Tourism: a systemic approach

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What is “tourism”?

Contrary to widely held belief, the popular notion of a multidisciplinary approach is not a systems approach.

[Gharajedagh, 1999]

Complicated matter

Multi – Inter – Cross – disciplinarity

According to Robert W. McMillans - “Tourism is the set of the phenomena and relationships arising from the interactions of tourists, business suppliers, host governments and new communities in the process of attracting and hosting tourists and other visitors”.

According to Hermann V. Sehgalld - “Tourism as an industry comprises the resultant of operations, notably of an economic nature which directly relate to money, may or may not involve the presence of foreigners inside and not inside a certain country, city or region”.

According to Haufler and Kofel - “Tourism is the set of phenomena and relationships arising from the travel and stay of nonresidents, in so far as they do not lead to permanent residence and are not connected with earning a living”.

According to W.T.O. recommendations - “Tourism comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes”.

According to E. J. Lickorsh - “Tourism embraces all movement of people outside their community for all purposes except migration or regular daily work. The main frequent reasons for this movement is for holiday but it will also include, for example attendance at conferences and movement on sporadic or intermittent business purposes”.

Concise and unfinished text that reads: “Tourism is a systemic approach”.

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[Gharajedagh, 1999]
System thinking

The systemic approach:
consider a whole entity (a “system”)
and investigate its structure and
static & dynamic behavior

• Define
  – system & tourism
• Methods
  – tools & methods to study
    statics & dynamics
• Insights
  – structure, past and future behavior
Tourism systems

- Tourism destination
  - basic subsystem
  - a problematic concept
    - the goal of travel: a place, a number of different stakeholders, a set of attractions, resources and services to satisfy tourist’s needs and wishes
      - N.B.: mainly a spatial (physical) concept, but may be extended to the virtual “collaboration space”

System

- Entity (conceptual or real) made of a number (normally not small) of elements interacting dynamically and generating some global behavior
  - elements, interactions, structure, objective
    - in a system “the whole is more than the sum of its components” as behavior depends on interactions as well

Butler, 1980
Farrell et al., 2004
Systems

- **Simple**
  - few components, linear and predictable interactions, repeatable, decomposable, knowable
- **Complicated**
  - many components, cause and effect separated over time & space but repeatable, decomposable, analyzable
- **Complex**
  - nonlinear interactions, sensitivity to initial conditions, dynamic, adaptable to environment, produce emergent structures & behaviors, can become chaotic
    - non decomposable, non predictable, non tractable analytically

Tourism systems are *complex adaptive systems*

i.e. no (full) analytic treatment possible → need models
In the life of Mr. Palomar there had been a time in which his rule was this: first, build a model in his mind, the most perfect, logic, geometric possible model; second, verify whether the model fits observable practical empirical cases; third, apply the needed corrections, so that model and reality coincide.

[Italo Calvino, Palomar, 1983]

Complex systems

- Need methods and tools to study global properties
  - non decomposable $\rightarrow$ consider system as a whole
  - non tractable analytically $\rightarrow$ use models & simulations
  - non predictable $\rightarrow$ build scenarios
  - management & control (???)
    - self-organizing systems!!!

- A (strong) theoretical framework

  Statistical physics

  - proved able to describe phenomena outside the realm of traditional physics
  - social dynamics

  [Castellano et al., 2009]
Theoretical framework

- Statistical physics
  - study of the statistical properties of many-body disordered systems considered as elements of an ensemble
  - macroscopic properties derived from extensive and intensive system quantities (order parameters)
    - partition function (expected value of microscopic properties) \( \rightarrow \) state equations
    - can study (quantitatively or qualitatively): dependency on external conditions, boundary conditions, control parameters, phase transitions & critical behaviors, optimization…
  - universality & scaling

Statistical physics

Typical problem formulation:

- **Given:**
  a macroscopic system consisting of a large number of microscopic elements AND an incomplete set of measurements of some system’s properties

- **Find:**
  probability distributions for other system’s properties

Example: ideal gases
given: gas (N molecules)
given: N, V, T, equilibrium
find: P, S, C_V, C_P, …
Structure & functions (behaviors)

Isoeugenol: \( \text{C}_{10}\text{H}_{12}\text{O}_2 \)

Eugenol: \( \text{C}_{10}\text{H}_{12}\text{O}_2 \)

Structure & functions are strongly coupled

Analogy

Percolation
Percolation

The toolbox

- A wide range of possible tools & techniques
  - most quite “old”, dated back to XIX century, but practical only with recent computer technology
  - based on modeling and simulations
- Toolbox
  - System dynamics
  - Agent-based modeling
  - Nonlinear dynamics (chaos & complexity theory)
  - Network science
System dynamics

- Aim at understanding how a system’s feedback structure produces and affects its dynamic behavior.
- Modeling based on differential equations describing interactions and feedbacks.
- Aggregation of agents into a small number of states assuming perfect mixing and homogeneity.

Jere-Lazanski et al., 2006

Woodside, 2009
Agent-Based models (ABMs)

- Simulate actions and interactions of autonomous (learning) individual entities
  - a.k.a. individual-based models (IBM)

- Hypothesis:
  the behavior of social systems can be modeled and understood as evolving out of autonomous interacting agents
  - preserves heterogeneity and individual attributes

Baggio², 2009
Johnson et al., 2010
Nonlinear dynamics

- Methods and techniques to assess the degree of complexity of a system
  - sensitivity to initial conditions
  - resilience
  - emergence and self-organization
  - complex & chaotic behaviors

- Typically analysis of a time series considered to be representative of internal system dynamics
  - stability (stationarity/unit roots), convergence to stable dynamic trajectories (Lyapunov coeff.), memory of past conditions (Hurst analysis), complex & chaotic behaviors (bifurcation diagrams, phase space plots, attractors)

Elba Island

System's internal dynamics
Networks & systems

- A complex system: many interconnected elements → network

- Main issues:
  - do universal properties exist?
  - does network topology affect functions?
  - do structure & functions integrate?
  - does dynamic evolution change the properties?
  - can we explain dynamic processes?
    - diffusion processes (viruses, info, messages, …)
    - small perturbations → avalanches
    - optimization, synchronization
    - self-organization
    - robustness and/or fragility
Tourism network studies

- Structural characteristics of a tourism destination
  - identify & characterize “important” stakeholders
  - measure extent of and attitudes towards collaboration
  - discover *emergent* communities (beyond traditional distinctions by type/geography etc.)
  - assess ICT usage

- Dynamics & optimization
  - resilience towards external shocks
  - diffusion of information & knowledge
  - effectiveness of advertising & word-of-mouth
  - destination’s visibility on WWW
  - evolution models
some
VERY PERSONAL
comments

The sciences do not try to explain, they hardly even try to interpret, they mainly make models.

By a model is meant a mathematical construct which, with the addition of certain verbal interpretations, describes observed phenomena.

The justification of such a mathematical construct is solely and precisely that it is expected to work.

John von Neumann

Tourism research

• Many x-disciplinary studies, but little theoretical systematization of acquired results and knowledge

• Too strong push towards practical application, which may slow the development of theoretical models

The scientist does not study nature because it is useful; he studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing, life would not be worth living. […]

I mean that profounder beauty which comes from the harmonious order of the parts, and which a pure intelligence can grasp.

Henri Poincaré
Tourism research

- Some authors call for new and innovative attempts, but there is little understanding and application of available methods and tools
- Too many mainstream works, repeating standard approaches
  - example: practically ALL papers using System Dynamics in tourism are published in NON-tourism journals
- Too strong bias towards qualitative descriptions
  - and modest innovation in usage of quantitative methods

Qualitative/quantitative?

- No quantitative approach is reasonable without a sound qualitative knowledge
  - model → simulation → interpretation
- Also, qualitative analyses rather useless without some form of quantitative verification

By abolishing the unfortunate categories of qualitative/quantitative and natural sciences/social sciences that have been set against each other, and letting them join forces for a common goal - to learn about life - people open up for methodological creativity

[Gummesson, 2007]
Final remarks

• A tourism destination is a complex adaptive system & needs to be studied as such
• Methods & techniques to measure and model behaviors & phenomena are available
• Appealing from a theoretical point of view
• Can become an interesting tool to assist practical endeavors

and...

it makes fun!

(remember Richard Feynman)

online at: http://www.iby.it/turismo/
References


