Operational Knowledge Management

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INTRODUCTION

The differences between the paradigms of knowledge management (KM) and operations management are huge. Whereas KM is rooted in the disciplines of human relations, sociology, organization analysis, and strategic management, the operations management paradigm finds its roots in industrial engineering, business economics, and information systems. These differences result in poor acceptance of KM ideas in operations management and vice versa. Several approaches to this problem are possible. For instance, one may state that the operations management paradigm is irrelevant for knowledge management. This is incorrect, because besides of the traditional person-oriented knowledge management processes, modern knowledge intensive firms use reengineered knowledge processes intensively (e.g., Hansen, Nohria, & Tierney, 1999). An alternative approach may be to forget about the KM paradigm and only use the operations management paradigm. This is wrong again, because most industrial enterprises compete on the development and exploitation of their expertise and human capabilities (Hamel & Prahalad, 1994; Quinn, 1992). Consequently, if knowledge management is relevant and if operations management is not irrelevant, then the main question is how to translate knowledge management issues into an operations management framework. I provide a conceptual framework for such a knowledge operations management (KOM) perspective.

BACKGROUND

Operations management studies the handling or transformation of inputs to outputs (the operations function), and the consequent realization of organizational goals via certain means (management of operations) (Hill, 1983). Operations management thus distinguishes objects, which are the inputs and outputs of operations, related support tasks, and the setting of goals and application of means. In the operations, I distinguish logistics as the delivery of the input to a client without changing this input (Ballou, 1992) from transformation as the change of the input object to something different (see Figure 1).

Given the wide paradigmatic differences between operations management and KM, not many attempts have been made to apply operations management on KM. One of the scarce attempts is from Armistead (1999), who distinguishes knowledge inputs and outputs and four related operations processes, that is,. two transformation processes (knowledge creation and knowledge embedding) and two knowledge logistics or transfer processes (exchange of knowledgeable people and the exchange of knowledge representations). The KM literature sees knowledge creation and embedding as related organizational learning processes (Nonaka, 1994), therefore, the term *learning* better covers what we mean by knowledge transformation. Finally, Armistead also defines metrics to control and feedback to improve these processes. This article continues the attempt made by Armistead with a further specification of a knowledge operations management model. Such a model does not only structure the KM field, but at the end of the article I also will explain some of its heuristic value.

MAIN FOCUS: THE KOM MODEL

In the context of KOM, the input-output objects are different types of knowledge. The input objects may be handled in operations without fundamentally changing them. This is what I call knowledge logistics and includes the storing and distributing of knowledge and its related

Figure 1. The operations function (based on Hill, 1983, p. 25)

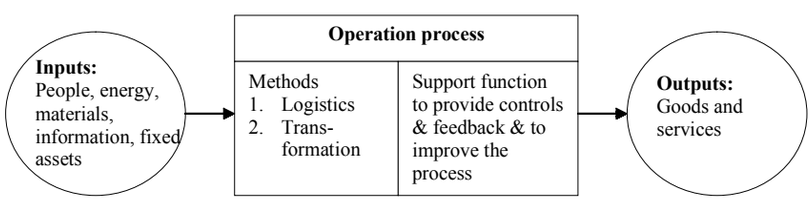
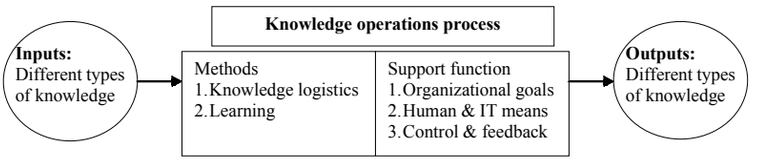


Figure 2. The KOM framework



representations. Alternatively, in learning processes, the knowledge inputs are transformed to new or different knowledge objects. The logistic process is an important support for learning, especially when done in organizations where learning is essentially a group process. Authors in the artificial intelligence discipline (e.g., Turban, Aronson, & Bolloju, 2001) have stated that besides people, machines also can learn. Although this is basically correct, the artificial intelligence field mainly regards learning at the behavioral and statistical level and not at the level of understanding and human skills formation, which is the focus of the KM literature. Thus, I exclude machine learning from KOM. In the knowledge operations management framework, the operation methods are supported by human and information technological means for specific goals, and metrics are used to control and deliver feedback on process performance as presented in Figure 2.

I first treat the input-output knowledge objects, then I discuss the knowledge operation methods. After that, a description of the support function, by a typology of possible organizational goals, means, and metrics for knowledge logistics and learning is given.

Knowledge Objects

Scientists often restrict the term knowledge for explicit understanding, which consists of explanations, predictions, and methodologies (Hempel, 1965). In information management, the term information is mostly reserved for representations of thoughts (e.g., explicit understandings), or the representation of objects and events, which may be stored or communicated (Stamper, 1973). Much of what popularly is called knowledge is neither an explicit understanding, nor a representation, but refers to effective behavior or skills (Spender, 1998). Especially in the arts and professions, people do not express (represent) how they do the job, and they also may not be successful in explaining their success. Thus, effective behavior is "what walks out the organization each day and hopefully returns the next morning" (Senge, 1990), and it is personally owned human capital. Some personal or individual knowledge consists of explicit knowledge that is not shared, while other individual knowledge consists of personal values. Much of a person's effectiveness, though, is based on individual knowledge and the social setting in which the work is done. More precisely, groups have norms and values, based on an underlying (sub)culture, that explain much of a group's effectiveness. For instance, decision-making norms and values that are well shared may speed up decision-making. These norms and values are often tacit knowledge (Leonard-Barton, 1992; Nonaka & Takeuchi, 1995). Their abilities of being shared require longer term and complex organizational change processes (Leonard-Barton, 1992).

The dimensions of sharedness (individual vs. group) and codification (explicitness vs. tacitness) make up four ideal types of knowledge (Spender, 1998; see Figure 3). Besides these types of knowledge, organizations use representations of knowledge to store, reuse, and distribute knowledge (Markus, 2001). Organizations also use representations of objects in reality as part of potential knowledge (Earl, 1994). Knowledge and information, which both form the content aspects of an organizational memory, are both needed in effective decision-making (Stein & Zwass, 1995).

Knowledge Management Operation Methods

The KM literature often defines the following knowledge operation methods: knowledge generation, distribution and sharing, usage, maintenance, and storage (Alavi & Leidner, 2001; Stein & Zwass, 1995). Generation and maintenance are knowledge transformation processes (i.e., learning). The other knowledge operations are knowledge logistics. The next two subsections describe the activities of these operations in relation to the input-output objects.

Learning

Following Nonaka (1994), learning consists of interactions between tacit and explicit knowledge. The interaction of knowledge as input and output relations is given in Table 1.

Socialization transfers individual tacit knowledge to other people, such that these others adopt these tacit insights and collective knowledge is created. Externalization changes tacit knowledge to explicit knowl-