummy coded variable, 1 if the firm with other firms for the promotion of tourism in the area and 0 otherwise

Table 2. Descriptive statistics of used variables

Variable Name	*Descriptive Statistics*	
	Mean	*St.Dev.*
Innovation activity	0.358	0.482
Management experience	0.463	0.501
Work experience	0.653	0.479
Family entrepreneurship	0.389	0.490
Knowledgeable entrepreneur	0.095	0.294
Knowledgeable workers	0.526	0.502
Firm age	18.157	25.302
Type of firm dummy	0.200	0.402
Employees' experience	6.018	6.972
Inside cooperation	0.221	0.417
Suppliers links	0.756	0.331
Customers links	0.665	0.348
Services links	0.155	0.292
Employees links	0.855	0.305
Finance links	0.263	0.443
Institutional links	3.147	5.907
Public promotion links	0.505	0.503
Social links	0.400	0.492
Sectoral links	0.705	0.458
Promotion links	0.484	0.502

Table 3. Estimated coefficients and marginal effects for the innovation activity model

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Marginal Effects – Model 6
Management experience	0.992*	0.941*	0.887				
	(0.522)	(0.558)	(0.583)				
Work experience	0.765						
	(0.529)						
Family entrepreneurship	-0.056						
	(0.487)						
Knowledgeable entrepreneur	-0.192						
	(0.825)						
Knowledgeable workers	0.732						
	(0.492)						
Firm age	-0.404*	-0.071					
	(0.211)	(0.273)					

Type of firm dummy	0.921						
	(0.619)						
Employees' experience		-0.126					
		(0.266)					
Inside cooperation		2.993***	3.048***	3.697***	3.859***	3.892***	0.839***
		(0.723)	(0.728)	(0.804)	(0.845)	(0.841)	(0.201)
Suppliers links			-0.019				
			(0.217)				
Customers links			-0.199				
			(0.219)				
Services links			0.199				
			(0.171)				
Employees links			-0.063				
			(0.224)				
Finance links			1.483**	1.651**	1.848**	1.813**	0.391**

			(0.616)	(0.653)	(0.679)	(0.669)	(0.145)
Institutional links				0.924***	1.101***	1.105***	0.238***
				(0.328)	(0.341)	(0.341)	(0.073)
Public promotion links				-0.017			
				(0.620)			
Social links				0.517			
				(0.613)			
Sectoral links					-0.223		
					(0.654)		
Promotion links					1.189*	1.208*	0.261*
					(0.676)	(0.675)	(0.145)
Constant	-1.292	-1.435	-1.728	-2.743	-1.778	-1.919	
	(0.854)	(0.746)	(0.755)	(0.757)	(0.698)	(0.569)	
Summary Statistics							

N	95	95	95	95	95	95
Log-L	-54.014	-45.028	-41.549	-38.548	-37.188	-37.247
Restricted Log-L	-61.959	-61.958	-61.957	-61.959	-61.959	-61.959
$\chi^2_{(df)}$	15.889(7)	33.862(4)	40.819(7)	46.821(5)	49.540(5)	49.424(4)
ρ^2	0.128	0.273	0.329	0.378	0.399	0.398
Correctly classified	75.79 %	80.00%	81.05%	82.11%	82.11%	82.11%

Standard errors in parentheses. $*p < 0.10$; $** p < 0.05$; $*** p < 0.01$.