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Analyze of complex problems in transnational relations

Summary of the PhD. Thesis

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Summary

Keywords: complex problems, formal theories, social networks, international networks, Fuzzy logic, chaos, social constructivism, complex analysis.

In classical way, the analytical approach of international relations, follow the ontology and worldview specific to choice paradigm for subject approach. However, in the years after Cold War, non-linearity and unpredictability became the main characteristics of a new type of international system, which make harder the follow of tradition. In fact, this two characteristics highlight the beginning of a stochastic process of change into world structures which regard the multi-dimensionality and path for network structures. These rise, however, real challenges to classical paradigms, in special in understanding and explication of the new dynamics, even more as evolution predictability begin to lose his energy.

All of these, brought in face of post-conflictual understanding from international relations the complexity and constructivism ontology related to social constructions. Through assimilation of the new approach, scholars follow to replace stiffness of discourse and realism logic as a resilience to new global context. In this sense, maybe, the most telling example is the incapacity of offensive realism to offer an explication regard with the source which conduct to finish of Cold War in a suddenly manner.

In this theoretical frame, formal theories and non-conventional approach, found a good space for development of applicability in explications construction and meanings for new events. For these, the subject which create more interest from practical and theoretical reasons it was the predictability of dynamics in conditions of uncertainty. The reason for this, at least in West, it was the new nature of social constructions, which through complexity and reaction to structure sensitivity make that anticipation of results to became very cumbersome. Because of this, the strategic projections had to be reduced in a short-medium horizon, where become more uncertain.

In special two global phenomenon – digitalization of information and propagation of technology – conduct to an unprecedented leap in worldview through reinterpretation of the way in which the knowledge and information are diffused on global level. The effects determined appearance of multiple information sources and overloaded with information of social networks. Each of these, conduct in an equally way to implication as influence factor of structure complexity and of entropy in evolution of international system. This was possible, due to, grow of

interconnectivity between actors and diffusion of multiple sources in network for events using propagation vectors from social structures. A particular characteristic for this mechanism is unpredictability of international dynamics which result from combination possibility between systemic, structure and decisional or perception elements. This characteristic is a typical one for new propagations and behaviors from systemic level in the actual stage of globalization.

This new social construction and his implications it can be see in actual nature of events from international relations. In this sense, history show us that evolution trend of international system from *pax Britanica* to the end of Cold War it was configured for many times by the rare events – conflicts, crises, pandemic or social changes – which have the power to produce effects on global scale. Logic for this it was in general in general: from local to general or direct global. The change in international structure and convergence process between factors and variables which generate events conduct to replacement of classical logic with a fuzzy one. This change is important in the new international context because he put in discussion the probability of existence of the events in uncertainty conditions and his manifestation under atypical operators. Therefore, the events approach which can configured the evolution vectors become a challenge, due to the fact, that have the possibility to become a problem through their impact in present produced by the information data based attached to future situations. This is sensitive dependence face to initial condition.

The research subject follow the development of a formal analyze model for *complex problems* which appear due to random growth of an event sensitivity. The role of a model is to simplify the understanding of mechanisms which configure the state attached to networks from the international system. The target of this procedure in an interdisciplinary approach of the equilibrium concept on structure level – social network – in the time of social process of interaction among international actors.

The interest for this subject came from the attempt to understand how configuration of complex problems under social process can to influence the future states of international structures. The correct approach of this subject request a serious and continue research of a concept with a high complexity – transnational networks. Due to this, the correct understanding of this concept, means the approach through intersection of the next set of concepts: globalization, interconnectivity, innovation, information and multiple dimensions. Whit other words, is necessary, to coverage the entire set of elements which characterize the international relations

under the fourth industrial revolution. Therefore, the linking of equilibrium to studied issue, represent the understanding of convergence points and their role in formulation of dynamics between actors. However, this approach highlight some theoretical and practical issues.

The possibility to simplify the research, in special the operational times, is reduced to capacity of utilization of some instruments for interpretation or modelling connected to the research subject. Through this, there exist a change, to be able to transfer the subject from a rigid dimension in a more permissive one from the perspective of research and operational rules.

Based on this fact, the paper put in discussion applicability of formal models from the perspective of their operational in dynamical structures. Through this, I want to explore in chaos conditions the social process which sustain events propagation through specific external variables. This step is conducted on structure level – social network – through providing of some fuzzy appurtenance degrees to construction elements.

Achieving of this aim follow to formulate a set of explications with a large set for complex problems approached in this paper.

The structure of paper is as follow.

In the first part are chapter 1, 2 and 3 of the paper which represent the preliminaries of research. This part construct the research frame and show the analyze instruments which are necessary.

In chapter 1 are defined the aim and objectives of paper. Here, I follow to clarify and to delimitate the research dimension in subject approach. On theoretical level, the process search to argue why is necessary utilization of multidisciplinary analyze in alterative constructions to international environment. Chapter 2 is *Research theory and concepts definition* and include research theory and approach the operational concepts. In first part are constructed the laws for statement and what are the links between different fields of research to which research make reference. To simplify the process I choose that basic logic of the theory to be the one proposed by Waltz and Kuhn. In the second part the operational concepts are clarified from the perspective of specialty literature. Their delimitation will know a character which is strict technical in a line to can maintain as possible the sense and significance of attached information. In final, I look through their presentation to show how can be used in events analyzing from international relations.

The third chapter present hypothesis which follow to be demonstrated and research methodology for this. Contain of hypothesis results from extension of the laws formulated in the previous chapters. This operation offer a generic possibility to identify whit approximation which

are the concepts and controllable variables from the model. In our case this assure the best projection of the reality into abstract environment.

In methodology a special place is occupied by the formal characterization which want to simplify the approach of theoretical concepts in explication of real events. In particular, development of operation protocols are based on logic structures and applied philosophy. Through this, mathematical device which is proposed follow to formulate the operational rules for analytical model.

The second part of the paper is the operational frame of the subject in paper. Here I want to analyze how event-problem from the model evolve in complex network. Chapters 4, 5 and 6 are submitted here. Chapter 4 approach the problem concept in international relations. For this I propose a formal model which to analyze the transformation mechanism of rare events in large events into social networks. Achievement of this objective is based on an interpretative algorithm for information propagation; this use modelling technics of crispy characteristics from international activity of actors in deductive knowledge.

Chapter 5 discuss the contribution of network structures to events study and the risks from international system. The last part of the chapter is an interpretive approach of the construction and their qualities of social networks configurations. This action follow to point out the fuzzy character which is associated with real simulations.

In chapter 6 is put in under view the state of networks as a general element on structure level. In particular, this chapter represent a demonstration of chaos existence in Devaney form for international system. The importance of demonstration appear in the chaos effects on the evolution vector which is attached to the system. For this case, mathematical instrument, imply the study of Lyapunov exponent for a function of historical evolution. Interpretation of results is made through report between stability and sustainable development face to historical evolution trend of actors.

In the third part are summarized the chapters which approach the elements which configure the social networks in international system, such as: Chapter 7, *State actor*; chapter 8, *Private environment* and chapter 9, *Society*. Also, in this part I introduce the chapter which make reference to *network interface*, chapter 10. The last one, follow to define the nature of links set between international actors which can be labels through next classes: state actors, non-state and nonconventional ones. To achieve this objective, my action is based on identification of the patterns with general character which are highlighted by the theory projection in graphs

construction. Through this I follow to define – in formal sense – a dynamical structure which is characterized through easy change and unpredictable evolution. Thus, through utilization of graphs theory I hope to obtain a partial projection of international system. His particularity will be that describe a social structure through the dynamics set between constitutive elements, where these have a role of informational operators.

The last part is dedicated to variables which can influence the propagation way and development of complex problems in time. In chapter 11 I analyze the variable controllable (power) from structure. This is correlated to the actors position in social structures and to internal dynamics. Through this analyze I follow the role of power in description of equilibrium points from the groups, and in *vibration* formulation on interface stage. To obtain the formal model I make an appeal to the technique of linear programming and to the methods of lexicographic comparison.

Chapter 12 treat external variables which facilitate the behavior of problems and can influence the complexity degree. Hence, the discussion is focused on variable training, respectively on character and significance of effect which is produced. For this I use the principles described by Ackoff and Sasieni, but also Breckner as existence conditions and elements of consistence. Through this, variable form is approach in model as a disruptive factor. Last chapter is conclusions and discussion of results. This chapter is followed by reference and annexes.

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