Innovation typology in tourism

Master Thesis

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September 2008

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1. Introduction

Innovation is a research topic with a broad tradition. However, learning processes, from which innovations emerge, and the dynamics of change and development have traditionally been studied in relation with the manufacturing sector. Moreover, the objects of study have been usually process and tangible product innovations. Although recently researchers have focused their attention in other sectors, more research on service innovation should be carried out. Furthermore, regarding innovation in tourism, there is a need to adapt generic theories to the tourism sector and to contribute with new ideas.

In order to find out, which are the origins of innovation processes, it is necessary to look into two fundamental subjects that are inherent to innovation, which are learning and interaction. Both are closely related. The first appears to be an intrinsic condition of individuals. Moreover, it can also be identified in organizations. Thus, learning allows individuals as well as organizations to develop. However, learning and development is not possible without taking the environment into account. Hence, it is necessary that interactions take place between individuals, groups of individuals, organizations, etc. Furthermore, the concept of interaction implies the transfer of knowledge, which is the basis for innovations.

This simplified description delivers, however, some important aspects of innovation that can be found throughout the different studies. Thus, some authors may refer to learning organizations, while others can use the terms innovative organizations for the same purpose. Concepts like knowledge transfer and social interaction within individuals are closely related as well. It is thus important to be acquainted with these similarities between concepts, since they are fundamental aspects of the processes of innovation.

Regarding the scope of the research on innovation processes, two fundamental levels are habitually considered: organizational and macro level. Both levels are necessarily linked.

First, the production, acquisition and diffusion of knowledge has been studied regarding organizations. In this matter, the dynamics of innovation within organizations have been analyzed. Accordingly, the structure of the organization and the management of innovation are fundamental factors to enhance innovative activity at organizational level. Many contributions on this topic can be found in the literature of innovation (see e.g. Sundbo 2001, Jensen et al. 2007, Guia et al. 2006). In this matter, as it also occurs in other innovation topics, the theories about organization of innovation are heterogeneous. In this regard, Lam (2005) identifies three different strands. First, most organizational theories link the structure of organizations with the tendency to innovate. Next, several theories are dedicated to the cognitive foundations of organizations, which are related to learning and knowledge management. Finally, a research strand is concerned with organizational change and adaptation. In this master thesis, these theories are linked to several contents, according to the subject of study.

Besides, the interaction with external organizations and institutions influences innovation processes within organizations as well as the macro level. In this subject, Asheim and Isaksen (2003) accentuate that cooperating in clusters and networks provides competitive advantage to organizations as well as to regions. In this regard, collective learning requires the combination of tacit knowledge, i.e. knowledge embodied in individuals, and explicit, i.e. codified knowledge.

In this work, both levels are considered. Innovation processes are regarded as both exogenous, because the environment influences technological change in organizations, and endogenous, given that innovative performance in organizations enhances the production of innovations at the macro level.

Another characteristic of the research carried out on the field of innovation is its multidisciplinarity. Researchers from economic disciplines have been traditionally concerned with innovation determinants and its economic results. Recently, however, scholars have considered the social aspects of innovation as well. As a result, numerous contributions on innovation as a social process have been made. For instance, Asheim and Isaksen (2003) point out that innovation is a sociological process based on interactive learning. Furthermore, multiple approaches such as sociological, economical, managerial or organizational have been lately combined in order to understand better innovation dynamics. Thus, cross-disciplinarity characterizes much of the recently scholar work made in the area (Fagerberg 2005).

In spite of the variety of topics and the multidisciplinarity of contributions that exist on the field of innovation, there is a need to broaden the theory of innovation in the tourism sector. Given that research on innovation in tourism has started later than in the service industry in general, the number of contributions is smaller than in other sectors. Several of the topics that need to be researched in the field of tourism innovation are: types of innovation and degree of innovativeness, interactive learning and knowledge transfer, the role of provider-customer interaction, production and acquisition of innovations, the organization of innovation processes, determinants of innovation, the measurement of innovation, and the types of innovative organizations within the tourism industry.

The structure of the tourism industry influences innovation performance. Nevertheless, several innovation theories can be applied to the tourism sector. In this regard, the majority of approaches on innovation are based on manufacturing. Lately, however, the contributions to the service sector have increased (see e.g. Sundbo 2001, 2007, Sundbo et al. 2007, Gallouj 2002, Schianetz et al. 2007, Miles 2005, Hjalager 2002). In this context, while several authors indicate that innovation in services and in manufacturing are closely related, other authors establish a difference between them (Sundbo 2007).

In this matter, Drejer (2004) emphasizes that service innovation can be understood in different forms. First, the assimilation approach, which considers innovation in services to be equivalent to innovation in manufacturing. Next, the demarcation approach, which differentiates the processes of innovation in services from those in the manufacturing sector. Finally, a synthesis approach, which indicates that although

innovation in services and innovation in manufacturing are not identical, neither are they completely different. Therefore, several theories might be applied to both sectors.

The view of this master thesis agrees with the synthesis approach and applies it to the tourism industry. Thus, characteristics of innovation in tourism might not be exclusive for the tourism industry. They might be identified in other service or manufacturing activities as well. Similarly, properties of innovation in manufacturing and in services might be adapted to the processes of technological change in tourism.

Concerning the tourism industry, Hjalager (2002) points out that the determinants of innovation can also be found outside the tourism sector. Consequently, it is important to enhance innovation through the interaction with other actors that might not be directly related to the tourism industry, but that can provide new knowledge to the sector.

Thus, the spatial specificity of innovation in the tourism sector is crucial in the study of innovation in tourism. In this regard, the role of the public sector, the contribution of tourists to innovation, the interaction with other actors of the destination, or the interaction and networking with other destinations are important aspects to take into consideration.

Another topic that must be considered in the study of tourism innovation is that of technology. There is a common belief that technology is only related to high-tech developments. Nevertheless, low-technologies must also be taken into consideration in services. The approach of this master thesis regards technology as several forms of applied knowledge. Therefore, in technologies are included knowledge embodied in artefacts as well as in intangibles, such as procedures, activities, techniques, methodologies, skills or competences.

It is also necessary to indicate that the term organization is used in this study in order to include diverse forms of private and public entities. This is motivated by the fact that in the tourism sector several types of organizations must be taken into consideration. Nevertheless, a more specific terminology is often used to emphasize which type of organization is being considered, e.g. private firm, non-profit organization, university, research centre, etc.

Regarding the purposes of this master thesis, these are to study in detail several of the topics indicated before and to develop a framework on the topic of innovation in tourism. First, some subjects are analyzed in detail: innovation types, innovation determinants, measurement of innovation, and typology of innovative organizations in the tourism sector. Second, this master thesis aims to provide a conceptual framework for further empirical research. The results of this master thesis might be a contribution for academics as well as for the tourism industry.

The main contributions of the master thesis to the theory of innovation in tourism are: the identification of different types of innovations, the classification of the determinants of innovation at organizational and macro level, and the development of an innovation typology for the tourism sector.

Two main reasons have motivated the research on these topics. First, a personal motivation to study the dynamics of development and change that are based on learning and knowledge transfer. Second, a professional motivation to understand the processes of innovation that enhance technological development in organizations and destinations in the tourism sector.

Given the complexity of the topic of innovation, this master thesis is based on the review of the literature. In this regard, generic literature on innovation as well as specific contributions for the tourism industry have been studied. Consequently, the identified innovation determinants and the developed innovation typology are explained by the review of several sources in the literature, which contribute to the topic of innovation.

In order to accomplish the objectives described before this work is structured in seven chapters, including this introduction.

In the second chapter I analyze the topic of innovation types. In this regard, I mainly focus on types of innovations in relation with the different areas of the organization. In order to know which types of innovation are more common in the tourism sector, I review the literature on innovation typologies. Besides, I study the subject of degree of innovativeness, in which two main categories are included: incremental and radical innovations. Finally, I also emphasize several characteristics of the innovation types in the tourism sector, such as the tangibility and intangibility of innovations, the relevance of personalization, or the simultaneous production and use of services. This chapter thus aims to introduce several fundamental concepts for the study of innovation processes in tourism.

The third chapter deals with the subject of sources of innovation. In order to establish a theoretical framework for the development of the following chapters, I study the processes of learning and knowledge transfer at organizational and macro level. Moreover, I analyze competences, skills and routines as forms of embodied knowledge. A further section of this chapter is dedicated to innovation trajectories, since they influence current innovation performance in organizations and destinations. Finally, the processes of innovation within organizations as well as collaboration at the macro level are analyzed in detail. This theoretical framework may set the basis for the following chapter, in which an approach for the tourism sector is developed.

The determinants of innovation in the tourism sector are introduced in the fourth chapter. In order to identify them, I analyse the characteristics of the tourism sector as well as its advantages and disadvantages to innovate. I also study the different actors that participate in the process of innovation in the tourism sector. At the end of this chapter I suggest a classification of the determinants of innovation in tourism at organizational as well as at the macro level, taking into consideration the theory introduced in the former chapters and the characteristics of the tourism sector.

In the fifth chapter, the subject of innovation measurement is developed. Therefore, I review the principal approaches to this topic. In this matter, input and output indicators and innovation surveys are the two main methods of gathering information about innovation performance. Besides, it is emphasized that innovation in tourism should be measured in terms of innovation activities rather than only by the difference

between investments in innovation and results of the innovative process. Thus, the aim of this chapter is to provide a theory of what can and cannot be measured in the tourism sector. Accordingly, the approach developed is a theoretical rather than a mathematical one.

As a result of the theory developed in the former chapters, in the sixth chapter a typology of innovation in tourism is provided. Regarding heterogeneity on innovation performance within the tourism industry, four types of innovative organizations are suggested: supplier dominated, scale intensive, knowledge intensive and network intensive. These different trajectories followed by organizations are based on the contributions made by Pavitt (1982) and Hipp and Grupp (2005). Nevertheless, the taxonomy is adapted to the tourism sector. Therefore, the typology of innovation suggested is explained by the determinants of innovation introduced in chapter four.

Finally, in the conclusions I summarize the principal findings of the master thesis. Besides, a proposal for further research is provided, according to the theory developed in this study.

2. Types of Innovations in the Tourism Sector

The subject of innovation types has been broadly studied and many scholars have contributed to its development. Most of the contributions have based the theory on the manufacturing sector. However, several studies have focused on the tourism industry as well (see e.g. Weiermair 2006, Hjalager 2002, Hall and Williams 2008). Nevertheless, there is a need to widen the theory of innovation types, especially in relation with the tourism sector. Regarding a synthesis approach that takes the similarities between services and manufacturing into account, without forgetting the specificities of services, this chapter is based on contributions for both sectors and their adaptation to the tourism industry.

The principal objectives in this chapter are to identify which innovation types emerge in the tourism sector and to study their characteristics. In the first section, the area of the organization is taken as the main reference to identify the types of innovations. In the next section, the subject of degree of innovativeness is presented. Finally, a third section introduces the specificities of the tourism product and their influence on innovation types.

2.1. Innovation Types and Organization's Area

It is possible to classify innovations regarding several criteria: area of the organization, technical characteristics, degree of innovativeness, tangibility, etc. The approach introduced in this section identifies innovation types according to the area of the organization and considers the other criteria as characteristics of this main taxonomy. The classification is based on the area of the organization where innovation emerges.

Most of the contributions in the literature on this topic have been made in relation with a determined field of study, usually sector or industry specific. Nevertheless, several of these contributions can be adapted to the tourism sector. Consequently, with the aim of identifying the innovation types that are relevant for the tourism industry, the literature on innovation types according to the area of the organization is here reviewed.

Schumpeter identified five areas of development: generation of new or improved products, introduction of new production processes, development of new sales markets, development of new supply markets and reorganization or restructuring of the company (Fagerberg 2005, Drejer 2004). This classification has been the inspiration for several authors and studies (e.g. Weiermair 2006, Hjalager 2002, Fagerberg 2005, Drejer 2004, OECD 2005). Hjalager (2002), for instance, develops a typology of innovations for the tourism sector that originates from Schumpeter's work. According to Hjalager, innovations are classified in five categories, which enable multiple combinations. Same as Schumpeter, the categories of product and process innovations are identified. A third category of management innovations is then introduced, which essentially refers to several organizational processes. The fourth category, logistic

innovations, which comprise the reorganization of external commercial linkages, has some elements in common with the categories of development of new sales markets and of new supply markets of Schumpeter. Finally, a fifth typology of institutional innovations takes the collaborative and regulatory structures in communities into account. Thus, Hjalager incorporates a new element to the classification: the linkages in communities, which go beyond the main economic activities of firms.

Different areas of the organization can be identified from the combination of the former mentioned approaches: product generation, process production, management of the organization, market development and linkages with other public and private organizations.

In this matter, Gallouj (2002) identifies three typologies of innovation based on the study of consultancy services. The first category of ad hoc innovations regards innovations taking place in the interaction between provider and customer. These types of innovations are unprogrammed and emergent. Consequently, their exactly reproduction is difficult. Ad hoc innovations, however, describe a characteristic of services innovation, namely that innovation processes take place in the interaction between provider and costumer. As a result, this category cannot be included in a classification based on the area of the organization. Next, Gallouj introduces the typology of anticipatory innovation. Drejer agrees with this typology, since from a Schumpeterian perspective it consists on the identification of new needs, which can lead to the development of new markets. This type of innovation thus refers to organizational capabilities. The third category of formalization of innovation is related to the transformation of tacit knowledge into explicit. Certainly, organizations that formalize knowledge tend to be more innovative, though, as Drejer states, formalization of knowledge enhances innovation, but it is not an innovation type in itself. Consequently, in identifying innovation types, Gallouj's approach does not only regard the area of the organization, but also other criteria. Nevertheless, it is a relevant classification because it emphasizes several characteristics of services, such as the interaction between costumer and provider, or the necessity to acquire tacit knowledge and to transform it into explicit.

Despite the existence of a great variety of typologies, most of the studies have basically focused in product and process innovations. These two types refer to the generation of improved or new goods and services and the ways to produce these goods and services (Fagerberg 2005). This distinction simplifies the classification made by Schumpeter and emphasizes the two areas of the organization that have a more direct economic effect. For instance, the OECD (2005) distinguished between product and process innovations in the first and second edition of the Oslo Manual, which aims to provide several guidelines for the measurement of scientific and technological activities. The third round of the European Community Innovation Survey used this typology as well (Drejer 2004). However, the third edition of the Oslo Manual (OECD 2005), which covers the manufacturing sector as well as the service sector, incorporates two new types of innovations: organizational and marketing innovations. This new classification introduced in the Oslo Manual has many similarities with Schumpeter's classification. Furthermore, it can be applied to services as well as manufacturing activities. Besides, the manual emphasizes the linkages with other organizations and institutions as a determinant for innovation. Yet, the improvement of external linkages is not regarded as an innovation type in the manual.

The typologies identified in the third edition of the Oslo Manual seem also appropriate for the tourism sector. However, the definition of each typology should be adapted to the peculiarities of the tourism industry. Accordingly, a classification of innovation types for the tourism industry based on the reviewed literature is provided:

- Product innovation: an incrementally changed or radically new good or service[1] capable of being commercialized.
- Process innovation: the implementation of an incrementally changed or radically new production process or delivery method.
- Organizational innovation: the implementation of a new or incrementally changed organizational method or managerial form.
- Marketing innovations: the implementation of a new or incrementally changed marketing strategy that develops the sales market.

The specificities of each typology are studied in detail. First, some characteristics related to product and process innovations should be mentioned. In tourism as well as in other service activities it is not always possible to separate product from process. In fact, in many cases the product is the process (Gallouj 2002). In this matter, Gallouj suggests to classify a new service function that is based on an existing production process as a product innovation and an existing service function that is emerging from a new process as a process innovation. If service function as well as production process are new, it can be categorized as both product and process innovation. The service function is thus the element that enables the distinction between product and process. However, considering the diversity and complexity of services, this classification is difficult to apply systematically. The Oslo Manual (OECD 2005) also emphasizes that it is more difficult to separate processes and products in services than in other types of products. In the Oslo Manual, a distinction similar to the one suggested by Gallouj is introduced as well, which is based on the separation between service's characteristics and methods, equipment and skills used to perform the service (OECD 2005).

Another contribution in relation with the differentiation between product and process innovations is the one introduced by Pavitt (1984)[2]. Although the research developed by Pavitt is mainly based on manufacturing firms, the characteristics regarding product and process innovations can be applied to other sectors. Pavitt defines innovations that are used in the same sector as process innovations and innovations that are used in other sectors as products innovations. Moreover, Pavitt relates each innovation to three sectors: the sector of production of the innovation, the sector of use of the innovation and the sector of the innovating firm's principal activity. Accordingly, the organization is considered, but also the sectors of production and use. Considering Pavitt's approach, a process innovation may emerge and be used in the same organization. If this innovation is commercialized, it becomes a product innovation from the producer's point of view. However, the incorporation to production of this new product represents a process innovation for the user organization. In other words, process innovations can be commercialized as product innovations and product innovations can be adapted as process innovations. Accordingly, the existence of

[1] Incremental and radical changes, i.e. degree of innovativeness, are analyzed in the following section.
[2] This influencing work from Pavitt (1984) provided the identification of three types of innovating firms: supplier dominated, production intensive and science based. These topics are presented in chapter 6.

sectors and organizations of production and use influences the distinction between product and process innovations.

Next, the typology of organizational innovations refers to changes in organizational forms and structures. Besides, innovative organizational methods can guide innovation processes in other areas of the organization as well. Drejer (2004), for example, points out that organizational innovation is closely related to process innovation. Although each innovation typology can influence innovation performance in other areas, organizational innovations have a special relevance on the innovation activity of the whole organization. Moreover, Drejer includes in this typology the processes that concern the internal organization of firms as well as firms' external organization of linkages. Consequently, the results of organizational innovations can influence the organization as well as the environment.

Finally, marketing innovations are incorporated in the classification, since they are fundamental innovations in the tourism sector. The tourism industry sells experiences. In this matter, the marketing strategy plays a major role to reach new users and broaden the sales market. This innovation type is also necessary to improve commercial linkages with other organizations and institutions.

To sum up, the classification between innovation types has traditionally focused in product and process innovations. Consequently, other relevant types of innovations in relation with the area of the firm have been disregarded. Organizational and marketing innovations, though, contribute to economic development as well. Furthermore, these are fundamental innovation types in the tourism industry. Consequently, the classification between product, process, organizational and marketing innovations appears to be the most adequate to study innovation performance in tourism. The four typologies may overlap. In the service industry, for instance, the distinction between product and process innovations is especially complex. These innovation types may emerge in different degrees, topic that is introduced in the following section.

2.3. Degree of Innovativeness

A characteristic of innovations is that they emerge in different degrees. Schumpeter (1939/1989) emphasizes the role of the entrepreneur in the production of radical innovations. However, he also indicates that innovation processes are cumulative. Schumpeter's approach thus created the foundations to distinguish between radical and incremental innovations.

Radical innovations are major changes in relation with the current technology. They can generate a disruption in the path followed. Besides, radical innovations can lead to many smaller innovations (Sundbo 2001). They can also emerge as technological revolutions, which consist on a group of innovations that together have a greater impact (Fagerberg 2005). Nevertheless, radical innovations are usually first identified long after they have emerged (OECD 2005). This is mainly due to the fact that the impact of radical innovations can be first measured after they have been implemented. Examples of radical innovations in tourism are the creation of a specific quality management system for tourism organizations, the reorganization of a hotel chain, or

the development of a new route based on the distinctive resources of a determined region.

In contrast, incremental innovations are gradually, cumulative changes, based on continuous processes[3]. The cumulative impact of incremental innovations can be just as great as the impact of radical innovations, or even greater. Furthermore, some sectors evolve through the implementation of incremental changes while others develop through the production of radical innovations. Besides, the profitability of radical innovations often depends on several incremental improvements (Fagerberg 2005). Examples of incremental innovations in tourism are quality enhancements, the reduction of energy expenditures and the resulting improvement on environmental sustainability, or the augment of the collaboration with other organizations.

In the classification of innovation models for service industries[4] Gallouj (2002) includes three more categories apart from radical innovations that are related to the subject of degree of innovativeness: ameliorative, recombinative and incremental innovations. First, ameliorative innovations are defined as improvements that increase the value of the service. Second, recombinative innovations are produced by combining existing service and technical characteristics. Third, incremental innovations emerge from the addition or removal of new elements. In this classification, incremental innovations are thus separated from the other two models. According to Gallouj, incremental innovations differ from ameliorative innovations, because a new element is added, that is new technical or services characteristics. He also points out that while ameliorative innovations are continuous, incremental innovations are discontinuous, which certainly differs from the approach that regards incremental innovations as cumulative changes in continuous processes. The differentiation proposed by Gallouj contributes with new elements to the subject of degree of innovativeness, yet the frontier between the three categories is blurred. For instance, the value of the product or service is either improved or reduced in every incremental innovation, not only in ameliorative ones. Besides, recombinative innovations can also be considered as a type of incremental innovations. In order to encompass these similitudes, Gallouj points out that the three models may overlap and be linked in various forms. However, instead of separating between three innovation models, it seems more appropriate to set ameliorative and recombinative innovations within the group of incremental innovations.

Another subject to take into consideration is the degree of innovativeness in innovations that emerge from the interaction between provider and user. Service improvements often take place in this interaction and some of them can be considered innovations. In this matter, Drejer (2004) indicates that if the elements of services are not modified, they can be part of quality services, but they are not sources of additional value. Besides, Drejer points out that changes based on the interaction between provider and customer can only be considered innovations, if the results of the learning taking place in adapting a service to a specific customer signify a new business opportunity of particular importance for economic development. Accordingly,

[3] The idea of continuity is here different from that of the linear model, in which innovation is seen as applied science that is based on different stages (Fagerberg, 2005). Here the term refers to innovations that continuously advance the process of change (OECD, 2005).

[4] Gallouj (2002) identifies between six innovation models: radical, ameliorative, incremental, ad hoc, recombinative and formalization of innovation. These innovation models may be linked in several ways. In this section, only the ones that are related to the degree of innovativeness are introduced.

personalization can only be considered an innovation if it has relevance in the market, i.e. either for the organization that generates the innovation, for other organizations or for users.

Nevertheless, Sundbo (2007) suggests that if a new behaviour or a new product is reproduced, it can already be considered as an innovation. He points out that the small changes that emerge from a better adaptation to several customers can create profit and growth. Consequently, several small changes can be the factor that enhances development in an organization. Sundbo introduces a change scale, in order to explain different degrees of innovativeness. At one extreme of the scale are small changes, which represent the individual and general instances of learning. At the other extreme are large changes, mainly large incremental innovations and radical innovations. In between, small incremental innovations are localized. This scale is not only helpful to study innovations that emerge from the interaction between provider and customer, it is also useful to analyse innovation processes in other areas of the organization.

The relation between changes in competences and knowledge within organizations and changes in the environment has been studied by Hjalager (2002) through the application of the Abernathy and Clark model to the tourism sector. Four categories are included in this approach. First, in regular innovations both competences and linkages are conserved. In this category, innovation is thus based on incremental changes. Second, niche innovations create new structures, but conserve competences and knowledge. Third, revolutionary innovations emerge when competences and knowledge are enhanced without changing the external structures. Finally, a fourth category of architectural innovations describes changes overall in structures and competences. These four innovation types can be applied at organizational as well as at destination level. Hjalager indicates that, although the Abernathy and Clark model is useful to understand the characteristics of determined innovations, it does not describe how innovations change from one category to another. In this matter, Hall and Williams (2008) also point out that the approach does not explain possible shifts between categories. Nonetheless, it contributes to the topic of degree of innovativeness, since it takes into consideration the combination of several changes in internal and external factors.

Regarding the service sector, innovation usually emerges from incremental changes rather than radical shifts on the current technology (Gallouj 2002, OECD 2005). In this matter, Sundbo (2007) also emphasizes that general instances of learning and small incremental innovations are more frequent than radical changes in services. In spite of few empirical confirmations, incremental innovations have been also recognized as the most frequent in the tourism sector (Sundbo et al. 2007, Hall and Williams 2008). This is partly due to the fact that most innovations in tourism emerge from the interaction between providers and customers or from collective instances of learning within organizations rather than from R&D departments. Besides, many innovations in the tourism sector are acquired from other sectors, which implies that, in order to adapt this innovation, further incremental changes might be necessary.

Several characteristics of the tourism product such as the intangibility of services influence the types of innovation and the degree of innovativeness in the sector. In the next section, these characteristics are studied in detail.

2.3. Characteristics of the Tourism Product

The tourism product is a combination of many elements. These elements can be tangible or intangible. For instance, in a destination several suppliers such as hotels, restaurants or tourism guides participate in the production of services. Furthermore, tourism is not only based on the production of goods or services. Many intangible characteristics are embodied in individuals. Accordingly, sociological and cultural aspects of the local population as well as of tourists can influence the tourism experience. In spite of this diversity, tourists contemplate the product as a complete experience (Weiermair 2006). Tourism is thus an industry that creates experiences rather than isolated products.

Each experience is unique. Accordingly, as in other service industries, personalization plays a major role in tourism. However, personalization is not only a characteristic of services, but also of some manufacturing products. Besides, some services can be standardized in order to increase productivity. This phenomenon of industrialization in services and flexibilization in manufacturing (Miles 2005) has neared both sectors. Nonetheless, standardization in tourism is not always possible or desirable. The limits of standardization are usually related to significant cultural differences between markets (Hall and Williams 2008) and the difficulty of reproducing services in the same form.

However, imitation, although not in exact form, is frequent in the tourism sector. Innovation in services is difficult to protect. In this context, product innovations are more difficult to protect than organizational, marketing or process innovations. Due to its intangibility, tourism innovation is seldom patented. Consequently, organizations try to innovate continuously, in order to gain advantage on competitors[5] (Hjalager 2002). However, the lack of innovation protection may as well reduce the incentive to invest in innovation (Hipp and Grupp 2005).

Given its intangibility most of services cannot be stored or transported. Intangible innovations have thus a time-length. Tourism services usually occur in a determined time period. For this reason, the supply cannot be postponed to another period of time. In order to minimize the impacts of high seasonality and low capacity utilization, tourism firms implement management strategies such as pricing systems. For example, airlines and hotels offer different prices regarding occupancy.

Another characteristic of the tourism product is its simultaneous production and consumption (Weiermair 2006). Coterminality is thus a characteristic of services (Miles 2005). Tourists habitually have an image of what they expect, but they can first evaluate the complete experience once they return from holidays. Given that the qualities of services are not easily transmitted to customers before consumption (Hipp and Grupp 2005), Weiermair (2006) indicates that destinations should create confidence and introduce quality criteria.

Interactions between individuals as well as information exchanges are fundamental in tourism innovation. Furthermore, with the development of the service sector, the

[5] The topic of competition in relation with innovation in the tourism industry is further developed in chapter 4.

interest on sharing information rather than goods has increased (Freeman and Soete 1997). Moreover, investments in intangibles might be more important for organizations than tangible investments in capital goods. In this context, the tourism industry can be highly IT-Intensive. Information plays a major role, whether it is provided to tourists, stored in databases or used to improve the strategy of the organization. Examples of the use of IT in tourism are the implementation of Data Warehousing in organizations in order to combine and analyse data from diverse sources, or the use of internet platforms to collect and share information about tourism destinations.

Nevertheless, services are not only intangibles. As it has been mentioned before, the tourism product is a combination of different elements tangibles and intangibles. Consequently, it seems necessary to identify which elements form this product. In this matter, Gallouj (2002) recognizes three groups of characteristics for products. First, service characteristics, which are defined as the utility provided by the product from the user's point of view. Second, technical characteristics that describe the internal structure of the technology. Third, process characteristics, which are related to the production methods of the service. This contribution thus regards the utility of the service from the user's point of view, its internal composition and the production process. Gallouj's set of characteristics can be applied to tourism services. In a guided visit, for instance, the information and the entertainment provided to tourists constitute its service characteristics, the means of communication, the guide's know-how and the objects observed its technical characteristics, and the modes of preparation and development of the visit form its process characteristics.

Another approach that contributes to identify the particularities of services is the one introduced by Miles (2005). His approach, though, is not based on service characteristics, but on types of services. He distinguishes between three groups of services. First, physical services such as transport or catering. Second, human services, regarding basically public services dedicated to individuals. Third, information services such as consultancy or entertainment. Consequently, the tourism product might be also considered as a combination of the three types of services.

In this chapter the characteristics of innovation types in tourism have been studied in detail. Four innovation types have been identified: product, process, organizational and marketing innovations. Besides, it has been pointed out that innovations in tourism emerge from incremental changes rather than from radical shifts in the current technology. Furthermore, several topics in relation with the specificities of the tourism product have been mentioned: tangibility and intangibility, coterminality, personalization, imitation and standardization.

3. Sources of Innovation

Innovation is a result of the interaction between individuals and organizations rather than a linear process based on predetermined stages. The interactive learning model is thus more flexible and adaptable to market developments than the linear model. In connection with learning processes are technological trajectories, which influence innovation performance in organizations and industries. Although shifts in the path followed may occur, learning is mainly based on cumulative processes, i.e. what was known before influences current knowledge. Learning processes can take place within organizations and between them. Consequently, it can be stated, in services above all, that the sources of innovation are based on cumulative learning processes that are influenced by the internal characteristics of organizations as well as by their external linkages.

In order to identify the determinants of innovation in the tourism sector, it is necessary to analyse in detail these main sources of innovation. With this aim, this chapter is divided in four sections. A first section deals with the topics of interactive learning and knowledge transfer. In a second section the dynamics of technological trajectories are analyzed in detail. The third section is dedicated to the management of organizations. Finally, in a fourth section the subject of collaboration with the environment is studied.

3.1. Interactive Learning and Knowledge Transfer

Innovation is not only related to high-tech industries. It actually emerges when the production and transfer of knowledge are appropriate. The interactive model moves from the traditional conception that innovation is only based on R&D and includes learning within and between organizations as well as between producers and users as innovation determinants. However, Asheim and Isaksen (2003) indicate that the linear model is still necessary in some high-tech industries, while the non-linear model or interactive model tends to benefit industries that are less R&D-based.

Despite the fact that co-operation and interactive learning play a major role in innovation in general, these processes are thus more relevant in some sectors than in others. The significance of interactive learning habitually depends on the sector's main activity and structure. Therefore, interactive learning is especially relevant in sectors structured in SME's, such as tourism. SME's increment innovation capacity by collaborating with other organizations and with customers.

As an external factor, organizations benefit from the interaction and the transfer of knowledge with other organizations and institutions. Besides, innovation processes within organizations influence the creation of linkages with the environment. Accordingly, technological activities inside the organization influence the intensity of technology production as well as technology acquisition (Patel and Pavitt 1995).

The objectives of this section are to study the modes in which knowledge enhances innovation and to analyse how learning processes work within and between organizations. In order to understand how knowledge is transferred and how does it influence innovation, different types of knowledge are reviewed in a first subsection. Since learning processes at the macro level are related to innovation performance within organizations, a second subsection deals with the learning taking place in organizations. Finally, the topic of knowledge embodied in routines is studied in detail.

Types of Knowledge

The subject of knowledge types is broad and complex. For the purposes of this study, knowledge is understood in the form of assets, such as competences and skills (Lundvall 2004). This approach allows their identification and transferability. Furthermore, these forms of knowledge are the most important inputs of innovation (Lundvall 2004).

Following this conceptual approach, knowledge types can be classified according to several criteria. For instance, Asheim and Isaksen (2003) indicate that learning relies on different types of knowledge, such as science-based, technical skills or market information. Another approach introduced by Lam (2004) differentiates between knowledge from individuals, which is able to be transferred, and collective knowledge that represents collective norms, behaviours and forms of distributing knowledge collectively. Besides, Lundvall (2004) emphasizes the differentiation between public and private knowledge. He argues that knowledge is not entirely public or private. Indeed, not all individuals and organizations have access to public knowledge. In contrast, spillovers make private knowledge transferable.

Most of authors, however, tend to differentiate between tacit and codified knowledge (Lam 2004, Powell and Grodal 2005, Asheim and Isaksen 2003, Lundvall 2004, Jensen et al. 2007, Cooper 2006, Asheim and Gertler 2005) in order to indicate that there is a kind of knowledge that cannot be easily transferred, i.e. tacit knowledge. This basic classification can be adapted to other contexts, e.g. private and public knowledge, individual and collective knowledge, local and global knowledge, etc.

Tacit or implicit knowledge is embodied in individuals. Tacit knowledge can be transformed into codified or explicit knowledge in different ways. For instance, by communicating it, writing it down or incorporating it in artefacts. Moreover, while explicit knowledge can be generated by formal study, tacit knowledge is principally acquired through practical experience (Lam 2004). However, the complementarities between both knowledge types are more relevant than the differences between them (Jensen et al. 2007). Thus, both types are crucial in the processes of knowledge creation and transfer. The creation of new knowledge implies the use of tacit knowledge, its diffusion and its interaction with explicit knowledge (Lam 2004).

The structure of knowledge changes frequently when it is shared. For instance, tacit knowledge that is transferred between individuals is seldom transferred identically. If tacit knowledge is transformed into codified it automatically changes to a more generalized form. Similarly, codified knowledge can be transferred in the same form or be transformed into tacit knowledge.

Some implicit knowledge, however, is difficult to transform into explicit information. Trust and other social and personal relationships are seldom transferable (Lundvall 2004). Therefore, there is a need to invest in this type of tacit knowledge, which is acquired in experience-based relationships.

Jensen et al. (2007) also point out that not all tacit knowledge can be written down. It is difficult to transform expert skill into explicit information (Lundvall 2004). Explicit knowledge, however, is easier to transfer. Nevertheless, codification is not the only way to transfer knowledge. For instance, education and training embody knowledge in individuals (Jensen et al. 2007). With the mobility of human resources knowledge is transferred between organizations as well.

Explicit knowledge can be more appropriate for some activities, while other industries may rely more on tacit knowledge. In this respect, the tourism industry tends to produce more tacit knowledge than explicit. This is mainly influenced by the structure of the sector, which is principally formed by SME's. At the macro level, however, tacit knowledge can be transformed into explicit, generalized knowledge.

Knowledge flows contribute to innovation performance. Therefore, production, identification, adaptation and transfer of relevant knowledge are crucial for competitiveness. Nevertheless, valuable knowledge requires an effort to be acquired. This can be applied to tacit knowledge, but also to codified. Several authors have indicated that the absorption of codified knowledge is seldom automatic (Jensen et al. 2007, Powell and Grodal 2005). Absorptive capacity or the capacity of identifying relevant knowledge, acquiring it and applying it plays here a major role. In this matter, innovative performance and absorptive capacity are correlated. Indeed, if innovative activity is improved inside organizations, this influences the capacity of organizations to adapt external knowledge.

Another classification that contributes to the subject of knowledge types is the one made by Asheim and Gertler (2005). They distinguish between synthetic knowledge base and analytical knowledge base. The approach of Asheim and Gertler is especially relevant because it takes into consideration knowledge characteristics, such as is tacitness or explicitness, as well as innovation characteristics, such as the degree of innovativeness. Furthermore, it relates each knowledge base with different types of industries.

First, synthetic knowledge base is usually used in industries that innovate through incremental changes. It is habitually generated in the interaction with customers and suppliers. Applied research is more relevant than basic research and tacit knowledge is more relevant than codified, since knowledge is habitually the outcome of learning by doing, using and interacting. Moreover, routines are not varied in a radical form through the use of this type of knowledge.

Next, analytical knowledge base can be found in industries that carry out science-based research. These industries tend to rely on the inputs from universities as well. The knowledge used is habitually codified. Knowledge processes are usually structured and organized. The creation of radical innovations is more frequent than in industries based on synthetic knowledge.

Consequently, it can be stated that synthetic knowledge is crucial in the economy of learning and interacting. Therefore, interaction between customers and suppliers is at the core of the innovation process. According to this classification, the tourism sector could be characterized by using more synthetic than analytical knowledge. Applied research, tacit knowledge and incremental changes based on the interaction with customers and suppliers play a major role in innovation processes in tourism. However, as it happens with tacit and explicit knowledge, it is more appropriate to emphasize the complementarities between analytical and synthetic knowledge than their differences.

Although geographically embedded industries such as tourism rely more on the transfer of synthetic knowledge, analytical knowledge spillovers can be regionally embedded as well (Asheim and Gertler 2005). Indeed, certain regions are characterized by an elevate interaction between organizations that fundamentally innovate through the mobilization of science-based knowledge, which motivates the development of spin-off organizations in the same geographical area. Consequently, despite the fact that codified knowledge can be transferred abroad, it frequently remains localized. This is mainly because knowledge spillovers occur in local social networks in the first place and, later on, knowledge is transferred abroad.

Learning Organizations

Several authors have studied the topic of organizational learning at different levels. For instance, Lundvall (2004) indicates that the knowledge economy has changed into the learning economy. In this context, learning organizations play a major role. Asheim and Isaksen (2003) also argue that a learning economy is necessary for the continuous change of economic, social and technical knowledge. Accordingly, they introduce the concept of learning regions as well, where learning organizations are supported by the institutional and social frameworks.

A strand of organizational theories focuses on the micro-level. This group of theories studies the development of ideas at the organizational level (Lam 2005). Sundbo (2001), for instance, develops his strategic innovation theory starting at the level of the firm. Individual learning is transformed into organizational learning. Afterwards, the performance of firms can be summarized in order to analyse the macro-level. In this subsection, several contributions related to the subjects of organizational learning and knowledge creation are reviewed. Besides, it is described how knowledge is embodied in skills and competences of individuals, which determines innovation capabilities of the organization.

Lundvall (2004) identifies different types of learning. “Learning by doing” and “learning by using” are related to experience-based learning and “learning by interacting” is connected with the development of competences through the interaction between producers and users. Although it is necessary to invest in all three types of learning, “learning by interacting” is especially relevant for knowledge production.

Interactive learning requires the collaboration between groups of employees of the same organization (Asheim and Isaksen 2003), since new knowledge is created in the

interaction between individuals. Accordingly, dynamic organizations with groups of employees that habitually exchange information tend to innovate more regularly. In this context, when individual experiences are shared between employees in organizations, individual knowledge is transformed into collective knowledge. Therefore, information must be stored in a form that makes able its further use. However, service firms often lack on procedures for storing information. Moreover, employees habitually do not see the benefits of codifying knowledge for its future use (Sundbo 2007).

Knowledge is created, transferred and organized according to the culture of the organization. Firm's behaviour is closely related to the process of accumulation of knowledge (Nelson and Winter 1982). Knowledge can be stored in skills, competences and routines.

Nelson and Winter (1982) relate skills to individuals. They state that, while routines are more relevant at the organizational level, skills are the embedded routines of individuals. Skills are related to tacit knowledge (Nelson and Winter 1982). In contrast, competences are connected with the ability of organizations to activate knowledge and transform it in processes. Competences can be based on tacit as well as codified knowledge. In this regard, organizations develop organizational efficiency by improving the use of competences (Meeus and Oerlemans 2005). Both skills and competences improve when they are used (Lundvall 2004).

Knowledge is not only embodied in skills and competences. It is also accumulated in routines, procedures, norms, etc. Among them, several scholars identify routines as one of the major determinants of innovation (see e.g. Nelson and Winter 1982, Lundvall 2004).

Routines

The consideration of routines within the innovation theory is related to the development of the evolutionary approach in economics. In the evolutionary theory, innovation includes long-term processes (Nelson and Winter 1982, Pavitt 2003) based on cumulative learning, gradual change and adaptation to the environment. The evolutionary theory emerges in contrast to mainstream economics, which claim that firms can be steered according to market and internal conditions in order to maximize benefits.

Routines are modes of doing things in organizations. Organizational memory is embedded in routines (Nelson and Winter 1982). Routinization implies the repetition of certain activities. Nevertheless, their merely repetition would not enhance innovation. Nelson and Winter (1982) emphasize the idea of search and evaluation of current routines. Through these processes, routines are examined in order to maintain, modify or replace them.

The notion of continuity expressed by routines is connected with the subject of incremental changes. The implementation of routines can enhance learning processes and produce new knowledge, which may result in the introduction of small changes. Apart from the continuity expressed by routines, it is also important to notice that

routines also enhance revolutionary innovations. The process of change of routines can occur faster, through the introduction of radical changes. In this context, the concept "revolutionary" appears in contraposition to "evolutionary" (Nelson and Winter 1982).

Learning processes can be routinized, which has a direct influence on innovation performance in organizations. Other relevant innovation processes may be also transformed in routines, such as collaboration with other organizations, acquisition of new technology or interaction with the demand. In relation with this topic, Guia et al. (2006) point out that organizations institutionalize routines in order to reduce uncertainty. In this respect, the institutionalization of routines is influenced by the type of knowledge used. Thus, routines that can be described explicitly should be easier to institutionalize than routines based on tacit knowledge.

Routines are also determined by external conditions. Thus, routines are influenced by the institutional framework as well as by the interaction with other organizations from the environment. Consequently, routines are not only relevant for firms, but also for other types of public and private organizations and institutions.

In conclusion, it has been emphasized in this section that "learning by interacting" has become the most relevant form of knowledge production in the learning economy. Forms of tacit knowledge based on trust and long-term relationships are of high value, since they are difficult to transfer. Besides, some industries innovate through the production and diffusion of codified knowledge. Nevertheless, the combination between both types of knowledge appears to be the most appropriate to enhance innovation performance. In the tourism sector, innovation is frequently related to tacit knowledge, which habitually emerges from the interaction between suppliers and customers.

Skills, competences and routines play a major role in the learning processes taking place in organizations. Competences are enhanced when knowledge is activated and developed in activities. While skills are more related to individuals, routines are modes of doing things in organizations. Routines can be institutionalized, i.e. they can be formalized according to determined objectives. Nonetheless, the existence of a tacit component makes innovation complex and the results of the innovation process uncertain. As Pavitt (2005:109) emphasizes, "only two processes remain generic: coordinating and integrating specialized knowledge, and learning under conditions of uncertainty".

3.2. Innovation Trajectories

The evolutionary theory suggests that organizational change is based on incremental changes. As it has been emphasized in the former section, routines are the way in which organizations develop. Nevertheless, the introduction of new technology can make routines change radically. Scholars have analyzed these processes (see e.g. Nelson and Winter 1982, Pavitt 1984, Freeman and Soete 1997) and have related them to determined innovation trajectories.

While in the former section routines have been connected to the topic of knowledge types, in this section I focus on the cumulative processes that take place in organizations and industries. Therefore, several concepts related to technological trajectories are studied in detail.

As Nelson and Winter (1982) proposed in their evolutionary theory, development processes are incremental. Therefore, current conditions of development are influenced by past circumstances. The evolutionary theory recognizes these paths of development as "natural trajectories". Thus, organizations and industries develop in certain paths through cumulative processes. Nonetheless, development processes are part of complex systems with a high component of uncertainty. Complexity, however, can be reduced if the factors of continuity can be identified.

Organizations do not have objective information about all available innovation possibilities. Indeed, technological change in organizations is conditioned by the technologies used in the past. Besides, knowledge and skills are mainly determined by the geographical and sectoral environment (Pavitt 1984). Technological trajectories in this environment influence innovation performance in organizations.

The topic of technological opportunity is also in relation with the notion of technological trajectories. Cohen (1995) defines technological opportunity as a set of possibilities for transforming research resources into production techniques. Furthermore, he emphasizes that technological opportunity also originates from the contributions of internal and external actors, such as suppliers, customers or research centres. Nevertheless, the connection between technological opportunity and innovation is not systematic. Technological opportunity does not necessarily mean innovation, or at least not as an immediate result. Thus, the transformation of technological opportunities into innovations can be influenced by several factors. The process of development is frequently uncertain. Nevertheless, it is crucial that organizations identify technological opportunities and the possibility to develop them into innovations.

The limits of technological opportunity have been defined as "technological frontier" (Barras 1986). This "technological frontier" can expand in periods of development or it can remain less unchanged in other periods.

Technological opportunity has often been regarded as a phenomenon related to industries (see e.g. Cohen 1995). Indeed, it appears that in some industries the opportunities to innovate are broader than in others. Furthermore, the idea that firms in the same trajectory tend to develop in similar ways, has originated the concept of "technological regimes" (Leiponen and Drejer 2007). Thus, technological regimes have usually been considered industry specific.

Leiponen and Drejer (2007), however, suggest that firms inside these operating environments can follow different modes of innovation. In their opinion, diversity among firms is a determinant of firm performance and situates organization's specific knowledge as the reason for this differentiation. Moreover, they emphasize that heterogeneity is favourable for interactive learning. They analyse this hypothesis through an empirical study on firms in Finland and Denmark. The results, indeed,

confirm that firms in the same industry follow different innovation trajectories[6]. Besides, they indicate that different groups of firms with different innovation characteristics may emerge within industries.

In the evolutionary theory it is indicated that development is based on cumulative changes, however it is also emphasized that working within a certain path may reduce the possibilities of development. In order to avoid "lock-in situations", the technological trajectory can be changed through the introduction of radical innovations (Asheim and Isaksen 2003). As a result, new knowledge is created. Consequently, organizations develop through the combination of periods of stability and periods of radical change (Lam 2005). Long-term fluctuations may be originated by successive technological revolutions (Freeman and Soete 1997).

In technological revolutions, diffusion of innovation plays a major role. Consequently, the creation of and innovation should be followed by its diffusion. Furthermore, diffusion processes over long time periods may benefit innovation trajectories.

Diffusion processes in the literature are often related to economic growth (see e.g. OECD 2005, Unger 2005, Patel and Pavitt 1995). Indeed, the benefits of innovation are explained by diffusion processes. This implies commercialization as well as acquisition. Accordingly, the output of innovation activities is first observed when diffusion processes take place. Besides, acquisition of innovations benefits the adopting organization.

Conditions of diffusion determine the scope of innovations. Thus, in order to commercialize innovations firms need the appropriate resources. Moreover, organizations that acquire technology must have the capability to adapt them, which may require further developments (Patel and Pavitt 1995).

Industries interact and exchange innovations. Accordingly, it can be stated that the interaction between sectors of production and sectors of use influences technological trajectories. Several scholars have studied the processes of production and use of innovations (see e.g. Archibugi and Pianta 1996, Pavitt 1984, Miles 2005, Barras 1986, Hipp and Grupp 2005).

For instance, Pavitt (1984) develops his taxonomy of innovation through the identification of sectors of production and use. He points out that innovations may be used in the same sector of production or in other sectors. Accordingly, some sectors produce their own innovations, while others are mainly producers or users. Moreover, Pavitt indicates that linkages between sectors are not only based on the purchase of innovations, but also on the diffusion of knowledge and skills.

Regarding the differences between the manufacturing sector and the service sector, several authors have pointed out that the main source of innovation in services is the acquisition of technology from other sectors (see e.g. Pavitt 1984, Miles 2005, Barras 1986).

[6] In this study, Leiponen and Drejer (2007) also relate diversification with the level of technological activity. The results of the survey confirm that heterogeneity can be found in both high and low technology industries.

Miles (2005), for instance, emphasizes the role of IT in services. Since services can be highly IT-intensive, the purchase of IT is one of the main drivers of innovation. Nevertheless, while acquisition of IT may be limited to the purchase of computer applications or artefacts, in some occasions IT acquisitions may require a further development and adaptation. In fact, IT applications are often improved and adapted through the collaboration between provider and user organizations.

In order to explain innovation in services, Barras (1986) proposed the theory of the reverse product cycle as an alternative to the traditional product cycle[7]. Barras' theory is related to the transfer of new technologies between users and producers. In his approach, there is a production sector of capital goods and a user sector, mainly represented by services. Major new technologies, which have an influence in the economy as a whole, are created in the capital goods sector. These technologies are then adopted by user sectors. In this regard, the service sector is the major adopter of IT. Nevertheless, in the process of diffusion there is a lag between the moment that capital goods are available and the moment that users adopt this new technology. The origins of these lags are the uncertainty in the performance of the new technology in relation with similar activities carried out by competitors, the capacity to benefit economically from the new technology and the market structure of the adopter industry. Besides, having adopted the new technology, the user sector generates innovative applications through the adaptation and use of the technology. Consequently, adoption and innovation are influenced by specific trajectories in user industries.

The "reverse product cycle" begins when the new technology has been adopted. First, the implementation of the new technology focuses on process innovations that improve the efficiency and reduce costs. Next, the application of this technology benefits quality improvements of services. In a third stage, there is shift from process innovation to product innovations and the application of technology benefits the creation of wholly new services. Having introduced these new services, it is expected that they follow a development similar to the traditional product cycle.

Barras points out that these processes are not linear. In fact, they are based on regular interactions between process and product innovations. Furthermore, the interaction between suppliers and users influences the creation of new innovative solutions, e.g. an innovation in services may create new needs in the user sector, which motivates the development of new technologies in the production sector.

The "reverse product cycle" has influenced research on innovation in services. The theory developed by Barras created a framework for the study of service innovations (Miles 2005). Some of the possibilities to broaden the theory of the "reverse product cycle" are to analyse the development of non-IT innovations and the production of innovations within the sector.

[7] In the traditional product cycle, first, innovations are introduced in the market. Then, the product is standardized and process innovations become more relevant. Next, the rate of process innovations decreases and new competitors emerge, which might result in the introduction of new product innovations.

Empirical studies have confirmed that innovation in services is based on the acquisition of technology from other sectors. For instance, in the Community Innovation Survey carried out in 1992 in the Netherlands investment in fixed assets represented a 65% of the total innovation expenditure in service firms (Brouwer and Kleinknecht 1997). The results of these studies, however, have been influenced by the approach applied in the surveys. Since innovation surveys have usually linked technology with artefacts, other relevant determinants of innovation in services have been disregarded. However, innovation trajectories in services are also related to the production of innovations within the sector.

To sum up, technological trajectories are based on cumulative processes of change. Industries as well as organizations may follow specific trajectories. Heterogeneity within a specific industry, however, enhances interactive learning. Trajectories do not only develop through cumulative processes, but they are complemented by periods of radical change. Technological trajectories in services have been usually related to the acquisition of technology from other sectors. Nevertheless, further research on the production of innovation within the sector should be carried out in services. Technological trajectories are also influenced by innovation performance inside organizations. In the following section, several concepts in relation with the management of innovation within organizations are studied in detail.

3.3. Organizational Structure and Innovation Management

Organizational changes are at the core of the innovation process since they influence other instances of innovation, such as production processes, development of products or coordination of competences. Regarding organizational theories, there is a strand that examines the relationship between organizational structures and innovation performance (Lamm 2005). In this regard, two different structures are habitually identified: one more formalized and hierarchical and another more flexible and dynamic.

The aim of this section is to study the characteristics of each of these organizational structures and their influence on innovation performance. Thus, the contributions of several authors are reviewed in order to develop this topic.

Sundbo (2001) points out that innovation is related to top-down as well as to bottom-up processes. As a result, two important actors can be identified in organizations: employees and management. Their interaction plays a major role in complex innovation processes (Meeus and Oerlemans 2005).

Regarding Sundbo's approach, organizations with a structure based on managerial characteristics are closely connected with the coordination of innovation activities and the implementation of the strategy that suits more the conditions of the environment. In contrast, interactive structures are more flexible and dynamic, which influences the enhancement of individual characteristics, such as entrepreneurship, creativity or learning (Sundbo 2001).

Similarly, Jensen et al. (2007) take into consideration two different types of production of innovations. Nevertheless, they do not focus on the structure of the organization,

but on modes of learning and innovation. However, their approach is of great relevance for the topic of this section, since it details diverse characteristics of each mode of innovation. The two categories are Science, Technology and Innovation, and Doing, Using and Interacting. Besides, their theory is based on a quantitative analysis that allows the identification of a set of indicators for both STI and DUI learning modes. They also emphasize that the theory can help to develop the strategy of firms and that it can be also applied to processes at the macro level.

The STI learning mode is related to activities where scientific and technical knowledge are codified. Formalization of activities such as R&D, training and linkages with universities play here a major role. Consequently, in order to make knowledge transferable within the organization, the strategy relies on knowledge codification. Nevertheless, there is also a tacit component in the interaction between researchers in R&D departments.

In contrast, the DUI learning mode is experience-based. Consequently, interactions are based on tacit knowledge. In the DUI learning mode, innovation originates in problem-solving situations. As a result, skills and know-how of employees are developed. Therefore, organizational coordination in diverse forms such as project groups may enhance innovation activities. Besides, user-producer interaction plays a major role in this mode of learning.

The results of the empirical study carried out by Jensen et al. (2007) indicate that firms that apply one of the two modes tend to be high innovative. However, the most innovative firms tend to combine elements from the DUI and the STI modes.

Sundbo (2001) also points out that the combination of both innovation structures is the most appropriate to enhance innovation performance. Thus, it is possible, that organizations combine both structures, or that the same organization have different structures in diverse areas.

Nevertheless, the environment may influence the application of one or another innovation structure. Thus, some structures can be more innovative than others in specific environments. The sector may also influence one structure to be more appropriate than the other. In this matter, large firms in industries that mainly generate innovations through the development of R&D processes tend to apply the managerial structure. In contrast, organizations in industries based on SME's such as tourism tend to enhance innovation through the interaction between individuals.

Nevertheless, it appears that while interactions between individuals are situated at the core of the innovation process, formalization of innovation may be a complementary factor rather than a main determinant of innovation. In this matter, Guia et al. (2006) indicate that regarding the complexity of innovation processes, these cannot be determined or structured by an actor. Accordingly, they emphasize that innovation needs the interaction of individuals in local situations.

In relation with the adaptation of the organization to the environment, Sundbo and Fuglsang (2006) suggest an approach for organizations based on strategic reflexivity. The theory is based on reflexive interpretations about the conditions of the environment. Strategic reflexivity can be managed and organized. Firms may adapt to

the conditions of the environment or they may try to influence the environment by introducing new possibilities. However, knowledge about the environment is uncertain and conditions of the environment may change. Therefore, in order to adapt fast to new possibilities, organizations should regularly actualize their interpretations about the environment.

To summarize, this work agrees with the approach that innovation processes are complex and uncertain. As a consequence, dynamic and flexible structures that enhance interaction between individuals may be more appropriate to increase innovation performance. However, in order to coordinate internal and external capabilities, several managerial components are also necessary (Meeus and Oerlemans 2005). Furthermore, organizations should adapt the strategy to the conditions of the environment as well as influence the environment through the innovation processes that originate in firms. In this context, flexible organizational structures are more able to adapt to new conditions in the environment.

3.4. Collaborative Structures

It is fundamental to take into consideration linkages with the environment as a determinant for innovation. Technological advance in an industry is supported by the interaction between different actors. Furthermore, interaction and collaboration are necessary to bring an innovation into the market (Cohen 1995). Collaboration is thus related to the division of innovative labour. In this matter, within industry spillovers facilitate innovative performance, since improvements are shared between organizations.

The literature on collaborative structures has usually focused on science-based industries, where R&D is the most important determinant of innovation. However, interaction and collaboration with the environment appears to be a fundamental determinant for innovation in service industries as well. Especially in the tourism industry, collaboration between different actors at the macro level is a factor that influences competitiveness in destinations[8]. Furthermore, linkages within destinations as well as external linkages increase innovative activity of organizations. Therefore, there is a need to study in detail the characteristics of collaboration with the environment in the tourism industry.

In this section, the topic of collaborative structures is studied on the basis of several contributions made by scholars. The study aims to offer a framework that helps the understanding of the collaborative dynamics in the tourism sector. In order to achieve this objective, first, the reasons to collaborate with other actors and the results of collaboration with the environment are analyzed. Next, several collaborative structures such as networks, clusters and innovation systems are studied. Then, the factors of cohesion such as geographical proximity, social values and institutional framework are detailed. Finally, several alternatives of innovation systems in tourism are suggested.

[8] Several actors such as universities, groups of users, research centres or private firms participate in collaborative structures. A detailed classification of the different actors in the tourism sector is developed in section 4.2.

Organizations principally collaborate in order to combine elements of know-how (Lundvall 2004). Due to the fact that knowledge is spread among organizations and institutions, collaboration is the basis to bring together all this knowledge and develop innovations. Thus, the development of social linkages benefits information diffusion, resource sharing and interorganizational learning (Powell and Grodal 2005). Collaboration with other organizations also helps sharing risks thus reducing uncertainty. Therefore, the development of networks is more frequent in periods of technological discontinuity (Powell and Grodal 2005).

Partnerships between organizations are at the core of the corporate strategy (Powell and Grodal 2005). Organizations that participate in different types of collaborative structures tend to be more innovative. In this context, SME's can benefit more from collaborating in networks than larger firms (Powell and Grodal 2005), since they usually have less resources to invest in innovation. Therefore, they are relatively influenced by the immediate innovative milieu (Asheim and Isaksen 2003). Consequently, they habitually participate in collaborative structures that are regionally embedded, such as clusters or innovation systems. Entrepreneurial organizations benefit from participating in networks as well (Powell and Grodal 2005). Especially in tourism, entrepreneurs build important linkages with the environment. They are providers of new knowledge and ideas and at the same time use external resources in order to transform their ideas into innovations.

Concerning the forms in which the process of knowledge sharing is contextualized, there is a main distinction between sectoral and geographical collaborative structures (Fagerberg 2005, Asheim and Gertler 2005). For instance, Asheim and Gertler (2005) consider that the environment of organizations can be interpreted functionally or geographically. Accordingly, organizations can create linkages outside the geographical boundaries and be functionally related to global knowledge (Asheim and Isaksen 2003). In this context, functional linkages are usually in relation with the organization's main activity. Besides, relationships can be based on geographical proximity. Regarding the contributions in the literature, scholars have mainly focused on the linkages within a geographical context (see e.g. Asheim and Gertler 2005, Asheim and Isaksen 2003, Edquist 2005, Lundval et al. 2002, Sundbo et al. 2007). Regarding the tourism industry, geographically embedded linkages tend to be more frequent, although networks in tourism can be based on non-local linkages as well.

Organizations can participate in different collaborative structures. For instance, Sundbo et al. (2007) relate innovation performance to three levels: firms, networks and innovation systems. For Sundbo et al. (2007) networks are situated between organizations and the development of innovation systems. This can certainly be expected if the network turns into a more institutionalized form. Nevertheless, this is not always the case, since organizations might benefit more from collaborating in networks than in innovation systems. In this matter, the main activity of the organization usually determines the kind of relationship to be built.

Networks may be more informal and embedded in social relations or more structured and based on formal linkages. Habitually, networks that are created through informal relationships emerge in regional economies or technological communities (Powell and Grodal 2005). Besides, networks that are more formally structured are usually based

on market considerations and established through contractual forms. As networks develop, however, their structure may change (Powell and Grodal 2005).

Despite the fact that networks do not have the institutionalized framework of innovation systems, they can be build on a geographical context as well. Relationships, in which the spatial factor plays a major role, are associated to the innovative milieu (Sundbo et al. 2007), i.e. the existence of several actors that enhance innovation in a determined geographical area.

Geographical proximity is also related to the emergence of clusters. Thus, interaction between organizations and the existence of complementary industries in a spatial context benefits the development of such industrial clusters, thereby enhancing regional competitiveness (Porter 1998).

Networks formed in an innovative milieu such as clusters of enterprises or industrial districts have similarities with innovation systems. In all of them geographical proximity and long-term relationships play a major role. However, the concept of innovation systems implies that determined patterns of innovation are carried out. It emphasizes thus the systemic character of innovation. This systemic character is displayed in various ways. Edquist (2005) points out that in innovation systems the objective is to develop, diffuse and use innovations. Organizations and institutions in innovation systems create and commercialize knowledge. Thus, in collective solutions, innovations are less important for innovators, but play a major role in the innovation system as a whole (Lundvall et al. 2002). Therefore, it can be stated that in innovation systems all aspects of the social, natural, economical and institutional environment are taken into consideration.

Scholars study geographically embedded innovation systems at different levels. First, national innovation systems are situated in the context of nation states (Lundvall et al. 2002). Accordingly, there is a national geographical, institutional, cultural and social framework. Next, regional innovation systems are developed within the boundaries of nations. These are regions characterized by a high level of innovation activity and cohesion between actors. Despite the fact that regional innovation systems have been situated in the context of nations, they actually might surpass national boundaries. Finally, another approach introduced by Prats (2005) emphasizes the existence of tourism innovation systems in local communities. Furthermore, he suggests that the theory of innovation systems can be applied at the level of the tourism destination.

Regarding the differences between innovation systems, it is important to take into consideration that innovation differs among regions and sectors. This is mainly due to the fact that natural, social and cultural characteristics influence innovation performance. For instance, long-term interactive learning is easier within the boundaries of national or regional innovation systems, in which cultural and linguistic factors are similar (Lundvall et al. 2002). In this subject, Lam (2004) introduces the concept of varieties of capitalism, which is based on the theory that societies with different characteristics have diverse economic, social and innovative capabilities. This approach can be also applied to the tourism sector, since the emergence of the tourism industry is closely connected with regional, economical and societal particularities.

Social capital is fundamental for the production of innovation and the cohesion of innovation systems. Social capital benefits the development of linkages based on long-term relationships and on cognitive factors such as trust. The augment of social capital can be motivated by investments in formal education and training, labour market dynamics and the organization of knowledge creation and learning. Despite the influence of financial capital in accelerating the rates of change and learning needs, policy making in innovation systems should invest in social capital and long-term, sustainable learning. As a result of considering competence building in innovation systems as a whole, natural environment must be also taken into consideration. Thus, social and financial developments in innovation systems must regard environmental sustainability. In this matter, both organizations and institutions must collaborate to achieve sustainability in innovation systems.

Regarding the role of institutions, Asheim and Isaksen (2003) indicate that public intervention can influence an innovation system to be more institutionalized or more networked. They suggest that regional innovation systems may be more institutionalized, based on the linear model that starts with R&D and on top-down innovation processes, or they may have a balance between institutions and other organizations and be based on a network that enhances bottom-up innovation processes. In this distinction, however, it must be emphasized that centralized development of innovation systems is infrequent. In fact, they develop over time in unplanned forms (Edquist 2005). Nonetheless, policy making can influence the process is several ways. For instance, institutions should motivate firms to develop innovations and reduce process duplication by sharing efforts. Consequently, innovation systems are based on the collaboration between private and public organizations.

Several factors might difficult the development of innovation systems. First, a lack on the necessary actors might influence collective learning in regions. Heterogeneity is crucial in order to create an innovative milieu. Consequently, the development of innovation systems relies on the existence of the required organizations and institutions.

Another factor that might hamper the development of innovation systems is the isolation of the different actors. The theory of innovation systems indicates that innovative activity in organizations and the creation of linkages with the environment are direct correlated. Accordingly, external linkages enhance innovative performance in organizations and innovative outputs generate further collaborative linkages. However, for several reasons the linkages with the environment might not exist. In this context, innovation activity in organizations is more difficult.

For instance, Sundbo et al. (2007) state, that in general, innovation systems are not consistent in tourism. However, they also point out that the cohesion of systems depends on several social, institutional and economical factors. One of the reasons because tourism firms are reluctant to participate in networks is that service innovations are easy to imitate. As a result, firms in the same destination see each other as competitors. Therefore, tourism firms do not share information about innovations.

Accordingly, organizations may be part of networks or innovation systems or remain independent. However, the fact that organizations operate in the market implies that they are always influenced by external actors and technological trajectories.

To sum up, collaboration with the environment is an important determinant for innovation. Economical, social, institutional, cultural and geographical factors influence the development of different types of networks and innovation systems. Success in the tourism industry might be achieved through collaboration in local environments, thus enhancing the competitive advantage of destinations. However, the determinants of innovation in the tourism sector can also be found outside the sector (Hjalager 2002). Consequently, it is important to enhance collaboration between the different actors in the tourism industry as well as with other actors outside the sector.

The development of innovation systems in tourism is related to the existence of specific actors as well as long-term relationships. Thus, cohesion between actors in a destination enhances the development of the industry. Furthermore, in order to avoid lock-in situations, innovation systems should not only rely on localized learning. They should also acquire knowledge from outside the destination.

4. The Determinants of Innovation in the Tourism Sector

Considering an approach that emphasizes the similitudes rather than the differences between the tourism sector and other sectors, this chapter aims to apply the topics introduced in the former chapters in order to identify the innovation determinants in the tourism sector. Although some adaptations to tourism have been already made in former chapters, it appears necessary to analyse also the specificities of the sector in order to suggest the appropriate determinants. Therefore, a first section in this chapter is dedicated to the characteristics of the tourism sector. Next, in a second section the different actors that form the sector are analyzed in detail. Finally, the framework provided in former chapters together with the characteristics indicated in this chapter are combined in order to develop of a series of innovation determinants at organizational as well as the macro level.

4.1. Characteristics of the Tourism Sector

The specificities of the tourism sector influence innovation performance. The conditions of the tourism industry are not always the most appropriate to enhance innovation. Therefore, low innovation levels have been usually attributed to tourism firms. However, the potential for a higher innovation activity has been also identified (Hjalager 2002, Sundbo et al. 2007). Besides, it has been stated that the tourism industry is characterized by high levels of competitiveness thus obligating organizations to innovate in order to stay competitive (Hall and Williams 2008). Consequently, it is necessary to analyse in detail the characteristics of the sector that create innovation disadvantages as well as those that enhance innovation.

Competition between organizations in the tourism sector is very high. One reason is that innovations in tourism are difficult to protect from imitation. Given the nature of the tourism product, information about successful innovations inevitably reaches competitors. Therefore, organizations in the tourism sector are challenged to innovate constantly in order to gain competitive advantage. Consequently, it can be stated that competition enhances innovation in tourism.

Both competition and collaboration between organizations in a destination are necessary to innovate. There is a certain degree of competition between organizations in the same destination, but at the same time organizations cooperate in order to gain advantage at destination level. This characterizes the tourism sector as well as other industries, in which the spatial factor influences innovative activity. Hence, organizations have to work together if they want to success in the market.

While collaboration between organizations is a factor of competitive advantage for destinations, cooperation between destinations can also enhance innovation. Destinations are not isolated. They offer their products in the market. Although each destination has its specificities, knowledge and innovation can be shared between them.

For instance, it is possible to adapt a successful innovation in diverse destinations. Besides, the same organization can operate in different regions successfully. Accordingly, collaboration inside and outside the destination plays a major role in tourism innovation.

Porter (1998) defines competitive advantage in productive terms. Thus, productivity depends on quality and features as well as on production efficiency. In the tourism industry, organizations that invest in quality and product diversification are usually very competitive. Quality and differentiation are the solution for decreasing numbers of customers in several destinations. Changes in quality can also influence the application of more appropriate price strategies. Other destinations, however, that do not innovate in this direction have a disadvantage towards competitors.

Regarding production efficiency, several tourism organizations invest in efficient production methods in order to increase productivity and decrease costs. In this matter, Weiermair (2006) points out that innovation is fundamental to reduce costs of production and marketing and provide product value. Many tourism firms, however, try to reduce costs by offering low wages to employees, which does not enhance innovation and does not improve competitiveness in the long term.

Thus, in order to develop a framework that describes the situation of the sector towards innovation, both competition and cooperation must be taken into consideration. Furthermore, several subjects such as globalization, demand needs, sustainability, industry's structure, professionalization and seasonality need to be analyzed.

Changes in the Tourism Sector

Despite the fact that tourism has been constantly influenced by continuous changes in market and environmental conditions, it is necessary to study in detail three factors that have lately influenced competition in the sector.

First, global development and deregulation have increased competition in the tourism sector (Weiermair 2006). Although the process of globalization is not new it has influenced tourism in the last decades. With the access of more regions to global markets, tourism consumption has grown, extending the sector to new economies (Hall and Williams 2008). Accordingly, the number of tourists has increased. Besides, new destinations have emerged. As a result, the level of competitiveness among regions has augmented. In this context, several destinations that were good positioned in the market still have competitive advantage, but they have to adapt to new conditions.

A second factor that influences competitiveness in tourism is the existence of more experienced tourists. With the growth of tourism consumption, tourists demand alternative products. Besides, tourists are more demanding because it is easier to access information. Furthermore, access to information has motivated tourists to be more independent. As a result, the number of self organized holidays has grown in the last decade.

Information exchanges between provider and costumer are a crucial factor for the adaptation to a more experienced demand. The individualization of mass tourism has emphasized the learning taking place in the interaction between suppliers and tourists. Accordingly, experienced tourists value destinations that regard individualization rather than standardization. Many traditional destinations, influenced by high seasonality, however, still receive great numbers of tourists during the high season, which complicates the labour of offering individualized products.

Weiermair (2006) indicates that in saturated markets tourists look for experiences. Accordingly, the diversification of tourism experiences is a fundamental factor for the success of destinations in the market. Regarding regional success, Porter (1998) emphasizes that cultural, economical, institutional and sociological differences contribute to competitive advantage. Consequently, destinations should invest in their own resources. This requires the combination of different elements: infrastructure, tourism services, complementary services, landscape, etc. Furthermore, the development on the basis of the own destination resources implies the collaboration of all the actors in the destination.

The third factor, sustainability, is fundamental to gain competitive advantage. In this regard, economical, sociological and natural environments influence competition. The increase in environmental sustainability is one of the main challenges of traditional tourism destinations. For instance, coastal regions have to cope with decreasing numbers of tourists (Weiermair 2006) and increasing challenges in the natural environment such as insufficient natural resources to sustain destination's productivity. Thus, several destinations have long reached the phase of product maturity, which has a direct influence on the development of the region. Besides, the number of tourists that set value on the environmental elements in the tourism experience has growth. Hence, there is a growing interest in alternative types of tourism that take into consideration environmental sustainability. Accordingly, if destinations want to be more competitive they should regard sustainability as an objective. Furthermore, there is a great number of possibilities to innovate in direction sustainable products.

These three factors, globalization, experienced demand and sustainability influence the new trends of the tourism sector. The number of tourists that look for more quality, product diversification, reasonable priced products and environmentally compatible types of tourism increases. Therefore, destinations should develop competitive advantage regarding demand needs.

Industry's Structure, Professionalization and Seasonality

Another factor that influences competitiveness in tourism is the industry's structure. Though it is difficult to make generalizations in tourism, due to the fact that the configuration of the industry varies among destinations, it can be stated that the structure of the tourism industry is mainly based on SMEs. Furthermore, in destinations where one or several large firms have the highest market share, SMEs are also present as a complement for the tourism product. Destinations thus need this type of structure in order to offer several types of services to tourists. There is, however, a common belief that SMEs are less innovative than large firms. This is mainly due to the fact that large firms usually have more resources to invest in innovation

processes, while SMEs must usually profit from the success of an idea or from the collaboration with other organizations.

Furthermore, SMEs are usually related to low innovation levels, because R&D is frequently taken into consideration as the only determinant of innovation productivity. SMEs in the tourism industry rarely perform R&D in the traditional sense or have a specific department in charge of innovation activities. Furthermore, R&D from universities is usually acquired by large firms, while SMEs in the tourism sector hardly adapt knowledge produced in universities and other research institutions (Hjalager 2002). However, SMEs in tourism can invest in the stage of product development, which benefits the industry and contributes to innovation.

Hjalager (2002) also points out that large firms have been usually classified as being more innovative than SMEs. Besides, Sundbo et al. (2007) confirm empirically that large firms tend to be more innovative than SMEs in the tourism sector. In their study of tourism firms Sundbo et al. (2007) also analyse business units that belong to a corporation. The results demonstrate that large tourism corporations have more innovation capacity, however, their business units are less autonomous to innovate, since innovation processes are centralized by the corporation.

Regarding innovative performance in SMEs, they can enhance their innovative capacity by collaborating with other organizations and institutions. Collaborative environments might also motivate the acquisition and adaptation of knowledge generated in universities and research centres as well as the creation of linkages with other sectors.

In the structure of the tourism industry it is necessary to put emphasis on entrepreneurship in improving economic development. Entrepreneurs can introduce innovations, influencing thus other organizations. They also tend to collaborate in networks and generate and adopt knowledge.

The degree of professionalization in the tourism industry is another aspect to take into consideration in the study of the sector's characteristics. While several tourism organizations implement professional methods based on elements like quality or customer orientation, many firms in the tourism sector lack on professionalization. On this matter, Sundbo et al. (2007) identify professional firms to be more innovative. Accordingly, firms that lack on professional organizational and production methods have habitually less capacity to innovate. Professional organizations also influence innovation activity in the environment, since they usually enhance collaboration in networks, transferring and adapting knowledge from the environment. The use of IT is also higher in professional organizations.

The lack on professionalization in some tourism firms is also related to low trained human resources. Although several organizations employ qualified personnel, for many firms it is difficult to find trained staff. These two variables, professionalization of the organization and qualified employees habitually correlate. Therefore, less professional organizations have more difficulties to employ trained staff. Despite the fact that qualified human resources are trained in universities, only a part of this workforce is employed in tourism. Although some professional organizations offer appropriate development opportunities to their employees, a career in the traditional sense is not a common characteristic in the tourism sector. Accordingly, innovative performance in

the tourism industry is directly influenced by the career opportunities offered to employees (Hjalager 2002).

Regarding human resources, the tourism industry is also characterized by high fluctuations of personnel. Though exchanges in qualified personnel between organizations might contribute to knowledge transfer and innovation, this is not often the case in the tourism sector. Tourism firms are rarely receptive to knowledge inputs from new personnel (Hjalager 2002). Furthermore, as a result of labour fluctuations, the capacity of firms to acquire new knowledge remains low (Sundbo et al. 2007).

Another factor that influences personnel fluctuation is the high seasonality of the tourism product, which is especially relevant in coastal destinations. Habitually, firms on destinations affected by high seasonality reduce productivity during the low season. Accordingly, part of the staff is only employed during several months, lacking thus on continuity. Furthermore, the sector is affected by low salaries and irregular working conditions (Hjalager 2002).

The influence of seasonality goes beyond the challenge of creating career perspectives for personnel. It also affects the whole destination. The economy of the region is influenced by these changes. Furthermore, the natural and sociological environments are affected by overuse periods. Accordingly, sustainability is difficult to maintain when seasonality is high in destinations.

Seasonality can be reduced by investing in new infrastructures and facilities that take alternatives for the low season into account. These new products can be then offered to new markets. Furthermore, the image of the destination can be improved by developing marketing strategies regarding alternative products. Flagestad (2006) suggests that seasonality can be reduced in destinations by implementing the theories of national innovation systems. In this regard, collaboration between actors is required in order to reduce seasonality. Especially relevant in this matter is the role of the public sector.

Consequently, the characteristics of the tourism sector can enhance innovation or represent innovation barriers. Accordingly, these can be classified as advantages and disadvantages.

The sector's disadvantages to innovate are: lack on protection from imitation, reluctance to collaborate with other organizations, high seasonality, insufficient natural resources, insufficient benefit from traditional R&D, lack on professionalization, low career perspectives for employees, low salaries, irregular working conditions and personnel fluctuations.

The sector's advantages to innovate are: existence of more experienced tourists, demand's diversification, increasing demand of high qualitative products, expansion of new markets, opportunity to develop sustainable products, entrepreneurship's capability and the summative capacity of SMEs.

In this section, it has been emphasized that several aspects like globalization or sustainability have lately influenced innovative performance. However, tourism has frequently been subjected to changes in preferences, technologies and institutional

conditions (Hall and Williams 2008). In this regard, collaboration has been identified as a fundamental factor to cope with changing conditions. Moreover, it improves the competitive advantage of destinations. Besides, competitiveness is enhanced by increasing productivity and quality through the development of innovations that add product value.

4.2. Necessary Actors in the Tourism Sector

The structure of the sector influences innovation performance in tourism. In this matter, there is a common belief that innovations are mainly developed by firms. Although innovative performance in firms certainly benefits economic development, the labour of other actors in the tourism sector is also relevant.

Accordingly, innovation performance in tourism is improved by the interaction of several actors from inside and outside the sector: tourism firms, Knowledge Intensive Business Services (KIBS), universities and research centres, government and other public institutions, tourists, and the local population. Thus, innovation is based on knowledge flows between these actors. Accordingly, in this section the innovation characteristics of each actor are studied in detail.

Tourism Firms

In this category are included individual firms as well as groups of associated firms in the tourism industry, which are the main innovators of the sector. Indeed, economic development in the sector is based on the activities carried out by firms. Collaboration between tourism firms is necessary to develop the tourism product. Nevertheless, it has been pointed out that in some destinations tourism services are offered independently and that firms are not aware of the whole product (Sundbo et al. 2007). In other destinations, however, firms may be part of an innovation system, together with other private and public organizations.

Sundbo et al. (2007) identify three organizational forms in the tourism industry that are highly innovative. First, large firms have more capacity to innovate, mainly because they can invest more on innovation processes. Next, SME's in collaborative environments. Finally, entrepreneurs, which are SME's that introduce new products and thus motivate other firms to invest in innovation processes in order to stay competitive. Given that the sector is mainly structured in SME's, collaborative environments are of major relevance in the tourism industry.

Regarding entrepreneurs, they create new business opportunities and motivate change processes. Furthermore, in order to bring the product into the market, they create linkages with other organizations and institutions from inside and outside destinations. Entrepreneurship thus influences innovation performance in the whole destination.

Regarding the processes of innovation in tourism firms, interaction between individuals plays a major role. Tourism firms seldom perform research in the traditional sense, although they carry out development processes. Therefore, most of innovations

emerge from the interaction with suppliers, customers and other organizations and institutions.

Innovations in tourism firms are habitually not commercialized to other sectors. The production of innovations in the tourism industry has two objectives: commercialization to tourists and use in the same industry. Tourism firms mainly produce innovations in the form of services, i.e. process and product innovations, which are commercialized to customers. Moreover, organizational, process, and marketing innovations produced by tourism firms are used in the sector.

Besides, the tourism industry acquires innovations from other sectors. Consequently, tourism firms are users of innovations provided by other sectors of the economy. Acquisitions of embodied and disembodied knowledge are adapted in production, organizational and marketing activities.

KIBS

The learning economy, which is based on the acquisition, production and transfer of knowledge, has influenced the development of KIBS. These types of firms acquire knowledge from different sources, produce new knowledge and transfer it to other organizations and institutions (OECD 2006). KIBS are usually high professionalized firms that provide know-how to tourism organizations in different stages of the innovation life cycle. Employees in KIBS are habitually high qualified. Collaboration with KIBS thus plays a major role in tourism innovation.

Regarding their contribution to innovation within the tourism sector, KIBS are mainly producers of knowledge. They provide embodied and disembodied knowledge (Lundvall 2004). Firms are the main adopters of knowledge produced by KIBS. They contribute with knowledge on process, product, organizational and marketing innovations. In this context, the development of innovations is influenced by the interaction between KIBS and organizations as well as the capacity to transform solutions provided by KIBS into innovations.

KIBS can be part of the tourism industry or they can be external actors. KIBS within the tourism industry are mainly consultancy activities and training services. Services provided by KIBS from outside the tourism industry are IT-applications, financial services, consultancy, etc. Moreover, KIBS can be localized within a destination or they can interact globally.

Universities and Research Centres

Regarding their main activities, universities and research centres develop similar processes. Research centres, however, carry out more research based on applied knowledge than universities. The results of research performed in universities and research centres can increase technological opportunity in the sector. Accordingly, technological trajectories in the sector are highly influenced by the inputs provided by these institutions.

Among public institutions, universities perform the major part of R&D in most countries (Edquist 2005). In the tourism sector, however, only some firms work together with universities. Nonetheless, universities as well as research centres are able to perform the necessary R&D for the industry.

Public institutions have usually more investment capacity in R&D than SME's. However, funding of research in universities might be provided by both public and private sectors. In this regard, most of the studies carried out in universities and research centres are funded by public institutions. Nevertheless, the contributions of public institutions to science-based research should increase in the tourism sector. Furthermore, linkages between universities and the industry should be enhanced. As a result, advances in research could be transferred to the industry, which would acquire this knowledge and increase innovation performance.

Universities also contribute to innovation in the sector by providing qualified employees. As a result, the level of professionalization increases. Furthermore, qualified personnel provide new knowledge to the sector.

Consequently, universities and research centres support innovation by transferring new knowledge to the sector. They may also participate in the development of innovations, in collaboration with other organizations.

Government and other Public Institutions

The participation of public institutions is fundamental to innovate in tourism. Institutions often motivate collaboration between actors in a destination. If organizations are reluctant to participate in networks and share information, usually because they do not want to be imitated, public intermediation can reduce uncertainty and support collaboration. However, this task is especially difficult if firms see each other as competitors.

The degree in which the public sector influences collaboration differs among destinations. Often, public institutions do not support collaboration or are influenced by several important actors thus not taking the whole industry into account. Porter (1998) indicates that the role of institutions should be rather indirect than direct. Accordingly, region's success should be based on the labour of business firms rather than in public intervention and policy making. Sundbo et al. (2007), however, emphasize the role of institutions in tourism and point out that the institutionalization of the tourism industry may improve the levels of innovation activity. Consequently, the public sector should motivate innovation in the destination and create the appropriate environment.

The public sector also performs expensive R&D processes that neither universities nor private firms are able to carry out. Besides, government funding represents the major economical source for the development of R&D activities in universities. Nevertheless, institutions may also slow down the process of technological change, because they are usually less flexible and more bureaucratic than private organizations.

At destination level organizational innovations emerging from public institutions can benefit the structure of the sector. Government motivates the creation of collaborative structures. Furthermore, public institutions carry out promotion of the destination. In this context, marketing innovations are of great relevance. Public institutions may also complement the tourism product by offering several services in the destination, which implies that they also invest in process and product innovation.

Entrepreneurship has been traditionally related to private firms. However, public institutions can have also entrepreneurial characteristics (Hall and Williams 2008). At the level of the destination, public institutions may act as entrepreneurs thus creating new business opportunities, changing the image of destinations, etc.

Customers

Several authors have indicated that the interaction between producers and users is at the core of the innovation process (Sundbo et al. 2007, Asheim and Gertler 2005, Lundvall and Vinding 2004). In the interaction between producers and users, transfer of knowledge goes in both directions. Users provide tacit knowledge to organizations, which might be then codified. With the knowledge acquired from users, producers develop new solutions that they offer to users. Accordingly, both actors benefit from the process of interaction. In this matter, diversification of sources plays a major role. Thus, innovators may benefit from accessing to knowledge form different users.

Product and processes in experience service industries are created through the interaction between providers and customers. In other words, tourists participate in the development of service innovations. They do not only provide information, in fact they participate as innovators. The degree in which they participate depends on the type of tourist. In this matter, the growth of a more experienced demand has increased the level of participation of tourists in the creation of products. Thus, more experienced tourists tend to purchase personalized services, organize several parts of their holidays and interact more with the tourism industry. Thus, personalization is a result of specific user needs. Tourists demand more personalized services. Accordingly, services are adapted to each customer. This implies a series of incremental changes, which may develop into innovations. Thus, the process of cooperation between providers and customers is a cumulative one. Service providers and tourists interact with a common objective: the improvement of services. In order to answer user needs, organizations may add new elements to services or enhance quality. User needs may also motivate to improve efficiency thus reducing costs. As a result, tourists may have access to similar products at lower prices. User needs may also motivate changes in the marketing strategy or in the organizational structure. In this context, dynamic and flexible structures are more able to interact with customers and adapt to their needs.

Local Population

Innovation performance in destinations might be also influenced by the local population. Local population often interacts with public institutions. Accordingly,

knowledge transferred from the local population to public institutions may start processes of change that develop into innovations.

The demands of the local population tend to be more effective if they are provided by organizations. Such organizations have more capacity to transfer the needs of the local population to public institutions. Especially relevant are the contributions on sustainable development made by these organizations. Several of these organizations work with the objective of preserving the local cultural, social and natural environment.

In conclusion, the tourism sector is structured in several actors. Innovation in tourism is enhanced through the collaboration between tourism firms, universities, government, customers and the local population. Thus, the function of each actor plays a major role. If some skills or competences are lacking, it may influence innovation performance in the whole sector. In contrast, if there is heterogeneity among actors innovation performance increases. In this context, tourism firms are the main producers of such innovations that enhance economic development. Among firms inside and outside the tourism industry, KIBS are crucial for the production and transfer of specialized knowledge. Next, universities and research centres support innovation in tourism by carrying out science-based and applied research. Furthermore, universities provide high qualified personnel to the sector. Then, demand needs influence innovation in organizations. Customers provide new knowledge and participate in the creation of the tourism experience. The local population also influences innovation performance. They mainly supply knowledge to public institutions. Finally, organizations and other public institutions create the appropriate framework for the interaction between actors and the development of innovations.

4.3. Innovation Determinants

The topic of innovation determinants has been usually analyzed regarding the manufacturing sector. Accordingly, R&D has been considered as the major determinant of innovations. Nevertheless, interaction between actors is the main driver of innovation in tourism. In this matter, Hjalager (2002) emphasizes that the determinants of tourism innovation are to find inside as well as outside the sector. For instance, sectors such as consultancy or IT-services provide many technological opportunities to the tourism sector. However, tourism firms are often not aware of the possibilities that the linkages with the environment can bring to the production of innovations.

Sundbo et al. (2007) contribute to the identification of several innovation determinants in the tourism industry. They indicate that innovative performance is determined by firms' size, professionalization and collaboration with the environment. Their study is based on private firms. Nonetheless, other organizations participate in the process of innovation in tourism. Besides, there is a need of study other determinants, such as diversification, demand conditions or heterogeneity of actors.

Therefore, in this section a classification of determinants is provided, which takes into consideration the diverse actors that participate in the innovation process. This includes private and public organizations from inside and outside the tourism sector.

This section is structured in two parts according to the determinants at the level of the organization and the determinants at the macro level.

Determinants at the Level of the Organization

Innovation performance in organizations influences innovation activity at the macro level. Similarly, linkages between actors enhance innovative activity in organizations. The determinants introduced in this subsection take into consideration the organizational level. These are summarized in table 4.1. Some of them also influence innovation at the macro level, e.g. technological trajectories or diversification, while others are organization specific. In this classification, organizations within the tourism sector as well as external organizations are taken into consideration.

- Type of activity. This determinant refers to the main activity of the organization. Innovation performance differs among private and public organizations. In the latter are included government, universities and other public institutions, which carry out different innovation activities. As for private firms, innovation performance differs according to the firm's main activity. In this regard, several tourism services have a higher rate of product change. Such services must innovate frequently in order to stay competitive. For instance, cultural services or leisure activities rely on the ability to introduce changes regularly. Besides, it is also necessary to consider firms that supply the industry with new knowledge. In this matter, KIBS play a major role. These can operate inside the tourism industry or they can be external actors.

- Organization's size. The influence of organization's size on innovation performance has been usually studied regarding private firms. In this matter, large firms have been identified as being more innovative. Nevertheless, SME's can be very innovative as well. In this regard, entrepreneurs are SME's that invest in innovation processes. Besides, innovation in SME's can emerge through the cooperation with other actors of the environment. Consequently, regarding private firms the most innovative ones are large tourism firms together with entrepreneurs and SME's that collaborate with other actors of the environment. Other organizations in the tourism sector such as research centres or public institutions are also influenced by organization's size. Large organizations with more resources and capacity to innovate may introduce changes regularly. In contrast, local institutions with fewer resources must rely on successful ideas as well as on the collaboration with other organizations.

- Diversification of innovation. Diversification is related to the range of activities carried out within organizations as well as with the different innovation processes developed. Specialized firms focus on the development of certain types of innovations. These firms have limited possibilities to innovate. For instance, firms that only invest on process innovations enhance efficiency, but they do not take into consideration quality improvements. In contrast, diversified firms that carry out different innovation activities are more able to acquire knowledge from different sources. Firms that diversify innovation processes have more possibilities to innovate. Diversification is more usual in large organizations. Smaller and

medium organizations, however, may enhance diversification at the macro level through collaboration.

- Organization's structure and innovation strategy. Given that innovation in tourism is mainly based on the interaction between individuals, flexible and dynamic structures tend to increase innovation performance in organizations. Adaptation to demand needs is easier in dynamic structures. They also motivate learning processes within organizations, through the development of bottom-up processes. Besides, dynamic and flexible structures adapt better to changing conditions within the organization and in the environment. Nevertheless, some managerial elements might be necessary in tourism organizations. For instance, formalization of innovation may reduce uncertainty. Consequently, the most appropriate structure for tourism organizations is the flexible and dynamic one that also includes some managerial components.

- Collaboration with the environment. Innovation is related to the collaboration with other organizations and institutions of the environment. At the level of the organization, collaboration with the environment is seen as an endogenous factor. Accordingly, the innovation strategy in organizations must take the acquisition of external knowledge into account. Given that the tourism product is a combination of different types of services, collaboration with the environment is especially relevant in tourism. Organizations may participate in local as well as in non-local networks. Furthermore, organizations may develop linkages within the sector or external linkages.

- Sources of external knowledge. This determinant is related to the former one. However, in this case the source determines the type of knowledge that is acquired. For instance, tourism firms that adopt knowledge from KIBS may develop more professionalized processes. In contrast, organizations that rely on producer-user interaction, i.e. tourists as suppliers of knowledge, may enhance personalization in services. Accordingly, the source of knowledge also influences the possibilities to develop different types of innovations. As a result, organizations that acquire knowledge from different sources may be more innovative.

- Knowledge and competences inside the organization. Innovation performance is also determined by the production of internal knowledge and the improvement of competences within organizations. Consequently, professional tourism organizations tend to be more innovative. In this regard, knowledge and competences within organizations might be improved by investing in training or employing qualified personnel. Furthermore, knowledge within organizations may be also produced through development processes. Although tourism organizations seldom perform R&D, they carry out development activities, such as improving quality, modifying processes or restructuring the organization. In this context, the participation of employees in development processes enhances the production of internal tacit knowledge as well as codified.

- Absorptive capacity. This factor is related to the capacity of tourism organizations to absorb knowledge. Absorptive capacity is influenced by innovation performance within organizations. Organizations that regularly acquire, produce and transfer

knowledge have usually more absorptive capacity. Furthermore, this determinant is also influenced by other factors such as the structure of the organization, the innovation strategy or the organization of innovation processes. In this regard, personnel fluctuations influence the levels of absorptive capacity in tourism organizations. Seasonality is another factor that diminishes the levels of absorptive capacity in tourism. Besides, absorptive capacity influences the ability to reproduce incremental changes that take place in the interaction between producers and tourists. Thus, absorptive capacity is closely linked with the ability to reproduce ad hoc innovations.

- Innovation trajectories. Innovation processes within tourism organizations are influenced by their innovation trajectories. Since technological change is a cumulative process, former innovation activities influence current innovation performance. Thus, tourism organizations that develop through incremental changes may introduce innovations on a regular basis. However, tourism organizations that combine periods of incremental change with the introduction of radical innovations may benefit more from the results of the innovative process. Both trajectories, one based on incremental changes and another based on the combination of periods of cumulative change and radical change, may increase the possibilities to acquire knowledge from several resources. Thus, innovation trajectories are linked with the ability to transform technological opportunity into innovations.

- Type of innovation. Innovation performance can also be influenced by the type of innovations that are developed in organizations. Accordingly, organizations that focus on product innovations in tourism may develop more personalized services, enhance quality, create new services, etc. In contrast, investments in process innovations may have the objective of increasing production efficiency or quality of processes. Besides, organizational innovations may influence innovation performance of the whole organization. Finally, marketing innovations may be necessary to increase market share or to open new markets. The type of innovation that organizations develop is determined by several factors, such as demand needs, technological opportunity or the strategy of the organization.

Table 4.1: Determinants of innovation in tourism at organizational level

Determinant	Hypothesis
Type of activity	The type of activity determines the rate of technological change in organizations and the modes of production and acquisition of knowledge.
Organization's size	Large organizations tend to be more innovative. However, entrepreneurs and SME's that collaborate in networks may have high levels of innovativeness as well.
Diversification of innovation	Diversified organizations tend to acquire knowledge from several sources and produce different types of innovations.
Organization's structure and innovation strategy	Dynamic and flexible structures that also include several managerial elements such as formalization of innovation are the most appropriate to improve innovation activity in organizations.
Innovation trajectories	Organizations that combine periods of cumulative change with periods of radical innovations tend to be the most innovative.
Collaboration with the environment	Collaboration with actors from inside and outside the tourism sector enhances innovation.
Sources of external knowledge	Organizations that acquire and adapt knowledge from different sources tend to be more innovative.
Knowledge and competences inside the organization	Investment in the production of knowledge in organizations enhances innovation performance within the organization as well as the development of linkages with the environment.
Absorptive capacity	Absorptive capacity influences the acquisition of new knowledge and the ability to reproduce ad hoc innovations, i.e. innovations produced in the interaction between producer and user.
Type of innovation	The types of innovations produced by organizations influence innovation processes.

Determinants at the Macro Level

The determinants included here take into consideration the processes of innovation at the macro level. These determinants influence innovation performance at local, regional, national and global levels. In this classification, not only the tourism sector is taken into account. Also other external sectors that influence innovation performance in tourism are considered. The determinants at the macro level are summarized in table 4.2.

- Heterogeneity of actors. In order to create the appropriate environment for innovation, heterogeneity of actors is required at the macro level. Thus, the existence of the actors identified in the former section might enhance innovation performance. These actors may be localized at destination level or may operate regionally, nationally or globally. Furthermore, the necessary actors to develop innovations in tourism can be found inside as well as outside the sector. For instance, KIBS from other sectors supply the tourism industry with new knowledge.

- Linkages between actors. This determinant is related to the former one. In order to enhance innovation activity, it is not only sufficient to have the appropriate actors at the macro level. Linkages between actors must be also created. Destinations with diverse actors that do not collaborate, may offer a fragmented product. In contrast, linkages between actors increase synergies. Furthermore, in collaborative environments spillovers benefit organizations. If organizations at the macro level see each other as competitors, collaboration may be hampered. Although, a certain degree of competition may benefit innovation performance, collaboration is the main driver of innovation in destinations.

- Institutional framework. The environment in which tourism firms operate may be highly institutionalized, i.e. regulations and public policy influence activities of firms. In contrast, institutions may have less influence on innovation activity at the macro level. In tourism, the institutional framework plays a major role. This is especially relevant at the different geographical levels, i.e. local, regional, national and global. Thus, institutions regulate activities of firms, motivate collaboration between actors, improve environmental sustainability, etc. Consequently, a certain degree of institutionalization enhances innovation at destination level.

- Technological trajectory. At the macro level, technological trajectories might be industry specific. Besides, destinations and groups of organizations may follow individual trajectories within industries. In this context, destinations may develop through cumulative processes and the introduction of small changes. Furthermore, new tourism services and whole new destinations may emerge through the introduction of radical changes. Consequently, destinations follow diverse paths of development. In order to avoid lock-in situations, periods of small cumulative changes should be combined with the introduction of radical innovations. This is especially relevant for traditional destinations, which must combine their know-how with the introduction of innovations in order stay competitive in the market.

- Interaction with the demand. Destinations are influenced by the conditions of the demand. Acquisition of information plays here a major role. Thus, if demand needs change, destinations may introduce some changes in their products. For instance, more experienced tourists demand more personalized services. Besides, the augment of the demand for sustainable products has motivated the introduction of innovation processes that enhance environmental protection. Accordingly, continuous interaction with the demand may reduce uncertainty and enhance innovation when demand needs change.

- Diversification. At the macro level, diversification enhances the possibility to benefit from technological opportunities. Destinations that carry out diversified innovation processes are more able to adapt new knowledge. Diversification thus enhances appropriability conditions. Accordingly, collaborative environments might improve external acquisition of knowledge as well as internal knowledge production through the diversification of activities. In order to increase diversification in the tourism industry, collaboration between SME's is necessary.

Table 4.2: Determinants of innovation in tourism at the macro level

Determinant	Hypothesis
Heterogeneity	Heterogeneity of actors, i.e. private and public organizations, enhances innovation performance.
Linkages between actors	The development of linkages among actors from inside and outside the sector improves synergies and enhances the capacity to benefit from spillovers.
Institutional framework	A certain degree of institutionalization at local, regional, national and global levels improves innovation activity in the tourism sector.
Technological trajectory	In order to avoid lock-in situations, destinations should combine periods of cumulative change with periods of radical innovations.
Interaction with the demand	Continuous interaction with the demand enhances the adaptation to demand needs and the development of innovations.
Diversification	Diversification improves the capacity to acquire knowledge as well as to develop innovations.

In conclusion, several determinants at organizational and macro level influence innovation performance in the tourism sector. Despite the fact that all determinants are relevant, interactions among public and private organizations from inside and outside the tourism sector and between suppliers and customers have been identified as the main drivers of innovation in tourism. Nevertheless, these processes are related to different aspects of knowledge and learning that are difficult to measure. In the following chapter an approach for the measurement of innovation in the tourism sector is suggested.

5. Innovation Measurement

Several factors make difficult the task of identifying the appropriate indicators for measuring innovation. For instance, innovation is a complex process that includes innovative activities at the firm level, external factors such as technological trajectories, demand characteristics or the institutional framework. Besides, it is still unclear if the main drivers of innovation, which are knowledge transfer and interactive learning, can be measured accurately.

Despite the number of uncertainties around the topic of innovation measurement, surveys have tried to measure innovation in several forms. Here is important to emphasize the role of the Oslo Manual (OECD 2005) in providing the guidelines for measuring innovation at the national level. Thus, many surveys in OECD and non-OECD countries have been carried out according to the suggestions of the Oslo Manual, which has facilitated the analysis of data at international level.

Nevertheless, a great number of theories on innovation must still be confirmed empirically. Regarding the measurement of innovation in tourism, the survey on tourism firms in Spain and Denmark carried out by Sundbo et al. (1997) contributes to the identification of some of the innovation determinants in the tourism industry. However, several factors influencing innovation performance in tourism such as linkages between organizations, the role of the demand, or the acquisition, production and diffusion of knowledge in the sector must still be analyzed.

Thus, the aim of this chapter is to provide a conceptual framework for the measurement of innovation in tourism. The different measurement approaches that are to find in the literature are presented in a first section. Next, an approach for the measurement of innovation in the tourism sector is developed.

5.1. Measurement Approaches

Innovation surveys have traditionally focused on manufacturing activities. Service innovation has only been taken into account recently (see OECD 2005). Therefore, the approaches introduced in this section are mainly based on manufacturing industries. They might be, however, of great relevance for the service sector as well.

Unger (2005) identifies the usual modes of measuring innovation: through case study, journals and publications, surveys, input indicators such as R&D, and output variables such patents and sales. Journals and publications, however, can be considered within the output indicators. Similarly, case studies can be regarded as a type of survey. Therefore, in this section I will sum up the different measurement approaches in two subsections. In the first subsection, the most important input-output indicators that are to find in the literature are reviewed. In a second subsection, different types of innovations surveys are studied in detail.

Input and Output Indicators

Mainstream economics has traditionally measured innovation through input-output studies (Unger 2005). Inputs understood as sources of innovation have been usually studied on the basis of investments on R&D. Besides, patents, publications or capital goods have been considered as the outputs of the innovative process. These measurement methods are useful since they link investments on innovation with their results. Furthermore, it is possible to evaluate which activities, firms and sectors are more innovative. In this subsection, I mainly focus on the two most used innovation indicators: R&D and patents (Patel and Pavitt 1995, Smith 2005).

First, the measurement of R&D activities in organizations usually focuses on gathering information about the investment on this type of innovative activity[9]. The Frascati Manual (OECD 2002) suggests the guidelines for collecting data on inputs in R&D in national surveys. The manual covers R&D activities in public institutions, private organizations and non-profit organizations[10]. According to the manual, R&D activities can be separated between basic research, applied research and experimental development.

The type of sector influences R&D intensity. Accordingly, organizations, industries and countries, where R&D activities are carried out, have been traditionally classified as more innovative. Thus, R&D statistics are influenced by the structure of the industry. However, low-technology industries can be highly innovative as well. They do not produce direct R&D, but acquire R&D embedded in goods and services from other sectors. Moreover, low-technology industries carry out a multitude of development activities that do not fall within R&D, such as product adaptation, market research or quality improvements in services.

Next, patents are the most mentioned output indicator in the literature (see e.g. Archibugi and Pianta 1996, Smith 2005). Patents can be regarded as one output of research activities. However, patents are linked with inventions rather than innovations. Furthermore, patented inventions must not necessarily develop into innovations. Patents do not give information about the possibility to commercialize the invention. Archibugi and Pianta (1996), however, indicate that if organizations patent their inventions is because they expect them to be commercialized. Consequently, patents provide information about the innovative performance of firms, despite the fact that some patents do not develop into innovations that can be commercialized. Furthermore, patenting is also a measure to protect inventions from imitation.

Since not all organizations patent their innovations, studies based on patents have an important limitation. Besides, not all innovations can be patented. Especially in the service sector, innovations are rarely patented. Firms protect innovations by other means, such as maintaining information within the organization, or, as in the case of software, publications and similar media, by protecting through copyright. Accordingly,

[9] Accordingly, sources of innovation such as R&D are often measured in economical terms.

[10] In the Oslo Manual (2005), however, only business firms are regarded, which makes the Frascati Manual (2002) broader in its scope. Nonetheless, the Frascati Manual only deals with the measurement of R&D activities, while the Oslo Manual includes the measurement of other innovation activities as well.

patents appear to be an indicator of innovative performance that is related to inventions and that does not include all sectors in the economy.

Similarly, other indicators such as patent citations and publications also provide information about innovation performance. However, these types of bibliometric statistics are mainly related to science-based research (Smith 2005). Consequently, they do not cover all innovations in the market and seldom provide information about their implementation or economical significance.

The advantages of input-output indicators are that they can be collected over long time periods and that they measure the results of innovative performance. At national and international level, input-output indicators provide data over different periods, which makes possible the analysis of the innovation trajectory in industries. Besides, the results of innovative performance can be obtained by combining investments in the development of innovations and the outcomes of sales.

However, input-output indicators have several limitations. They habitually do not take into consideration other factors relative to innovation such as the acquisition, production and diffusion of knowledge and skills, which are difficult to measure through economical values. Furthermore, they do not measure other intangible determinants of innovation, such as linkages with the environment, interactive learning or the cumulative character of innovative activity. Consequently, incremental changes are seldom regarded. Therefore, input-output measurement methods based on R&D and patents are above all not suited for tourism and other services industries, where incremental, intangible innovations that emerge from the interaction between individuals play a major role. In the tourism industry, other types of indicators should be developed, which reflect the process of innovation, rather than only the investments and the results of innovative performance.

Innovation Surveys

Although innovation surveys can also include input-output indicators, they habitually take into consideration other determinants of innovation as well. They can be separated in two different types of surveys, those based on the "subject" approach and those on the "object" approach. The first type of surveys takes firms as the subject of study, while the latter is based on significant technological innovations.

First, surveys that apply the "subject" approach gather information about the innovative activities of firms (OECD 2005). Thus, they focus on the organizational level (Archibugi and Pianta 1996). These types of surveys collect information about the factors that enhance innovation as well as the outputs of innovation. Nevertheless, they do not only focus on R&D inputs. They consider other non-R&D innovation sources as well. Besides, product innovations are the outputs that are easier to identify. Nevertheless, other types of innovations can also be taken into consideration in these surveys, such as process, marketing and organizational innovations.

The "subject" approach has been the method used to gather data on innovation in OECD countries (OECD 2005). Through the Oslo Manual (OECD 2005), the OECD provides the guidelines to collect data on innovation activities. The objective of the

Manual is that surveys follow similar methods, in order to improve international comparability. The Oslo Manual emphasizes that the level of the firm is the most appropriate, if the purpose is to gather data on both the production and the acquisition of knowledge. Information collected at the level of firms can afterwards be related to industry's characteristics. Furthermore, the Manual suggests collecting data about organizations that generate innovations and those that acquire them. Consequently, not only organizations with high levels of innovation production are taken into account. Also organizations that innovate through the acquisition of embedded knowledge are regarded.

The Community Innovation Survey is based on the "subject" approach as well. The CIS compares innovation data between EU-countries. It has been carried out four times and includes relevant aspects related to interaction and learning. The CIS collects data about expenditures on innovation activities, outputs of innovative products, sources of information, technological collaboration, and perceptions of barriers to innovation and factors enhancing it (Smith 2005).

In contrast, surveys based on the "object" approach collect information about individual innovations. They usually cover innovations that are technologically significant and/or provide economic outcome (Archibugi and Pianta 1996). Data is habitually collected through the consultation of experts or the review of literature (Smith 2005). Surveys that follow the "object" approach are very useful for specific case studies, since they can be adapted to the objectives of the analysis. Thus, experts may apply a specific approach to innovation in the survey. However, this characteristic makes difficult comparability between surveys. Therefore, such surveys are in most cases limited to the case studied.

Another disadvantage of surveys based on the "object" approach is that they rarely gather information about all existent innovations. Surveys are conditioned by the literature and/or experts consulted. Nevertheless, additional information of each innovation tends to be more detailed than in other type of studies.

Since information in such surveys is limited to significant innovations, which are new to an industry, a country or globally new, they generally do not report information on incremental changes.

The research carried out by Pavitt (1984) has similar characteristics with the "object" approach. He develops a taxonomy and a sectoral theory based on data collected about 2000 significant innovations and innovating firms in Britain form 1945 to 1979. Significant innovations were identified by external experts, independent from innovating firms. In the analysis of data, Pavitt solves some of the limitations that can have surveys based on the "object" approach. For instance, he indicates that incremental innovations are not measured in the study because these processes are already included in significant innovations. Furthermore, consulted experts do not only identified the most important innovations, but also which type of institution provided the most important knowledge inputs to each innovation. Besides, innovations are classified according to the sectors of production and use as well as the sector of the innovating firm's principal activity. Consequently, the applied methodology makes able to identify the sectors that produce more innovations and those who acquire them. Moreover, the institutional sources and the nature of technology are identified. The

study carried out by Pavitt does not only provide a theory of innovation and a taxonomy, but also confirms the adaptability of innovation surveys to each case studied.

To sum up, in this section several measurement approaches have been introduced. While input-ouput studies are based on the investments and results of innovation, innovation surveys are more suitable for measuring innovative activities or innovative performance. Nevertheless, the combination of both methods might be the most appropriate form of gathering data on innovative performance. However, some topics related to the measurement of innovation need further study. With the aim of providing a conceptual framework for the measurement of innovation in tourism, in the next section several of these topics are reviewed.

5.2. Measurement of Innovation in Tourism

The measurement approaches presented in the former section were developed in order to study specific cases. Each survey thus requires a determined measurement approach. Consequently, theoretical concepts such as what an innovation is and what should be measured may be determined by the approach that researchers develop (Unger 2005). The measurement approach developed in this section is based on the theory introduced in former chapters. The characteristics of the tourism sector, the determinants of innovation and the types of innovation are taken into consideration in the development of an conceptual framework for the measurement of innovation in tourism. In this context, several contributions must be regarded.

The work developed by Kline and Rosenberg has influenced the perception of what should be measured (Smith 2005). For instance, their approach contributed to several conceptual foundations of the Oslo Manual (Smith 2005). They emphasized three aspects of innovation. First, innovation is not a linear process. It involves several interactions and feedbacks in knowledge production. Next, innovation is related to learning processes that involve multiple inputs. Finally, innovation is not determined by invention activities, but by problem-solving processes within the ongoing innovation process rather than an initiating factor (Smith 2005). Therefore, it is of great relevance to differentiate between inventions and innovations, as it has been emphasized in the analysis of patents as an output indicator. Thus, innovations do not necessarily emerge from invention processes (Smith 2005). Innovation is related to processes of interactive learning and knowledge organization that are difficult to measure.

Another contribution to the measurement of innovation is the third edition of the Oslo Manual (OECD 2005). Some modifications are introduced in this edition, which are of great relevance for the tourism sector. The Oslo Manual (OECD 2005) recognizes the interaction with the environment as a driver of innovation. Apart from the linkages with other organizations, it is also suggested to take into consideration the institutional framework and the demand conditions. Nevertheless, the measurement of these innovation determinants is carried out as an external factor, since the manual is based on the "subject" approach and firms are the subject of study. Another important contribution from the Oslo Manual (OECD 2005) is to take into consideration industries with low levels of R&D such as services. It is emphasized that the measurement of innovation does not only include innovative activities carried out in

manufacturing industries, but that the range of innovation processes should also include innovation activities developed in services. In this context, the manual indicates that innovation in services is less formalized and that incremental innovations play a major role. Besides, the Oslo Manual suggests that innovation surveys should adapt the provided guidelines to each study. Consequently, it may be necessary in some cases to focus on product and process innovations and to consider organizational and marketing innovations as subsidiaries, while in other surveys it may be required to regard the four innovation types. Regarding sources of innovation, the manual includes the production as well as the acquisition of innovations, which makes possible the identification of the type of innovative organization.

Apart from the Oslo Manual (OECD 2005), scholars have been recently aware of the relevance of innovation processes in the service sector as well. Accordingly, contributions on innovation indicators that include manufacturing as well as services have increased (see e.g. Brouwer and Kleinknecht 1997, Unger 2005, Smith 2005). Some of the objectives of these contributions are to develop meaningful indicators that are able to measure incremental changes, collaboration and interactive learning, and innovation activities carried out in SME's.

With the aim of developing an appropriate framework for the measurement of innovative activities in tourism, some factors that have appeared several times during this work should be considered. These different aspects of innovation influence its measurement.

Thus, it is necessary to regard innovation as a complex process that involves different competences and the interaction with the environment. This implies that some determinants of innovation cannot be measured, at least not in economical terms. Nevertheless, they should be taken into consideration when measuring innovative activities. For instance, studies have usually focused on the measurement of codified knowledge, e.g. the acquisition of capital goods, such as equipment or machinery. However, innovation is also related to many sources of knowledge that can be tacit or codified. Consequently, appropriate indicators that measure the production and acquisition of tacit knowledge should be developed. These processes might be measured to some extent by expenditures on activities, such as implementation, development, training, market research, etc.

Regarding R&D activities in the tourism industry, these are few or non-existent. Most of R&D activities carried out in the sector are developed in universities and research centres.

Accordingly, the approach of this work is that innovation in tourism should not be measured through traditional input-outputs statistics, but on the basis of innovation activities. This approach is also supported by the fact that the results of innovation can only be identified once they exist. A study that only focuses on innovation results does not really measure innovative performance as a whole, but only successful innovations. Nevertheless, unsuccessful innovations as well as innovations in progress should be studied (OECD 2005). Despite the fact that unsuccessful innovations could not be implemented, they required several innovation activities, which indicates the innovative capacity of firms.

However, information about innovation activities is difficult to gather. Organizations are rarely aware of all the activities that enhance innovation. Brouwer and Kleinknecht (1997) analyse the CIS survey carried out in 1992 in the Netherlands, in which both manufacturing and service industries were included. In the study, other innovation activities than R&D were studied. Accordingly, intensity on activities such as acquisition of patents and licences, design, trial production, training of employees, market research and investment in production capacity was analyzed. Additionally, it was asked with which accuracy the data was provided. The results showed that 47,8% of service firms were unable to answer with information about innovation activities, 32,1% answered with rough estimates and 20,0% gave fairly accurate figures. Brouwer and Kleinknecht point out that those firms that gave fairly accurate figures tended also to be the most innovative.

Another factor that influences the measurement of innovation in tourism is the consideration of what is meant by "new". In this regard, it is important to identify if product, process, organizational methods and marketing strategies are new for the firm, for the industry or for the world (Unger 2005). Besides, at the level of the destination, it is also necessary to consider if an innovation is new for the organization or for the destination. However, surveys are habitually influenced by the cognitive perception of the respondents. For instance, innovators rarely have a global perception of all current innovations. Habitually, innovators have the amount of information about innovations that is available in the sectoral and geographical environments, in which they operate. Innovations outside these environments are seldom taken into consideration. Accordingly, indicators of innovation shall specify at which level is the innovation significant. The Oslo Manual (2005), for instance, focuses on gathering information about innovations "new to the firm".

Novelty, however, is also linked with incremental changes, whose contribution to innovation may be of major relevance over long-time periods. Most surveys have focused on significant innovations thus ignoring the cumulative nature of innovation. Therefore, measurement methods should consider several degrees of innovation. Indicators should measure incremental as well as radical changes.

The measurement of innovation activities within the tourism sector should also consider the acquisition of knowledge. Therefore, not only linkages within the destination should be analyzed, but also interaction with other actors from outside the destination. For instance, the acquisition of IT plays a major role in tourism. Thus, in order to analyse the acquisition of innovations, it would be necessary to identify which are the sectors that interact the most with the tourism industry.

Regarding the linkages with other actors, the interaction between provider and customer should be also taken into consideration. As it has been pointed out, the demand can also influence innovation processes. Thus, the degree of participation of customers in the creation of innovations should be analyzed. Furthermore, it should be studied if organizations acquire knowledge related to demand needs.

An appropriate approach to the measurement of innovation in the tourism sector should also regard innovation performance of public institutions, since their contribution is crucial in tourism innovation. In this matter, surveys have usually taken

into consideration business firms, while the tools for measuring innovation in the public sector are still to be developed.

In relation with the structure of the tourism sector, it is important to consider that innovation in SME's emerges irregularly. This factor influences the measurement method to be applied, which should regard the development of organizations and destinations over long-time periods.

To summarize, the measurement of innovation at the macro level implies to regard several actors within and outside the tourism sector. Moreover, innovation measurement in the tourism sector should be based on innovation activities that include processes of production as well as acquisition of innovations.

6. Typology of Innovation in Tourism

The typology presented in this chapter is motivated by Pavitt's (1984) categorization. In his typology, Pavitt identifies three different possible technological trajectories among sectors: supplier dominated, science based and production intensive. These trajectories can be observed at firm, regional and country levels. Pavitt's approach mainly takes manufacturing activities into account. However, Hipp and Grupp (2005) indicate that Pavitt's taxonomy can be also applied to the service sector. Furthermore, they add a fourth innovation category of network intensity.

The aim of this chapter is to suggest a typology of innovation that regards the characteristics of the tourism sector. Therefore, the contributions of Pavitt and Hipp and Grupp are combined with the theory developed in former chapters. Consequently, the determinants introduced in section 3.3 help to describe the characteristics of each innovation category.

Four categories are suggested: supplier dominated, scale intensive, knowledge intensive and network intensive. Table 6.1 presents the main characteristics of this typology.

Table 6.1: Characteristics of the innovation typology for the tourism sector

Innovation trajectory	Type of organizations	Sources of knowledge	Organizational structure	Innovation types
Supplier dominated	SME's on site, e.g. hotels, restaurants and leisure activities	Suppliers	Managerial structure	Process and product innovations
Scale intensive	Large firms, e.g. leisure parks and hotel resorts	Internal competences and specialized suppliers	Managerial structure that motivates bottom-up processes	Process, organizational and marketing innovations
Knowledge intensive	Public institutions, universities, research centres and KIBS	Science-based and applied research	Dynamic with formalization of innovation	Product, process, organizational and marketing innovations
Network intensive	Large firms and support services, e.g. consultancy, financial services or IT-services	External sources and internal competences	Dynamic structure with capacity to adapt to changes in the environment	Product, process, organizational and marketing innovations

These trajectories are mainly analyzed in relation with individual organizations. Accordingly, these four trajectories define different innovation modes at organizational level. Nevertheless, their influence at the macro level is also studied. For each category a scenario is analyzed, in which a group of firms of the same category collaborate at the macro level.

Given that innovation in tourism can emerge inside as well as outside the tourism sector, the typology includes both tourism organizations and external actors, such as suppliers of IT, financial services or consultancy.

Supplier Dominated Tourism Organizations

At the level of the organization, this category is represented by SME's, such as hotels, restaurants and leisure activities. These SME's habitually provide services on site. They have few resources to invest in innovation. Therefore, innovations are mainly acquired from external sources. The acquisition of innovation is based on the purchase of capital goods and services, such as machinery, IT-services or financial services.

Nevertheless, supplier dominated firms may also acquire knowledge from customers. Thus, incremental changes in services may emerge from the interaction with suppliers and tourists. However, low levels of absorptive capacity hamper the transformation of knowledge into innovations. Tacit knowledge acquired from tourists is not codified. Hence, supplier dominated firms have difficulties to repeat these small changes and transform them into innovations.

Since these firms have low levels of knowledge production, they are highly influenced by the trajectories of suppliers. Accordingly, if innovations are not acquired from suppliers, the technological trajectory followed by these firms may lead to lock-in situations. Moreover, supplier dominated organizations are not diversified, which influences the adaptability to changing conditions in the environment. Therefore, such firms have difficulties to open new markets or to adapt the product when demand needs change.

The low levels of absorptive capacity of such organizations make difficult the acquisition of knowledge from universities, research centres or KIBS. Thus, collaboration with other actors is limited to suppliers from inside and outside the tourism sector.

The structure of organizations in supplier dominated firms is mainly a managerial one. Processes are usually steered by managers. As a result, bottom-up innovation activities are not motivated. Therefore, employees rarely take part in learning and knowledge production processes. This lack on knowledge production within firms is accentuated by high levels of personnel fluctuation. The main reasons why personnel changes frequently in supplier dominated firms are low salaries and high seasonality. As a result, these firms do not offer career perspectives for high qualified personnel. Consequently, the levels of professionalization are low, which influences innovation performance.

The two main types of innovations introduced by these firms are process and product innovations. First, process innovations are mainly acquired externally and are directed towards the reduction of costs. Next, product innovations may be generated from the interaction with customers. However, product innovations are the result of problem-solving situations rather than formalized processes of innovation. Innovations in supplier dominated firms are new to organizations rather than new to the market.

In situations, in which the majority of firms that operate in a destination are supplier dominated firms, institutions play a major role in maintaining the cohesion of the tourism product. The main reason is that linkages between supplier dominated firms in a destination are low or inexistent. Collaboration is mainly hampered because firms see each other as competitors rather than collaborators. Consequently, organizations in such destinations do not benefit from synergies. As a result, the lack of cohesion influences the fragmentation of the tourism product. Therefore, the labour of institutions plays a major role in creating services at destination level, motivating sustainable development, or enhancing collaboration between actors. At the macro level, concentrations of supplier dominated SME's can be found in traditional mass tourism destinations. Nevertheless, groups of supplier dominated firms can also be found in other alternative destinations.

Scale Intensive Tourism Organizations

Organizations in the tourism sector that can be defined as scale intensive are large firms that offer standardized products and services. Thus, firms such as hotel chains or leisure parks might be included in this category. These firms habitually have enough resources to invest in innovation. Therefore, they have the capacity to innovate regularly. Furthermore, these large firms diversify their innovation activity. Consequently, they can adapt knowledge from different sources and increment the possibilities to innovate.

Scale intensive firms have a hierarchical and managerial structure. Decisions of managers play a major role in the innovation process. Furthermore, the process of innovation is habitually formalized. Therefore, bottom-up processes are included in development processes.

In this context, scale intensive firms enhance the production of knowledge and competences inside the organization. For instance, these firms employ high qualified personnel, by offering career perspectives. Furthermore, innovation processes are based on the codification of knowledge, which enhances its transferability. Therefore, scale intensive firms have also the capacity to produce and use their own innovations.

These organizations acquire external knowledge embodied in capital goods and services from specialized suppliers. In this matter, several sectors such as IT or KIBS play a major role. Thus, scale intensive suppliers are able to adapt technology and develop it into innovations. This is mainly due to the fact that firms in this category have high levels of absorptive capacity. Nevertheless, since services are standardized, personalization is infrequent and innovations seldom emerge from the interaction between suppliers and tourists.

Innovations in these firms follow a price differentiation strategy. Production of innovation is focused on process innovations in order to increase efficiency and decrease costs. Moreover, organizational innovations are directed towards the formalization of processes. Besides, there is less investment in product innovation. As a result, products are less differentiated from those of competitors. Therefore, marketing innovations play a major role in the enhancement of market share.

Given that services in such firms are less differentiated, changing conditions in the demand may influence trajectories of such firms. Although scale intensive firms combine periods of cumulative change with the introduction of radical innovations, these innovations are new to the organization rather than new to the market. Therefore, the lack on linkages with the demand may lead to periods of stagnation.

At the macro level, destinations such as coastal resorts, whose structure is manly based on one or several scale intensive firms have also difficulties in adapting to changes in demand needs. Furthermore, because firms in these destinations have enough capacity to produce their own innovations they rely less on the interaction with other actors in the destination. Linkages are mainly limited to specialized suppliers outside the destination. Furthermore, given that one or several scale intensive firms in the destination dominate the market, institutions are less able to develop a framework based on sustainable development.

Knowledge Intensive Tourism Organizations

The activities included in this category are related to the production of different types of knowledge. Knowledge intensive tourism organizations carry out science-based research as well as applied research. These organizations are mainly universities, research centres, government and other public institutions. Nevertheless, some KIBS and entrepreneurs may also implement processes that have knowledge intensive characteristics. Although not based on research, often the processes of development of innovations in these SME's are similar to those carried out in research centres. Furthermore, KIBS play a major role in transferring the results of research developed in universities and research centres to other organizations in the tourism sector.

Knowledge intensive tourism organizations invest more in research than other types of organizations. Furthermore, they enhance knowledge and competences inside the organization by investing in social capital. They employ high qualified personnel as well as enhance learning processes. Consequently, the level of professionalization influences innovation performance. In this context, tacit as well as codified knowledge play a major role.

These processes are also enhanced by the structure of such organizations, which is usually a dynamic and flexible one. Accordingly, knowledge production within organizations is based on bottom-up processes. This structure benefits also the adaptation to changing conditions in the environment. Besides, some managerial elements are introduced in the structure, such as formalization of innovation, which benefits a more systematic implementation of innovation processes.

Moreover, these organizations diversify the modes of knowledge production. As a result, they have a high level of absorptive capacity. Therefore, they are able to acquire knowledge from different sources and transform them into innovations.

Knowledge intensive tourism organizations are less demand driven. Since they usually deal with the production of knowledge through research processes, they habitually base their activities on the opportunities that offer technology.

Innovations produced by these organizations are habitually used by other tourism organizations in the sector. Knowledge intensive tourism organizations are the main providers of innovation based on research in the sector. In this context, product, process, organizational and marketing innovations are developed. In developing such innovations, knowledge intensive tourism organizations have several objectives. They do not only aim to improve quality and efficiency in the tourism industry. They also invest in research in other important areas, such as sustainability, needs of the local population or environmental protection.

Trajectories in such organizations are based on research processes. Accordingly, the development of radical innovations is preceded by cumulative development processes and a series of incremental changes. Innovations in such organizations are often new to the market.

Destinations can be highly influenced by the existence of one or several important knowledge intensive tourism organizations. Innovations emerging in such environments are habitually alternative products. These innovations can be very successful. Furthermore, since they are steered by public institutions, they habitually take into consideration the cohesion of the several actors in the destination. Furthermore, aspects that enhance sustainable development and benefit the local population are taken into consideration. Accordingly, innovations are developed on the basis of internal competences. In contrast, although demand needs are important, they are not the main inputs of the innovation process. Therefore, the success in the market of product innovations developed by knowledge intensive organizations is related to high levels of uncertainty. Examples at the macro level of such innovations are the transformation of old railways in tourism paths, the creation of routes among small villages with important cultural heritages, the development of the services in a national park with the aim of receiving tourists, or the adaptation of old industrial villages as tourism destinations.

Network Intensive Tourism Organizations

This category is mainly formed by private firms. Within the tourism industry, large intermediaries such as Central Reservation Services and tour operators have network intensive characteristics. Besides, in order to enhance innovation performance, several SME's such as entrepreneurs may also rely on the linkages with the environment. Outside the tourism sector, network intensive activities that support innovation in tourism are consultancy, financial services or IT-services. Furthermore, some public institutions can be included in this category as well. For instance, innovation activities of tourism offices in large cities are based on the knowledge provided by the tourism industry as well as by the demand.

The activities of network intensive organizations are related to the storage and use of large amounts of information. In this context, IT-services are fundamental producers of technology for the tourism sector. Network intensive organizations also rely on IT for data processing. Commercialization through internet plays a major role in these organizations.

The structure of such organizations is dynamic and flexible, which makes easier the adaptation to changing conditions in the market. Moreover, innovation performance is generated through bottom-up processes. Thus, in order to produce new knowledge, interactions between individuals are enhanced within organizations. Furthermore, these organizations generally employ high qualified personnel, thereby increasing knowledge and competences inside the organization.

Collaboration with the environment is an endogenous characteristic of such organizations. Network intensive tourism organizations are linked with actors within the sector and with external actors. Furthermore, they participate in local and non-local networks. Therefore, these organizations often develop innovation processes beyond the geographical boundaries. Although they interact with local, regional, national and global institutions, they also operate in other less institutionalized networked environments.

Network intensive organizations diversify innovation processes, which benefits absorptive capacity. They also offer diversified services. As a result, they are able to acquire knowledge from different sources and transform technological opportunities into innovations. Furthermore, they acquire knowledge from users and follow changes in demand needs.

The rate of innovation in these organizations is very high. Accordingly, radical innovations must be introduced regularly. Innovation trajectories thus combine periods of cumulative change with the introduction of radical innovations. Furthermore, innovations in this category may be both new to the organization and new to the market.

These types of organizations develop product, process, organizational and marketing innovations. Innovations have the aim of increasing product differentiation through more effective ways of producing as well as quality improvements.

Only some destinations are structured with a majority of such organizations. This is the case of some large cities, where several network intensive organizations are clustered regionally. Nevertheless, these types of organizations habitually operate at national and global levels. Since they motivate linkages with the environment, other organizations may benefit from knowledge spillovers. At the macro level thus these kinds of organizations enhance innovation performance of other organizations.

To sum up, there was traditionally a common belief that technological change in tourism was exclusively provided by external sectors. As a result, most of tourism organizations would have been identified as supplier dominated. Nevertheless, a new approach to knowledge production based on the interaction between individuals has shown that service activities can be high innovative as well.

In the tourism sector, organizations follow specific innovation trajectories. Furthermore, these types of innovative organizations interact at the macro level. For example, network intensive organizations supply scale intensive firms with knowledge. Moreover, the tourism product is often a combination of several categories. For instance, knowledge intensive organizations may combine their products with those of supplier dominated firms in the same destination.

7. Conclusions

Innovation processes differ across industries, or rather, for the purposes of this study, across organizations and regions. Accordingly, the characteristics of innovation in the tourism sector are different from those in other industries. Furthermore, innovation performance among organizations and destinations also varies. Therefore, in this master thesis the determinants of innovation in the tourism sector at the level of the organization and at the macro level have been identified. Then, the classification and definition of these determinants has let to the proposal of a typology of innovation in tourism.

In spite of the diversity of innovation activities in the sector, "learning by interacting" appears to be the most effective form of innovation. Learning takes place within organizations as well as among them. Processes of learning can be localized in a determined region or they can occur more globally. Consequently, learning within the destination as well as outside becomes necessary. Thus, knowledge transfer across organizations, destinations and whole industries enhances processes of learning, which directly influence the emergence of innovations.

The tourism industry, mainly based on SME's, relies more on tacit knowledge, i.e. knowledge that is embodied in individuals, than explicit. In contrast, tacit knowledge is codified and transformed in explicit knowledge in destinations (Cooper 2006). This indicates that in order to improve innovation capacity of SME's in the tourism industry, several processes must be enhanced, such as collaboration in networks, collective learning or the combination of tacit and explicit knowledge.

In this context, organizations rely on two main forms of innovation performance: knowledge production and knowledge acquisition. Therefore, in order to enhance innovative activity, organizations must create linkages with the environment as well as invest in the internal production of innovation. In spite of the fact that both factors are relevant and mutually supporting, it is possible to identify organizations that acquire more external innovations and others that have more internal innovative capacity. Accordingly, both determinants should be taken into consideration in the analysis of innovative performance in organizations.

Innovation at the level of the organization is closely related to the development of skills, competences and routines. Whereas skills are embodied in individuals, competences and routines are more linked with processes at organizational level. In this context, organizations develop through processes of improvement and change of skills, competences and routines. A great part of these are based on tacit knowledge and the interaction between individuals, thereby adding complexity to the process of innovation. However, routines may be institutionalized, i.e. formalized, in order to reduce uncertainty. Consequently, management of innovation and the structure of organizations influence the production of innovation within organizations.

In spite of the heterogeneity of theories, two different forms of managing innovation according with the structure of the organization can be identified: one formal and structured and another informal and less structured. Since innovation is related to the interaction between individuals in local situations (Guia et al. 2006), it appears that in tourism the most appropriate structure is the dynamic and less structured one. Nevertheless, some managerial elements might be necessary in order to reduce uncertainty, such as formalization of innovation, investment in training or development of bottom-up processes. Accordingly, strategy plays a major role in creating the structure of organizations. Innovative strategies improve organizational forms that enhance information exchange as well as management activities. Furthermore, strategies may influence innovation performance in organizations over long-time periods.

Another form of reducing uncertainty is to create linkages with the environment. External linkages allow firms to acquire new knowledge and develop new competences.

The environment thus influences innovation processes. Consequently, innovation at the macro level might be determined by the interaction between actors. The systemic character of innovation is explained by the necessity of individuals and organizations to interact and develop. This interaction can be identified at different levels according with the type of linkages. At the first level, there exist several forms of cooperation. Next, there is a higher level of linkages in networks. Finally, sectoral and regional similarities are present in systems.

Social, cultural, economical and natural environments influence innovation activity in destinations. Accordingly, innovation processes in destinations are influenced by the local characteristics of the region. In this matter, the theory of local tourism innovation systems (see Prats 2005) can provide information about how a destination develops. Innovation at destination level needs heterogeneity of actors. In this master thesis, several actors have been identified for being necessary. These are tourism firms, Knowledge-Intensive Business Services, universities and research centres, government and other public institutions, tourists, and the local population. Since innovation in tourism also emerges from the interaction with other sectors, these actors can be from the tourism sector as well as from other industries. In this context, the labour of institutions in creating a sustainable framework in tourism innovation systems is fundamental.

Another topic analyzed in the master thesis has been the measurement of innovation in tourism. In this regard, the complexity of measuring some of the topics mentioned earlier, such as interactive learning, knowledge transfer or collaboration with the environment, has been studied in detail. Traditionally, innovation in tourism has been related to the acquisition of knowledge rather than knowledge production. This has been mainly the result of the application of surveys based on traditional input and output indicators such as R&D, investments in capital goods or patents. Nevertheless, the measurement approach that would be the most appropriate for the tourism industry is one that measures innovation activities rather than inputs and outputs. Some of the activities that can be here included are product development, investment in training, process management, creation of external linkages, motivation of bottom-up processes or interaction with the demand.

Principal Findings

The master thesis contributes to the theory of innovation in tourism in three forms. First, with a classification of innovation types. Next, with the identification of the determinants of innovation in the tourism sector. Finally, with an innovation typology. These findings have been based on the review of generic literature on innovation as well as the analysis of specific studies for the tourism sector.

Regarding the topic of innovation types, a classification with four categories has been suggested: product, process, organizational and marketing innovations. Although the four categories are relevant, the investment on one type or another depends on several factors, such as firms' strategy, sources of knowledge or technological opportunities. These innovation types may overlap. For instance, product and process innovations might be both part of the same service. Besides, the subject of degree of innovativeness has also been analyzed. It has been indicated that innovation in tourism is based on incremental changes rather than radical innovations. In this regard, the benefits of incremental innovations in the long term can be equivalent to those of radical innovations, or even greater. Furthermore, it has been pointed out that in the tourism sector tangible as well as intangible innovations emerge.

Next, the theory on sources of innovation has been adapted to the characteristics of the tourism sector in order to identify the determinants of innovation in tourism at organizational and macro levels. Since the determinants of innovation in the tourism sector can be found within as well as outside the sector, the suggested classification includes tourism organizations and institutions as well as external actors. At the level of the organization several determinants influence innovation performance. These are: type of activity, organization's size, diversification of innovation, organization's structure and strategy, innovation trajectory, collaboration with the environment, sources of external knowledge, knowledge and competences inside the organization, absorptive capacity, and type of innovation. Besides, the determinants at the macro level are: heterogeneity, linkages between actors, institutional framework, technological trajectory, diversification and interaction with the demand.

The third and last contribution of this master thesis has been the identification of an innovation typology for the tourism sector. Although innovation trajectories have been traditionally related to whole industries, intra-industry differences are possible. In fact, they are necessary, since heterogeneity enhances innovation. Therefore, in order to differentiate technological trajectories within the tourism industry, a typology of innovation has been suggested. In this matter, the level of the organization has been taken into consideration. Furthermore, groups of organizations may form a regional cluster. In this case, the characteristics of the typology might be applied at the macro level as well. Four categories have been developed: supplier dominated, scale intensive, knowledge intensive and network intensive. Each typology has been described regarding the determinants of innovation indicated before. The objective of the typology is not that of creating boundaries between categories. It aims to understand different innovation trajectories within the tourism sector. As a result, these categories may be combined at the macro level, which is indeed an indication of heterogeneity. Thus, supplier dominated organizations need to acquire innovations from knowledge intensive organizations as well as from network intensive organizations. Next, scale intensive organizations produce their own innovations, but

also acquire innovations from knowledge intensive organizations and network intensive organizations. Besides, knowledge intensive organizations provide the other three categories with knowledge based on research. Finally, innovation in network intensive organizations is based on the interaction with the other three categories.

Further Research

The master thesis has established a framework for the further study of innovation in tourism. Accordingly, research in the field of innovation determinants and their measurement might be developed in several forms. Some of these further developments are included within the contents of the Ph.D. thesis that will follow this work.

Regarding the research that will be developed in the Ph.D. thesis, certainly the most important further contribution will be to validate empirically the typology suggested. The innovation typology developed in this work is based on the review of the literature on innovation. The determinants of innovation as well as the resulting typology are supported by a theoretical analysis. Therefore, there is a need to corroborate the theory.

Accordingly, appropriate indicators for the measurement of innovation performance will be identified. This master thesis has provided several determinants of innovation. Further research should identify the subsequent indicators, such as the number and the types of linkages with the environment, the type of investment in the production of knowledge, or the number of acquired innovations. The types of indicators might vary according to the needs of the study. Mainly two types of study could be carried out, one more quantitative and another more qualitative.

For instance, a survey on specific actors such as tourism firms could be based on quantitative methods. Thus, if the subjects of study are qualitatively similar, comparability between them is possible. Accordingly, several quantitative indicators could be developed. The main disadvantage of this type of survey would be that other relevant actors might not be taken into consideration.

In contrast, if the subject of study were a destination, it would be possible to include several actors, i.e. public and private organizations and institutions. Due to the heterogeneity of activities, this type of study would then require more qualitative than quantitative indicators. Some disadvantages of this type of study would be that incremental innovation activities in organizations such as routines could not be closely analyzed, and that a comparison between agents would be difficult. However, such a study could include all relevant actors in the destination, which is necessary to study innovation in tourism at the macro level.

Another research that will be carried out in the Ph.D. thesis is related to the subject of organizations of production and use. The suggested innovation typology in the master thesis considers that some organizations are mainly producers or users of innovations, while others are both producers and users. Accordingly, innovations flow across organizations. Therefore, the linkages between innovation typologies will be further analyzed. In this regard, it might be necessary to identify the main external actors that

provide the tourism sector with innovations, e.g. IT-services, financial services or consultancy. In this context, several concepts such the absorptive capacity and appropriability conditions will be taken into consideration.

Apart from the topics that will be included in the Ph.D. thesis, from this work emerge other subjects that might need further study.

Thus, another research line might develop the topic of innovation in the experience service industry. In the master thesis the role of tourists as suppliers of knowledge and innovators has been emphasized. Nevertheless, the processes that take place in the interaction between service providers and customer should be further analyzed. In this regard, a study based on users as drivers of innovation would require to emphasize social aspects of the interaction between provider and user. Other topics such as lead-user innovation, user communities or information channels might be further studied as well.

Next, the topic of Knowledge Intensive Business Services in the tourism industry might be broadened. Since the type of KIBS varies among industries, those that operate in the tourism sector could be identified. Furthermore, the characteristics of these KIBS could be analyzed. In this regard, skills and competences of KIBS in the tourism sector might influence the type of knowledge produced and transferred by theses actors. Thus, such a study would have the objective of identifying the necessary KIBS to develop innovations in the tourism sector.

Finally, more research on the topic of interaction between public institutions and the tourism industry is necessary. This master thesis has pointed out that the institutional framework plays a major role at the macro level. It has been also emphasized that universities and research centres provide knowledge based on research as well as high qualified personnel. Hence, the linkages between public institutions and private organizations should be further studied. Since there is a need of enhancing the linkages between universities and private firms, the study could focus on the factors that motivate or hamper collaboration between these entities.

To sum up, in this master thesis a classification of innovation types has been developed, the determinants of innovation in tourism have been identified and an innovation typology has been suggested. Furthermore, several other areas have been studied in order to develop a framework for the study of innovation in tourism.

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