The science of complexity in the tourism domain: a perspective article

Rodolfo Baggio

Master in Economics and Tourism and
Dondena Center for Research on Social Dynamics and Public Policy
Bocconi University, Milan, Italy
and
National Research Tomsk Polytechnic University, Tomsk, Russia

rodolfo.baggio@unibocconi.it

Abstract

Purpose: This paper provides a reflection on the application of complexity science in the tourism domain and is written for the celebration of 75 years of the Tourism Review journal.
Design/methodology/approach: The paper is based on a purposeful critical selection of the literature on the topic.
Findings: After a slow start, complexity science has found a definite position in the tourism literature.
Research limitations/implications: The paper is based on a critical selection of the literature.
Originality/value: The paper provides a brief overview past and future developments in the area.
Keywords: Tourism systems, complexity science, network science
Paper type General review

Introduction

In the past 75 years scholars have investigated an incredible number of features of that varied (and ill-defined) domain we identify as tourism. Under this term we include also hospitality, leisure, travel and all the other connected topics. Since the very beginning, academic studies have recognised the systemic nature of the phenomenon and of its components. In order to understand the characteristics of this domain, at any level, a holistic consideration of the structural and dynamic aspects was unavoidable. The main reason is that, as well stated by Krapf (1946: 5) in the very first issue of this journal (at the time called The Tourist Review): "the functions of tourism go well beyond its economic framework and are called to play a role in many other fields." The use of methods coming from the interdisciplinary domain of complexity science allows better achieving our knowledge objectives.

Past perspective 75 years of developments 1946-2020

For several years the systemic approach to tourism has used a reductionist view in which the systems studied. Typically, tourism destinations have been dissected for examining the internal components (the stakeholders) and their connections (between themselves and with the external environment). A linear approximation of the different relationships was the focus (Wolfe, 1952, Jafari, 1987). Representative offspring of this approach is the famous Butler's evolutionary model of a destination. Between the end of the last century and the beginning of the current one, a few seminal papers strongly called for a different approach in the tourism studies: that of the complexity science, which had, by that time, well developed a series of methods and techniques able to uncover the structural and dynamic characteristics of such systems (McKercher, 1999, Farrell and Twining-Ward, 2004, Faulkner and Russell, 1997).
Complexity arises in circumstances where several independent elements interact in interdependent, and somehow unpredictable, ways. The agents adapt their behaviour (learn) and may give rise to new and unforeseeable (in simple ways) properties or configurations that cannot be recognized at individual level (Levin, 2003). Many natural and artificial phenomena and systems can be seen in this way, and tourism, with the structures that compose it, is a prototypical example.
In the following period many other scholars elaborated on this idea, although prevalently from a qualitative perspective, re-stating the necessity and describing advantages and disadvantages. (e.g. Russell and Faulkner, 2004). This situation evolved a few years later, when quantitative methods derived from the different disciplines that originated complexity science were applied to the tourism domain as well (Baggio, 2008).
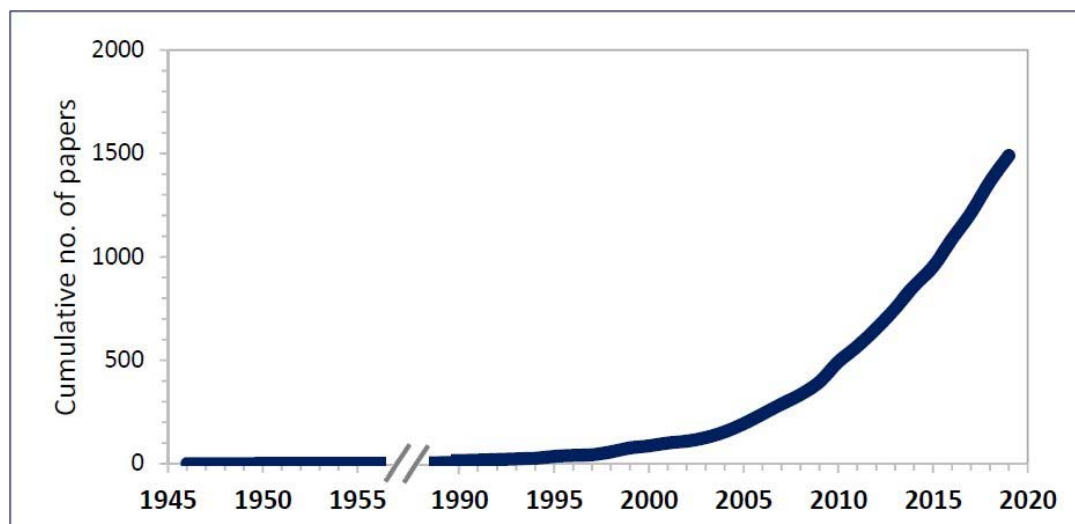

Figure 1. 75 years growth in the number of contributions on complex tourism
science as reported by Scopus

Since then, several methodological suggestions have been made for using techniques such as non-linear time series analysis (Olmedo and Mateos, 2015), agent-based-modelling (Amelung et al., 2016) and network analysis (Baggio et al., 2010b), and a growing number of works have applied these methods (figure 1). Among the various proposals, network science is the one that has seen the widest acceptance in the tourism academic community (van der Zee and Vanneste, 2015). This is probably due to the easier understandability of the basic concepts and to the wide availability of software pieces (packages or libraries for the most common programming

languages) that ease substantially the task of calculating all the quantities needed for the analyses.

Most of the studies involve tourism destinations (Baggio et al., 2010a). Here the major results concern the structural characteristics and the cooperative behaviour of the different stakeholders, the relevance of specific actors, the advantages obtainable with good connectivity and the simulation of dynamic processes such as knowledge transfer and opinion formation. In this area the network approach has also allowed to uncover possible optimizations for increasing the efficiency of the network and of its members (Heidari et al., 2018, Baggio, 2017). Moreover, it has been possible to verify the positive effects exerted by digital technologies, giving a sounder basis to the view of a destination as a digital ecosystem (Baggio and Del Chiappa, 2014). Besides the obvious theoretical interest, many of these results have shown to have a good applicability to the governance and the planning activities of a destination and of its stakeholders. The 'old' qualitative quantitative dichotomy ought to be overcome, as both approaches, taken individually, risk providing deceiving, when not definitely wrong, outcomes (Coviello, 2005). It is also manifest that, for the different competences needed (computer science, mathematics, social sciences etc.), good multidisciplinary teams are crucial for the successful application of these methods in the tourism domain.

Future perspective 75 years 2020-2095

Having achieved a recognition of the theoretical appeal as well as for the capability to provide good "practical" insights, we face a further phase of development. First, a wider sample of thorough studies is desirable, so that the features highlighted so far can be better confirmed and form the basis for more rigorous structural and evolutionary models. The more refined and sophisticated techniques (e.g. analysis of multilayer or temporally evolving networks, or simulation techniques) made available in the last years by scholars of many disciplines (see e.g. Cimini et al., 2019) need to be checked for their applicability to the study of destinations and their components. In particular, they can be well applied to analysing the complex dynamic co-evolution of technological and socioeconomic structures and infrastructures in a destination. Deeper investigations of the interactions between the 'real' and the 'virtual' components in a tourism digital ecosystem will provide *smarter* and more sustainable approaches to technology-based futures.

Finally, better simulation tools are to be developed for a more profound understanding of the whole domain and for providing more accurate scenarios. This can allow better informed planning and policy making endeavours.

Conclusions

Although relatively new and still in an embryonic phase, the application of complexity and network science to the tourism domain is slowly increasing and has already shown its validity and usefulness from both an academic and practitioner's perspective. The work to be done in the future is challenging and will require enhanced capabilities to work as multidisciplinary teams. But there is little doubt that it can greatly contribute to providing a more rigorous and deeper understanding of the whole domain.

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Rodolfo Baggio is professor at the Master in Economics and Tourism at Bocconi University, Milan, Italy. His teaching and research activities are centered on the use of information technology in tourism and on the interdisciplinary applications of complexity and network science methods to the study of tourism destinations.