Towards Social Capital in a Network Organization: A Conceptual Model and an Empirical Approach

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Due to the complexity of an open multi-agent system, agents’ interactions are instantiated spontaneously, resulting in beneficial collaborations with one another for mutual actions that are beyond one’s current capabilities. Repeated patterns of interactions shape a feature of their organizational structure when those agents self-organize themselves for a long-term objective. This paper, therefore, aims to provide an understanding of social capital in organizations that are open membership multi-agent systems with an emphasis in our formulation on the dynamic network of social interactions that, in part, elucidate evolving structures and impromptu topologies of networks. We model an open source project as an organizational network and provide definitions and formulations to correlate the proposed mechanism of social capital with the achievement of an organizational charter, for example, optimized productivity. To empirically evaluate our model, we conducted a case study of an open source software project to demonstrate how social capital can be created and measured within this type of organization. The results indicate that the values of social capital are positively proportional towards optimizing agents’ productivity into successful completion of the project.

The idea of this paper is to reflect the effects of existing social fabric among individual agents by quantifying "Social Capital" in an ad-hoc organization using benevolence as a measure of their collaborations. We illustrated that SC is achievable in the context of a dynamic network organization with the help of a popular open source software project through the presentation of heuristics to compute numeric values for measuring SC, which, in turn, can translate to degree and effectiveness of collaboration in open ad-hoc agent organizations[1][2][4].

This article defined SC on three different levels, i.e., network, link and agent, and proposed a measurement for it based on the benevolences between autonomous agents operating in a large-scale open service-oriented organization. Incorporating benevolence, in measuring the social capital for individual agent and for the organization as whole, gives more tangible values. Those values contribute positively towards the cooperative nature of an organization. We showed an empirical evaluation of the proposed approach using a real-world case study of an open-source project development, and we assessed the validity of each measure of SC in different settings within a network organization.

The empirical evaluation showed that the social capital of an individual agent may result in a negative value as the agent expected contributions from other agents; however, the contribution received may not be as expected. This finding is a result of considering the benevolence in a social capital measurement. Another finding is that the belief and trust also contributes towards the measurement of social capital. As we observe, the social capital of a group or an organization increases when it involves more agents; on the other hand, few numbers of agents involved in a subtask with significant line code contributions provides a higher social capital, due to a higher value of belief. The authors believe that the amount of data used in the empirical evaluation represents the behavior of the OSS social network, as the computations are to be easily scaled up[3].

The concept of SC has shown its usefulness, fruitfulness, and efficiency in genuine empirical research, such as the available empirical approach of SC presented here. The heterogeneity of the proposed conceptualization has been less reflected in the empirical heterogeneity as to what has been expected. Future work should consider the use of multi-method and multi-level strategies to improve the current role of empirical evidence in the debate on SC. It should also consider the proposition of a detailed social capital assessment model that is required to estimate the future behavior of agents and agents' peers in...
order to simplify the interaction process with those peers. Another further direction is to benefit from a systematic analysis and recommendations on how agents ought to behave for better performance to include comparisons with baselines and other metrics that measure ad-hoc organizations.

For the complete article: please visit the article webpage.

References

1. Alqithami, S., & Hexmoor, H. (2012, September). Social capital in virtual organizations. In 2012 Fourth International Conference on Intelligent Networking and Collaborative Systems (pp. 682-687). IEEE.
2. Alqithami, Saad, and Henry Hexmoor. "Social capital in network organizations." Twenty-Eighth AAAI Conference on Artificial Intelligence. 2014.
3. Alqithami, Saad, Jennifer Haegele, and Henry Hexmoor. "Conceptual modeling of networked organizations: The case of aum shinrikyo." Case Studies in Intelligent Computing: Achievements and Trends (2014): 391-406.
4. Alqithami, S., Alzahrani, M., Alghamdi, F., Budiarto, R., & Hexmoor, H. (2019). A Measurement of Social Capital in an Open Source Software Project. arXiv preprint arXiv:1911.10283.

Keywords

Social Capital;Open Multi-agent Systems;Collaboration;Interaction;Complex networks;Network theory

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