

Organizational Learning through imperfect knowledge transfer - an agent based simulation

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Research Question

How do (different types of) imperfections in the process of transferring knowledge (on the micro level) affect organizational knowledge creation (on the macro level)¹? Thereby, imperfections can take different forms: incomplete knowledge transfer, random perturbations in the transfer process, and systematic (time stable or social) biases.

Rationale

There is much consensus among organizational scholars that the sharing of knowledge (across the organization) is an important driver of firm performance (Hayek 1945; Hamel and Prahalad, 1994; Grant 1996; Inkpen, 1996). At the same time the insight that knowledge is a resource of a different kind has attracted more and more proponents (e.g. Tsoukas, 1996). For example, it is often argued that the value of knowledge grows when it is shared (Quinn et al, 1996, Spender 1989). However, its idiosyncrasies pose some challenges to its effective transfer (Nonaka, 1994; Argote and Ingram, 2000). There is a large body of literature addressing barriers to effective knowledge transfer (e.g., Szulanski, 1996; Dyer, 1999). Inspired by the communication and signalling literature, this literature more or less implicitly suggests that the goal of an organization is to process information as complete and correct as

¹ In the remainder of this text, „knowledge transfer“ refers to the micro level while „organizational learning“ and „organizational knowledge“ are located on the macro level.

possible, a logic that has been consequently adopted by many popular management practices like TQM, benchmarking, and best practices. However, the precise effects of imperfect knowledge transfer (on the micro level) have not been researched so far, despite strong empirical evidence that perfect knowledge transfer is rarely achieved (Szulanski, 1996; Ruggles, 1998). This is surprising since more recent theoretical contributions to the concept of knowledge do not only acknowledge the highly fragile and problematic character of knowledge but also shed a new light on imperfections, reflected in transfer concepts like "re-creation" (von Krogh et al., 1994) or "translation" (Callon, 1986).

In contrast to the literature on knowledge transfer, this stream of research highlights the importance of deviations from the original knowledge template. Nonaka and Takeuchi (1996), for example, argue that fluctuations and creative or intentional chaos are necessary conditions for organizational knowledge creation.

Given these two opposing positions regarding the effect of imperfections in the knowledge transfer process, I will seek to empirically investigate through an agent based simulation the boundary conditions under which both of these positions hold. Furthermore, I will seek to identify the "optimal" level of imperfections for some selected parameter configurations.

Hypotheses

- (1) Incorrect (=random errors) knowledge transfer negatively affects organizational learning.
- (2) Incomplete knowledge transfer negatively affects organizational learning.
- (3) Random errors in the knowledge transfer process positively affect organizational learning.

- (4) The relationship between error level in the knowledge transfer process and organizational learning is inverted U-shaped.
- (5) Systematic, time stable errors positively affect organizational learning.
- (6) The relationship between the level of systematic (time stable) errors in the knowledge transfer process and organizational learning is inverted U-shaped.
- (7) Social biases positively affect organizational learning.

Method

Many organizational scholars emphasize the emergent character of organizational knowledge (e.g. Spender 1996, Tsoukas 1993). Agent based simulations allow to bridge the analytical gap between micro activities and macro outcomes. Existing research (e.g. Nonaka and Takeuchi, 1995) seeking to bridge this gap often remains purely theoretical. Agent based models, instead, offer the opportunity to be (1) microvalidated against accounts of individual behavior and (2) macrovalidated against data from the organizational level (Macy and Willer, 2002).

Measuring knowledge and knowledge transfer poses a particular challenge to researchers (e.g. Argote and Ingram, 2000). The transfer of knowledge manifests itself in either changes in the knowledge or changes in the performance of the recipient (Argote and Ingram, 2000).

Performance based measures are problematic to the extent that the causal link between changes in knowledge and performance is hard to establish and additional, uncontrolled factors may even better explain performance changes (Argote and Ingram, 2000). Knowledge based measures are equally problematic given the extent of knowledge that can not be articulated (Nonaka, 1991).

With agent based simulation models, measurement problems are no longer an issue. The proposed model is an extension of March's (1991) exploration and exploitation model. I extend March's model by introducing imperfect belief adaptation by the organization's

agents. Thereby, imperfections can take the form of incomplete knowledge transfer, random perturbations in the transfer process, and systematic (time stable and social) biases.

Results

The analysis yielded some interesting but often counterintuitive results: First, in contrast to much of the existing literature, I demonstrated that organizations can benefit from imperfections in knowledge transfer processes. Interestingly, it seems not to make any difference whether imperfections are the result of incomplete or incorrect knowledge transfer. Second, organizations can only benefit from imperfections if their rate is not too high. Furthermore, the upside of imperfections can be smaller than the downside. Third, organizations can even benefit from errors which are not random but systematic. Systematic errors can take the form of, for example, individual cognitive biases or biases introduced by artefacts like social norms or culture, with the former characterized by stability over time and the latter modelled as stability over a population. Indeed, biases can improve organizational learning significantly as it has been demonstrated for the case of shared biases. On a more general level, this study provides evidence that optimal actions on the micro level do not necessarily translate to optimality on the macro level. In economics, for example, the idea that optimality on the micro level results in optimality on the macro level is one of the cornerstones (i.e. “the sum of micro is macro, and the decomposition of macro is micro” (Dopfer et al., 2004: 264)).