

Abstract

The diffusion of an innovation in a social system is characterised by specific dynamics usually giving rise to a life cycle. The diffusion process depends on its internal rules, and on external interventions (policies, marketing mix strategies, etc.), which introduce evolutionary changes. These systems apparently work without a central control: Tracks left by 'innovators' or 'hubs', and interpersonal communication due to 'imitators', are the main latent drivers of the evolution. Diffusion of innovation modelling has a long tradition within aggregate differential approaches in Quantitative Marketing (see Bass (1969), and Bass et al. (1994)). A different approach based on Complex Systems Analysis emphasises, from a simulative point of view, the heterogeneity of agents and the different local 'transition rules' in determining an emerging macro-behaviour (see Wolfram (1983), and Boccara (2004)). Recent results of our research group at the University of Padua have highlighted a theoretical linkage between Aggregate Differential models and Complex Systems Analysis based on Cellular Automata and Network Automata (see Guseo and Guidolin (2008, 2009, 2010, 2011)). Applications of previous results include new pharmaceutical drugs, non-renewable and renewable energy technologies, and other commodities. We aim to prepare a Junior Researcher as a firm's statistician specializing in the area of Quantitative Marketing, with a particular emphasis on time series analysis of competing life cycles in an innovation diffusion context.

References

1. GUSEO, R., GUIDOLIN, M. (2011). *Market potential dynamics in innovation diffusion: modelling the synergy between two driving forces. TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE*, (Forthcoming); doi: 10.1016/j.techfore.2010.06.003;
2. GUSEO R., GUIDOLIN M (2010). *Cellular Automata with Network Incubation in Information Technology Diffusion. PHYSICA. A*, 389; 2422-2433, doi: 10.1016/j.physa.2010.02.007
3. GUSEO R., GUIDOLIN M (2009). *Modelling a Dynamic Market Potential: A Class of Automata Networks for Diffusion of Innovations. TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE*, 76(6);. 806-820, doi: 10.1016/j.techfore.2008.10.005
4. GUSEO R., GUIDOLIN M (2008). *Cellular Automata and Riccati Equation Models for Diffusion of Innovations. STATISTICAL METHODS & APPLICATIONS*, 17(3);. 291-308, doi: 10.1007/s10260-007-0059-3
5. GUSEO R., DALLA VALLE A, GUIDOLIN M (2007). *World oil depletion models: Price effects compared with strategic or technological interventions. TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE*, 74(4); 452-469, doi: 10.1016/j.techfore.2006.01.004