Resilient Tourism

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Abstract

Resilience concept is not new, applied in various fields and in various ways according to the context and the needs. Today it's widely used and fashionable in the context of successive crises. Tourism has been greatly impacted by the pandemic and this sector, which was ill-prepared for it, is working to develop its resilience. Assuming that tourism is an ecosystem in which organisms evolves in their environment, this complex dynamic system can be studied at different scales, local or global, and resilience is the expression of a return to a stable functional state following a disruptive event. The system thus goes through several stages of operation and its evolution is constant and the system lives. Resilience is also expressed in the posture taken upstream. Become aware of the system, its dependencies and its strengths and weaknesses to prevent, limit the impact or benefit from a disruptive event. It is then possible to act beforehand by adjusting the system at priority strategic points and then when a foreseeable, probable or unforeseen event occurs, thus reducing the shock suffered by the system. The term resilience echoes the idea of adaptation which may be reductive. Resilience affects multiple aspects of an environment and its actors, is expressed at different scales and is a phenomenon that takes place over time and evolves in stages : before, during and after a system disruptive event. This approach lays the foundations to study the manifestation of resilience in a simulated model built on the example of Valais tourism.

Keywords : resilience; tourism; ecosystems; modeling and simulation

1 Introduction

The notion of resilience is very successful and seems more than appropriate in periods of successive crises because it is what allows any system to recover from these destabilizing hazards. Generally the most affected are the most unexpected crises, although some of them can be imagined, but their intensity is also unexpected. However, resilience is not only concerned with pejorative events. The emergence of new ideas generates change and the system must know how to adapt to these innovations. Faced with innovation, of course, it is possible to opt for an opposing vision with suspicion and defiance in the face of this new competition. The opposition, which can consider rejecting this novelty and sticking to its position, is growing stronger to discredit this new trend. Globally, we can consider resilience as resistance to a shock, implying by this the occurrence of a change with sufficient intensity to destabilize the balance and restore it in a given time.

Adapting can take many forms, but some are less effective than others. Between robustness, flexibility, anticipation, projection, security, risk-taking, evolving in a complex environment is an equally complex task where chance plays a major role if you are not prepared for it.

The term resilience is increasingly heard and is used in several areas. Resilience is often compared to the image of the reed that bends in the storm but does not break. This image is certainly charming, but this analogy can be interpreted in such a way that it is necessary to define more precisely what resilience is in order to work with this concept.

In this article it is a question of presenting the inventory of fixtures of the literature covered to define the limits of the concept of resilience applied to tourism for its implementation in a simulation model. The first simulation model prototype tested is presented in connection with the concept of resilience retained.

2 Resilience concept

The use of the term resilience has evolved over time for more than a century through various fields (Villar (2020)). We see the term resilience appear around the beginning of the 20th century with a material point of view with the ability of a material to absorb a shock, then studying its physical properties. The concept is taken up in the field of child psychology and then in socioeconomic systems. It is also formalized in the field of ecology with the work of Holling (1973) included in this article. The list of fields using the concept of resilience expands significantly towards the arrival of the 21st century, applying to geography and then to the field of business and management, cities, systems and IT.

Today, resilience is generally perceived as the ability of individuals and communities to meet the challenges that society encounters. Between strategies, anticipation, social cohesion, resilience brings together several already existing concepts and goes beyond them. As part of territorial management, the Cerama (2020) offers benchmarks for territorial resilience in the form of objectives by domain called "compass" acting as a strategic guide. Resilience is thus expressed in qualitative terms, helping to identify and prioritize actions and political choices.

In the field of urban resilience, there is talk of a new concept of urban governance following "smart cities" (Wei (2020)) but it remains oriented to the ability to manage disasters and "self-recovery". The latter, however, can through resilience find a capacity to adapt more quickly and better to new technologies and innovations (Rojas (2022)).

In the field of ecology, starting from the resilience model proposed by Holling (1973), the concept is being refined over the course of research and various applications (Walker, Holling, Carpenter, and Kinzig (2003)). Among other things, the active interdisciplinary network of the "Resilience Alliance" publishes numerous studies in this direction.

In connection with the systemic, tourism is a complex open system where various actors rub shoulders with different objectives and perceptions. It is therefore preferable that the reflections impacting the entire system be made in cooperation with all the actors that make it up. This is why it is interesting to develop a tool that is open and accessible to as many people as possible, which can report on this system.

The application of systemic for sustainable tourism (Camus (2010)) provides a theoretical framework and extending its application to resilience is similar. In the tourism sector, we find this general idea of resilience in connection with the territory, society and the economy. The tourist destination and its actors are considered in their ability to withstand and recover from destabilizing events such as crises, disasters or the arrival of an innovation. What will strengthen resilience is diversity, offering flexibility, infrastructure and quality governance, all in cohesion with the local community.

The success of resilience produced by recent striking events propels this concept to the forefront of the political scene. Subject actively discussed there is the risk of highlighting only certain aspects of a complex system. However, it is only possible to act on a complex system in an appropriate manner by considering all of its characteristics(Hynes W (2020)). As a network becomes more complex, it creates dependencies that can make it less resilient. Acting on a limited number of variables, seeking to stabilize them, for example through political choices, will initially make the system prosperous, but without adaptation, an imbalance is created elsewhere in the system (Gunderson and Holling (2003)).

The strong impact of COVID restrictions on tourism has revealed that resilience is an under-exploited concept in the tourism world and this is reflected in a document published by the OECD dedicated to tourism. (OECD (2022)). Resilience and sustainability are at the heart of global and local economic development policies and goals, with tourism playing a vital role. This highlights the importance of differentiating supply and markets to build resilience. The proposal gives direction through concrete examples implemented and ideas for indicators to be used to assess resilience. In the rest of the article, the goal is not to propose key indicators or possible implementations as stated above. It is a question of proposing a vision of resilience by modeling and simulating a dynamic system. Multiple simulations will make it possible to visualize various possible scenarios in which resilience would be expressed and could ultimately serve as a decision-making tool.

3 Tourism system

The complex system of tourism can be seen as an ecosystem, an organized environment composed (biotope) populated by organisms (biocenosis). Tourism resources such as land, infrastructure and heritage form the environment, while the various tourism stakeholders are its organisms. The notion of

resilience, as we have seen, is applied in various fields. In ecology, this application can be found in the pioneering work of Holling (1973).

Finally, tourism made up of its actors and resources forms a living system through its socioeconomic structure and its urban planning (Alberti et al. (2003)). Through its various scales of observation and the interactions which constitute it, it is about a sustainable development of the system which exists through its capacity of adaptation (Holling (2001)).

This resilience is expressed in the adaptive cycle model (Fath, Dean, and Katzmair (2015)). This theoretical model assumes a cycle of destruction-reorganization in systems. Resilience is effective if the system manages to find a state of organization that allows it to continue to operate. Resilience is then expressed globally in the emergence of its local self-organization.

An adaptive cycle is composed of four successive states: the growth phase, the conservation phase, the destruction phase (fall, deconstruction) and the reorganization phase. A resilient system is assumed if it maintains its operation through its adaptive cycle. If the cycle is destroyed the system is not considered resilient.

Resilience can be observed at different scales. Resilience can be interpreted from two different points of view (Batabyal (2023)): (1) A system which maintains a "centered equilibrium", its function, by measuring its resistance to disturbances and its speed of return to equilibrium. (2) A system that cares about disequilibrium by observing the conditions that tip the equilibrium to a new stage of behavior, away from the system's center of equilibrium.

In view of the position of the OECD (2022), resilient tourism expresses its adaptability through change but also through its ability to transform itself, to learn from past events that have destabilized the system. It is similar to the second point of view (2) interested in the imbalance thresholds at the edge of the system. This second vision is part of a more sustainable vision of resilience, part of the very long term.

In the other hand, the first vision (1) is interesting over a slightly shorter term. We then observe more local changes and not global transformations.

Saunders and Becker (2015) proposes an overall framework which successively includes: risk management, contained in resilience, itself contained in sustainability. Everyone is compensated at different time scales. We find this temporal granularity which is part of a different vision and impact. Risk management is a tool for resilience which is itself a tool for sustainability. Rogov and Rozenblat (2018) recalls the links and distinctions between resilience and sustainability by analyzing the term used in the research. It is also expressed in the scales of application and the areas they impact. They make it possible to highlight that the concept of resilience is then closer to the first vision (1), on a shorter term called adaptation, while that of sustainability is closer to the second vision (2), over a longer term called transformation. Transformation involves a fundamental change in the nature of the system (Walker et al. (2003)). For this reason, the vision of resilience adopted is based on the idea of "centered equilibrium" (1).

4 Modeling and application

The choice of modeling is motivated by the fact that the ecosystem considered as composed of an environment and an organism, an ecosystem as explained above. The agent model has a similar structure facilitating the transposition of the latter.

Multi-agent systems make it possible to approach the idea of collective intelligence through the operational independence of individuals. This distributed artificial intelligence makes it possible to model the cognitive state of an individual and to simulate behavior resulting from his beliefs, his free will, between dependence on the environment and independence of the individual. Multi-agent system modeling releases global components through local interactions found, for example, in ant colonies (Ferber (1995))

It is important to design agents that are autonomous and not constrained by the coordination between agents Stratulat (2002). The set of rules defined must be generic and carefully chosen at the risk of having too many rules and orienting the model.

The creation of the model carried out on NetLogo (Wilensky and Resnick (1999)) simulates a set of individuals according to the "sugarescape" model (Epstein and Axtell (1996)) adapted to a situation of scarcity of resources to evaluate the resilience of the model. The environment is represented by the population density of Valais, which indicates the possibility of exploiting resources there. Two types of agents evolve in this environment according to the harvester-annuitant model. The former recover the resource while the latter exploit this income. Roles can be changed. Agents evolve according to a life cycle, they age and die, reproduce if they have enough resources and die if they don't have enough.

The adaptive cycle has as criterion the survival of the population following a shock. Disruptive events consistent with a shortage of available resources randomly generated through NetLogo's interface. In the event of a minor shortage, the system survives by exchanging resources and stock amassed by agents.

There are three stages in the operation of the simulation which can be defined as (1) before the disruptive event (2) time of the impact of the disruptive event (3) after the disruptive event. In these three stages, the different stages of the adaptive cycle are expressed: growth, conservation, destruction, reorganization.

During simulation (1) the first step takes place before the occurrence of a disturbing event by adjusting the state parameters of the system, which corresponds to the growth and conservation phase of the adaptive cycle. Modifying these parameters makes the system more or less resilient to the occurrence of a future shock. It is also possible that the system is unstable and decays by itself with the initial conditions. Defining the parameter setting that generates better resilience is done by successive observation of different simulations.

The occurrence of a disturbing event (2) is triggered by the activation of a button during the simulation. This event causes a shortage of resources for a predetermined duration. The resources and actors who are directly impacted suffer the shock. During the duration of the shock, the destruction phase is initiated but also, possibly, the reorganization phase if the system is sufficiently resilient. During this event, the system can survive or disappear.

When the disruptive event is over (3), by propagation, the system can recover by going back into a reorganization phase. If the reorganization succeeds, the system then goes back into a growth cycle, otherwise the adaptive cycle is interrupted, the system is no longer functional.

5 Conclusion

The term resilience, which has become very present in everyday language, is applied to a myriad of areas. Its meaning reduced to the idea of the capacity of "adaptation" is simplistic and its implementation depends on the context in which it is applied. This is why it is important first of all to define resilience for a given application, thus delimiting the objectives and criteria to be considered in this approach. This is not a magic recipe but a strategy to adopt. Resilient tourism is still trying to define itself and the positions taken in this article are choices among many others, motivated by certain practical constraints related to the realization of a model applied to Swiss Valais tourism.

There are different spatial and temporal scales to analyze and model resilience. The choice made for the modeling allows this flexibility. The representation of tourism in the form of an ecosystem, adapted to modeling by multi-agent system, is motivated by the socioeconomic character inscribed in a spatial environment made up of multiple resources and various interacting actors.

The bases thus laid, the next step will be to define the whole of these resources and actors specific to the Swiss Valais tourism and to state the rules which govern the interactions and behaviors to simulate the tourist ecosystem and to analyze the factors which characterize the resilience specific to this territory.

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