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# Searching for clusters in tourism. A quantitative methodological proposal

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**Abstract:**

The tourism industry is one of Europe's leading employers, and for many regions highly dependent on tourists' spending, innovation is the difference between growth and stagnation. Thus, at a regional level, tourism may function as a driving force of socioeconomic development and thus contribute to the demise of regional disparities. Such lever effect is usually associated to a geographical concentration abusively denominated of clusters. Most of the studies within the tourism industry identify clusters resorting to simplistic analyses of geographic location measures or experts' opinions. These latter tend to neglect the essence of the cluster concept, namely the inter-linkages among regional actors. In the present paper, we propose a methodology to rigorously identify tourism clusters, stressing the importance of networks and cooperation between agents.

*Keywords*: Clusters; Tourism; Methodology

*JEL Codes*: R12; R15; L83; C67

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## 1. Introduction

Tourism constitutes a recognized driving force of economic growth and development with regional incidence but also a considerable country wide impact (Sharpley, 2002; Brau et al., 2003; Chao et al., 2005; Jackson et al., 2005).

In the year 2000, it was estimated that tourism represented 11% of the world's GDP, employing more than 200 million people around the world, which represents 8% of the world's employment (Rita, 2000). In Europe, tourism employs 7.7 million, a figure that is growing and its contribution to GDP reaches already 5% (EC, 2001; 2003). Several authors (e.g., Brown, 1998; Sinclair, 1998; Sharpley, 2002; Brau et al., 2003) argue that tourism may be the only vehicle to engage lagging regions in economic development, placing tourism on regional policies agenda.

Most analyses on tourism are based on a macroeconomic performance, trying to assess and measure the effect of tourism in GDP (e.g. Archer, 1982; Frechtling, 1987a,b; Balaguer and Jordá, 2002; Deegan and Moloney, 2003), employment and balance of payments (Chao et al., 2005).

Due to the peculiarities of its product, tourism is bind to a particular geographic location. Despite this fact and tourism above-referred potential impact, tourism activity has been neglected in regional policy studies and the clustering hypothesis is rarely addressed (Berg et al., 2001; McRae-Williams, 2002; Nordin, 2003; Capone, 2004). If we look at the studies published in major tourism-related scientific publications (from 2000 up to 2004) such as Journal of Travel Research, Tourism Analysis, Tourism Management e Annals of Tourism Research, we observe that no study was to be found relating tourism to regional policy aspects and/or clusters (Xiao and Smith, 2006). Moreover, major regional-related scientific journals, such as Regional Studies and Economic Geography have published, in the last 5 years, a total of 3 articles on tourism related issues and its cluster potential (Ioannides, 2006). Economic Geography has published one article relating to the airline industry (Bowen, 2002) and Regional Studies has had an article devoted to airport and airline choice (Pels et al., 2001) and one on world heritage designation and economic development (Jones and Munday, 2001).

Given the rather widely recognition that clusters increase the competitiveness of a regional industry (Porter, 2002; Rocha, 2004) and that tourism might constitute a powerful regional development tool (Engelstoft et al., 2006), it seems pertinent and critical to discuss the role of tourism clusters in regional policy, and on the top of it, the criteria for classifying a given area/region a 'tourism cluster'.

In fact, the definition of 'tourism cluster' is far from consensual. The popularity of the 'cluster' concept has led to an abusive use (Bergman and Feser, 2000; Broersma, 2001; Hoen, 2002, Vom Hofe and Chen, 2006). In face of a regional agglomeration, there is a tendency to speak of the existence of a 'cluster'. Notwithstanding, in a true assertion cluster additionally implies a certain degree of interlinkages among local actors that in the generality of the case is most often presumed that proved (Maskell and Kebir, 2005). Thus, anecdotal analysis have identified as 'clusters' regional concentrations of activities that are far from complying with the criteria underlying the theoretical concept (Ziona, 2000; Vom Hofe and Chen, 2006).

The aim of this paper is to propose a conceptual, but operational, methodology for identifying tourism clusters. The article is structured as follows. In the next section we overview the definition of cluster in general. Afterwards (Section 3), we discuss the potential specificity of tourism clusters. Section 4 surveys existing methodologies for identifying clusters, and finally in Section 5, taking into account the potential specificity of tourism clusters, we propose an operational methodology for identifying tourism clusters.

## 2. On the concept of 'cluster'

The popularity of the cluster term has led to the emergence of many studies trying to analyse, identify and even define clusters. However, several authors (e.g., Martin and Sunley 2001; Markusen, 2003) have pointed out that the cluster definition is obscure and far from unanimous leading to anecdotal and less than rigorous identification procedures. In fact, a large number of clusters is everyday identified in spite of the lack of supporting data (Engelstoft et al., 2006). Thus, we lack consensus on a true methodology that would allow a clear identification of clusters and the scientific validation of their existence.

Recall Rosenfeld's (1995) definition according to which a cluster is described as a "… geographically bounded concentration of interdependent businesses with active channels for business transactions, dialogue, and communications, and that collectively shares common opportunities and threats. The presence of clusters generates specialized skills, new knowledge, innovation competition, opportunities for cooperation, tailored infrastructure, and often attract specialized support and other services and related businesses" and that of Sölvell et al.'s (2006: 2) who state that "[c]lusters are groups of companies and institutions co-locate in a specific geographic region and linked by interdependencies in providing a related group of products and/or services”. In Table 1 we summarise some definitions of clusters which illustrate the absence of a unanimous definition. The confusion with similar concepts like networks further contributes to the lack of rigor that we find in most analyses (McRae-Williams, 2002; Maskell and Kebir, 2005).

**Table 1: Cluster theoretical concept**

| Group of concepts | Conceptual definition | Authors |
|---|---|---|
| Geographical location/proximity | “A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities.” | Porter (1998) |
| | “The more general concept of “cluster” suggests something looser: a tendency for firms in similar types of business to locate close together, though without having a particularly important presence in an area.” | Crouch and Farrell (2001) |
| | “A cluster is a very simply used to represent concentrations of firms that are able to produce synergy because of their geographical proximity and interdependence, even though their scale of employment may not be pronounced or prominent.” | Rosenfeld (1997) |
| | “Economic cluster are not just related and supporting industries and institutions, but rather related and supporting are more competitive by virtue of their relationships.” | Feser (1998) |
| | “Clusters are here defined as groups of firms within one industry based in one geographical area.” | Swann and Prevezer (1996) |
| | “A cluster means a large group of firms in related industries at a particular location”. | Swann and Prevezer (1998) |
| | “A regional cluster in which member firms are in close proximity to each other.” | Enright (1996) |
| Networks/Cooperation | “We define an innovative cluster as a large number of interconnected industrial and/ or services companies having a high degree of collaboration, typically through a supply chain, and operating under the same market conditions.” | Simmie and Sennett (1999) |
| | “Clusters can be characterised as networks of producers of strongly interdependent firms (including specialised suppliers) linked each other in a value-adding production chain.” | Roelandt and den Hertag (1999) |
| | “The popular term cluster is most closely related to this local or regional dimension of networks…Most definitions share the notion of clusters as localised networks of specialised organisations, whose production process are closely linked trough the exchange of goods, services and/or knowledge.” | Van den Berg et al. (2001) |
| | “A cluster is a progressive form of business network, which has strong business objectives focusing on improving sales and profits.” | SEEDA (2003) |
| | “Clusters are groups of companies and institutions co-locate in a specific geographic region and linked by interdependencies in providing a related group of products and/or services” | Sölvell et al. (2006) |

Thus, despite the lack of a clear definition of a cluster, authors tend to agree that on some distinctive features that a cluster must bear in order to be a true cluster. These features are agglomeration and inter-connection (Simmie, 2004; Akgünkör, 2006). By agglomeration we mean the geographical concentration of a specific industry and related activities (Gordon and McCann, 2000) while by inter-connection we are imposing a mix of competitive-cooperative relationship among local actors (Simmie, 2004), instigating a better overall performance in terms of employment (e.g. Glaeser et al., 1992; Fingleton et al., 2005), productivity (Henderson, 1986; Porter, 1997, 1998a, 2000; Baptista, 2000), and knowledge transfer (Porter, 1990; Cooke, 2001; Porter and Ackerman, 2001). Thus, geographical proximity serves as an enabler of these spillovers. Thus, a cluster should comprise the inter-connection feature, which consubstantiates itself in gains that go beyond the gains derivable from simple agglomeration.

In the next section we discuss the specificity of tourism clusters.

**3. Is there any specificity in the case of tourism clusters?**

The cluster concept has been widely applied to manufacturing industrial activities (Jackson and Murphy 2002; Steinle and Schiele 2002; Nordin 2003; Cunha and Cunha 2005) but its application to the services sector, and in particular, to the tourism industry is rare. This issue is even more pressing since the services sector is already predominant among the vast majority of countries and its importance keeps on growing (Nordin, 2003). Like services, the tourism industry presents a very favourable evolution in recent years but despite its increasing economic impact at regional and country level, the cluster concept is only now being introduced to analyse that industry (Capone and Boix, 2005).

Due to the intrinsic and unique nature of the tourism 'product', the application of the cluster concept seems to be particular adequate (Jackson and Murphy, 2002; Cunha and Cunha, 2005). In fact, the tourism product can be defined more accurately as a bundle of characteristics that combine a geographical characteristic with a wide range of local services (Jones et al., 2003; INE, 2003). In this sense, the tourism industry might be characterized by potential dense linkages among locally operating agents both in complementary activities and even in direct competition.

The use of a cluster approach to the tourism industry analysis is still in a very early stage. Although the lever effect that tourism activities may have over regional economies is recognized (Santos, 2002; Australian Regional Handbook of Tourism, 2003), even in the most prominent regional scientific publications like Economic Geography, Regional Studies, Urban Geography or Annals of the Association of American Geographers, articles concerning tourism are rare, and this rareness is even greater when it concerns applying to this activity the concept of cluster.

The reasons behind such apparent disinterest may be the complexity inherent to the definition of tourist activities themselves (Jones et al., 2003) as well as the inexistence of a clearly defined cluster analysis methodology (Rosenfeld, 1997; Berg et al., 2001; Nordin, 2003; Capone, 2004; McRae-Williams, 2004).

In general, the definitions of tourism clusters are in essence not significantly different from the ones applied to other activities clusters. Regardless of the type of industry, clusters definition implies two components: agglomeration and deep linkages between members. Thus, to be a cluster, the externalities derived from geographical concentration must exceed the simple agglomeration economies.

Thus, the distinction between clusters in different industries tends to relate mainly with the type of actors that operate in them. Hotels, tourism agencies, governmental tourism regions, theme parks, restaurants and hotel management schools are some of the examples of actors in potential tourism clusters. The tourism product has one peculiarity; it implies that the customer can only consume the product at that geographically defined area reinforcing the concentration aspect (Jones et al., 2003). What remains to be ensured so as to classify and identify clusters in tourism is to assess and define a minimum threshold for the degree of interconnections among actors. Thus, the tourism cluster may be perceived as a geographical concentration of cultural, social, environmental, economic and labour intensive activities where local actors and institutions interact and cooperate as to increase the value of a product (Dias, 2000).

Nordin (2003) applies the Porter's diamond to the tourism travelling industry, focussing in particular on tourism companies and its innovative performance. This report highlights the importance of developing cooperation among tourism actors as a way to derive synergies capable of increasing the value added and creating a comparative advantage in a network (Capone, 2004). The advantage of being in a cluster derives from its potential of promoting different types of spillovers, increasing the efficiency of its elements.

According to Capone (2004: 9), "[a] tourist cluster is … a geographic concentration of interconnected companies and institutions in tourism activities. It includes suppliers, services, governments, institutions, competitors, and universities". The linkage aspect across different actors in heterogeneous activities is a characteristic also highlighted by Monfort (2000: 46) who defines tourism cluster as "[a] complex group of different elements, including services carried out by tourism companies or business (lodging, restoration, travel agencies, aquatic and theme parks, etc…); richness provided by tourist holiday experiences; multidimensional gathering of interrelated companies and industries; communication and transportation infrastructures; complementary activities (commercial allotment, holiday traditions, etc.); supporting services (formation and information, etc); and natural resources and institutional policies".

Unlike Monfort (2000) and Capone (2004), whose approach is based on the type of activities to include, Beni (2003) stresses the cohesion and cooperation between members. Thus, for Beni (2003: 74) "[t]ourism cluster is a group of highlighted tourism attractions within a limited geographic space provided with high quality equipment and services, social and political cohesion, linkage between productive chain and associative culture, and excellent management in company nets that bring about comparative and competitive strategic advantages". Porter (1998: 77), despite focussing more on traditional sectors, refers that the tourist product can be defined as a "*travel experience*", that is to say "[a] host of linkages among cluster members result in a whole greater than the sum of its part. In a typical tourism cluster, for example, the quality of a visitor experience depends not only on the appeal of the primary attraction but also on the quality and efficiency of complementary businesses such as hotels, restaurants, shopping outlets and transportation facilities (Porter, 1998).

Cunha and Cunha (2005: 51) propose a similar definition to that of Porter's. For these authors, "[a] tourism cluster is a group of companies and institutions bound up to a tourism product or group of products. Such companies and institutions are spatially concentrated and have vertical (within the tourism productive chain) and horizontal relationships (involving factor, jurisdiction and information exchange between similar agents dealing with a tourism product offer)".

The specific bundle features of a tourism product means that increasing the value of a tourist product implies cooperation between independent agents (Novelli, 2006). The Australian Regional Handbook Tourism (2003) stresses the main advantages of creating a cluster structure, namely the offering of complementary services, the minimization of costs per tourist, the sharing of infrastructures and marketing campaigns. Instead of promoting one company, agents promote one product with a positive effect on the value added.

A tourism cluster should, according to Jackson and Murphy (2002), present the following characteristics: firms' interdependence, flexible boundaries, competitive-cooperative mix, trust and collaboration, community culture, ethics and private leadership. These authors tried to assess whether these characteristics were present in the tourism agglomerations of Albury-Wodonga (Australia) and Victoria (Canada). In both cases, the major players are private and, though in direct competition, they collaborate in promoting one destination by developing common packages. The presence of learning institutions, namely universities and training centres, allows for the temporary recruiting of high-skilled labour inputs, thus allowing a better human resources management in dealing with tourism's seasonality. This study also highlights the importance of the knowledge spillovers resulting from the contact of firms with universities. In fact, according to Jackson and Murphy (2002), the linkages to the University allowed for a higher awareness of the importance of cooperation among local actor. The introduction of modern management techniques such as marketing, and the collective development of these activities constituted a turning point to the Victoria destination. From decadence to flourishing, these industries' competitive-cooperation and its linkages to universities resulted in important competitive gains (Jackson and Murphy, 2002). In the spirit of a cluster, the development of a cooperative platform leads to a pooling of resources, increasing the value added of a tourism destination as well as tourist attractiveness. For instance, Jackson and Murphy (2002) report that the awareness of the mutual benefits of the competitive-cooperative mix allows a more fulfilling experience for the client and each actor can concentrate in its core business, interconnecting with others to provide additional services.

The fact that clusters are considered as important levers in regional development and productivity stimulators, together with the absence of a clear and precise definition of cluster and the usage of a wide range of methodologies to identify clusters, makes it imperative to provide a synthesis of those different methods.

## 4. Surveying existing methodologies for identifying clusters

Over the years, the cluster approach has been increasingly popular and has associated with an over-application and frequently misuse of the concept. For instance, Monitor Company (1994) has identified tourism clusters in Portugal in the regions of Algarve, Alentejo, Madeira and Setúbal. The ease and elasticity of the cluster concept on which Monitor Company's (1994) analysis is based serves as an example among many that are criticized by some authors (e.g., Martin and Sunley, 2003).

This over-identification of clusters occurs both in manufacturing industries and in tourism (Engelstof et al., 2006). Although works on this latter area are far from numerous, they tend to suffer from the same erroneous approach. Engelstof et al. (2006) consider a vast number of clusters identified in a large number of studies as anecdotal due to the inconsistence of the methodology used. The majority of such studies simply identify geographical concentration of industrial activities ignoring the interlinking aspect that lies in the basis of the cluster concept (Malmberg and Maskell, 1997).

Only a few studies are devoted to proving the real existence of a cluster which may be explained by the difficulty in defining the cluster concept aggravated, in the case of tourism, by the highly heterogeneous activities that potentially are part of the cluster. Thus, it seems that the absence of a clear scientific methodology to identify and distinguish clusters from simple geographical concentration is on the basis of this abuse of the cluster terminology (Vom Hofe and Chen, 2006). Despite this scarcity, some seminal works have approached this gap and provided some insight to this issue. For instance, McRae-Williams (2002) state that any methodological cluster identification approaches should combine quantitative and qualitative data.

It seems to exist two main starting points in a cluster identification study: a case study approach, with a prior cluster suspicion, and a general approach, without any prior judgement regarding any agglomeration and which is intended to identify potential clusters in general. In the second approach, one seeks to identify potential clusters in a country or even a region. As in an optimization problem, what is intended is to highlight geographical concentrations and afterwards to validate the cluster's existence using some type of interaction measure (Braunerhjelm and Carlsson, 1999). According to Engelstoft et al. (2006), most cluster identification studies use a case study approach, though most of them lack rigor and quantitative certification. Using a case study approach one is departing from a suspicion concerning the possible existence of a cluster. What the studies within this approach aim is simply to validate the existence and not to search for clusters without any prior analysis. The popular case study approach allows for the addition of qualitative data and further insights to the potential cluster, complementing the quantitative data. This approach, however, does not allow for the extension of the results to other cases. Both of the above referred approaches imply defining a methodology for the identification/validation of clusters.

In reviewing the methodologies used so far in the literature, we must recall what has been said about the definition of cluster. Although, as surveyed in the previous section, many authors neglected agents' interaction and focused almost exclusively on the geographical concentration aspect of the clusters (Vom Hofe and Chen, 2006), it is crucially for having a clusters to observe both aspects: agglomeration and interaction (Donoghue and Gleave, 2004). Several authors (Doeringer and Teekla, 1995; Rosenfeld, 1997; Bergman and Feser, 1999) uphold that, even though local concentration measures such as location quotients, are good means to identify a region's specialization, they shed no light on the interaction among agents. It is, however, this element that distinguishes 'clusters' from simple 'geographical agglomerations'. Thus, a cluster identification methodology should combine regional specialization measures with indicators in order to assess the depth of the inter-linkages among agents. Some authors (e.g. Sölvell et al., 2006) also add a minimum absolute significance criterion so as not to identify micro concentrations with poor regional economic significance.

To account for regional specialization/agglomeration, a range of measures and techniques is available, namely location quotients, G-Statistic, Gini's coefficient or even shift-share analysis (Vom Hofe and Chen, 2006). Usually derived using employment, these indicators constitute simple measures of geographical concentration. Nevertheless, a cut-off value is not universally defined (Martin and Sunley, 2003; Donoghue and Gleave, 2004). The definition of this cut-off varies among authors and seems quite arbitrary (Donoghue and Gleave, 2004). Using as an example the location quotient, a value above 1 indicates a concentration of employment in one industry in a region above the national average. But how much above average is significant enough so to be a potential cluster?

For instance, Held (1996) just uses 1 as threshold value, whereas Bergman and Feser (1999) argue that only a location quotient higher than 1.25 indicates regional specialization. This same cut-off value is used by Miller et al. (2001) to identify clusters in the UK. Braunerhjelm and Carlsson (1999), in their attempt to identify clusters in Ohio and Sweden, take 1.3 as the minimum value up to which they consider significant regional specialization whether for Sölvell et al. (2006) the reference is 2. More demanding, Isaksen (1996) considers that agglomeration is significant only when location quotient is above 3. For distinguishing the degree of clustering Kumral and Deger (2006) use two reference values - they consider as a minimum a specialization quotient of 1.25 and 5 as the value reflecting the presence of high concentration in an industry.

Due to these differences, Donoghue and Gleave (2004) propose the adoption of a standardized localization quotient. This measure would try to assess the probabilistic distribution of location quotients among different industries. Outliers would represent high concentration levels, above expectable levels. Thus, it would be possible to determine a cut-off point by using a 95% confidence interval. The z-stat derived from the normality test would represent the standardized location quotient value and should be compared with z-critical corresponding to the 95% confidence interval (this would be the cut-off value; 1.96 standard deviation from the mean in a two-tailed test or 1.65 standard deviation from the mean in a one-tail test). An obvious limitation of this measure is that location quotient's distribution may not be normally distributed, invalidating the calculation of the standardized version.

The alternative use of Gini's coefficient presents the same type of problems (Donoghue and Gleave, 2004). The Gini index is constrained to the range from 0 to 1 (1 indicating maximum specialization). In addition to the specialization quotient, Sölvell et al. (2006) use Gini's coefficient. These authors consider that a cluster must present a Gini's coefficient above 0.3 when in presence of factor mobility. Cotright (2006), in turn, defines 0.5 as the critical value of Gini's coefficient, beyond which the level of specialization may indicate the presence of a cluster.

Though less used, two other indicators are often computed to assess geographical concentration. One of them is the G-statistic of Ord and Getis (1995), which was used by Feser et al. (2001) in their cluster study. These statistics try to capture the existence of spatial autocorrelation. If positive, they would indicate concentration. Another indicator of regional specialization is the shift share analysis which is sometimes used to decompose an industry's growth into a national growth, regional growth and industry's specific growth factor (Vom Hofe and Chen, 2006). In this way, we can assess if the locally based industry shows a better growth performance than regional/national counterparts, indicating, if that is the case, the possible existence of a cluster (Vom Hofe and Chen, 2006).

Considering, as referred above, that a cluster has two distinctive but complementary features - geographical agglomeration and in depth interconnections between local actors - it is critical to uncover how we might evaluate local agents' interaction. The question now is how to measure/evaluate the interconnections and again, which cut-off or reference values to use.

One of the most commonly used statistical datasets to compute the depth of interconnections among agents in a cluster is the input-output matrix (Bergman and Feser, 2000). In short, the input-output matrix presents the values of aggregate inter-industry's transactions providing insight on the interlinking of these industries in terms of buyer-supplier relationships (Jones et al., 2003). More specifically, the input-output matrix shows how a given industry's input is incorporated in other industry's output (Willumsen, 2000), becoming an interesting proxy to describe the depth of interaction between local actors, though capturing only buyer-supplier type of connections and thus ignoring collective actions and links with institutions. Defined a minimum value beyond which relations are considered significant, we could identify the industries part of the cluster and the core industry. Usually, the matrix is defined not in terms of monetary flows but in relative terms, allowing for a measure of relative economic significance. In fact, the matrix can be manipulated in order to compute several indicators of linkages between industries (Jones et al., 2003). If this is the case, each coefficient represents the part of an industry's total output that is consumed by a counterpart. If no significant relationship is captured by the input-output matrix or if the significant relationships link only a much reduced number of activities, this would indicate that no cluster exists. DeBresson (1996) found that the linkages in input-output tables resemble the diffusion pattern of innovations, and Forni and Paba (2001) even conclude that input-output linkages are an important source of technological externalities. Munnich et al. (1998), Braunerhjelm and Carlsson (1999), Hill and Brennan (2000), Botham et al. (2001), and Peters (2004) constitute further examples of studies that use the input-output matrix in combination with regional concentration coefficients.

In the following paragraphs, we present some of the methods used to operate the input-output matrix and thus infer about the degree of interlinkages among the industries portrayed. This process, in a complementary fashion to the previous agglomerative analysis, would conduct to the identification of a cluster and its core industries.

A simple way of assessing the depth of interlinkages is by comparing the matrix's coefficients against a threshold value. Braunerhjelm and Carlsson (1999), on their attempt to identify clusters in Ohio and in Sweden, define 0.15 as the minimum level beyond which relationships are to be considered significant. The core industry would be the one concentrating significant trade flows from at least four other industries. Earlier studies, such as Czamanski (1974, 1979), Roepke et al. (1974), and ÓhUallacháin (1984), had already acknowledged the potential of the input-output matrix in revealing the depth of interaction among agents and thus serve as a vital instrument in identifying and proving the existence of a cluster. This view was more recently shared by Peters et al. (2001), Jones et al. (2003), and Feser et al. (2005). Also the OECD focus Group, in spite of using a more complex analysis method, defined a minimum threshold of 0.20 for horizontal and vertical linkages.

Other, more complex but still popular methods to identify clusters, based on the input-output matrix, follow the *filière* method (Czamansky and Ablas, 1979; Hoen, 2002). According to this, we conclude that an industry belongs to a cluster if the linkages between the sectors are relatively large (Hoen, 2002). The subsets of industries belonging to a 'filiere' are previously determined according to technical characteristics. Starting with a final consumption industry, we then determine which are it suppliers, and then the suppliers of the suppliers. In this sense we determine *filières* that may constitute a cluster. The implementation of this approach may follow different application methods. For instance, following Hoen (2002), three of the most used methods are the maximization method, the restricted maximization method, and the diagonalization method. We synthesize in Table 1 the implementation procedures (Hoen, 2002).

All four techniques share the same common approach – identifying the most significant inter-linkages.

The maximization technique basically starts identifying clusters by the largest values in the input-output matrix. This method is the most frequently used in the Netherlands (Broersma, 2001) and it is based on the size of intermediate deliveries relative to average deliveries and the input and output coefficients relative to the average coefficients. Unless the coefficient exceeds the cut-off point,[1] its value is set to zero so that these interactions' of "minor" significance are put aside. But, the cut-off point is fixed arbitrarily (Broersma, 2001). However, not only there is no theoretical solid ground to define the threshold values but also a clear establishment of which matrix to use (Hoen, 2002).

The restricted version is a similar method with prior definition of threshold values in the form of restrictions on the matrix's coefficients. Further arbitrarity characterizes the first two methods. The analysis will identify as many clusters as we previously, without theoretical support, define. Hoen and Arnoldus (2000) are very critics to the maximization and restricted maximization techniques due to its poor robustness (cit. Bergman and Feser, 1999).

[1] Broersma (2001) proposes the consideration of only the 1.6% largest flows.

**Table 1: Some of the most popular techniques of operating the input-output matrix**

| Steps | Maximization Method | Restricted Maximization Method | M-Method | Diagonalization Method |
|---|---|---|---|---|
| **1** | Choose an input-output matrix (i.e. the intermediate deliveries matrix, the input coefficient matrix, the output coefficient matrix or the Leontief inverse). | Choose restrictions of the type *zij*>a1, *aij* >a2, and *bij*>a3, where *zij* denotes the intermediate deliveries of sector *i* to sector *j*, *aij* is the input coefficient belonging to this intermediate delivery, *bij* is the output coefficient belonging to this intermediate delivery, and the symbols a1, a2 and a3 are values that are specified exogenously. | Set all elements of the matrix's diagonal to zero. | Choose a significance level. |
| **2** | Set all elements on the diagonal to zero. | Choose an input-output matrix (i.e. the intermediate deliveries matrix, the input coefficient matrix, the output coefficient matrix or the Leontief inverse). | Analysing forward (horizontal) linkages: With the matrix defined in percentual terms, above a predefined threshold level, links are considered important and we attribute the value 1, if not we attribute the value 0. | Select all elements that belong to the α % of largest elements and for which the input coefficients and the output coefficients also belong to the α % largest input coefficients, respectively output coefficients. |
| **3** | Find the largest element. | Set all elements that do not satisfy the restrictions to zero. | Analysing backward linkages (or vertical): Using also a predetermined cut-off value (that does not have to be equal to the one defined for forward linkages), if the percentage significance is greater than that threshold, we attribute the value 1 or else we write 0. | Set all other elements to zero |
| **4** | Add the two sectors corresponding to this element. | Set all elements on the diagonal to zero. | We merge the two input-output matrixes defined in the two previous steps. We have 0, 1 and 2 values. The value two indicates significance between industries strong both in terms of backward and forward linkages. 1 represents only one way (backward or forward) significant links and 0 means no significant linkage. | Select a matrix (intermediate values, input coefficients, output coefficients or Leontief inverse), check if it is decomposable and rearrange the sectors so that the elements are given in blocks. |
| **5** | Compute the new input-output matrix (with one sector less). | Find the largest element. | Clusters include industries with 2. The inclusion of industries' presenting only one-way relevant linkages is not clearly defined by Peeters et al. (2001). | Each block contains the sectors that belong together in one cluster. |
| **6** | Repeat steps 2 to 5 until an exogenously specified number of clusters has been identified. | Add the two sectors corresponding to this element | | |
| **7** | | Compute the new input-output matrix (with one sector less). | | |
| **8** | | Repeat steps 4 to 7 until an exogenously specified number of clusters has been identified | | |

Peeters et al. (2001) also use the input-output matrix but operationalized through the M-method in their attempt to identify and analyse clusters in Switzerland and Flandres. Similar in logic to the maximization method, the M-method (or maxima method) determines if an industry belongs to a cluster or not based on the strength of commercial links between buyer-suppliers. Firstly, Peeters et al. (2001) examine the forward linkages, also known as horizontal links since we are reading the matrix's rows – using the suppliers' view-point. On a second phase, the M-method analyses vertical links, that is, backward linkages. In this phase we are analyzing which suppliers are relatively important to each consuming industry (we are reading the matrix's columns). When significant links are found, industries are said to be part of a cluster. Being a simpler version of the maximization method, still we face the problems of determining adequate threshold values (usually, in terms of percentage of an industry's total output/input consumption).

In essence, the diagonalization method is identical to the decomposition method[2] used by Broersma (2001) to identify service clusters in the Netherlands. The intuition behind its application is to split a decomposable matrix into different groups of industries, assigning together only the ones which share significant linkages. In the end of this assigning process, we would have defined a cluster.

Note that the input-output matrix can be subdivided in sub matrices like intermediate deliveries, Leontieff inverse and primary inputs. All these relationships are theoretically relevant in a cluster. Usually we use intermediate deliveries sub matrix, but we could use a different block. The advantage of diagonalization/decomposability method is that, according to Broersma's (2001) empirical findings and Hoen's (2002) critical analysis, this method is more robust because it identifies always the same clusters despite the matrix used. The maximazation family of methods produce different results depending on the sub matrix used (Broersma, 2001; Hoen, 2002) whereas the decomposability/diagonalization produces a more consistent outcome. As a threshold level of significance Broersma (2001) and Hoen (2002) have defined the level of 1%. Still, there may be a catch to this procedure. In fact, as it happens in Hoen's (2002) cluster identification study, sometimes it is not possible to identify a clear statistical distribution. Thus, if we cannot define a statistical distribution, the threshold values must be defined in a similar arbitrary fashion as in the maximization family methods. Nevertheless, the diagonalization method presents itself as the most robust according the

[2] Sometimes, the methods are alike but different algorithms are used to implement what in essence, is the same method.

empirical findings of author's like Broersma (2001) and Hoen (2002) since regardless of the sub matrix to which is applied, the clusters identified are exactly the same whereas using the maximization family methods, the results vary according to the sub matrixes used (intermediate deliveries, inputs or Leontief inverse).

Some additional comments regarding the use of the input-output matrix are in order. This matrix reports on trade relationships between agents. A first pitfall is ignoring the role of institutions. In the cluster concept literature, institutions appear as an important element in a regional cluster, however, the input-output matrix does not provide any insight on their presence/relevance. Furthermore, since the input-output matrix is focussed on commercial links, we are ignoring the endeavour of cooperative projects, the importance and magnitude of knowledge transfer flows. Finally, recently there seems to be a tendency for an increased used of outsourcing. This may distort cluster analysis based on the input-output matrix because significant commercial links may not serve as an adequate proxy to the externalities which are part of a cluster (Broersma, 2001). In terms of innovation, Broersma (2001) upholds the use of an investment flows matrix since it is a better proxy for knowledge transfer. Van Ark et al. (1999) had already highlighted this aspect, referring it to be particularly important in services.

An alternative instrument to the input-output matrix is the shift-share analysis. It constitutes an alternative way to estimate the degree of interaction between agents since it tracks the evolution of a regional industry's share in employment, distinguishing the economic growth effect from a local effect associated to a local competitive advantage (YCEDC, 2004). The existence of this regional comparative advantage would indicate the presence of a cluster.

Following this extensive analysis, we carry on in reviewing some less known methodologies. DRI/McGraw-Hill's (1995) Cluster Power Index (CPI) is one of these alternatives The CPI combines different elements of a clusters' definition. Computed as a weighted average[3] of employment share (40%), concentration level (40%), growth performance (10%), and the depth of the interconnections between buyers and suppliers (10%) (Rosenfeld, 1997; Braunerhjelm and Carlsson, 1999; Peters et al., 2001; Jones et al., 2003; Feser et al., 2005).

DRI/McGraw-Hill carried out numerous analyses for the United States which has resulted in the identification of 380 US clusters in advanced manufacturing, consumer industries, service industries and resource industries. According to Rosenfeld (1997), since this approach is so inclusive, the 380 clusters accounted for 57% of the US workforce, 6l% of the nation's

[3] The numbers in brackets correspond to the weights attributed to each indicator.

output, and 78% of the nation's exports. This reinforces our point that the lack of a unanimous criteria set leads to an over identification of clusters.

San Diego Association of Governments (Sandag) also presents a methodological proposal to identify clusters. This association upholds that all clusters share common characteristics namely, export-orientation, interdependence and better relative performance which they proxy through three indicators respectively: employment concentration factor, the cluster dependency factor, and economic prosperity factor. To compute the first indicator, Sandag estimates the industry's share in regional employment and compares it to the national average. It assumes that if the employment concentration factor is above 1, it would indicate that the region has a higher relative production and would probably be export-oriented. The reasoning behind this assumption is that if a region has an abnormally high relative level of employment in an industry, it probably does not consume the industry's total output. The remaining part is exported. The cluster dependency factor is estimated using the input-output matrix and serves as a proxy for the interconnection depth between activities that underlies the cluster concept. This process allows the identification of the industries constituting the cluster. However, Sandag does not define a minimum level from which the links should be considered significant. Finally, the economic prosperity factor is estimated comparing the average industry's wage in the potential cluster in comparison to the average industry's wage of the country or state. Again the reasoning behind this is that clusters potentially promote externalities among agents, conducive to a better performance. This performance would be revealed by higher income levels of the clusters workers.

Using as reference San Diego, USA, the Sandag analysed the following potential clusters: optics and lasers, advanced materials, environmental technology, power supplies and systems, higher education and several agricultural sectors. Many of the potential clusters consist of a number of industries that were already included in an existing cluster. If the IO analysis failed to show that they belong elsewhere or as a separate group, they remained in their current cluster. Sandag makes also an enlighten final remark. Due to the disparities in cluster definition and in the lack of standardized rules for grouping industries, the clusters derived do not coincide with clusters derived by different authors for the same region. This translates the problem we have been trying to stress to justify the need of defining a global, unanimous pool of procedures to determine whether or not there exists clusters and thus avoid the anecdotal clusters identification present in some studies (Austrian, 2000).

Finally, we go through the more qualitative methods used to identify clusters. The first one is experts' opinion. The more subjective studies (Porter, 1998) simply validate the existence of a cluster in face of geographical concentration of an industry and an expert's subjective opinion. However, a more objective approach (Martin and Sunley, 2003) is based on interviews of focus groups, the Delphi technique, Industrial Association Reports or even newspaper articles. The biggest problem with this method, besides the obvious lack of data validation, is the fact that as the cluster concept has become very popular and there is a tendency for agents to identify clusters that actually do not exist in the true sense of the term (Bergman and Feser, 1999).

The marriage of qualitative and quantitative data has the advantages of combining theoretical support from data with insights from direct inquiring (Sölvell et al., 2006). If numbers validate the cluster existence, using the case study approach allows for the addressing of local actors and thus the collection of very useful qualitative data. According to Sölvell et al. (2006), experts' contribution to the identification of clusters is a valuable one but the high degree of subjectivity involved may lead to the identification of mere geographical concentration as clusters and impedes any attempt of generalization.

Using a case study approach, Novelli et al. (2006) try to identify Healthy lifestyle tourism clusters in the UK. They identified potential cluster members using local yellow pages and visiting local markets. Afterwards, they contact the Board of Trade and local Hotels association to infer the interconnection between agents. The acknowledgment of the cluster's existence boosted agents' interaction and promoted collective actions, namely in terms of promotional campaigns.

The study of Capone and Boix (2005) extends Sandag's (2001) analysis to the tourism industry, attempting to identify what they designate as 'Tourist Local Systems'. Their methodology involves a first stage on which they split the country into 'Local Labour Market Areas', identified by national statistical bureaus. Then, they define which activities are associated to the tourism *filière*. Accordingly, when a Tourist Local Systems exists, we would found a relative geographical concentration, as measured by standard location coefficients. Instead of defining a concrete threshold level for the location coefficient, their analysis stands on a classes' scheme defined as follows: [0.00-1.00], [1.00-1.25], [1.25-2.00] and [>2.00]. The results point to above-average concentration levels in the North (Trentino and Alto Adige) and centre of Italy (Liguria, Toscana e Lazio). Also the *Arts Cities* like Florence, Rome and Venice, localities specialised in the *three S* (Sun, Sand and Sea), sky destination (Alps, in particular Trentino Alto Adige), and lakes localities (as around Garda Lake) present a high degree of specialization in tourist activities.

In order to identify different typologies for 'Tourist Local Systems', Capone and Boix (2005) use a k-means cluster analysis. The results show that 'Tourism Local Systems' can be subdivided into two groups: one with a higher degree of concentration in transport and accommodation facilities, and the other on food and recreational facilities (Capone and Boix, 2005).

Our goal here is to develop a generally applicable methodology to identify clusters. Thus, we focus on the quantitative aspect. Nevertheless, we do not reject that, in a complementary fashion, the input of qualitative data is quite valuable.

## 5. Proposing an operational and coherent methodology for identifying tourism clusters

Albeit the cluster concept is now widely accepted in essence, the tourism cluster still lacks a unanimous and coherent methodology to define its boundaries and establish a criterion to distinguish simple geographical concentration, or a more evolved network system, from a true cluster (Capone, 2004).

No methodology seems to be currently available to identify true regional clusters and thus avoid the anecdotal way that characterizes many studies clusters identification processes (Vom Hofe and Chen, 2006). The majority of studies simply identify clusters based on geographical concentration measures disregarding completely the interconnection among agents and activities, aspect that is central to the theoretical cluster concept (Malmberg and Maskell, 1997).

In this section we devise our own proposal of a generally applicable methodological approach, focusing on the particular case of tourism clusters.

The concept of cluster is particularly adequate to the specific characteristics of tourism activities (WTO, 2004). Tourism product specificity implies a deep interaction with the local area, promoting joint actions of inter-related enterprises to increase the attractability and value of a tourism destination (WTO, 2004). In most economic activities, it is the product that reaches the consumer, but the tourism product is bound to a specific location. To consume it, it is the clients that have to travel and thus, this reinforces the local aspect. The cluster potential of tourism activities is enhanced by other characteristics of tourism activities such as the complementarities and interdependence among local actors, the integration of local culture and heritage (Cunha and Cunha, 2005). As stated, the attractability of a destination depends on the ability to differentiate and increase the value of a tourism product. Porter (1999) emphasizes that tourism does not depend only on the appeal of the main attraction (beaches or historical sites), but also on the comfort and service of hotels, restaurants, souvenir shops, airports, other modes of transport and so on.

Before presenting our methodological proposal to identify clusters and specifically, tourism clusters, we must recall what our assumptions about the cluster concept. We stated that it is our understanding, despite the numerous existing definitions of cluster, that a cluster comprises two elements: agglomeration and significant linkages between locally concentrated actors. This is the guideline followed in our proposal.

Whether we are departing from a case study approach, with prior knowledge of some geographical concentration of an industry or service, or whether we want to identify potential clusters, we must quantitatively measure the significance of this concentration as a starting point in a cluster identification procedure. Hence, our methodology's first stage is to identify geographical concentration supported on quantitative data. In Section 4 we reviewed several alternatives to measure concentration. Due to the disparities in authors' opinions regarding what threshold value to attribute to the employment location quotient, we propose the use of the Gini coefficient as the main indicator, though complemented with the location quotient applied to employment and specific industry variables.

According to Sölvell et al. (2006) a cluster should present at least a Gini coefficient of 0.30. Cotright (2006), on the other hand, defines a minimum threshold of 0.50. Note that Sölvell et al. (2006) presents data for the average Gini coefficient for different clusters in EU15 and the USA. In the European case, the average concentration value is 0.39 whereas in the US the average is between 0.40 and 0.50. Interestingly, *tourism* cluster identified in EU15 present an average of 0.36.

Based on the above evidence, we propose 0.40 as our threshold level for the Gini coefficient. In complement to the Gini coefficient and since it is simple to calculate, we advise the use of location quotients. Given the wide range of values upheld by different authors for cut-off points, we computed the average for this indicator using Sölvell et al.'s (2006) data for the 50 EU10 largest clusters. The values are 1.57 for general cases and 1.93 for the five tourism clusters.[4] Thus, and since these values are in the middle of most of the values used by in the studies reviewed in Section 4, these are the threshold we propose, 1.60 for general cases and a more demanding 1.90 for tourism.

To evaluate the depth of the inter-linkages among local actors, and thus to provide quantitative support for the presence of a cluster, we propose the simultaneous use of the input-output matrix and a capital flows matrix. As analysed in the preceding section, the input-output measure provides a reasonable proxy to evaluate the significance of linkages between firms (Roepke et al., 1974; Czamanski and Ablas 1979; ÓhUallacháin, 1984; Broersma, 2001). Nevertheless, it focuses on trade relations, ignoring joint actions, the role of institutions and, more importantly, spillovers. In order to complement the information, we propose the use (when available) of a capital flow matrix (Broersma, 2001).

In what concerns the input-output matrix, Hoen (2002) is clear in identifying the diagonalization method as the most robust of the ones presented. Hence, this is the framework we endorse. As a threshold level, Broersma (2001) uses 1% significance level and Hoen (2002) considers 5% as a cut-off value to apply to the restrictions in step 1 of the method (see Table 1). Following these two authors, we propose the adoption of the less restrictive 5% significance level.

The capital flow matrix sheds further light on the interdependence of regional actors and knowledge transfer. In our opinion, this matrix should be studied in an analogous way as the input-output. In terms of threshold values, we opt for not proposing any since there is still little use of these matrixes and our goal is to focus on tourism. Our point is that quantitative validation of a cluster is essential. Though a qualitative complement based on the Delphi technique or even local expert's opinion may be useful, qualitative data must never stand alone in an analysis. Both the agglomeration aspect and the linkages aspect must be quantitatively certified.

In sum, as a general methodology to identify clusters we propose the use of Gini coefficient[5] using a threshold value of 0.40 and the use of the input-output matrix, using the more robust diagonalization technique taking a significance level of 5% as the cut-off point.

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[4] Notice that Sölvell et al. (2006) simply adopt an agglomerative analysis to identify clusters. Apparently, they do not take into consideration the linkages, which in our perspective is a pitfall. However, their findings on concentration levels of different "potential" clusters are useful to define the threshold value for the specialization (location) quotient.

[5] With the optional use of the specialization quotient with a cut-off value of 1.60.

Focussing now on tourism clusters, we adapt this simple methodology to tourism which serves as an example of the implementation of the general framework proposed, bearing in mind the sector's specificities and the type of information available.

In what concerns agglomeration, the first stage of our methodology is similar. We propose the use of Gini coefficient using the mentioned threshold value of 0.40 and for the location quotient 1.90. Notice that Gini coefficient may be used to express unequal spatial distribution besides the obvious income or employment. And we can also add additional indicators when available. For instance, we could compute Gini coefficient for regional lodging capacity. We can also use specific indicators such as Revenue per Available Room or tourism indicators produced by National Bureau of Statistics.[6]

The main difference towards the general methodology is concerned with how to estimate the depth of interlinkages between actors, which is actually the cornerstone of the cluster concept.

Tourism has some peculiarities that make its analysis particularly hard. Specifically for the tourism industry, countries have been developing in recent years a Tourism Satellite Account (TSA) which present the flows between activities related to tourism (Jones et al., 2003). The TSA allows a more accurate comparison of tourism to other industries and among different countries since this methodology is to be implemented across countries. It also allows for a more precise estimate of the direct impact of tourism on the economy (Dupeyras, 2006). For the Portuguese case, for instance, the TSA is being computed by the National Bureau of Statistics (INE). Hence, instead of using input-output matrixes we propose the use of TSA when available.

In order to justify our option, we should compare the TSA with the input-output matrix. Although useful, the traditional input-output matrix presents some limitations, particularly acute in the case of tourism (Jones et al., 2003). Even the most disaggregated input-output matrixes report on tourism activities as a whole, making it impossible to decompose flows into the different tourism activities (Jones et al., 2003). Hence, this puts in jeopardy the application of a cluster identification algorithm. Also the difficulties in estimating the size, value added, and tourism-related employment makes the TSA even more important. TSA has the great advantage of being custom made for tourism thus allowing for instance to estimate tourism real impact on GDP or leakages in terms of value added, besides incorporating additional information such as employment (Jones et al., 2003).

[6] Just as an example, for Portugal, INE calculates an index of regional tourist intensity which may be valuable in identifying or supplying further evidence on the existence of a cluster.

The TSA is composed of 6 statistical tables (see Annex A). Table A1 calculates the value of Tourist Consumption by non-residents whether as Table A2 does the same for residents. Table A3 calculates the tourist consumption from major origin countries and Table A4 presents the data estimated for internal tourist consumption. Tables A5 and A6 are the most important for us and are similar to an input-output matrix. In concrete, Table A5 is a matrix that relates inputs and outputs disaggregated into 12 tourism activities and several connected activities and not tourism specifics that come up in an aggregated fashion, presenting also the production and exploration accounts. This table allows for the identification of the sectoral origins of tourism's specific products. Finally, Table A6 is also of great relevance because it distinguishes which part of the tourist supply is effectively consumed by tourists, allowing the calculation of which part of each industry's production is tourist-related and which part it is not. Thus data on tourism using TSA is much more accurate and precise and so more adequate to estimate the linkages intensity between potential cluster members (Jones et al., 2003).

Having described the TSA, we define now a proper methodology to estimate and conclude the significance of the links between different activities. Using Table A5 of TSA we can adopt the diagonalization method using the 5% threshold of Hoen (2002) in an analogous way as it is used to analyse the input-output matrix. In fact, the TSA derives from national accounting and follows the same principles of an input-output matrix. The difference is that it is custom made for tourism and provides more accurate, detailed and disaggregated data (Jones et al, 2003; Statistics New Zealand, 2004). So, the TSA is ideal to analyse the linkages' depth between tourism activities (INE, 2003). Table A6 allows to establishing which part of the production of a specific sector is tourism-related, helping to identify tourism activities and delimitating more accurately the boundaries of the cluster.

In sum, in the case of tourism, we propose as a reference the use of Gini coefficient, as well as other available regional indicators, to establish geographical agglomeration and specialization. Next, we uphold that, in an analogous way to what is done in other industries using the traditional input-output matrix, we propose the use of the TSA, especially Table A5 further complemented with Table A6 to estimate the significance of the relations between local actor and thus determine if there is evidence supporting the existence of a cluster.

There is still a long way to go and to avoid the abusive usage of the cluster concept and we must keep on working in a certification method of their existence and "quality".

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## Annex A: TSA framework (Eurostat, 2002)

### Table A1

| Products | Same-day visitors (1,1) | Tourists (1,2) | Total visitors (1,3) = (1,1) + (1,2) |
|---|---|---|---|
| **A. Specific products** | | | |
| **A.1 Characteristic products** | | | |
| **1 – Accommodation services** | X | | |
| 1.1 – Hotels and other lodging services (3) | X | | |
| 1.2 – Second homes services on own account or for free | X | X | X |
| **2 – Food and beverage serving services (3)** | | | |
| **3 – Passenger transport services (3)** | | | |
| 3.1 Interurban railway (3) | | | |
| 3.2 Road (3) | | | |
| 3.3 Water (3) | | | |
| 3.4 Air (3) | | | |
| 3.5 Supporting services | | | |
| 3.6 Transport equipment rental | | | |
| 3.7 Maintenance and repair services | | | |
| **4 – Travel agency, tour operator and tourist guide services** | | | |
| 4.1 Travel agency (1) | | | |
| 4.2 Tour operator (2) | | | |
| 4.3 Tourist information and tourist guide | | | |
| **5 – Cultural services (3)** | | | |
| 5.1 Performing arts | | | |
| 5.2 Museum and other cultural services | | | |
| **6 – Recreation and other entertainment services (3)** | | | |
| 6.1 Sports and recreational sport services | | | |
| 6.2 Other amusement and recreational services | | | |
| **7 – Miscellaneous tourism services** | | | |
| 7.1 Financial and insurance services | | | |
| 7.2 Other good rental services | | | |
| 7.3 Other tourism services | | | |
| **A.2 Connected products** | | | |
| distribution margins | | | |
| goods (4) | | | |
| services | | | |
| **B. Non specific products** | | | |
| distribution margins | | | |
| goods (4) | | | |
| services | | | |
| TOTAL | | | |
| number of trips | | | |
| number of overnights | | | |

X does not apply

## Table A2

| Products | Resident visitors travelling only within the country of reference | | | Resident visitors travelling to a different country(*) | | | All resident visitors (**) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Same-day visitors (2.1) | Tourists (2.2) | Total visitors (2.3) = (2.1) + (2.2) | Same-day visitors (2.4) | Tourists (2.5) | Total visitors (2.6) = (2.4) + (2.5) | Same-day visitors (2.7) = (2.1) + 2.4) | Tourists (2.8) = (2.2) + (2.5) | Total visitors (2.9) = (2.3) + (2.6) |
| **A. Specific products** | | | | | | | | | |
| **A.1 Characteristic products** | | | | | | | | | |
| **1 – Accommodation services** | X | | | X | | | X | | |
| 1.1 – Hotels and other lodging services (3) | X | | | X | | | X | | |
| 1.2 – Second homes services on own account of for free | X | X | X | X | X | X | X | X | X |
| **2 – Food and beverage serving services (3)** | | | | | | | | | |
| **3 – Passenger transport services (3)** | | | | | | | | | |
| 3.1 Interurban railway (3) | | | | | | | | | |
| 3.2 Road (3) | | | | | | | | | |
| 3.3 Water (3) | | | | | | | | | |
| 3.4 Air (3) | | | | | | | | | |
| 3.5 Supporting services | | | | | | | | | |
| 3.6 Transport equipment rental | | | | | | | | | |
| 3.7 Maintenance and repair services | | | | | | | | | |
| **4 – Travel agency, tour operator and tourist guide services** | | | | | | | | | |
| 4.1 Travel agency (1) | | | | | | | | | |
| 4.2 Tour operator (2) | | | | | | | | | |
| 4.3 Tourist information and tourist guide | | | | | | | | | |
| **5 – Cultural services (3)** | | | | | | | | | |
| 5.1 Performing arts | | | | | | | | | |
| 5.2 Museum and other cultural services | | | | | | | | | |
| **6 – Recreation and other entertainment services (3)** | | | | | | | | | |
| 6.1 Sports and recreational sport services | | | | | | | | | |
| 6.2 Other amusement and recreational services | | | | | | | | | |
| **7 – Miscellaneous tourism services** | | | | | | | | | |
| 7.1 Financial and insurance services | | | | | | | | | |
| 7.2 Other good rental services | | | | | | | | | |
| 7.3 Other tourism services | | | | | | | | | |
| **A.2 Connected products** | | | | | | | | | |
| distribution margins | | | | | | | | | |
| goods (4) | | | | | | | | | |
| services | | | | | | | | | |
| **B. Non specific products** | | | | | | | | | |
| distribution margins | | | | | | | | | |
| goods (4) | | | | | | | | | |
| services | | | | | | | | | |
| **TOTAL** | | | | | | | | | |
| number of trips | | | | | | | | | |
| number of overnights | | | | | | | | | |

X does not apply

**Table A3**

| Products | Resident visitors travelling only within the country of reference | | | Resident visitors travelling to a different country(*) | | | All resident visitors (**) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Same-day visitors (2,1) | Tourists (2,2) | Total visitors (2,3) = (2,1) + (2,2) | Same-day visitors (2,4) | Tourists (2,5) | Total visitors (2,6) = (2,4) + (2,5) | Same-day visitors (2,7) = (2,1) + 2,4) | Tourists (2,8) = (2,2) + (2,5) | Total visitors (2,9) = (2,3) + (2,6) |
| **A. Specific products** | | | | | | | | | |
| **A.1 Characteristic products** | | | | | | | | | |
| **1 – Accommodation services** | | | | | | | | | |
| 1.1 – Hotels and other lodging services (3) | | | | | | | | | |
| 1.2 – Second homes services on own account of for free | | | | | | | | | |
| **2 – Food and beverage serving services (3)** | **VARIOUS DATA SOURCES:**<br>(1) Household surveys,<br>(2) Household budget surveys (HICP-Regulation),<br>(3) Guest inquiries (e.g. in hotels),<br>(4) Surveys on inbound tourism of important tourism generating countries related to the country of reference. | | | | | | | | |
| **3 – Passenger transport services (3)** | | | | | | | | | |
| 3.1 Interurban railway (3) | | | | | | | | | |
| 3.2 Road (3) | | | | | | | | | |
| 3.3 Water (3) | | | | | | | | | |
| 3.4 Air (3) | | | | | | | | | |
| 3.5 Supporting services | | | | | | | | | |
| 3.6 Transport equipment rental | | | | | | | | | |
| 3.7 Maintenance and repair services | | | | | | | | | |
| **4 – Travel agency, tour operator and tourist guide services** | | | | | | | | | |
| 4.1 Travel agency (1) | | EU-Directive on TS | | | EU-Directive on TS | | | EU-Directive on TS | |
| 4.2 Tour operator (2) | | | | | | | | | |
| 4.3 Tourist information and tourist guide | **VARIOUS DATA SOURCES:**<br>(1) Household surveys,<br>(2) Household budget surveys (HICP-Regulation),<br>(3) Guest inquiries (e.g. in hotels),<br>(4) Surveys on inbound tourism of important tourism generating and destination countries related to the country of reference. | | | | | | | | |
| **5 – Cultural services (3)** | | | | | | | | | |
| 5.1 Performing arts | | | | | | | | | |
| 5.2 Museum and other cultural services | | | | | | | | | |
| **6 – Recreation and other entertainment services (3)** | | | | | | | | | |
| 6.1 Sports and recreational sport services | | | | | | | | | |
| 6.2 Other amusement and recreational services | | | | | | | | | |
| **7 – Miscellaneous tourism services** | | | | | | | | | |
| 7.1 Financial and insurance services | | | | | | | | | |
| 7.2 Other good rental services | | | | | | | | | |
| 7.3 Other tourism services | | | | | | | | | |
| A.2 Connected products | | | | | | | | | |
| distribution margins | IO- and NA-statistics | | | | | | | | |
| goods (4) | | | | | | | | | |
| services | | | | | | | | | |
| **B. Non specific products** | | | | | | | | | |
| distribution margins | IO- and NA-statistics | | | | | | | | |
| goods (4) | | | | | | | | | |
| services | | | | | | | | | |
| TOTAL | | EU-Directive on TS | | | EU-Directive on TS | | | EU-Directive on TS | |
| number of trips | | EU-Directive on TS | | | EU-Directive on TS | | | EU-Directive on TS | |
| number of overnights | X | | | | | | | | |

X does not apply

**Table A4**

| Products | Visitors final consumption expenditure in cash | | | Other components of visitors consumption | Internal tourism consumption (in cash and in kind) |
|---|---|---|---|---|---|
| | Inbound tourism consumption (4,1)* | Domestic tourism consumption (4,2)** | Internal tourism consumption in cash (4,1) + (4,2) = (4,3) | (4,4)*** | (4,5) = (4,3) + (4,4) |
| A. Specific products | | | | | |
| A.1 Characteristic products | | | | | |
| 1 – Accommodation services | X | X | X | | |
| 1.1 – Hotels and other lodging services (3) | | | | | |
| 1.2 – Second homes services on own account of for free | | | | | |
| 2 – Food and beverage serving services (3) | | | | | |
| 3 – Passenger transport services (3) | | | | | |
| 3.1 Interurban railway (3) | | | | | |
| 3.2 Road (3) | | | | | |
| 3.3 Water (3) | | | | | |
| 3.4 Air (3) | | | | | |
| 3.5 Supporting services | | | | | |
| 3.6 Transport equipment rental | | | | | |
| 3.7 Maintenance and repair services | | | | | |
| 4 – Travel agency, tour operator and tourist guide services | | | | | |
| 4.1 Travel agency (1) | | | | | |
| 4.2 Tour operator (2) | | | | | |
| 4.3 Tourist information and tourist guide | | | | | |
| 5 – Cultural services (3) | | | | | |
| 5.1 Performing arts | | | | | |
| 5.2 Museum and other cultural services | | | | | |
| 6 – Recreation and other entertainment services (3) | | | | | |
| 6.1 Sports and recreational sport services | | | | | |
| 6.2 Other amusement and recreational services | | | | | |
| 7 – Miscellaneous tourism services | | | | | |
| 7.1 Financial and insurance services | | | | | |
| 7.2 Other good rental services | | | | | |
| 7.3 Other tourism services | | | | | |
| A.2 Connected products | | | | | |
| distribution margins | | | | | |
| services | | | | | |
| B. Non specific products | | | | | |
| distribution margins | | | | | |
| services | | | | | |
| Value of domestically produced goods net of distribution margins | | | | | |
| Value of imported goods net of distribution margins | | | | | |
| TOTAL | | | | | |

## Table A5 :

| Products | TOURISM INDUSTRIES 1 - Hotels and similar | 2 - Second home ownership (imputed) | 3 - Restaurants and similar | 4 - Railway passenger transport | 5 - Road passenger transport | 6 - Water passenger transport | 7 - Air passenger transport | 8 - Passenger transport supporting services | 9 - Passenger transport equipment rental | 10 - Travel agencies and similar | 11 - Cultural services | 12 - Sporting and other recreational services | TOTAL tourism industries | Tourism connected industries | Non specific industries | TOTAL output of domestic producers (at basic prices) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A. Specific products** | | | | | | | | | | | | | | | | |
| **A.1 Characteristic products** | | | | | | | | | | | | | | | | |
| **1 – Accommodation services** | | | | | | | | | | | | | | | | |
| 1.1 – Hotels and other lodging services (3) | | X | | | | | | | | | | | | | | |
| 1.2 – Second homes services on own account of for free | x | | x | x | x | x | x | x | x | x | x | x | | x | | |
| **2 – Food and beverage serving services (3)** | | X | | | | | | | | | | | | | | |
| **3 – Passenger transport services (3)** | | X | | | | | | | | | | | | | | |
| 3.1 Interurban railway (3) | | X | | | | | | | | | | | | | | |
| 3.2 Road (3) | | X | | | | | | | | | | | | | | |
| 3.3 Water (3) | | X | | | | | | | | | | | | | | |
| 3.4 Air (3) | | X | | | | | | | | | | | | | | |
| 3.5 Supporting services | | X | | | | | | | | | | | | | | |
| 3.6 Transport equipment rental | | X | | | | | | | | | | | | | | |
| 3.7 Maintenance and repair services | | X | | | | | | | | | | | | | | |
| **4 – Travel agency, tour operator and tourist guide services** | | X | | | | | | | | | | | | | | |
| 4.1 Travel agency (1) | | X | | | | | | | | | | | | | | |
| 4.2 Tour operator (2) | | X | | | | | | | | | | | | | | |
| 4.3 Tourist information and tourist guide | | X | | | | | | | | | | | | | | |
| **5 – Cultural services (3)** | | X | | | | | | | | | | | | | | |
| 5.1 Performing arts | | X | | | | | | | | | | | | | | |
| 5.2 Museum and other cultural services | | X | | | | | | | | | | | | | | |
| **6 – Recreation and other entertainment services (3)** | | X | | | | | | | | | | | | | | |
| 6.1 Sports and recreational sport services | | X | | | | | | | | | | | | | | |
| 6.2 Other amusement and recreational services | | X | | | | | | | | | | | | | | |
| **7 – Miscellaneous tourism services** | | X | | | | | | | | | | | | | | |
| 7.1 Financial and insurance services | | X | | | | | | | | | | | | | | |
| 7.2 Other good rental services | | X | | | | | | | | | | | | | | |
| 7.3 Other tourism services | | X | | | | | | | | | | | | | | |
| **A.2 Connected products** | | X | | | | | | | | | | | | | | |
| distribution margins | | X | | | | | | | | | | | | | | |
| services | | X | | | | | | | | | | | | | | |
| **B. Non specific products** | | X | | | | | | | | | | | | | | |
| distribution margins | | X | | | | | | | | | | | | | | |
| services | | X | | | | | | | | | | | | | | |
| Value of domestic produced goods net of distribution margins | | X | | | | | | | | | | | | | | |
| Value of imported goods net of distribution margins | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| TOTAL output (at basic prices) | | | | | | | | | | | | | | | | |
| 1. Agriculture, forestry and fishery products | | | | | | | | | | | | | | X | X | X |
| 2. Ores and minerals | | | | | | | | | | | | | | X | X | X |
| 3. Electricity, gas and water | | | | | | | | | | | | | | X | X | X |
| 4. Manufacturing | | | | | | | | | | | | | | X | X | X |
| 5. Construction work and construction | | | | | | | | | | | | | | X | X | X |
| 6. Trade services, restaurants and hotel services | | | | | | | | | | | | | | X | X | X |
| 7. Transport, storage and communication services | | | | | | | | | | | | | | X | X | X |
| 8. Business services | | | | | | | | | | | | | | X | X | X |
| 9. Community, social and personal services | | | | | | | | | | | | | | X | X | X |
| Total intermediate consumption (at purchasers price) | | | | | | | | | | | | | | | | |
| *Total gross value added of activities (at basic prices)* | | | | | | | | | | | | | | | | |
| Compensation of employees | | | | | | | | | | | | | | | | |
| Other taxes less subsidies on production | | | | | | | | | | | | | | | | |
| Gross Mixed Income | | | | | | | | | | | | | | | | |
| Gross Operating surplus | | | | | | | | | | | | | | | | |

## Table A6

| Products | TOURISM INDUSTRIES | | | | | | | | TOTAL tourism industries | | Tourism connected industries | | Non specific industries | | Total output of domestic producers (at basic prices) | * Imports | Taxes less subsidies on products of domestic output and imports | Domestic supply (at purchasers price) | Internal tourism consumption | Tourism ratio on supply |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1- Hotels and similar | | 2 - Second home ownership (imputed) | | ... | | 12 - Sporting and other recreational services | | | | | | | | | | | | | |
| | output | tourism share | output | tourism share | output | tourism share | output | tourism share | output | tourism share | output | tourism share | output | tourism share | | | | | | |
| **A. Specific products** | | | | | | | | | | | | | | | | | | | | |
| **A.1 Characteristic products** | | | | | | | | | | | | | | | | | | | | |
| **1 – Accommodation services** | **Output:** TSA-Table 5 **Tourism share:** According to TSA-MR | | | | | | | | | | | | | | | IO-table | NA-statistics IO-table | | TSA-Table 4 | |
| 1.1 – Hotels and other lodging services (3) | | | | | | | | | | | | | | | | | | | | |
| 1.2 – Second homes services on own account of for free | | | | | | | | | | | | | | | | | | | | |
| **2 – Food and beverage serving services (3)** | | | | | | | | | | | | | | | | | | | | |
| **3 – Passenger transport services (3)** | | | | | | | | | | | | | | | | | | | | |
| 3.1 Interurban railway (3) | | | | | | | | | | | | | | | | | | | | |
| 3.2 Road (3) | | | | | | | | | | | | | | | | | | | | |
| 3.3 Water (3) | | | | | | | | | | | | | | | | | | | | |
| 3.4 Air (3) | | | | | | | | | | | | | | | | | | | | |
| 3.5 Supporting services | | | | | | | | | | | | | | | | | | | | |
| 3.6 Transport equipment rental | | | | | | | | | | | | | | | | | | | | |
| 3.7 Maintenance and repair services | | | | | | | | | | | | | | | | | | | | |
| **4 – Travel agency, tour operator and tourist guide services** | | | | | | | | | | | | | | | | | | | | |
| 4.1 Travel agency (1) | | | | | | | | | | | | | | | | | | | | |
| 4.2 Tour operator (2) | | | | | | | | | | | | | | | | | | | | |
| 4.3 Tourist information and tourist guide | | | | | | | | | | | | | | | | | | | | |
| **5 – Cultural services (3)** | | | | | | | | | | | | | | | | | | | | |
| 5.1 Performing arts | | | | | | | | | | | | | | | | | | | | |
| 5.2 Museum and other cultural services | | | | | | | | | | | | | | | | | | | | |
| **6 – Recreation and other entertainment services (3)** | | | | | | | | | | | | | | | | | | | | |
| 6.1 Sports and recreational sport services | | | | | | | | | | | | | | | | | | | | |
| 6.2 Other amusement and recreational services | | | | | | | | | | | | | | | | | | | | |
| **7 – Miscellaneous tourism services** | | | | | | | | | | | | | | | | | | | | |
| 7.1 Financial and insurance services | | | | | | | | | | | | | | | | | | | | |
| 7.2 Other good rental services | | | | | | | | | | | | | | | | | | | | |
| 7.3 Other tourism services | | | | | | | | | | | | | | | | | | | | |
| **A.2 Connected products** | | | | | | | | | | | | | | | | | | | | |
| distribution margins | | | | | | | | | | | | | | | | | | | | |
| services | | | | | | | | | | | | | | | | | | | | |
| **B. Non specific products** | | | | | | | | | | | | | | | | | | | | |
| distribution margins | | | | | | | | | | | | | | | | | | | | |
| services | | | | | | | | | | | | | | | | | | | | |
| Value of domestically produced goods net of distribution margins | | | x | x | | | | | | | | | | | | | | | x | x |
| Value of imported goods net of distribution margins | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | x |
| TOTAL output (at basic prices) | | | | | | | | | | | | | | | | | | | | |
| 1. Agriculture, forestry and fishery products | TSA-Table 5 | | | | | | | | | | x | x | x | x | x | | | | | |
| 2. Ores and minerals | | | | | | | | | | | x | x | x | x | x | | | | | |
| 3. Electricity, gas and water | | | | | | | | | | | x | x | x | x | x | | | | | |
| 4. Manufacturing | | | | | | | | | | | x | x | x | x | x | | | | | |
| 5. Construction work and construction | | | | | | | | | | | x | x | x | x | x | | | | | |
| 6. Trade services, restaurants and hotel services | | | | | | | | | | | x | x | x | x | x | | | | | |
| 7. Transport, storage and communication services | | | | | | | | | | | x | x | x | x | x | | | | | |
| 8. Business services | | | | | | | | | | | x | x | x | x | x | | | | | |
| 9. Community, social and personal services | | | | | | | | | | | x | x | x | x | x | | | | | |
| Total intermediate consumption (at purchasers price) | | | | | | | | | | | | | | | | | | | | |
| *Total gross value added of activities (at basic prices)* | | | | | | | | | | | | | | | | | | | | |
| Compensation of employees | TSA-Table 5 | | | | | | | | | | | | | | | | | | | |
| Other taxes less subsidies on production | | | | | | | | | | | | | | | | | | | | |
| Gross Mixed income | | | | | | | | | | | | | | | | | | | | |
| Gross Operating surplus | | | | | | | | | | | | | | | | | | | | |

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