Simulation of Resource Acquisition by e-Sourcing Clusters Using NetLogo Environment

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Outline

- Virtual vs. Porterian cluster
- Limitations of e-sourcing
- Bee colony strategy
- Simulation initials
- Simulation model and results
- Conclusions
- Future work

Virtual vs. Porterian cluster

Merriam-Webster Online Dictionary defines the cluster as a number of similar things that occur together.

Porterian cluster properties:

- geographical proximity,
- coopetition,
- knowledge, know-how, supplies, workforce exchange,
- 2+2 = 5.

Virtual cluster properties:

- less important geographical proximity,
- broader possibility for potential partners acquire,
- coopetition,
- knowledge, know-how, supplies, workforce exchange,
- 2+2 = 5.

Limitations of e-sourcing

- Difficulties and restrictions in browsing thousands of globally operating e-marketplaces by humans
- Differences between the requirements of a potential participant for buying purposes and those of the enterprises seeking participation as suppliers
- Growing competitiveness and the changeability of the demands at e-marketplaces

Why bee colony strategy?

Bees behavior	**E-sourcing strategy**
Enough nectar must be collected	Enough resources must be acquired
Amount of nectar is limited	Amount of resource is limited
Bees' environment is constantly changing	Market's environment is constantly changing
Robust bees	Goal-oriented agents
Self-organized bees	Autonomous agents
Adaptive bees	Reasoning agents
Limited number of workers	Unlimited number of agents

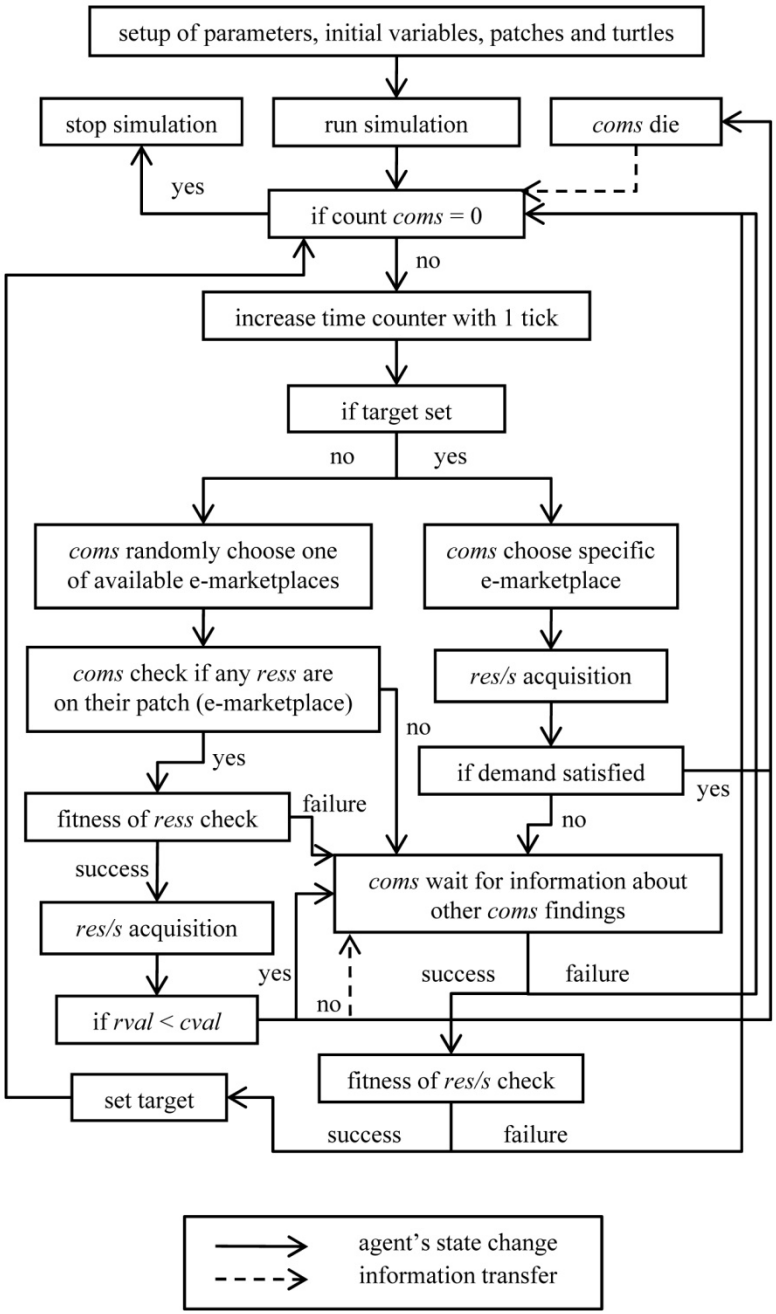
Bee colony strategy

- **direction** (IP address of e-marketplace),
- **distance** (the important thing is the type of connection, the speed of the server, the type of platform, e.g. Internet, mobile phone, value added network etc., not the physical distance)
- **fitness** (price, terms of delivery and other characteristic features of the offer).

Simulation initials

- Platform: NetLogo 4.0.4 (multi-agent modeling environment).
- Runs: 420000.
- Fitness of resource (variables): price, place and ship-time.
- Resource aqcuisition method: first-come, first-buy.
- patches = 900 vs. 9000 (number of e-marketplaces).
- cnum = 100 (number of companies).
- rnum = 10 (initial number of resources).
- max-cval = 20 (max value of company demand).
- max-rval = 200 (max value of finding resources).

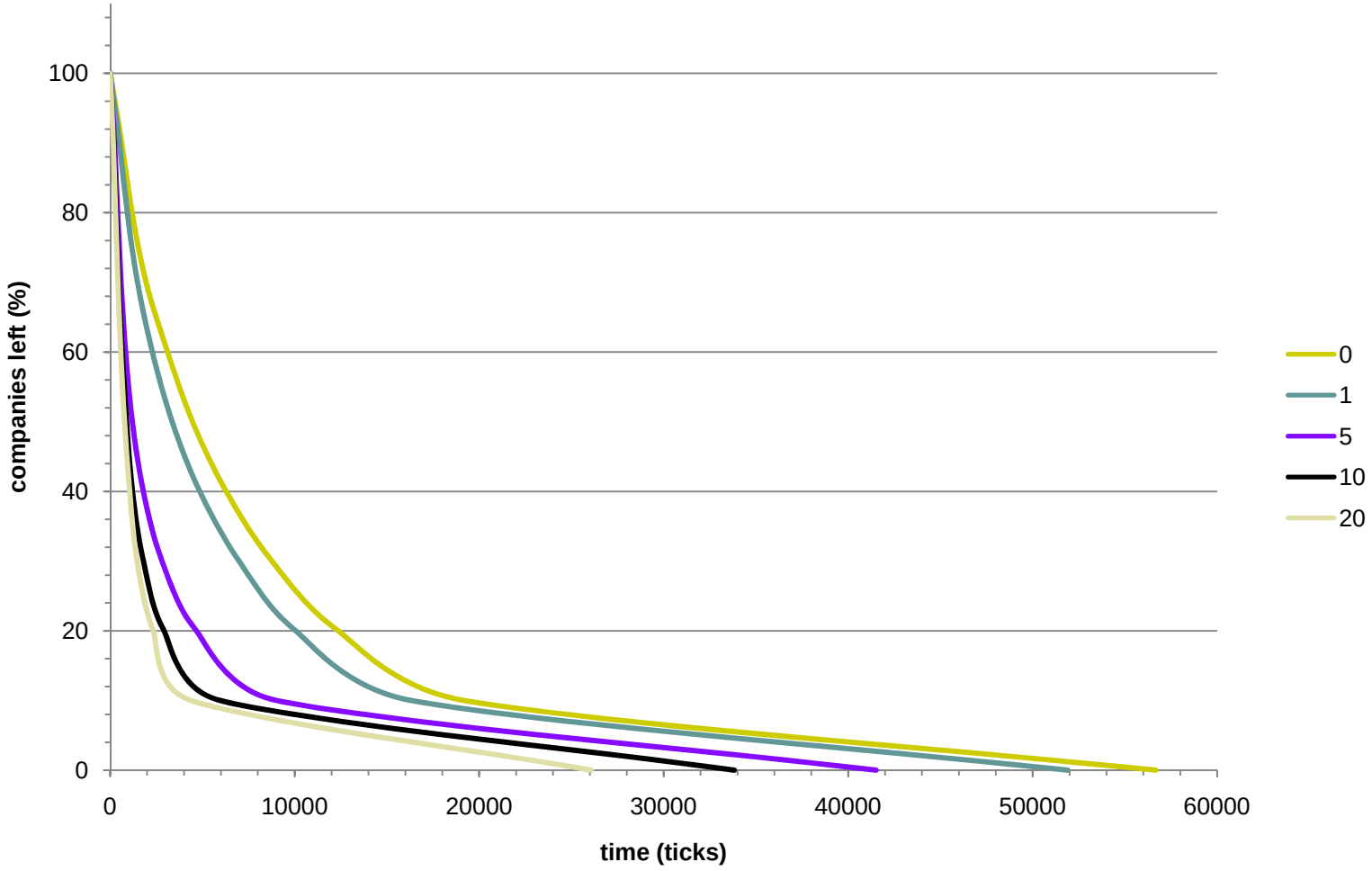
Simulation model



Results of simulation (1)

Clusters	*100*	*90*	*80*	*70*	*60*	*50*	*40*	*30*	*20*	*10*
0	5704	1882	1193	873	660	509	387	292	195	102
1	4980	1496	933	665	517	400	305	224	147	75
5	3786	749	465	321	225	164	115	74	45	22
10	2850	461	312	222	155	107	73	47	27	15
20	2086	382	239	171	123	84	57	40	25	12

Results of simulation (2)



Conclusions

- Software agents can significantly shorten information search time, but also open broader possibility for enterprises to configure global supply chains (find potential partners).
- Lower than traditional Porterian cluster entry/exit costs can indirectly result in a lower risk factor of investing in a new business model.
- This can lead to better cooperation, cross-companies relations and collaboration in achieving the eSoC's members' individual as well as collective goals.

Future work

- Simulation of other scenarios of resources division.
- Comparison of results from different scenarios.
- GS1 standards extention.

End

Thank you for attention

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