

Models and Multi-Agent Simulations of Logistics Networks - A Case-Study in Self-Organization by Microeconomics

Wolfgang Renz

Multimedia Systems Lab,
School of Engineering and Computer Science
Hamburg University of Applied Sciences
Berliner Tor 7
20099 Hamburg
wr@informatik.haw-hamburg.de

Auction-based prices have been used in multi-agent simulations for a long time. Currently, dynamic simulations of transport in logistics networks are usually performed while prices are given as input parameters. A model where such transport logistic simulations are based on auction-based prices has been studied in some detail recently¹, and shows interesting dynamic properties. The model considers the transport units as market participants, the individual transport vehicles as bidder and the carrier as reviewer which imposes additional constraints. Here we want to focus on the relation of the appearing dynamics with the properties based on its complex systems characteristics, in this case its self-organizing behavior.

In the last decade, the self-organizing and emergent behaviors observed in microeconomics have been studied in models which simplify reality to a great extent. As an example, the minority game, as a mathematical model of the well-known El Farol Bar problem, introduced by Challet and Zhang in 1997 describes some of the stylized facts obtained in financial markets. Recently, it has been shown, that mesoscopic models can be used to *construct* systems with emergent behaviors more efficiently [ReSu].

Here we discuss how mesoscopic models can be used to simplify the mathematical description while keeping it still adequate for a *quantitative prediction* of the expected and observed self-organizing behavior.

Literaturverzeichnis

[ReSu] Renz, W.; Sudeikat, J.: Mesoscopic Modeling of Emergent Behavior - A Self-Organizing Deliberative Minority Game. In: Engineering Self-Organising Systems, Springer (ESOA-2005), LNAI 3910, Springer, 2005, pp. 167-181.

¹Müller, K., Renz, W., Ruwinski, W., Timotin, D., Voss, H., Sudeikat, J., to be published