Constructionist Organizational Data Mining

Isabel Ramos
Universidade do Minho, Portugal

João Álvaro Carvalho
Universidade do Minho, Portugal

INTRODUCTION

Scientific or organizational knowledge creation has been addressed from different perspectives along the history of science and, in particular, of social sciences. The process is guided by the set of values, beliefs, and norms shared by the members of the community to which the creator of this knowledge belongs, that is, it is guided by the adopted paradigm (Lincoln & Guba, 2000). The adopted paradigm determines how the nature of the studied reality is understood, the criteria that will be used to assess the validity of the created knowledge, and the construction and selection of methods, techniques, and tools to structure and support the creation of knowledge. This set of ontological, epistemological, and methodological assumptions that characterize the paradigm one implicitly or explicitly uses to make sense of the surrounding reality is the cultural root of the intellectual enterprises. Those assumptions constrain the accomplishment of activities such as construction of theories, definition of inquiry strategies, interpretation of perceived phenomena, and dissemination of knowledge (Schwandt, 2000).

Traditionally, social realities such as organizations have been assumed to have an objective nature. Assuming this viewpoint, the knowledge we possess about things, processes, or events that occur regularly under definite circumstances, should be an adequate representation of them. Knowledge is the result of a meticulous, quantitative, and objective study of the phenomenon of interest. Its aim is to understand the phenomenon in order to be able to anticipate its occurrence and to control it.

Organizations can instead be understood as socially constructed realities. As such, they are subjective in nature since they do not exist apart from the organizational actors and other stakeholders. The stable patterns of action and interaction occurring internally and with the exterior of the organization are responsible for the impression of an objective existence. The adoption of information technology applications can reinforce or disrupt those patterns of action and interaction, thus becoming key elements in the social construction of organizational realities (Lilley, Lightfoot, & Amaral, 2004; Vaast & Walsham, 2005).

BACKGROUND

The Rational and Emotional Nature of Personal Knowledge

Individual knowledge is actively constructed by the mind of the learner (Kafai & Resnick, 1996).

We make ideas instead of simply getting them from an external source. Idea making happens more effectively when the learner is engaged in designing and constructing an external artifact, which is meaningful for the learner, and he or she can reflect upon it and share it with others. From this constructionist description of the learning process, we can emphasize several elements associated with the creation of knowledge, namely, *cognition*, *introspection*, *action*, *interaction*, and *emotion*.

Through *cognitive* processes, humans construct mental representations of external and mental objects. *Introspection* is a specific type of cognition that permits the personal inquiry into subjective mental phenomena such as sensory experiences, feelings, emotions, and mental images (Damásio, 1999; Wallace, 2000). Through *action* and *interaction*, we create our experiences of the world we live in. The effective construction of personal knowledge requires the building of relationships between concepts and other mental constructs, in profoundly meaningful experiences (Shaw, 1996). All human experience is mediated by *emotions*, which drive our attention and concentration in order to help us to process external stimuli and to communicate with others.

The Historical and Socio-Cultural Context of Knowledge

A social reality is a construction in continuous reformulation that occurs whenever social actors develop social constructions that are external and sharable.

By the mere fact that people interact, influencing each other's mental constructs, social reality is in constant reconstruction. In this context, learning of new concepts and practices is happening continuously, either intentionally or unintentionally.

Learning happens inside specific mental and social spaces, meaning that what a group can learn is influenced by:

- The concepts, schemata, values, beliefs, and other mental constructs shared by the group.
- All knowledge we create about external things, events, and relationships is based on and constrained by our mental constructs and the tools we use to experience that external world.
- The creation of knowledge is founded on the historical and socio-cultural context of its creators, providing a shared basis for the interaction inside a group. The continuous interaction of the group members, happening in a common environment, leads to similar mental constructs, a common interpretation of events, and the creation of shared meaning structures and external constructions, such as new tools that change how the external word is experienced.
- There is no viewpoint outside human subjectivity or historical and socio-cultural circumstances from which to study phenomena and to judge the inquiry process and the knowledge produced.

ODM AND KNOWLEDGE CREATION: PROBLEMS AND OPPORTUNITIES

ODM (organizational knowledge discovery) has been defined as the process of analyzing organizational data from different perspectives and summarizing them into useful information for organizational actors who will use that information to increase revenues, reduce costs, or achieve other relevant organizational goals and objectives (Fayyad, Piatetsky-Shapiro, & Smyth, 1996; Matheus, Chan, & Piatetsky-Shapiro, 1993).

Data mining is a sub-process of the knowledge discovery. It leads to the finding of models of consumer behavior that can be used to guide the action of organizational actors. The models are built upon the patterns found out among data stored in large databases that are backed by statistical correlations among that data. Those patterns are extracted by specific mechanisms called data mining algorithms.

Attached to the discourse around the data mining tools, there is the idea that in the future, new and more powerful algorithms will be developed that will be capable of finding more valuable patterns and models, independently from human subjectivities and limitations. If it ever becomes possible to integrate the knowledge of the relevant business domain into the system, the algorithm would be able to decide about the usefulness and validity of discovered patterns, correlations, and models, as well as to grow in sophistication by integrating these models in its knowledge of the business. The decision-making process would become extensively automated and guided by the objective reasoning of clear and rational rules implemented in a computer-based system.

However, this view has several drawbacks, namely:

1. Since all human knowledge has a tacit and non-expressible dimension, it will never be possible to integrate all relevant business knowledge in a repository to be analyzed by a data-mining algorithm.
2. The diversity of views about the business activities and their context is what allows for the emergence of organizational creativity and development and the challenge of taken-for-granted concepts and practices (Bolman & Deal, 1991; Morgan, 1997; Palmer & Hardy, 2000). The stored knowledge representations are those around which there is some degree of consensus. This is important for the stability of work concepts and practices and to support organizational cohesion. However, they may also trap organizational actors in those concepts and practices, even when evidence shows they are threatening organizational success.
3. The relevance of knowledge representations stored in organizational repositories changes according to changes in the socio-cultural circumstances that offer the context for making sense of the representations. Only the organizational actors can understand those contexts and are able to give meaning to knowledge representations.
4. It is still believed that decision-making is or should be an essentially rational process, guided by cognitive processes such as planning, resolution of problems, and creativity (Sparrow, 1998). However, recent experiments in neurobiology show that emotion is an integral part of reasoning and decision-making (Damásio, 1999). Thus, only organizational actors can make decisions. The full automation of the process is not a realistic objective.

Instead of the present focus on the technological side of ODM, it would be interesting to adopt a constructionist approach and to focus on the social process of knowledge construction that makes ODM meaningful. With this new focus on people and the way they create and share knowledge, the main concern would be to mobilize the knowledge of organizational actors so the whole organization can benefit from it. This concern is justified by the awareness that the organization, seen as a community, is more intelligent than each one of its members, including any of its leaders.

LEVERAGING KNOWLEDGE CREATION IN ORGANIZATIONS: SOME CONSTRUCTIONIST GUIDELINES FOR ODM

With ODM there is a special focus on knowledge about consumer behavior to support decision and action. ODM