Italian tourism intermediaries: a social network analysis exploration

Marco Valeri
NCI University London, UK and Niccolò Cusano University, Rome, Italy
marco.valeri@unicusano.it

Rodolfo Baggio
Master in Economics and Tourism, Bocconi University, Milan, Italy and
National Research Tomsk Polytechnic University, Tomsk, Russia
rodolfo.baggio@unibocconi.it

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Abstract

The purpose of this paper is to analyse the application of Social Network Analysis (SNA) to the Italian tourism system. The research question is: *do relationships among tourist enterprises affect the organizational asset of the Italian travel system?* The research takes as unit of analysis the Italian travel agencies and tour operators system and represents quite a significant disclosure for organizational theses because it offers a different view over the structure and governance of a hospitality intermediaries' network. SNA is helpful in detecting genuine proficiency and therefore in foreseeing possible losses determined by poor or inefficient configurations. Furthermore, it will help delineate new roles within the organizational networks and evaluate the relation between formal and informal organizational structures. This paper provides a structural analysis of the Italian travel agencies network and highlights its self-organization characteristics (typical of a complex system) that lead to the development of informal communities. The methods of network science proved useful and effective and, together with more traditional approaches and a qualitative knowledge of the system, can provide a deeper and more extensive understanding of the system.

Keywords: Complex systems, network analysis, quantitative methods, small and medium-sized tourism enterprises, travel agencies

1. Introduction

The hospitality system is an important unit of analysis that can be considered as a cluster of interrelated stakeholders embedded in a social network (Parkhe et al., 2006; Scott et al., 2008a; Casanueva et al., 2016). The actions of such a community of stakeholders are strictly interconnected, thus satisfying visitors' requirements and generating the experience they undergo (Clauset et al., 2007). Among these hospitality players, we can list accommodation enterprises, tourist attractions, tour operators, service suppliers, government and tourism offices, along with members of territorial communities. The network among these players is characterized by complexity, dynamicity, and a strong susceptibility to external shocks. The basic premise of tourism destination management is that by means of synergic activities of planning and organization, the strength of such a network can be enhanced to the advantage of any single stakeholder (Baggio et al., 2010; Valeri, 2015; 2019).

In the present paper, we make use of an articulated adaptive system theory, along with the methods of network science for the delineation and the analysis of the relationships on which stakeholder governance effectiveness is based. It uses a network model based on the concept that the

actual valuable unit of analysis is the entire ensemble rather than just the singular stakeholder (Williams et al., 2017).

Network governance "involves a select, persistent, and structured set of autonomous firms (as well as non-profit agencies) engaged in creating products or services based on implicit and open-ended contracts to adapt to environmental contingencies and to coordinate and safeguard exchanges. These contracts are socially – not legally-binding'' (Jones et al., 1997). Such network owns a number of structural features that defines the correlations of the stakeholders' community. They are very helpful in understanding destination governance and the way we can improve it.

In modelling a hospitality system as an entity subject to network governance, the governance system may be considered as the tool by which the destination adapts to change. However, we must also recognize that an important characterizing feature of the dynamics of a destination system is its complexity. While others have noted this complexity in how a destination changes (Khalilzadeh, 2018; Kim and Scott, 2018; McKercher, 1999; Russell and Faulkner, 2004), they have essentially adopted an approach based on an elaborate system as a tool of analyzing hospitality. This is not advantageous in simulating destination dynamics, because the components of such systems are not fully in accordance and there is a lack of information about their interactions (Baggio, 2017).

Old-school organizational thesis do not have a real coherence with mathematical theories, and, in this regard, we have been trying to look for a concrete conformity. Social Network Analysis (SNA) is the mathematical methodology that could be applied to identify whether knowledge management practices have a real effective impact on the organizational performance (Czernek, 2017; Nieves and Diaz-Meneses, 2018; Provenzano and Baggio, 2020).

Following the exploration of the collaboration dynamics inherent in the network of Italian travel agencies and tour operators by means of a social network analysis, we will adopt this approach to study the generation and implementation of groups of practice and to find out potential obstacles to fruitful correlations. As a matter of fact, SNA is helpful in detecting genuine proficiency and therefore in foreseeing possible losses determined by a poor or ineffective expertise (Wu et al., 2004; Inkpen and Tsang, 2005; Ward and Peláez-Verdet, 2018).

The paper is organized as follows: the first section is dedicated to the analysis of this complex network approach as a means of informing the theory and practice of managing a tourism destination and improving its governance, the second part describes the research framework and method applied, finally the paper presents our results and discuss implications and directions for future research.

2. Framework

Complexity science approach

The increased attention in complexity science as a context to comprehend social and economic systems has recently had a significant impact on the analysis of tourism when considering organizational repercussions (Tribe, 2005).

Defining the concept of complexity is a long-standing unsettled issue and a large number of theories have been supported for its clear definition and perimeter. A shared consensus has not been reached yet, however, according to several scholars such as Levin (2003), we can state that a system is complex when it usually includes a big quantity of components that interact in a complementary way. Usually, the interdependence between such elements is non-linear and, even though it may seem reasonably uncomplicated at local level, it develops in a changing and unsteady way, creating practices and structures that are not a direct configuration of local distinctive marks (Eber et al., 2018).

Most of the works discussing a complexity approach to the study of hospitality management have analyzed the issue from a qualitative point of view. They have debated about either possible structural and dynamic features by classifying groups of components and their relationships (McKercher, 1999)

or the relentless and casual growth of destinations and the role of a number of specific elements in supporting economic development (Pechlaner et al., 2003).

Most recently, some authors have begun to apply quantitative methods to assess the characteristics of hospitality system (Davies, 2003; Baggio, 2008; Baggio and Mariani, 2019). This is quite meaningful because, although the complexity of a methodology can be evaluated with a qualitative approach and the related features are identifiable with no effort, assessing complexity is key as it offers the possibility for modelling and simulation.

Sociology has a traditional custom in utilizing modelling and simulation (Inbar and Stoll, 1972). The efficiency of these methods is quite good, as long as a number of primary conditions are achieved: e.g. have a strong conceptual pattern and confine simulations to specific situations for which they are run (Kuppers and Lenhard, 2005; Schmid, 2005). Only if such requirements are fulfilled, simulations will be productive and efficacious in generating various kinds of methodologies, thus representing a precious asset in the decision making process.

However, this modelling approach is often disputed as it is deemed to be an oversimplification of actions and interaction of social players (either single or grouped). To overcome this issue, researchers have first produced significant and competent results in several sectors and secondly have identified the perimeters and the limits of such methodologies (Henrickson and McKelvey, 2002). Individual players are undoubtedly much more complicated as compared to model's assumptions, however, by means of algorithmic simulations, we can understand the statistical average behavior of the whole system, even if we can't identify the characteristics of single components or players. A key theoretical frame comprising investigations of complex networks is that referred to as statistical physics, i.e. a set of theories that makes use of statistical methodologies to solve problems, and that is considered one of the most important specializations of physics.

The focal outcome of such approach, as well as its strength, lie in the development of two decisive principles: universality and scaling (Amaral and Ottino, 2004; Barthélemy *et al*., 2005). According to these two principles, statistical physics methods may be applied to study global social issues. Several systems show off general characteristics, which are not dependent of the distinct form of their components, like for instance weather conditions or financial markets.

On the account of the above, we can support the theory that cosmic laws or outcomes may also be revealed in different kinds of complex systems be they economic, social or biological. Within the context of statistical physics and complex systems, the principle of universality has the key target of seizing the nature of diverse characteristics and sort them out into distinctive categories enabling the use of conclusions and models from known areas to new ones.

The scaling concept suggests the vision that an assortment of relations, known as scaling laws, may be of help in classifying the peculiar conduct of a system and its crucial transformations. Hence, when dissimilar events show affinities between them, these may represent a symptom of the presence of shared fundamental laws or values. In particular, this happens mainly when such similarities arise in the performance of components of dissimilar systems or between the structures of systems.

The above argument is a scheme of discussion by analogy that may result in possible misuses. However, it is argued that such scheme is essential to offer details of true and tangible issues and to show the way towards new additional innovative approaches. Accordingly, laws and techniques of statistical physics that are applied to the exploration of a socio-economic context are legitimated only when the quantitative techniques utilized turn out to be very well grounded in a reasonable and approved qualitative interpretation of the events outlined (Mariani and Baggio, 2020)

There are many opportunities to apply formal methodologies to analyze a complex system. Likewise, there are many simulation models that have been elaborated making use of non-linear dynamics and agent-based modelling. In this research, we will center on applying the new techniques provided by the network scientific domain (Amaral and Ottino, 2004). Here below, an introductory perspective to such approaches.

SNA in tourism and hospitality management research

The tourism destination has set itself as a key factor within the tourism management research, and in this the intermediaries sector plays a crucial role in connecting the destination's resources with the customers (Cooper et al., 2008). Thanks to its features and its evolutionary dynamic, the tourism destination has a fundamental role for the definition of management and development strategies and the comprehension of economic, social and environmental impacts generated by tourism (Framke, 2002; Ritchie and Crouch, 2003; Vanhove, 2005). Naturally, this entails the need of a deep knowledge of the structure of the destination and of the interconnections between its constitutive elements (Czernek, 2017; Nieves and Diaz-Meneses, 2018; Provenzano and Baggio, 2020).

When analyzing these concepts, one factor seems to stand out with a particular emphasis: the importance of the set of relationships among the different parts of the destination system. This consideration leads one to wonder how the recent developments of what is now known as the "network science" (Watts, 2004) can help improve our knowledge, and whether and how they can provide useful elements for a better and more effective management of the tourist system (Song and Li, 2008).

Many definitions have been proposed to describe a destination. As it often happens, there is no general agreement and the different expressions tend to highlight this or that aspect, depending on the aim of the author.

For the purpose of the present work, we can define the tourism destination as a geographically delimited system, where a number of actors operate (businesses, associations, public administrations, etc.) providing travelers and tourists with services and other products. Furthermore, this should ideally happen trying to promote a correct balance between the tourist use of a territory and the respect of its environmental, social and cultural features (Framke, 2002). The set of public and private organizations which operate in the tourist system and the configuration of the ties built among them have been studied and analyzed in different ways, usually by means of methodologies deriving from economic and social studies.

Using a systemic approach, the tourism destination can be considered as an example of hospitality belonging to a dynamic complex system. Actually, from a structural perspective a destination can be seen as a system made of a number (usually not a small one) of elements that evolves responding to external and internal stimulation; the relationships bonding the different components can be characterized by well-known non- linear dynamics, frequently described in the relevant literature (Farrell and Twining-Ward, 2004; Casanueva et al., 2016).

Phenomena such as the resistance towards external shocks, the spontaneous development of intermediate structures (self-organization), the sensitiveness to the variation of the initial conditions, the unpredictability of the impact of events even when of minor importance, the difference between the behavior of the entire system and that of each of its constitutive elements, strongly confirm this interpretation (Hagberg et al., 2008; Baggio, 2008).

In such a framework, as it is well known, the traditional techniques of analysis and forecast have shown great limits (Russell, 2006; Russell and Faulkner, 2004). We can mention many examples of sophisticated methods developed to forecast the trend of tourist phenomena and their relatively low reliability which can be easily explained if the "complexity" is considered as an intrinsic feature of the system. Furthermore, this complexity requires a deep rethinking of the managerial or governmental arrangements of the destination.

In a complex system, self-organization is probably the most striking feature, and this implies that no individual coordinator or manager can completely handle the system behavior, and that the control is spread over different factors interacting among themselves. Moreover, the nonlinearity of these interactions means that sometimes in a very unpredictable way, small disruptions can cause significant catastrophic effects whilst heavy shocks can be easily absorbed (Levin, 2003).

As said earlier, one of the main characteristics of a tourist system is its network organization. For this reason, the techniques and analysis methods of complex networks, developed over the last years

by a large group of researchers of diverse disciplines, provide an interesting hint for a scientific approach to the study of a tourism destination (Baggio et al., 2010; Baggio, 2017).

Network measurements

The comprehension of complex systems is facilitated when they are rendered in the shape of a diagram, that is to say mathematically (Mitchell, 2006). A number of elements (nodes) are connected by a number of edges (ties). The edges of a graph can be undirected or directed, that is symmetric associations between nodes, or causal relationships between them.

Depending on the characteristics of the nodes, the edges of a diagram can be classified in two ways: we talk about directed edges if the associations between nodes are symmetric, whereas we refer to undirected edges when the correlations between nodes are casual. To stress the strength in the relation of elements such as cost, urgency, level of contacts, etc., edges can also be given a weight. In order to mirror the actual world properties and features, some network characteristics have been identified. For instance, the amount of links (i.e. the real quantity of links measured against the total quantity of possible links), in relation to the compactness of a group, a fundamental characteristic in ascertaining collective behaviors.

A number of researches carried out on the network characteristics of tourism destinations have highlighted that the examined samples have a low degree of connections (Baggio *et al*., 2010; Scott *et al*., 2008b). This result, although uncomplete, is quite significant because, by means of policy and management mediations, we can sort out and definitely identify the vulnerabilities in the compactness of a destination.

The interrelations inherent in a value-creation system enable us to identify dissimilarities in the measurement of the level of inter-organizational compactness in different contexts (Scott et al. 2008a). At the same time, we are offered another fundamental managerial suggestion, i.e. the network approach highlights the necessity for a destination to be considered as a cooperative context.

These concerns can also be addressed through a modularity analysis. In a network, a group of nodes, connected by stronger links between them than with other parts, is considered a module, or a community.

We can calculate this result through the modularity rate Q, which is the quality indicator for groups identified by the variance between the ratio of links connecting nodes in a community and its forecast value, in case the links are distributed randomly. The modularity rate can be measured either for a given allotment of the network into modules, or by applying a stochastic calculation that will obtain the breakdown maximizing Q for the network (Clauset et al., 2004; Girvan and Newman, 2002).

In addition, network approaches have been applied to recognize the key stakeholders of a tourism system, that is to say those players that are able to generate significant added value for the development of tourist business and for the destination management (Casanueva et al., 2016). Comparing the perceived relevance of enterprises in a given destination and their network features enables us to establish a set of metrics capable of describing them (Baggio and Mariani, 2019).

It has been noted, by comparing perceived importance and position in the network, that the key members are usually located at the heart of the system, thus creating a sort of inner circle that plays a prominent role compared to the outer stakeholders (Cooper et al., 2009). This means that the overall control of a tourist destination is governed by a restricted number of organisms, confirming once more the need for a cooperative inter-organizational network able to lead to real integrated tourist practices (Cooper, 2018). Not least, public stakeholders can be considered key factors in destination networks for the following reasons: they own fundamental resources, have a core position and are legally the most powerful over other members. So far, we have considered the use of network methods to analyze the features of the hospitality system. At this stage, we can move on to the more difficult task of shaping possible evolutions to a touristic network.

Gathering data and details within a network analysis approach can be made in different methods. We can interview staff members and ask them about their interrelations with other employees; we can keep under observation the various dynamics, or better still obtain measures from statistics in case a computer aid system is available.

To assess networks and identify their features, we can use a number of measures. The most frequently used can be ordered into two classes: group (or global) and individual (or local) measurements. Below are the most popular and significant (Tribe, 2005; Baggio *et al*., 2010; da Fontoura Costa *et al*., 2007; Scott *et al*., 2011; Tonti and Baggio, 2012):

Group measurements:

1. Density: the proportion resulting from the comparison of the current amount of connections and the highest number of possible connections when all network nodes are interconnected.
2. Cohesion: the average length of the gap between couples of persons in the networks, that is to say the median number of steps on the shortest pathway for all potential couples of network nodes

Individual measurements:

1. Degree centrality: amount of individual connections
2. Betweeness centrality: evaluation of the way a person is linked with others in the network.
3. Closeness centrality: closeness of a node to any other, calculated as the opposite of the sum of all the distances from the node to any other.

It has been found that formal structures are not sufficiently explicative to comprehend the flow of information in an organization and how assignments are fulfilled. Actually, the dynamics inherent in organization mechanisms are determined by the mutual dependence of the community (Barrat et al., 2008; Brass and Burkhardt, 2017; Ibarra, 2017).

Such correlations are often so hard to be estimated that we should reconsider the power of "informal structures". Any organization theoretician would agree that the best procedure for an organization to achieve target objectives is to look more closely at its internal and external contexts, that is to say where the interventions are distributed.

Nevertheless, being the nature of organization dynamics essentially qualitative, it is invariably and extremely arduous to frame it with quantitative measures.

In this regard, Social Network Analysis (SNA) represents a relevant guide to comprehend the evaluations of organizational dynamics in both qualitative and quantitative terms. Especially when concerning organizations, SNA adopts the connotation of Organizational Network Analysis (ONA) (Tichy et al., 1979). Organizational Network Analysis reveals the collaboration tendencies among employees in the working environment and helps to identify possible interventions to solve inefficiencies in the communication process (Burt, 2000; Inkpen and Tsang, 2005; Tonti and Baggio, 2012).

3. Methodology

The methodology research is based on social network analysis (Inbar and Stoll, 1972; Stauffer and Aharony, 1992; Gilbert, 1999; Suleiman *et al*., 2000; Schmid, 2005; Toroczkai and Eubank, 2005; Küppers and Lenhard, 2005; Tesfatsion and Judd, 2006; Axelrod, 2006; Hollingsworth and Müller, 2008; Sornette, 2008; Baggio and Baggio, 2020). The unit of analysis considered here is the Italian travel agencies/tour operator industry composed of a collection of private organizations and their common relations with stakeholders. The Italian travel agencies/tour operator is seen as a network whose actors are the single organizations and whose links are the connections established among them.

The choice of such a representative unit is due to the strategic role played by travel agencies within the national and international tourist system. The number of actors of this segment is quite considerable (about one thousand) and therefore able to provide significant results from a statistical perspective. The related stakeholders (hotels, transport companies, associations, public authorities, etc.) have been identified through the official lists supplied by the local agency for the tourist promotion and represent the network nodes.

In this network analysis process, information was gathered in different ways: by interviewing the general manager of travel agencies/tour operators about their interactions with other organizations, by observing the competitive dynamics, by extracting measurements from statistics if an information technology collaboration system is present. The examination of these networks depends on data collection methods, which may turn out to be hard to perform or result in fragmentary or uncertain conclusions. This allowed to add a number of interactions left out in the documentary survey. The completeness of the data thus collected can be estimated around 80%. The collection is based on surveys, with a number of different techniques that aim at highlighting the connections among the different actors, and statistical sampling procedures are applied. Nonetheless, performing an accurate sampling of global network properties is difficult because miscalculations may increase more and more.

An online questionnaire was used to collect the data from September to December 2019. A list of 1000 tourism companies and organizations working in the Italian travel agencies/tour operator industry was created. The survey was emailed to the organizations in the list, with two subsequent reminders sent after three weeks.

As the units of the research were organizations, whilst information were provided by single persons representing those organizations, the information letters and email emphasized the importance that the respondents had a good knowledge of the contacts and the relationships of the organization of which they were part. In a small number of cases, when considering large organizations, multiple questionnaires were submitted. In conjunction with the data collection, relationship data (relational network data) were constantly imported and network developed.

This supported also the identification of previously unidentified as well as important organizations. The very central companies in the network, who had not responded to the survey, were emailed an extra reminder and the new companies were emailed with two reminders. This process continued until all companies were contacted. Finally, 350 valid questionnaires were collected, which resulted in a network with 329 nodes and 741 ties. Nodes represent the organizations and ties are the knowledge transfer connections between the organizations.

Actually, interviewees might have relationships with other involved actors at various degree of "intensity". This might influence their personal evaluation, leading to possible deep prejudices and making their narrative less accurate (Bendle, 2018; Qiao et al., 2019). In a complex network, even minor errors can have striking effects on the properties as a whole. With the data collected, it has been possible to draw a graph of the travel agencies/tour operators' network (Hagberg *et al*., 2008). Afterwards, we have deducted its key features by first analyzing the categorization of the static properties of the system and secondly by proceeding with the study of is dynamics and evolution. The numerical values calculated for the data collection under examination have been weighted against those of a synthetic graph presenting the same order (number of nodes) and size (number of links) and a random distribution of the links. Such a method enables a superior comprehension of the importance and of the 'physical' interpretation of the quantities involved.

4. Results: network structure

The number of actors (network nodes) is relatively large so as to offer meaningful results from a statistic perspective. They were identified by each interviewed travel agency as discussed in the

previous section. The resulting network is displayed in Fig.1, while Tab.1 contains the main metrics calculated. All connections are considered symmetrical and non-weighted.

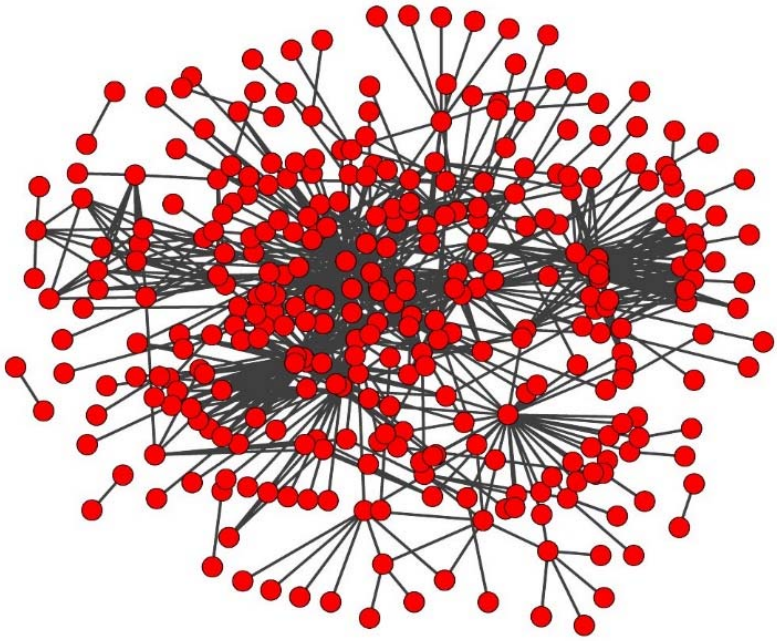

Fig. 1 - The Italian travel agencies network

Tab. 1 - Main network metrics

Node count:	329
Link count:	751
Density:	0.014
Largest component nodes fraction:	0.796 (262 nodes)
No. of components	28
Diameter:	8
Average path length:	3.681
Clustering coefficient:	0.036
Global efficiency:	0.198
Average local efficiency:	0.058
Assortativity:	-0.215
Modularity (main component) Q:	0.630
No. communities:	7
Degree distribution exponent:	2.93±0.25

The network is relatively sparse (density is quite low) and fragmented, there are 28 components with a fairly large main component (79.6% of nodes).

The main portion of the degree distribution (Fig. 2) has a clear power-law shape, whose exponent (2.93±0.25) is compatible with a preferential attachment formation mechanism. In other words, a few nodes have a large number of links and are the hubs of the network and new links (or new nodes) are established preferably with nodes who already have a high degree.

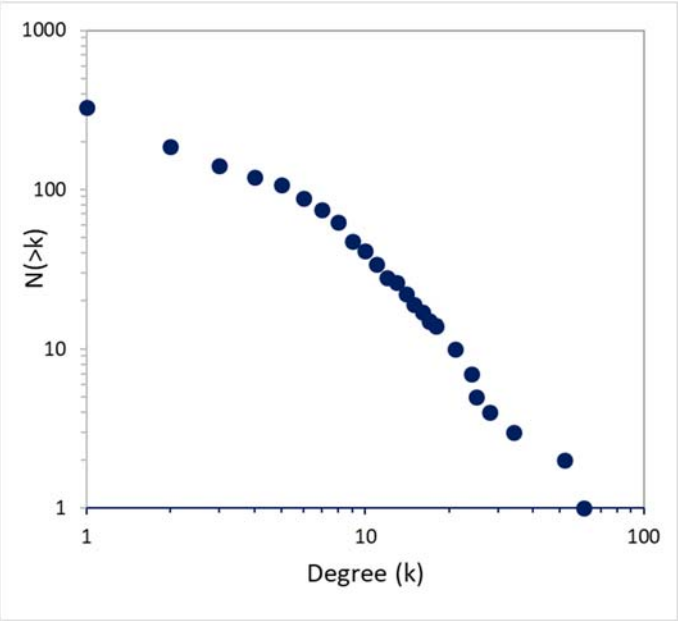

Fig. 2 - Cumulative degree distribution

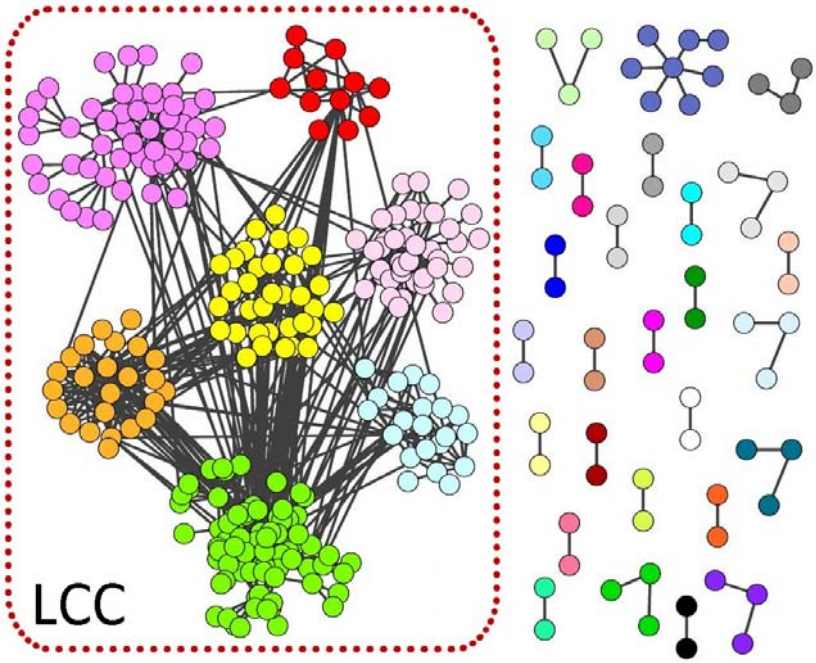

Fig. 3 - The network largest connected component (LCC) and the other fragments. Colors (online) show the different communities identified in the LCC

The low clustering coefficient and the negative assortativity (correlation between a node's degree and that of its neighbors) are, as discussed elsewhere (Baggio, 2007) a symptom of scarce levels of collaboration between the travel agencies and of their scarce propensity to form collaborative alliances. This fact is also evident from the fragmentation of the network. Besides that, the efficiency both at a local (nodal) and global level has quite low values.

Looking at the largest connected component of the network we find a relatively well defined modularity, with seven communities (Fig. 3). Two communities are larger than the others that are anyway fairly well balanced in size.

Research highlights that network systems, through their mathematical representation, are excellent candidates for numerical simulations, and that they are asserting themselves as supporting tools for the analysis and planning of social and economic systems when the complexity of such systems prevents the effective use of more traditional methods of study.

5. Discussion

As we have seen from the topological analysis of the connections between travel agencies operators, the network has characteristics that are quite similar to those of many other natural and artificial systems; in particular, its distribution of degrees follows a power law. Nevertheless, some differences seem to be quite significant. Firstly, the network connectivity is very low just as its level of local aggregation and of the general efficiency of the system. In terms of "hospitality" this shows a low level of collaboration and cooperation of the involved actors. If, as already suggested (Baggio, 2007; Valeri, 2016; Valeri and Baggio, 2020), we take into account the clustering and assortative coefficients, these can be considered as quantitative measures of the phenomenon, and we could compare them with the results of traditional methods of qualitative surveys thus validating or challenging them. This is a significant point, considering the acknowledged importance given to collaborative practices to increase the competitiveness and the economic results of groups of tourist businesses (Ingram and Roberts, 2000). So, in addition to the possible collaborations following the qualitative surveys, network analysis offers a quantitative support to the testing and evaluation of such characteristics.

Another interesting point comes from the analysis of the modularity of the network. We have seen, as proof of what has just been said, how this is generally low when considering natural and traditional subdivisions. However, it was possible to note how a certain level of aggregation exists when studying the network for its intrinsic topological features. This shows that the system has a certain level of self-organization (typical of a complex system) that leads to the development of informal communities, phenomenon found also in other contexts (Minerba *et al*., 2008).

This proves to be very important to the governance of the tourist destination and offers several hints, for example in the definition of development plans, suggesting directions on how to act in the attempt to maximize operations and results or on how to favor different collaborative forms other than the prefixed groups, thus satisfying the natural tendency of the system and giving further support to the activities of adaptive governance that many consider an important approach in the management of complex tourist systems (Farrell and Twining-Ward, 2004).

Furthermore, the network topology and its local features have a crucial importance for the diffusion of information and knowledge or for the formation of shared opinions. In other terms, the results suggest that the existence of a level of a well-identified local cohesion has a primary role in ensuring some efficiency of the process (Baggio, 2015; Tran et al., 2016; Raisi et al., 2020).

One final consideration is essential. The quantitative analyses of the network's parameters offer important recommendations that however have to be confirmed and compared with the qualitative knowledge of the system, of its components and of its dynamics. Only in this way it is possible to read the results correctly. In fact, it has been demonstrated that significant values of clustering can also be found as statistical fluctuations in the case of networks with a casual distribution of links, a limited number of nodes and a fixed distribution of degrees P(k) (Newman, 2003; Raisi et al., 2018). Once the model is built and the results are correctly interpreted, it is possible to conduct different simulations by changing the different parameters and developing various scenarios assessing their effects and conditions.

6. Concluding remarks

The paper briefly describes the main methods and techniques that the network science has been developing over the last years and how they can be applied to the study of a tourism system. We have discussed the results of the analyses and the implications that they can have over the governance and

the functioning of the system. Taken individually, those methods are all certainly fascinating and challenging from an intellectual perspective. However, scientists operating in this area are well aware that, no matter how effective and advanced models and theories are, they have little value if it is not possible to give a "physical meaning" to their outcomes. In other words, a good knowledge of the objects of the analyses is essential to obtain significant results from a theoretical and practical point of view, and this knowledge comes from the so-called qualitative methods (Mariani and Baggio, 2020).

Nowadays, issues such as collaboration, cooperation or partnership and the benefits of tools for the analysis of these relationships and their results are well considered within the literature specialized in management. It is considered that the implications go well beyond the simple study of networks and a great potential is recognized to innovation, marketing messages, use of technology, creation of consensus and dynamic of opinions and finally to the effects that all the above may have on the development and performance of organizational structures (Parkhe et al., 2006; Brandão et al., 2018; Valeri, 2020). In this regard, the methods of network science can result extremely useful and effective when deepening the knowledge of complex systems and their dynamics and, together with the heritage of already developed traditional procedures, they can be powerful tools within the adaptive approach that many consider the only effective way to guide these systems (Farrell and Twining - Ward, 2004; Ritter *et al*., 2004). The possibility to use quantitative methods to analyze phenomena and relationships that up to now have only been studied with qualitative techniques opens up new horizons to those interested in the study of tourist systems and their governance (Davies, 2003).

We have, in summary, shown how the structure of the travel agencies network examined is relatively fragmented and of poor efficiency, mainly due to the low level (and tendency) of collaborative practices. The study presented here is an important contribution to the understanding of these crucial actors in the tourism domain and, what is more, paves the way for the application of simulation techniques that can produce different scenarios aiming at improving the overall efficiency and effectiveness of this set of operators. This is an important point and assumes today an even higher relevance for the functioning of the whole chain in view of the possible modifications in the way of conducting business that is expected once the present deep crisis is over.

Future researches will provide the necessary confirmations of the results here presented through a bigger number of cases and examples. Obviously, the methods shown in this paper need more refinements, both from a theoretical and an applied perspective, and the increasing commitment in the interdisciplinary study of the complex systems and of networks will offer further suggestions for their application to the world of hospitality intermediaries.

Besides that, these network analytic techniques can contribute to a more rigorous methodological approach that may help rationalizing the often cluttered set of ideas, models and theories which currently characterize the studies on tourism (Tribe, 2005).

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