

Positioning experts in knowledge networks

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Knowledge has been recognized as the keynote for economic growth [1]. As innovative firms are highly knowledge-based, the effective management of Knowledge Networks is the key for attaining competitive advantage [2]. Applications of Knowledge Networks Analysis already include consulting firms, manufacturing firms, telecommunications firms, healthcare and pharmaceuticals industry, biotechnology industry, banks and financial services companies, petroleum companies, strategic alliances, etc [3]. Knowledge attainment is conditioned by two main factors: (1) the order of implementation of Selection (s) and Filtering (f) by the agents of the network, and (2) the position of the highly knowledgeable agents (experts) within the network. Knowledge attainment can be accelerated by implementing Filtering before Selection (sf prioritization), compared to the conventional prioritization Filtering after Selection (fs prioritization). The sf prioritization is more efficient simply because every Selection (s) realized for obtaining knowledge after Filtering (f) is fruitful, resulting certainly in some knowledge upgrade. In this way, there is no waste of valuable time. The non-commutativity of Selection (s) and Filtering (f) reveals a Non-Boolean Logic of these two network operations. We investigate here two key questions: (Q1) How is Knowledge Dynamics influenced by positioning experts randomly or on central positions, with respect to selected centralities (Degree, Closeness, Betweenness, Eigenvector), and (Q2) How the order of implementation of Selection (s) and Filtering (f) is influencing the effect of positioning experts in the network? These two questions are addressed in terms of Knowledge Attainment Times and Knowledge Attainment Diagrams. Results are presented for 4 typical classes of network structures, namely (i) Regular, (ii) Random (Erds-Rnyi Model), (iii) Small-World (Watts-Strogatz Model), (iv) Scale-Free (Barabasi-Albert Model). The main result found is that implementing Filtering before Selection (sf prioritization) is much more important than positioning experts in central positions. Therefore, if agents are Selecting (s) after Filtering (f), then knowledge is diffusing fast, regardless the location of experts. The real-world implication is that knowledge-based organizations should establish appropriate Net-Awareness procedures, operating in real time.

[1] R. M. Grant, *Str. Man. Journal* **17**, 109-122 (1996).

[2] L. Argote, P. Ingram, *Org. Beh. Hum. Dec.* **82**, 150-169 (2000).

[3] E. Ioannidis et al., *Physica A* **470**, 275295 (2017).