Crozier & Luhmann: social theory as a support for a systemic socioterritorial modeling and simulation

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Abstract. This paper shows how a socioterritorial system could be computationally modeled by means of two social theories, Sociology of Organized Action (SOA) and Social Systems (SS) to study power relations among social actors. It is concluded that both approaches helps the empirical research and that they complement each other, while SOA emphasizes the power relations, the SS focuses on the generative process of communication.

Keywords: sociology of organized action. social systems. regional analysis. power.

1   Introduction

Territories may be conceptualized as complex systems composed of three subsystems (social, symbolic and spatial) that frames the socioterritorial system (STS). The symbolic subsystem represents the gateway that drives how the social system observe and act over the spatial system [1]. STS can be analysed as organizations with some kind of governance arrangement towards a general goal. It is characterized by a fuzzy relationship among social actors and is geographically bounded. STS can be informal or formal as some brazilian initiatives from the Territorial Development Program from the Ministry of Agrarian Development. One of the key issues about STS is how social actors act collectively to achieve their goals and how they react to territorial public policies. So, this implies that we need to pay more attention to a sociological understanding of how people make collective actions on a regional scale. In this work two systemic social theories were compared as support for formal modeling and for empirical research on STS. The aim is to establish a correspondence between the STS proposed by Moine with each of these social theories, separately, discussing how these theories are or could be formalized to allow an empirical work on modeling and simulation of STS's. For now, it has been investigated the Sociology of Organized Action (SOA) by [2] and the Social System (SS) by [3].

2   Sociology of Organized Action

The SOA has its roots on the bounded rationality and field theories, and is based on empirical research about formal organizations. Its main focus is on human decision and collaboration and tries to explain how well-defined or fuzzy organizations maintain their stability. [4] proposed a formalization of the SOA and implemented it into a software called SocLab where all the SOA's conceptualization is transformed into a relational database that stores a list of social actors, resources, relations among social actors and resources, the weights for each relation and the meta-data about how social actors act taking into account the state of each resource. In this work we will use the SOA social theory as reference and the SocLab as framework as supports for empirical research on a socioterritorial system. The simulation process using SOA/SocLab will search for a stable state, considering all possible social actor's strategies.

3   Social Systems

The SS is quite abstract theory inspired by the structural functionalism and is based on a set of frameworks and theories as the autopoiesis. It is more concerned about the communicative process and attempts to explain how organizations evolve by a recursive reduction of complexity. Due to the high level of abstraction, the formalization of the SS is not an easy task at all. While the SOA emphasizes social norms, rules and values, the SS is looking to the differentiation between system and environment (other systems) and to how social entities (not individuals) transform communication into meaning. Some works formalized key aspects of the SS theory, using agent-based paradigm, as: social emergence [5], evaluation of anticipatory behavior [6], study of a simple economic system [7], the micro-macro link [8] and implementation of expectation structures [9]. In this research we will focus, by means of an agent-based model, on generative features associated to the Luhmann's communicative process inside STS's.

4   Modeling socioterritorial systems with SOA and Social Systems

Despite of these differences between the SOA and the SS it is important to notice that both can be used to study an key element of the STS, power and its implications on collaborative actions. The SOA see power as the capacity of one social actor to constraint the action of the other by means of changing the level of access to the set of resources that he controls. In the Luhmannian interpretation power is the capacity of one social actor to transform their communication into meaning, when something happens, which rule the differentiation between the STS and the environment that increases the social dynamism of the STS.

When we are trying to model a STS, it is worth to establish a connection between social and spatial subsystems. But, neither SOA nor SS treats explicitly

spatial constraints of social behavior in their social theories. However, we propose that the spatial constraints may be mapped as resources or relations in the SOA based modeling. In this case a concrete spatial object could be a resource controlled and desired by social actors, as well as a relative proximity that may be represented by social relations. The symbolic subsystem from Moine is part of the social system in the SOA formulation because this theory does not separate social action from individual cognition. Analogically, in the SS approach, the social system could be viewed as a political functional system, the symbolic subsystem should be interpreted as a psychic system, and the spatial system could be a set of various coupled functional systems that interact and change the way that people use the geographic space. Here, the process of differentiation between the STS and the environment increases the spatial dependence between the political functional system and the spatial subsystems by means of the psychic system, and this implies that we will observe, again, an increase of social dynamism.

5   Conclusion

In conclusion, this work shows that both social theories contributes to empirical research on STS's, providing enough guidance to data gathering and the formalization needed to do simulations using strategic decisions (SOA) or observing the emergence of social systems differentiation (SS) taking into account spatial constraints.

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