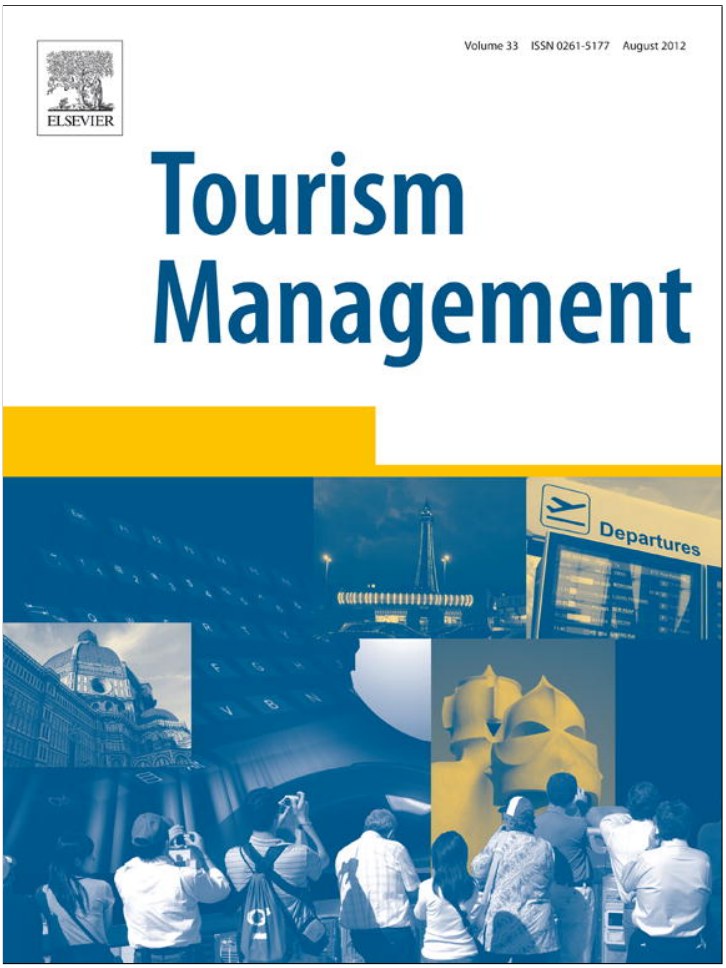

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Measuring innovation in tourism from the Schumpeterian and the dynamic-capabilities perspectives☆

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ABSTRACT

This paper offers a diagnosis of the "state of the issue" regarding the measurement of innovation in the tourism industry at the company level, and some recommendations for overcoming identified problems. The study addresses two central issues: how existing secondary databases of innovative activity define the boundaries of the tourism industry, and the degree to which these databases reflect the particular characteristics of this economic activity. It is concluded that these analyses present serious biases and anomalies hindering the understanding of the situation at the micro level and complicating the issue of international comparability, and the analyses do not capture the internal heterogeneity of innovative behavior of tourism companies from specific, intra-sectoral activities. The problems concern inappropriate indicators and the need for survey methods to complement the development of innovation scoreboards in secondary sources. The study concludes by detailing a set of proposals that should be considered in the context of a scoreboard to provide a comprehensive view of a tourism firm's technological and organizational innovations, as well as its innovative capabilities, combining Schumpeterian theory and the dynamic-capabilities-based approach, and also making cross-national comparisons feasible.

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1. Introduction

There is an array of challenges that have been taking place since the mid-1980s and which have spotlighted innovation as a crucial emerging force for the international competitive position of tourism companies and destinations (Hjalager, 2002; Ottenbacher, 2007; Ritchie & Crouch, 2000; Volo, 2005). The 2000 Delphi study of the trends and key success factors in Mediterranean tourism designated the critical competitive variables: innovation and the willingness to change, the introduction of organizational innovations, the technological modernization of processes, facilities, and products, and the improvement of information technology (Camisón, 1999; Monfort, 2000).

However, despite the increasingly strong evidence indicating that innovation is a first-magnitude competitive force, this is still an unresolved issue in tourism companies, as the literature acknowledges (Hall, 2009b; Hall & Williams, 2008; Hjalager, 2010). The tourism industry has always been quick to adopt technological innovations for many purposes, from serving customers better, to marketing or product development. Specifically, many tourism companies have already explored the different applications of information and communication technologies (see Miralles, 2010) for uses in the back-office (for example, for handling routine operational tasks, or in yield management) and in the front office (for example, for customer-relationship management [CRM]), for developing web-based services (including web 2.0 tools or geo-localization technologies using phones or GPS), or for using clean technologies and building environmentally efficient hotels. But the diffusion of innovation among tourism enterprises is nonetheless characterized by a low propensity for the development of new products and processes, particularly in independent or micro establishments with less than five employees (COTEC, 2007; Weiermair & Peters, 2002).

The tourism sector is a key sector to evaluate because tourism companies have specific problems and processes in each activity

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(Pavitt, 1984). Innovation differs across goods- and services-producing sectors (Damanpour, 1996), and even within the services sector, itself (Howells & Tether, 2004). Empirical studies on innovation and technology diffusion in tourism are still few and recent, as some of the latest research has highlighted (Hall, 2009b; Hall & Williams, 2008; Hjalager, 2010, 2002, Peters & Pikkemaat, 2006; Weiermair & Peters, 2002). However, there is a growing discussion about tourism as an innovative field, and it is significantly different from the average extent of a company's level of innovation in the economy (Hall, 2009a, 2009b). The question is whether there are sector-based obstacles for innovation in the tourism industry, or whether a less-innovative approach by tourism companies can be biased by the measurement approaches based on scoreboards developed for the manufacturing or general services industries, which undervalue the actual innovation that occurs within this sector and, consequently, the low official rates of technological innovation in the tourism industry can be explained by the great number of "hidden" innovations that take place within it.

To more clearly distinguish actual and measured innovation, it is necessary to develop a consolidated theoretical framework, and to clarify specific methodological problems of, and limitations to, the public sources and models when analyzing and measuring innovation in tourism. Innovation has been understood from Schumpeter's innovation theory to be an outcome, the innovative performance; and from the resource-based view, as a capability which is a source of innovative performance. Preference toward the study of innovation process outcomes, from a Schumpeterian point of view, is captured with more intensity in empirical research applied to tourism enterprises (e.g., Hjalager, 1994, 1997; Novelli, Schmitz, & Spencer, 2006). Some studies have explored the influence of market and enterprise characteristics on incremental and radical innovations (e.g., Gallouj & Sundbo, 1998; Hjalager, 2002; Martínez-Ros & Orfila-Sintes, 2009; Volo, 2004), and on the decision to innovate in products or processes (López-Fernández, Serrano-Bedia, & Gómez-López, 2009; Orfila-Sintes, Crespí-Cladera, & Martínez-Ros, 2005). Others have analyzed certain technological innovations, particularly those related to the diffusion of information technologies across the sector (Camisón, 2000; Jolly & Dimanche, 2009; Law & Jogaratnam, 2005; Werther & Klein, 1999). However, knowledge related to the diffusion of organizational and marketing innovations, and the internal structure of the innovative activity, is limited to some recent studies (COTEC, 2007; Orfila-Sintes & Mattsson, 2009; Tseng, Kuo, & Chou, 2008). Together, the progress made by investigators regarding the identification and measurement of the internal capabilities which determine a company's level of innovativeness and innovative performance (e.g., Bontis, Crossan, & Hulland, 2002; Schulz, 2001) has not been transferred with equal intensity to the tourism sector. This paper establishes theoretical foundations for studying innovation in the tourism industry developed from the Schumpeterian and the dynamic-capabilities approaches.

The inadequate analysis and measurement of innovation in the tourism industry is also related to methodological constraints that arise from the design of secondary data sources focused on manufacturing. The advances in databases regarding tourism statistics are much clearer for the demand behavior and the supply structure. However, there remains a lack of comprehension regarding microeconomics topics, such as the innovation process and its outcomes (Hjalager, 2002; Hollanders & Van Cruysen, 2008). Therefore, it is not surprising that tourism studies based on secondary databases at the enterprise level are very limited (e.g., López-Fernández et al., 2009). Despite these methodological issues, the available literature related to the measurement of innovation in tourism is scarce (Coombs & Miles, 2000; Hjalager, 2010; Johannessen, Olsen, & Lumpkin, 2001; Pikkemaat & Peters, 2006; Volo, 2004). In this sense, it seems necessary to improve the adjustment of general secondary statistical sources to tourism patterns. A second contribution of this paper is to provide some guidelines on key aspects of innovation that should be considered in a scoreboard. Based on the theoretical approaches previously mentioned, these recommendations would allow the development of a complete analysis of the innovative performance and the dynamic capabilities in tourism, while also helping to perform benchmarking studies on the international comparability of national policies that support innovation. These recommendations include the use of primary databases or surveys that provide regular and reliable statistics on the situation and development of innovation in tourism.

The paper is structured into five parts. We first review the literature on innovation in the services industry and its usefulness for tourism analysis, as well as the main approaches for evaluating innovation in this sector in Section 2. Section 3 introduces the focus and content of an innovation measurement based on Schumpeterian theory by illustrating the differences between manufacturing, general services, and tourism companies from empirical evidence related to the case of Spain. Section 4 analyzes indicators and databases developed from a Schumpeterian-based approach for measuring innovation performance in the manufacturing and service sectors. We also explain the degree to which these scoreboards can adequately measure innovation in tourism, including innovation inputs and outputs. Further discussion on guidelines for measuring innovation in tourism from a dynamic-capabilities-based approach can be found in Section 6. Finally, the paper summarizes the main conclusions reached in preceding sections.

2. Approaches to research innovation performance in manufacturing, services, and tourism

The **concept of innovation as an outcome or innovative performance** is present in Schumpeter's (1934) innovation theory, wherein he states that the creation of new knowledge or new combinations of existing knowledge are transformed into innovations in the enterprise. Innovation, understood as *performance*, is a visible result of the ability to generate knowledge, and its utilization, combination, and synthesis for the introduction of products, processes, markets, or new types of organizations or substantially improved ones. The European Commission (1995) also shares this concept in the *Green Paper on Innovation*, defining innovation as

> the renewal and enlargement of the range of products and services and the associated markets; the establishment of new methods of production, supply, and distribution; the introduction of changes in management, work organization, and the working conditions of the workforce.(p. 688)

This conceptualization clearly separates innovation from little changes in the production or delivery of products, such as the extension of product lines, service components incorporation, or product differentiation. Therefore, innovation can take a wide variety of forms (Fagerberg, 2004; Gopalakrishnan & Damanpour, 1997). Following Hall and Williams (2008), an innovation can be described by two elements: its form, which indicates the form of the innovation, and its impact range, which delimitates whether its effects are observable at a world, national, regional, or sectorial level.

Reasons that lead companies to begin an innovative process have traditionally been associated with the necessity of identifying and solving technical problems (Nelson & Winter, 1982). However, the "dual-core" model by Daft (1978), followed by OECD (2005) in the third edition of the *Oslo Manual*, distinguishes between

technological or *technical innovation* and *organizational* or *administrative innovation*. *Technological innovation* is the introduction of technical innovations in products or processes, and is thus associated with the change of the "technological core" or "technical system" of the company. Technological innovations are directly related to the primary activity of the organization, and its introduction is reflected by changes in products, processes, and operating systems, or technologies and physical capital for production. Within technological innovation, most common classifications distinguish between two opposite types: one which differentiates between *product innovation* and *process innovation* (Abernathy & Utterback, 1978), and another which classifies the degree of novelty as either *incremental* or *radical innovation* (Damanpour, 1991). The results of the technological process of innovation, which is materialized in product-related innovations, can stem from the development or introduction of new materials, intermediate products, or new components or product features. In the case of innovation results related to processes, they may be associated with the development or introduction of new equipment, an increase in the degree of automation of processes, a redistribution of the production processes, or the use of new energy sources. In contrast, radical innovation produces fundamental changes in dominant practices and in the knowledge available in a company or an industry, while incremental innovation represents instead marginal changes with respect to usual practices and knowledge.

On the other hand, non-technological innovations include organizational and marketing innovations (OECD, 2005). Organizational innovation is based on the introduction of new systems and management methods and new types of work organization and business models. Marketing innovations imply the introduction of new commercial methods, and they include changes in product design, promotional strategies, and price. Therefore, non-technological innovations are indirectly related to core operations. They represent new approaches that take place within the "administrative core" or "social system" of the organization, that are operationalized through new practices concerning the management of human resources, the structure and organization of work, the processes and executive systems, and the external relationships with customers, markets, suppliers, and competitors (Damanpour & Evan, 1984; Damanpour, Walker, & Avellaneda, 2009).

Outcomes of the innovation process, taking into account where the innovation occurs or its novelty level, have been extensively studied in the literature. A review of innovation research in tourism would begin with the debate about whether or not the Schumpeterian innovation theory provides concepts and methodologies adaptable to the special characteristics of services in general and, in particular, to the tourism industry. Tourism did not remain outside the relative forgetfulness suffered by the tertiary innovation until the 1980s (Miles, 2005). Although warning signals about peculiarities of innovation in services appeared in the literature (Metcalfe & Miles, 1999) over two decades ago, with, for example, the idea of the "industrialization of services" launched by Levitt (1976), the analysis of the specific features of the knowledge-dissemination process in this field is still limited (Coombs & Miles, 2000; Drejer, 2004; Gallouj & Weinstein, 1997). The growing importance of services in the global economy has stimulated increasing interest in the study and measurement of innovation in this sector.

Coombs and Miles (2000) distinguish four different and consecutive approaches to studying innovation in services. First is an initial stage of indifference (up until the 1980s), in which services were not considered innovative and, therefore, they were not studied. Second is the subordination or assimilation approach (1990s), which equalizes the nature of services and manufacturing and, consequently, innovation in services is studied by applying technology or manufacturing-based concepts (e.g., Pavitt, 1984). Third is the autonomy, or demarcation, approach, which arises as a response to the previous view, as it emphasizes that the service sector has some basic common and specific characteristics which present important differences from manufacturing in a wide range of aspects. Among them, we can cite the intangible and perishable nature of tourism products (Hjalager, 2002), the coterminality of service and consumption, the information intensity, the importance of the human factor, and the critical role of the organizational factors (Hall, 2009b; Hall & Williams, 2008). For this reason, the autonomy approach considers that service innovation is: 1) very different from innovation in manufacturing (Miles, 2000, 2008); and 2) follows dynamics that require new theories and concepts (Djellal & Gallouj, 2001; Gadrey, Gallouj, & Weinstein, 1995; Sundbo & Gallouj, 2000). Fourth and finally, there is the novel and progressive synthesis approach, which offers a better explanation of the vague boundaries between manufacturing and services (Tether, 2003), and is a starting point for assessing what makes service innovation distinctive (Miles, 2005). Today, products have a higher service component than in previous times. This old servitization dichotomy between products and services has been replaced by a service-product continuum (Vandermerwe & Rada, 1988). At the same time, there is a trend which indicates the convergence of services and some manufacturing sectors because companies produce solutions combining goods and services which are supplied jointly; time-sharing vacation communities being an example of this. The synthesis view also means that innovation is not uniform across service subsectors (Drejer, 2004; Gallouj & Weinstein, 1997; Howells & Tether, 2004) and in this sense, some services may be more similar to certain manufacturing industries than to other services activities (Preissl, 2000).

This research review presents the ongoing discussion regarding how innovation in services is studied, and the suitability of analyzing service innovation using concepts related to innovation in manufacturing (Drejer, 2004; Tether, 2004). The assimilation approach focuses on technological innovations, while the autonomy view has extended the concept of innovation beyond technical innovation by including non-technological innovations. The demarcation approach is still dominant in empirical research on innovation in services and, consequently, the technology-based concept of innovation, which only includes product and process innovation, has been the most frequent notion in empirical research up until this decade.

However, at the same time, the expanded view of innovation postulated by the autonomy approach has led to a growing number of innovation studies that also include non-technological innovations. Drejer (2004), amongst others, recognized there are also important organizational innovations in manufacturing and services. The synthesis approach shares this idea of a broader view of innovation by proposing that service innovation highlights some forgotten aspects of the innovation dimensions which are of relevance for all sectors (Drejer, p. 553); its conceptual model includes innovation input (capacity) and outcome (as technological and non-technological innovations). This broader concept does not imply a change in the nature of innovation. Drejer (p. 553) warns that an excessively expanded concept of innovation might cause "an infection of innovation with normal day-to-day business." Therefore, all innovation (technological or non-technological, performance or capability) must verify the Schumpeterian conditions of being new and reproducible, as well as producing an economic impact.

The principal attempt to develop a Schumpeterian approach for analyzing and measuring innovation in all sectors, despite their differences, is the common guide labeled *The OECD Oslo Manual*. The first edition of this guideline, designed for measuring

innovation across sectors and nations, is from 1995, although its latest 2005 version takes a broader conceptualization perspective based on the demarcation concept. The development of this universal guide has benefited from the availability of improving *Innovation Scoreboards*, which facilitate the measurement of innovation at the national and regional levels by using aggregate indicators which are supposed to be able to measure their progress over time, and by providing uniform metrics for innovation with international ranking purposes.

Statistical information on innovation in Europe captured from this approach is gathered in The European Innovation Scoreboard (EIS), the instrument developed in the European Commission initiative in 2000, to provide an annual assessment of the innovative performance for European Union member countries and other groups of innovative leaders (European Commission, 2008). The information contained in the EIS about innovation activities and innovation results comes from a variety of sources, mainly data collected by Eurostat in the Community Innovation Survey (CIS), reports on research and development (R&D), and other official data sources. The CIS is a survey at the European level conducted by national statistics offices, covering European firms with more than 10 employees, in all member countries, to determine their performance and innovative strategies. The importance of this source can easily be understood if we remember that it includes surveys from more than 250,000 companies throughout 30 countries (CIS6 data). Six waves of research were performed through 2008.

Taking into consideration recommendations of the third edition of the Oslo Manual (OECD, 2005), the structure was reviewed in the 2008 EIS version (European Commission, 2009a), increasing the number of dimensions to seven, which compile 29 innovation indicators and refer to three categories: enablers, company activities, and outputs (Table 1). The overall innovation performance for each country is captured by a composite index (Summary Innovation Index, SII). The 2006 CIS also allows the calculation of a synthetic composite index of global innovation performance in services—the Service Sector Innovation Index (SSII). The last edition of the SSII covers 23 indicators of innovative performance organized into nine categories. Compared to CIS-2008, there are clear differences in using nine indicators, while seven are similar to one another and seven are identical (see Table 1). The Global Summary Innovation Index (GSII) is another composite indicator which has been included in GIS since 2006, and which compares the innovative performance of the 27 EU member countries and other European nations with the major international economies. Given that many indicators provided by EIS are not available outside the EU, the GSII is calculated from only 12 indicators, although it maintains the same structure as EIS.

3. Schumpeterian approach to research innovation performance in tourism: empirical evidence from the case of Spain

Some empirical studies support the conclusion that Schumpeter's concept of innovation is broad enough to cover all innovation in services (Marklund, 2000). To test the singular pattern of tourism innovation, measured from a Schumpeterian approach, when it is compared with manufacturing and services in general, we extracted dates from the *Encuesta de Innovación de las Empresas* (Survey on Innovation in Firms) carried out by the Spanish *Instituto Nacional de Estadística* (National Institute of Statistics, INE) for 2008 (Table 2). This standard source provides information as to the structure of the innovation process, the innovative activity of enterprises (including R&D), and the innovative performance and effects of these activities, excluding micro-companies (10 employees or less). This survey follows Eurostat's rules and the OECD Oslo Survey. In general, it requests information about the companies' innovative activities during the reference year, although variables related to product and process innovations are prepared on a three-year basis to facilitate international comparability. Our exploitation shows a comparative analysis among manufacturing, services in general (excluding tourism), and aggregated tourism. It also shows partial data for some tourism activities, although only with regard to the specific classification each database offers. The tourism activities for which survey offers disaggregated data are hospitality, food and beverage services (groups I-55 and I-56 from the National Classification of Economic Activities CNAE-2009), transportation (groups 49, 50, 51, 52, and 53 from CNAE), and arts, entertainment, and recreation (groups 90, 91, 92, and 93).

The first global conclusion that can be drawn from the empirical information about the case of Spain is that the services sector is less innovative with respect to products and processes than is the manufacturing sector, so when innovation is based on internal R&D, as R&D external acquisition. The only two innovation activities for which there are no significant differences between manufacturing and services are: 1) the acquisition of external knowledge; and 2) training. This statistical evidence is convergent with previous empirical studies (e.g., Arundel, Kanerva, Van Cruysen, & Hollanders, 2007; Van Cruysen & Hollanders, 2008) which had already demonstrated that relatively fewer companies engaged in services can be seen as technological innovators when compared to manufacturing companies. Our empirical evidence amplifies the previous results from Kanerva, Hollanders, and Arundel (2006)—that manufacturing achieves better results in two central aspects of the technical innovation: technological knowledge and intellectual property. In the Spanish case, manufacturing firms have requested patents, industrial models, trademarks, and copyright protection in a larger percentage than have services companies. The manufacturing companies also practice innovative cooperation more frequently than services companies, with regard to all types of external organizations.

Our data also confirm that there are no significant statistical differences between manufacturing and service sectors in terms of the percentage of companies that introduced non-technological innovations in general (Arundel et al., 2007; Kanerva et al., 2006; Van Cruysen & Hollanders, 2008). Innovation in services has brought not only new products and processes, but also new ways of organizing and distributing services. Services companies have performed better than industrial firms even in organizational innovations for introducing new management models for external relations, and for introducing marketing innovations in the channels for the product promotion or for establishing good prices.

But empirical evidence from the case of Spain also confirms the heterogeneity within services. This fact is not new because the synthesis view had already postulated that innovation is not uniform across service subsectors (Drejer, 2004; Gallouj & Weinstein, 1997; Howells & Tether, 2004). Specifically, the empirical results presented in Table 2 support the conclusion that tourism services have a differentiated innovative behavior. Tourism firms are less innovative than manufacturing and other services companies. This fact is observed regarding all types of technical innovation. However, the difference is even larger for innovation based on internal R&D. Consequently, a small percentage of tourism organizations have patents and other intangible innovative outputs that can be protected. On the other hand, the difference is smaller for designs and trademarks. But the absolute and relative number of tourism companies that develop this type of innovation is still very low.

The tourism industry has four particular structural features that distinguish it from other services, and these features can easily damage the process of knowledge generation and transfer

Table 1
EIS 2008 indicators for measuring innovation.

Global innovation indicators[a]		Service sector innovation indicators[b]	
1. Enablers			
	1.1. Human resources		1. Human resources
1.1.1	S&E (science and engineering) and SSH (social sciences and humanities) graduates per 1000 population, aged 20–29 (first stage of tertiary education)	1.1	Share of firms engaged in training for innovation purposes
1.1.2	S&E and SSH doctorate graduates per 1000 population, aged 25–34 (second stage of tertiary education)	1.2	Share of firms reporting lack of qualified personnel as an important issue—reversed indicator
1.1.3	Population with tertiary education per 100 population, aged 25–64		2. Innovation demand
1.1.4	Participation in life-long learning (defined as participation in any type of training course during the 4 weeks prior to the survey) per 100 population, aged 25–64	2.1	Share of firms reporting uncertain demand as an important issue—reversed indicator
1.1.5	Youth education (20–24 years) having attained at least upper secondary-level education	2.2	Share of firms reporting to need to innovate because no demand for innovation—reversed indicator
	1.2. Finance and support		3. Public support for innovation
1.2.1	Public R&D expenditures (% of GDP)	3.1	Share of firms that received any public funding for innovations
1.2.2	Venture capital investment (% of GDP)		
1.2.3	Private credit (relative to GDP)		
1.2.4	Broadband access by firms (% of firms)		
2. Firm activities			
	2.1. Firm investments		4. Product and process innovation
2.1.1	Business R&D expenditures (% of GDP)	4.1	Share of firms engaged in intramural R&D
2.1.2	IT expenditures (% of GDP)	4.2	Expenditures in intramural R&D (% of total innovation expenditure)
2.1.3	Non-R&D innovation expenditures (% of turnover)	4.3	Share of firms engaged in acquisition of machinery, etc.
	2.2. Linkages & entrepreneurship		
2.2.1	SMEs innovating (which have introduced new products or processes) in-house (% of SMEs)		
2.2.2	Innovative SMEs collaborating with other enterprises or institutions (in the 3 years of the survey period) (% of SMEs)		
2.2.3	Firm renewal (SME entries plus exits) (% of SMEs)		
2.2.4	Public–private co-publications per million population		
	2.3. Throughputs		9. Intellectual property
2.3.1	European Patent Office patents per million population	9.1	Share of firms that applied for a patent
2.3.2	Community trademarks per million population	9.2	Share of firms that registered an industrial design
2.3.3	Community designs per million population	9.3	Share of firms that registered a trademark
2.3.4	Technology balance of payments flows (% of GDP)		
3. Outputs			
	3.1. Innovators		5. Product and process outputs
3.1.1	SMEs introducing product or process innovations (% of SMEs)	5.1	Share of firms with highly important effects in reduced materials and energy
3.1.2	SMEs introducing marketing or organizational innovations (% of SMEs)	5.2	Share of firms with highly important effects in improved flexibility
3.1.3	Resource efficiency innovators, Share of innovators where innovation has significantly reduced labor costs Share of innovators where innovation has significantly reduced the use of materials and energy	5.3 5.4	Share of firms with highly important effects in improved quality Share of firms with highly important effects in reduced labor costs
			6. Non-technological innovation
		6.1	Share of firms that introduced organizational and/or marketing innovations
		6.2	Share of firms that introduced organizational innovations
		6.3	Share of firms that introduced marketing innovations
			7. Non-technological innovation outputs
		7.1	Share of firms with highly important effects in reduced time to respond
		7.2	Share of firms with highly important effects in improved quality
		7.3	Share of firms with highly important effects in reduced costs
	3.2. Economic effects		
3.2.1	Employment in medium-high & high-tech manufacturing (% of workforce)		
3.2.2	Employment in knowledge-intensive services (% of workforce)		
3.2.3	Medium and high-tech manufacturing exports (% of total exports)		
3.2.4	Knowledge-intensive services exports (% of total services exports)		8. Commercialization
3.2.5	New-to-market sales (% of turnover)	8.1	Turnover of new and significantly improved products only new to firm (% of total turnover)
3.2.6	New-to-firm sales (% of turnover)	8.2	Share of firms that have new or significantly improved products new to market

[a] The European Innovation Scoreboard (EIS), 2008 version, Eurostat (European Commission, 2009a).
[b] The European Service Sector Innovation Index, 2008, Eurostat (European Commission, 2009a).

Table 2
Innovation trends: comparative analysis between manufacturing, services, and tourist Spanish companies.

	Industry	Services	Tourism	Hospitality	Transport	Other tourist activities
% Companies with innovative activities in 2008	**24.51**	**17.17**	**7.96**	**7.06**	**15.82**	**16.73**
Internal R&D	13.67	5.17	0.58	0.44	1.92	2.93
R&D acquisition (external R&D)	6.69	3.23	1.13	0.83	2.39	6.36
Acquisition of machinery, equipment, and advanced hardware and software	10.90	8.80	4.63	4.03	9.35	7.03
Acquisition of other external knowledge for innovation	0.69	0.68	0.54	0.55	0.61	0.59
Training for innovation activities	3.04	2.87	1.08	1.09	1.86	1.84
Introduction of innovations in the market	6.51	5.58	2.08	1.65	5.33	0.92
Design, other preparations for production and/or distribution	3.18	1.99	0.96	0.97	1.35	2.26
% Companies with innovative activities in the period 2006–2008	**31.13**	**18.62**	**9.29**	**8.61**	**17.42**	**17.17**
A) Product-based	**16.89**	**7.96**	**2.86**	**2.31**	**6.51**	**4.44**
- Companies that have introduced new or improved **goods** in the market	15.55	5.32	2.12	1.89	4.41	3.85
- Companies that have introduced new or improved **services** in the market	5.17	5.17	1.33	1.01	4.15	6.11
- Companies that have introduced products that were only an innovation for the company	13.60	6.69	2.79	2.26	5.74	7.28
- Companies that have introduced products that were an innovation for the market	8.10	3.59	0.37	0.28	2.03	4.94
B) Process-based	**26.10**	**15.61**	**7.86**	**7.16**	**14.91**	**15.40**
- New manufacturing methods	19.66	4.70	1.66	1.66	2.87	5.02
- New or improved logistic systems or distribution methods	4.67	3.20	0.94	0.72	6.49	1.42
- Activities to support processes - new or improved	13.36	12.39	6.52	6.06	11.62	10.46
C) Product- and process-based	**11.86**	**4.95**	**1.42**	**0.86**	**3.99**	**6.02**
Sources of information for innovation activities (% of firms that consider them of major importance)						
- Internal	**15.50**	**8.93**	**3.50**	**2.66**	**6.59**	**7.86**
- Market sources	**15.16**	**9.47**	**5.05**	**4.72**	**8.80**	**9.33**
- Equipment, material, components, software providers	8.96	6.13	3.40	3.26	6.11	6.08
- Clients	6.80	3.80	1.93	1.76	3.23	3.55
- Competition or other companies in the same activity	3.66	2.14	1.14	0.77	2.38	1.28
- Consultants, commercial laboratories or R&D institutes	2.68	1.47	0.41	0.39	0.56	1.76
- Institutional sources	**2.91**	**1.55**	**0.45**	**0.44**	**0.64**	**0.87**
- Universities, other higher education centers	1.37	0.88	0.10	0.08	0.13	0.78
- Public research bodies	0.80	0.68	0.35	0.35	0.40	–
- Technological centers	1.79	0.71	0.15	0.14	0.45	0.17
- Other sources	**4.64**	**2.91**	**0.89**	**0.71**	**2.51**	**2.71**
- Conferences, commercial fairs, exhibitions	3.48	1.73	0.67	0.47	0.92	2.04
- Scientific reviews and publications	1.65	1.20	0.10	0.09	0.36	1.70
- Professional and sector associations	1.38	1.39	0.18	0.18	1.69	0.85
% Companies cooperated in innovation in 2006–2008	**6.57**	**3.55**	**0.58**	**0.29**	**2.10**	**3.18**
- With other companies of the same group	1.57	0.68	0.01	0.01	0.38	–
- Equipment, material or software providers	3.19	1.77	0.36	0.13	0.14	0.92
- Clients	1.70	0.84	0.03	0.02	0.38	0.08
- Competition	0.97	0.83	0.02	0.01	0.29	0.92
- Consultants, commercial laboratories or R&D institutes	1.71	0.90	0.14	0.12	0.52	0.34
- Universities, other higher education centers	2.15	1.10	0.05	0.03	0.29	0.17
- Public research organisms	0.97	0.64	0.02	0.01	0.25	0.84
- Technological centers	2.16	0.78	0.07	0.03	0.27	0.17
- Companies that in the 2006–2008 period						
- Requested patents	3.09	0.82	0.28	0.29	0.24	0.92
- Registered a drawing or industrial model	2.61	0.92	0.59	0.53	0.41	2.59
- Registered a trademark	5.53	3.08	1.18	0.81	1.03	4.94
- Claimed copyrights	0.36	0.24	0.16	0.10	0.03	0.42
% Companies that performed non-technological innovations during the 2006–2008 period	**29.88**	**27.10**	**18.17**	**17.68**	**22.29**	**25.90**
A) Organizational innovations						
- New business practices in the organization of the work	20.41	17.16	10.29	10.01	13.63	12.30
- New organization methods for workplaces	20.22	19.80	13.07	12.71	16.41	19.33
- New management models for external relations	6.74	6.91	3.26	2.97	5.77	7.95
B) Marketing innovations						
- Significant modifications in the design or packaging of the product	8.95	3.41	2.05	2.02	1.19	3.10
- New techniques or channels for product promotion	7.69	8.42	7.35	6.90	3.49	11.21
- New methods for the positioning of product in market	5.96	5.04	4.65	4.56	1.73	3.77
- New methods for establishing the prices of the good	6.20	6.79	6.24	6.27	5.39	4.52

Source: *Survey on Innovation in Firms*, Spanish National Institute of Statistics, INE, 2008.

(Hjalager, 2006; Shaw & Williams, 2009) or act as a barrier against investment in technology (Jolly & Dimanche, 2009). Within its idiosyncratic profile, there are some related specifically to the nature of tourist products.

The first such characteristic is heterogeneity, which usually leads to standardized services. The relative lack of quality standards in the industry can decrease market transparency and also deteriorate innovation. This problem is perceived to be a disadvantage in

tourism because this sector has various classification systems to address companies' quality (such as the number of stars given to hotels), but many of these standards are criticized as being poorly defined (for example, being more about the facilities, themselves, than the actual quality of service).

The second structural characteristic is the case of the fragmented nature of the industry, dominated by small companies (Hjalager, 2006). Of course, smaller firms could be extremely innovative, but the reduced dimension can also be an obstacle to reaching an optimum rate of innovation, which often leads to diseconomies of scale that affect the profitability of investments in R&D, market research, and new product and skills development (Pikkemaat & Peters, 2006). Small companies are also often characterized by a staff resistant to change and by a conservative organizational culture. This fact can explain the wide differences between tourist companies with internal or external R&D in relation to services in general.

A third important structural characteristic of the tourism industry is that few firms create technologies; they prefer to buy technologies from outside the company (suppliers and organizations that manage infrastructures, cultural services, destination promotion, etc.), rather than from internal R&D departments. The wide-spread use of reticular organizational forms (chains, franchises), which increase the size and flexibility of tourist firms, would amplify their innovative potential (Orfila-Sintes et al., 2005). However, the results of this advantage are not observable in innovation outcomes measured by a Schumpeterian approach, but rather by the innovative capabilities of partner firms beyond its concept.

The knowledge transfer is obstaculized in tourism by a value chain having a low cumulative innovation level (Weiermair & Peters, 2002), and where opportunities for technology and innovation diffusion are penalized by the weak cooperative relationship with customers and other suppliers. Table 2 empirically tests this point and gives us evidence of the low proportion of tourist companies that cooperate in innovation with all types of organizations. This absence of a propensity toward collaboration is at least paradoxical, given both the "integrated tourist-product" nature that the tourist acquires, and the necessity of the experience co-producing organizations in destinations to share practices and knowledge to improve the attractiveness of their offer and to effectively sell experiences (Wang & Fesenmaier, 2007). Hall and Williams (2008) identify the clustering of a complex, spatially located set of complementary activities as encounters that delimitate the tourism experience. Tourism companies are embedded in various innovation systems on national and regional scales, as well as sector-specific systems which occur at tourism destinations (Hall, 2009b; Hall & Williams, 2008). Then, innovation in tourism is an intrinsically territorial, localized phenomenon which is highly dependent on resources which are linked to specific places and are impossible to reproduce elsewhere (Longhi & Keeble, 2000).

A fourth structural characteristic is that, due to the weak disposition toward cooperation in innovation among tourist companies (Novelli et al., 2006; Pikkemaat & Weiermair, 2007), collaboration among them is usually intermediated by destination institutions that play a key role in the knowledge-transfer process among companies. However, due to this intermediation, some of the positive effects of cooperation may be lost (Hjalager, 2002). Together, the capability of these agents to develop knowledge applicable to innovation is reduced, at least in the case of Spain. We can observe in Table 2 that the identified institutional organizations are considered of minor importance as sources of information for innovation activities.

From the analysis of non-technological innovations, it can be concluded that the number of tourism companies that employ such innovations is more significant, and the differential is less important in this case. Perishability and information intensity make non-technological innovations regarding the way services are produced more relevant (e.g., Gallouj, 1997, 2002; Gallouj & Weinstein, 1997; Miles, 2005). Tourism companies stand out in regard to commercial innovations, particularly those related to new product-promotion techniques, new methods for product positioning in the market, and new practices to determine product prices. In fact, concerning determining product prices, tourism companies perform better than manufacturing firms.

Innovation in organizations is an extremely complex and uncertain process as a result of its evolving and interactive nature (Desouza et al., 2009; Holleinstein, 2003; Lo Storto, 2006; Veugelers & Cassiman, 1999). These characteristics of the innovation process stimulate companies to perform primarily incremental innovations based on previously available knowledge within the organization in order to minimize high economic efforts involved in its development, associated risks, and failure probability. This general situation is observed with more emphasis in tourism, allowing imitators and adapters to prevail over the genuine innovators (Gallouj & Sundbo, 1998; Hjalager, 2002; Volo, 2004). Table 2 supports the empirical evidence of this aspect by quantifying the low percentage of tourism companies that have introduced products that were an innovation for the market (0.37% in front of 3.59% in services, and 8.10% in manufacturing).

Other special characteristics are related to human capital. The tourism industry has traditionally relied on semi-skilled human resources that they are abundantly available; low productivity has been offset by lower wages, and this fact has discouraged investment to rationalize the production structure and substitute labor for capital. The progressive increase in labor costs has quickly stimulated the introduction of labor-saving process innovations (e.g., automated cleaning machines and computerized services for the reporting process). The shortage of skilled human capital, which has created incentives to develop technological innovations, continues to impede the innovative potential of tourism enterprises in non-technological innovations, hindering the capacity to attract highly qualified and motivated personnel (Hjalager, 2002). For example, there are very few engineers working as such in tourism companies.

Finally, both the high rate of structural change related to the organizational renovation (being a consequence of the unusually high formation and disbandment rates of tourism companies), and the human resource renewal rate (associated with the seasonal nature of the activity), can hamper the information-collection process, as well as the information analysis and its transformation into knowledge and innovation processes (Lafferty & van Fossen, 2001). Tacit knowledge transfer via individuals moving between companies (even if they are located in a close geographical area) is an important mechanism of knowledge spillovers. However, tacit knowledge related to internal innovation is especially sensitive and often "sticked" to people who often get lost when the company closes or has a high rate of employee turnover, unless other structures and institutions care about its codification to preserve, as it often happens in franchise chains (Darr, Argote, & Epple, 1995).

4. Limitations of Schumpeterian guidelines for measuring innovative performance in tourism

An analysis limited to these innovation scoreboards with the Schumpeterian concept has serious methodological constraints when measuring innovation in tourism at the company level, which constraints are related to four major questions. First, can innovation at the individual company level be appropriately evaluated with indicators designed for measuring innovation at a national or

regional level? Second, can those scoreboards integrally capture the huge variety of services included in tourism? Third, can innovation in services (and particularly in tourism) be adequately measured through indicators that were mainly developed to measure technical innovation in manufacturing? And, fourth, can we compare innovation in services (and in tourism) across countries? These questions cannot be answered in the affirmative.

In relation to the first issue, these innovation scoreboards offer some remarkable panel data for analyzing innovation at a country or regional level. Nevertheless, they share certain methodological limitations and biases that significantly restrict their capacity to measure innovation at the individual company level. As they employ aggregate data, the sources neither allow an ad-hoc analysis at the enterprise level for specific purposes, nor permit the calculation of the statistical significance of the differences among sectors. They were developed as informational support for assessing public policies that promote innovation, and for developing the best policies, both in this field and in international ranking. However, even for these purposes, the reliability of these innovation scoreboards is questionable (Hollanders & Van Cruysen, 2008). These scoreboards collected data derived from company surveys and data drawn from other sources (such as censuses and official databanks), and it is a challenge in most countries to ensure a clear relationship between the two categories. Arundel (2007) noticed the limited extent to which these data contribute to the European innovation policy. Importantly, national statistics offices should be aware that the indicators currently offered, most of them, frequency indicators, are very rough approximations. Further, confusion arises from the use of inappropriate or poorly defined indicators. Another general limitation to these indicators is that there are substantial issues which they do not address, such as knowledge diffusion and aspects of innovation radicality.

The global analysis of the tourism sector based on innovation scoreboards is difficult to perform because there are some important differences among specific activities within this sector. Given its horizontal nature, the measurement of the performance of technology innovation among tourist enterprises must capture a wide range of technologies. Heterogeneity is not as significantly wide-spread in standardized services as it is, for example, for holiday packages or the catered/takeout food sector. The fragmented structure of tourism markets has also some exceptions, such as the airline industry, in which the companies are large and have relevant economies of scale. The innovation that takes place in some elements of the value chain, basically low in the major part of tourism, is considerable in other tourist businesses (for example, IT suppliers and airlines). To illustrate the structural differences among tourism activities, in Table 2 we provide an extension of the comparative analysis of innovation within the sector. Hospitality, food, and beverage activities have a lower level of technological innovation but some of their marketing innovations are superior to those of manufacturing as new methods for product positioning in the market and for establishing correct pricing strategies. Transportation stands in other areas as innovation based on the acquisition of machinery, equipment, and advanced hardware and software, the product-based technological innovation, and process innovation as new logistics distribution systems or methods. Finally, the arts, recreation, and entertainment industries stand in R&D internal development or acquisition, technological innovation based on new services and new manufacturing methods, and organizational innovation as new procedures for the workplaces and external relations, or marketing innovations based in new techniques or channels for product promotion. These different innovative features among tourism industry activities require consideration of the question whether the "one-size-fits-all" overview does justice to the nature of the industry.

The specific question we raise in this study is whether innovation scoreboards can integrally capture this huge variety of services included within the realm of tourism (Tremblay, 1988). The answer cannot be in the affirmative. In the European case, the SSII does not include NACE Section H, which covers hotels and restaurants (Arundel et al., 2007), and, consequently, most of the tourism sector for most countries is omitted (Kanerva et al., 2006; Van Cruysen & Hollanders, 2008). The CIS-3 and SSII-2006 include some tourist activities, such as transportation and supporting and auxiliary transportation activities (including travel agencies). However, their aggregation in codes 60–63 (Section I: "Transport, storage and communication") does not allow the identification of the components of these activities, which are tourism-related, because the CIS only provides data regarding one-digit sectors, while ignoring the variety of services in terms of innovation inputs and outputs that would require two-digit-level data. In Spain, the Survey on Innovation in Firms from the INE only provides aggregated data for codes 55 and 56 (hospitality, food, and beverage), 49–53 (including goods and people transportation), 90–93 (arts, recreation and entertainment). Travel agencies are included in a plural group next to administrative and auxiliary services (codes 77–82).

Another issue is whether data provided by innovation scoreboards well represent the innovation process in tourism firms. These secondary sources are basically designed for measuring innovation in manufacturing, and, consequently, they also have relevant methodological limitations when applied to services such as tourism. The first limitation of the CIS for measuring innovation in tourism is that it does not include representative samples of all sizes (e.g., micro-enterprises with 10 employees or less are not covered). This criterion leads to the exclusion of a great many small tourism businesses (for example, in Spain, at the 96.4% level for tourism companies, dates from *Directorio Central de Empresas* (DIRCE) of the National Institute of Statistics, 2009) and slants the sample substantially toward businesses which may be part of franchises and chains. These databases also share a second problem: the lack of consideration of the specific characteristics of tourism.

Differences in the nature of innovation and its variable dependence on the balance between flows and stocks are the reasons why innovation in tourism cannot be measured through indicators developed to evaluate technological innovation outcomes. The more-or-less explicit objective of all of these sources is to assess the ability of national and regional systems of innovation to respond to the challenges of a knowledge-based economy and to boost competitiveness. Nevertheless, innovation policy decisions are guided by a supply-side innovative approach (science- and technology-push model), which interprets it as a result of internal R&D. Because of that, they are basically fed by proxy indicators, such as spending on R&D as a percentage of GDP, patents, total innovation expenditures, and innovative-product-sales-to-total-sales ratio. These innovation indicators were created to reflect the results of the private innovation decisions and public policies in the field in the most technologically dynamic sectors. However, progress in R&D is only one part of the problem: the investment in the internal development of innovations by companies. These indicators are also limited, because not every innovation results in issuance of a patent; many innovations in the strategy and organization fields are not patentable, and many informal innovative activities are performed by non-research staff (Bell, 2006), especially in the services sector. In particular, the measurement of innovation in tourism cannot come from R&D indicators, patents information, or other measures of this kind, because tourism companies do not allocate significant resources either to knowledge generation or to obtaining patents (Hjalager, 2002).

A good example of this problem is the difference between the types of patents related to the industry which are awarded, a key

measure in manufacturing, and trademarks used, another indicator widely used in the services sector. Obtaining a patent depends on the firm's ability to discover a technological innovation which represents an advance over the existing knowledge, and these capabilities rely on extensive scientific and technical knowledge and require a large investment over a long period of time. On the other hand, a company that provides services can introduce a trademark, which does not require accumulated scientific and technical knowledge, and, therefore, could be completely outsourced.

Regarding innovation performance, the traditional bias toward product innovation has gradually changed, and greater attention to process innovation is given, although the latter remains undervalued, while non-technological innovations are also limited. Studied scoreboards consider as innovative those firms that perform an innovation in a product and/or a process, and a great number of the surveys is limited to these types of companies. At the end of the surveys, there are some questions about non-technological innovations to determine their existence; however, the analysis of the characteristics of their adoption process is disregarded. In future waves, the inclusion of indicators on management techniques, organizational change and design, and marketing issues is planned; the version CIS 2008–2010 has not yet, however, taken these factors into account.

There are other indicators of innovative performance at a national level inspired by the Schumpeterian approach (for a revision of these scoreboards, see Archibugi, Denni, & Filippetti, 2009; OECD, 2007). The Technology Index developed by the World Economic Forum in 2001 denotes a country's technological readiness, and it includes indicators as to spending on R&D and the level of creativity of the scientific community, as well as personal computer and Internet penetration rates. This composite index was replaced in 2004 by two indices: 1) the Technological Readiness Index, which measures the capacity of companies to absorb new technology and the reliability of the legal system concerning information and communications technology (ICT), as well as the diffusion of ICTs and Internet technologies; and 2) the Technological Innovation Index, which includes variables related to R&D investments, the capacity for innovation, the quality of scientific research institutions, university-industry research collaboration, legal protection of intellectual property rights and patents, the availability of scientists and engineers, and patents.

The Technological Advance Index has been calculated by UNCTAD since 2005 and measures a nation's technological activity, using both input and output measures, respectively represented by the labor force employed in R&D and the number of patents awarded and scientific publications. The World Bank has also created a synthetic indicator for measuring a country's capacity to compete within the knowledge economy; this is the Knowledge Index, conceived in 2006, which includes variables for the education level of the human capital, the innovative capability of the economic systems, and the ICTs diffusion.

A final composite indicator of interest is the NESTA Innovation Index, developed by NESTA and accessible from 2009, to measure investment in innovation by the United Kingdom and the impact such innovation has had on productivity growth (Haskel et al., 2009). This index covers a broader range of measures of innovation than previous instruments because it allows for more detailed performance metrics about a company's behavior for all stages of the innovation process.

These sources eliminate some of the limitations of innovation scoreboards by expanding dimensions and indicators. The growth of innovative performance indicators toward the economic effects of innovation, in terms of the growth in exports, sales, and the rate of entry into new markets, can lead to a shift to a market-pull innovation model. Under this approach, market needs are the cause of innovation (Arundel & Hollanders, 2006). However, the science-push model and the market-pull model continue with the convention of a linear process in which innovation would be a result of technology or market research. Together, these indices do not include questions tailored toward sector-specific metrics of innovation. The exception is the NESTA Index, which, together with cross-sectoral indicators, includes more sector-specific questions using the metrics that might be more appropriate for every industry. This adaptation was developed for 12 business sectors by Adams, Neely, Yaghi, and Bessant (2008) and for nine sectors by Roper, Hales, Bryson, and Love (2009), but the tourism sector was not included in either adaptation.

The limitation of Schumpeterian-based innovation scoreboards to the evaluation only of technological innovation and a short list of non-technological innovations led to the formation of an incomplete picture of innovational developments when applied to tourism companies. The introduction of marketing and organizational innovations through best-practices imitation is less difficult for these services compared to the introduction and patenting of new inventions by manufacturing companies. Consequently, tourism enterprises also focus more on organizational and marketing innovations than on inventions (Hjalager, 2002; Hollanders & Van Cruysen, 2008; Metcalfe & Miles, 1999).

Innovation in tourism includes, to a larger degree than for the services sector in general, "hidden" innovations for Schumpeterian measurement approaches. This is due to several reasons. These measurement approaches include changes in the way services are provided, or service-process innovation (Ottenbacher & Gnoth, 2005) based on its co-production nature and a major intensity in the interaction with other elements of the value chain (Lovelock & Young, 1979), by using the intense relationship between customers and suppliers (Coombs & Miles, 2000). Tourism business innovations also include changes and improvements in commercialization (service or sales infrastructure, customer delivery processes) (Gronroos, 1990) not included in the non-technological innovations defined in the Oslo Manual. Other innovation dimensions inadequately measured by Schumpeterian scoreboards are institutional innovations that reveal the creation of new types of organizations or new business models (Hjalager, 2002), or changes in the tourism innovation system (Hall, 2009a). Finally, tourism is more intensive in hybrid innovations because the simultaneity of production and consumption may complicate the distinction among product, process, and organizational innovation.

In conclusion, analyzed scoreboards deserve criticism because they still work within a narrow definition of innovation performance and fail to capture all of the relevant dimensions of the innovation process, providing an incomplete description of knowledge and technology diffusion in tourism firms (Smith, 2004). These measurement methodologies also ignore the systemic nature of the innovation process in tourism this systemic nature is better explained by the "learning by doing, using, and interacting" model. To be precise, the triggers for innovation are diverse and are also linked to multiple factors, as postulated in the model by Kline and Rosenberg (1986). Innovation does not arise linearly from activities like market research, design, R&D, production, and commercialization, but rather from the combination of innovative or knowledge capabilities by the company, and from its location in an environment where public policies and industrial structures facilitate the knowledge spillovers.

Finally, there is the question about international comparability. Although the meaning of the innovation scoreboards arises from the aggregate innovative performance measurement, the goal of developing benchmarking studies on national policies to support innovation, international comparability of these statistical sources

is questionable. Then, the answer to the question of whether it is possible to compare innovation in services among countries must be "no," or perhaps, "yes, but with great difficulty" (Kanerva et al., 2006). Cross-country comparison of innovation levels in tourism would also be an imperfect process because it would not take into account structural differences among countries, and because in some EU member countries, the questionnaire is not complete. Service innovation flows could be very large in less-developed countries that are very weak in these sectors, because companies rapidly achieve best practices. These anomalies suggest that there are serious problems when comparing innovation in services between countries with dissimilar levels of development. Cross-country comparability with countries outside the EU is even less helpful, because surveys about innovation do not exist in many and there are methodological differences between national statistical offices. Therefore, the reliability of rankings made from these synthetic indexes should be considered with caution.

5. Guidelines for measuring innovation in tourism from a dynamic-capabilities-based approach

To be useful, guidelines for measuring innovation in the tourism industry need to provide solutions that answer the major questions about the methodological constraints described above. First, these guidelines require the adjustment of developed scoreboards that measure innovation in manufacturing and services industries, in other words, which consider the nature of innovation in every tourist activity, but on the individual company level and for companies of all sizes. Second, these recommendations must allow the comparison of innovation levels in tourism among countries.

The synthesis approach postulates that it is possible to develop a typology of innovation models which is appropriate for all economic sectors, enabling the study of different activities inside the tourism sector. But for this purpose, the adoption of a broader concept of innovation beyond the Schumpeterian concept is needed (Coombs & Miles, 2000; Drejer, 2004; Gallouj & Weinstein, 1997; Hipp & Grupp, 2005; Holleinstein, 2003; Kanerva et al., 2006), as well as tools with a set of indicators able to capture all factors relevant to the knowledge-production and dissemination processes in tourism. Thus, a complete guide to innovation measurement must also include indicators that encompass hidden or forgotten dimensions, along with indicators of innovative performance and capabilities. The idea of producing a service as a system of characteristics and competencies by Gadrey et al. (1995) represents this definition of innovation in a correct way. According to them, to produce a service is

> to organize a solution to a problem…which does not principally involve supplying a good. It is to place a bundle of capabilities and competencies (human, technological, organizational) at the disposal of a client and to organize a solution, which may be given to varying degrees of precision.

Following the synthesis approach, the question is not whether the manufacturing, other services, and tourism industries innovate differently from one another, but rather whether innovation in tourist services could rely less upon the accumulation of internal technological capabilities, thus making it easier for services firms to achieve the best practices in a more expeditious way. Therefore, innovation indicators in services must basically measure flows, while in manufacturing, measurement of a combination of flows and stock is needed (Kanerva et al., 2006). The Schumpeterian approach for measuring innovation needs thus to be complemented by the dynamic-capabilities-based theory.

The resource-based view (RBV) starts from the view of the firm as a repository or a center for resources, skills, and knowledge accumulation (Foss, 1996a). The ability to accumulate, protect, and update its distinctive skills is what ultimately determines the position and competitive advantage, as well as the different results over time, between a company and its competitors in the same business sector. Although RBV is currently a unified theoretical framework, different lines of thought are distinguished in its construction. Foss (1996b, p. 179) believes that it is feasible to organize them into two opposing versions according to their degree of confidence in an equilibrium methodology. The first version is more equilibrium-oriented (Foss, Knudsen, & Montgomery, 1995) and studies the characteristics to be met by the assets in order to become sources of competitive advantages—valuable assets for the consumer, which are unique and difficult to replicate (Barney, 1991).

The second version is characterized by a dynamic reading of the competitive process that leads one to be particularly concerned about the conditions that create the disequilibrium. Therefore, the dynamic side of RBV is not interested in the assets per se, but rather in how a company allocates resources and capabilities in order to innovate, within the processes of the accumulation and in the generation of new combinations of resources and capabilities. From this approach, a second concept defines *innovation* as a capability which captures the learning dynamics that allow the renewal of the competitive advantage (Eisenhardt & Martín, 2000; Teece, 2007; Teece & Pisano, 1994; Teece, Pisano, & Shuen, 1997; Zollo & Winter, 2002).

Under the influence of RBV, recent literature highlights the dynamic capabilities of the organization that have the power to originate innovative behavior. Since RBV, dynamic capabilities have become the basic source of sustainable competitive advantages and economic income. However, the impact of dynamic capabilities in economic performance is reflected earlier as a more immediate result: the innovative performance (Gopalakrishnan & Damanpour, 1997; Rush, Bessant, & Hobday, 2007).

The generation of unique indicators is increasingly followed by investigations that seek to identify the range of capabilities which measure the perception of wealth related to the company's capabilities, and relative to its competitors (Camisón, 2004). In this sense, the importance of dynamic capabilities for innovating and creating value has initiated a great number of studies aimed at investigating its nature and determining how to measure these skills. Scales for measuring innovative capabilities include skills used to regenerate the resources and capabilities of the company and to foster knowledge development (e.g., Helfat & Raubitschek, 2000; Schulz, 2001), in addition to organizational learning capabilities (e.g., Bontis et al., 2002; Williams, 2001).

It is necessary to apply the collection of more information about the various methods of knowledge diffusion, as recommended by the Oslo Manual (OECD, 2005), with regard to three, in particular: embodied knowledge, contained in the equipment that is acquired and accessed by using the asset without the necessity of understanding, disembodied knowledge, which is accessible through open and free sources, and the knowledge achieved directly from other people (usually tacit knowledge). Knowledge and expertise diffusion among tourism SMEs also requires the measurement of activities and results in areas such as staff training and individual and organizational learning.

The dynamic competencies that would be measured can follow the structure previous authors have suggested (Camisón & Forés, 2009; Camisón & Villar, 2011). The analysis of the knowledge development process must also pay attention to two subprocesses: internal knowledge creation and external knowledge absorption (Chakravarthy, McEvily, Doz, & Devaki, 2003). We understand a company's *internal knowledge-creation capacity* to mean all the competencies associated with the creation of an

internal system of continuous learning in the firm. A company's internal knowledge creation is, fundamentally, generated by R&D investment and internal problem solving (Grant, 2000). Other antecedents of a firm's internal knowledge creation are employees' abilities, levels of education, experience, training, and the skills they acquire in the workplace through their interaction with other agents with different knowledge bases (Nonaka & Takeuchi, 1995). This reason emphasizes the formation of self-management teams and informal social networks because greater autonomy allows employees to experience more complex learning by creating new ideas and mental models (Nonaka, 1991).

External knowledge flows also provide opportunities for the companies to broaden their knowledge base, make up the internal shortages common to all companies today (Grant & Baden-Fuller, 2004), develop useful knowledge more quickly than their rivals (Prahalad & Hamel, 1990; Teece et al., 1997), and increase their flexibility (Grant, 1996). A firm's *external knowledge absorptive capacity* involves the usage of mechanisms through which knowledge outside the company is identified, acquired, assimilated, transformed, and applied. This definition by Zahra and George (2002) reformulates the traditional three-dimensional model introduced by Cohen and Levinthal (1989, 1990), as it identifies four different, complementary dimensions: acquisition, assimilation, transformation, and application. The concept of each of these processes is described in Table 1.

Zahra and George (2002) suggest that these dimensions can be integrated within two complementary components: (a) potential absorptive capacity, which comprises external knowledge acquisition and assimilation capacities; and (b) realized absorptive capacity, which includes both knowledge-transformation capacity and the capacity to exploit newly developed knowledge. Furthermore, external knowledge absorptive capacity relies on companies' internal capacities and on how they structure their relationships with the environment. Companies need internal effort and R&D investment (Cohen & Levinthal, 1990; Leahy & Neary, 2007) and to adjust their internal structures to support the formation and sustenance of other capacities (Fosfuri & Tribó, 2008; Zahra, Filatotchev, & Wright, 2009) in order to absorb new external knowledge. Therefore, although different in nature, these two components are interrelated: innovative assets are considered to be a consequence of the complementarity between the creation of internal knowledge and the assimilation of external knowledge (Cohen & Levinthal, 1990; Teece et al., 1997; Zahra & George, 2002).

The structure of the measurement would include, together with the cross-sectoral indicators already cited, questions tailored toward sector-specific metrics of innovation, for capturing the specific forms of innovation, which are most relevant for different activities, and to allow the comparative analysis of innovation between sectors. This measurement approach is similar to that proposed by the NESTA Index, which includes a number of new, more sector-specific questions.

Secondary innovation scoreboards based on the Schumpeterian concept of innovation performance do not provide information on innovative capabilities. Consequently, the study of knowledge-creation patterns and the diffusion of innovation in tourism, as in services in general (Drejer, 2004; Gallouj & Weinstein, 1997), have had to progress with primary studies based on surveys. Primary empirical studies have attempted to determine innovation trends in tourism by focusing on the internal structure of the innovative activity in this sector and the capabilities that facilitate the achievement of superior innovative output. Together, innovation scoreboards focus on the measure of innovation strictly at a national or regional level, and for this reason, comprise indicators that can be integrated in a composite index. Empirical studies based on surveys usually follow other measurement forms by using multidimensional and multi-item scaling. Then, innovation scoreboards that provide composite index of national or regional innovation levels and activities, and surveys that provide multidimensional, multi-item scales for measuring innovative performance and capabilities at the company level (which can have different structures, accordingly indicating that researchers should not prejudge the construct nature as being either aggregate or latent), are complementary developments.

These guidelines would also allow the comparison of innovative developments in tourism among countries because they eliminate the problems related to the international comparability of innovation inherent in the studied scoreboards, by using indicators reflecting a company's innovative capabilities. This procedure makes it possible to measure the wealth of innovation stocks and flows of a company in relation to its competitors, thus bypassing the limitations of composite indicators included in innovation scoreboards. Multidimensional scales for measuring innovative capabilities are also not biased by the difficulties in comparing innovative performances between countries with dissimilar levels of development. Internal technological capabilities could be very large in countries that are near the capability frontier of the sector. However, other skills, such as the knowledge-absorption capacity or the learning ability, are more independent of the structural differences among countries.

6. Conclusions

The empirical evidence about the diffusion of innovation among services and tourism enterprises is characterized by a low propensity for the development of new products and processes. However, previous literature does not empirically test the singular pattern of tourism innovation in comparison to manufacturing and services in general. We develop this comparative analysis with dates extracted from a survey carried out by the Spanish INE. The first global conclusion that can be derived from the case of Spain is convergent with previous empirical studies (e.g., Arundel et al., 2007; Kanerva et al., 2006; Van Cruysen & Hollanders, 2008), and it notes two trends: the services sector is less technologically innovative than is the manufacturing sector; and there are no statistically significant differences in non-technological innovations. More interesting is the evidence of the huge diversity within services as the synthesis view had already postulated (e.g., Drejer, 2004; Gallouj & Weinstein, 1997). Specifically, empirical results support the conclusions that the tourism industry demonstrates differentiated innovative behavior within the services sector. Conclusions further indicate that tourism companies are less technically innovative than manufacturing and other services companies, and that they perform mainly incremental innovations based on previously available knowledge within the organization, allowing imitators and adapters to prevail over the genuine innovators. The innovative behavior of Spanish tourism companies is more focused toward non-technological innovations, where the differential is less important, and particularly toward commercial innovations, where they perform better than manufacturing firms. Data also support the internal heterogeneity within tourism in innovation.

Our thesis is that the low official rates of technological innovation in tourism can be explained by two factors: structural features that distinguish it from other services, and which can easily damage the process of knowledge generation and transfer, or act as a barrier to investing in technology, and the great number of "hidden" innovations that are made in this industry. To distinguish more clearly between actual and measured innovation, it is necessary to develop a consolidated theoretical framework, and to clarify specific methodological problems as to the public sources and models when analyzing and measuring innovation in tourism.

The diagnosis of the "state of the art" notes the problems and biases which the instruments and databases developed for manufacturing have for measuring innovation in tourism at the individual company level, and to address the issue of international comparability. Two of the central issues are: first, how innovation scoreboards capture the concept of innovation at the company level and to what extent the concept fits the particular characteristics of tourism; and, second, how existing secondary databases of innovation define the boundaries of the tourism industry and provide an understanding and interpretation of how tourist destinations, enterprises, and systems adapt to this challenge, and with regard to the effects of measures to promote innovation in the sector. Benchmarking analysis with comparability guarantees would be achievable with data collected from globally harmonized databases, and with well-designed innovation scoreboards. However, the actual secondary sources have important problems for the international comparability of innovation. The objective of reaching the maximum international comparability could be done by using standardized criteria and large-enough samples to provide guarantees for regionalized analysis with an appropriate statistical significance. This objective has two aspects: what information we need to measure all dimensions of innovation in tourist firms, and how we can capture this information.

Official statistical systems refer to innovation as an outcome, the innovative performance, following the conceptualization from Schumpeter, which was used as a basis for the Oslo Manual (OECD, 2005). The innovation scoreboards based on the Schumpeterian concept offer very limited information for knowing the processes and outcomes of innovation in tourism because they ignore the fact that innovative performance is a consequence of dynamic capabilities. The broader concept of innovation proposed by a synthesis approach (Drejer, 2004; Howells & Tether, 2004; Tether, 2004), by including innovative performance (as technological and non-technological innovations), together with innovative capabilities, has raised some resistance, based on the fear that this amplified concept of innovation would distort it. However, in order to capture longitudinal information about unknown aspects of the innovation process within the tourism enterprise, it is necessary to develop new instruments for measuring innovation in tourism which are able to collect both its informal and multidimensional nature, together with some forgotten aspects of the innovation dimensions in services, and which are adapted to its structural characteristics. A more complete scoreboard would provide a comprehensive view of technological and organizational innovations, the dissemination of non-technological innovations, and the enterprises' strategies, as well as its innovative capabilities, combining the Schumpeterian theory and the dynamic-capabilities-based approach. Innovation in tourist services could rely less on the accumulation of internal technological knowledge, and more on capabilities for developing knowledge and learning. Therefore, the Schumpeterian approach for measuring innovation must be complemented by the dynamic-capabilities-based theory. The structure of an appropriate measurement for innovation in tourism would also include, together with cross-sectoral indicators, more sector-specific questions for capturing the specific forms of innovation which are most relevant to different tourist activities, for example, following the measurement approach proposed by the NESTA Index.

The expectations regarding expanding the innovation scoreboards provided by secondary sources, such as the CIS, are restricted to issues related to management, organization, commercialization processes, and cooperative activities involved in innovation (Arundel & Hollanders, 2006; Arundel, Bordoy, & Kanerva, 2008; Hollanders & Van Cruysen, 2009). Therefore, effort should be focused on primary studies which must take into account secondary-source limitations and develop ad-hoc-designed surveys in order to longitudinally measure the wide range of innovative variables not included in the official statistics. Together, innovation scoreboards have the objective of measuring innovation at a national or regional level, and for this reason, comprise indicators that can be integrated into a composite index. Multidimensional scales also have advantages for studies focused on international comparability when indicators evaluate the wealth of the innovation stocks and flows of a company in relation to its competitors, bypassing the limitations of the composite index. Empirical studies based on surveys usually follow other measurement forms more appropriate for estimating innovation at the firm level, by using multidimensional and multi-item scaling. The design of these new surveys can take advantage of lessons provided by previous primary studies about innovation in tourism (e.g., COTEC, 2007), and also of the dissemination and adoption patterns of new specific technologies in tourism (e.g., Daghfous & Barkhi, 2009).

Evidently, academic research typically consists of cross-section studies and small-size samples, but the measuring instruments that it includes can guide the working agenda for statistical projects to measure innovation in tourism with all the requirements specified above. Many researchers would be grateful to see an international effort to set up a research program that could coordinate the acquisition and handling of data in a rigid and comparable way. The concern is which organization would have the ability and financial resources to afford the appropriate study of this issue. Innobarometer periodically developed by European Commission (2009b) would be an interesting opportunity.

There are at least three good justifications for the efforts to collect systematical statistical data on innovation performance and capabilities in tourism (Arundel & Garrelfs, 1997). The first reason is that innovation indicators can be used to increase our theoretical understanding of the knowledge-diffusion process and to test innovation theories in this sector. Suitable measurement tools are needed to test hypotheses about drivers of innovation and their consequences in tourism. A second justification is that a good innovation scoreboard is a source of information for public policies. Innovation in tourism suffers political restrictions (Hjalager, 1997) because public policies supporting innovation do not recognize it as a particularly innovative field (Hall, 2009a) and they instead focus on high-technology industries (Dosi, 1982; OECD, 2000). Policy makers must take into account the heterogeneity of services and the special features of tourism, as well as the multidimensional nature of innovation within this sector for innovation measurement purposes.

Understanding the sources and patterns of the innovation activity in tourism is a key task for re-evaluating whether or not innovation policies adequately cover the needs of tourism companies, and for developing better policies in order to improve the international competitiveness of companies and tourist destinations. For many tourism SMEs with reduced innovative capabilities, public policies to encourage progress in these aspects are crucial, and, therefore, it is essential to be familiar with the situation and the evolution of target organizations.

Finally, this statistical base is useful as an input for firms in developing their strategies. Data on the innovative performance and capabilities of different countries allow managers to have a better understanding of the technological change and the competition context in which firms develop their innovative activities.

The objective of this paper was not to investigate in depth whether adopting the conceptualization and measurement of innovation performance is suitable for tourism organizations that share similar innovative characteristics. Instead, of studying the high degree of diversity among tourism companies, it would be interesting to classify companies that share similar innovative features.

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