

KNOWLEDGE MANAGEMENT CHALLENGES IN THE CONSTRUCTION SECTOR¹

By Kristian Kreiner

Introduction

My analysis of the knowledge management challenges in the Danish construction sector is based on the following assumptions:

1. Construction is a sector of unique characteristics, e.g. in the form of temporal structures, highly complex processes, and high environmental turbulence.
2. These characteristics influence the possibilities for managing knowledge, e.g. in terms of creating, transferring, and sharing knowledge,
3. However, the same characteristics are currently being adopted by other sectors – a fact which makes the construction case less unique and its knowledge management challenges less idiosyncratic.

The case of the construction sector may both warn us, but possibly also teach us which knowledge management challenges we can expect to be facing in the future.

The knowledge society

It is obvious that knowledge management is a huge problem for the construction industry. A report² released a few days ago points to the fact that especially small companies in the construction sector are not exploiting the knowledge and innovations created in technical research institutions. Small companies are lacking behind in the development – and are hampering the development of the sector as a whole, not least in terms of quality and innovation. But before we despair on behalf of the construction sector, let us remind ourselves that knowledge is an issue not only for this sector, but for the economy and the society as a whole. We talk about the knowledge society and the knowledge economy as if knowledge were the solution; but even cursory observations of reality would convince us that knowledge is less a solution than a challenge. We focus on it because it is a more important issue in modern society than it used to be earlier. We have turned knowledge into an issue simply because our ambitions are higher:

- a) There is much more to know in modern civilizations, and we still want to know it all, yet our mental and organizational capacities are limited, making bounded rationality a necessity. Such bounded ra

¹ This paper is a revised version of a speech given on the occasion of the Japanese Delegation's visit to Copenhagen Business School , August 31, 2005

² Byggeviden – oplæg til strategi og handlingsplan (Juni 2005 – financed by Fonden Realda-
nia).

tionality has grave consequences occasionally because of the complexity of structures and interactional patterns;

- b) We want to appropriate knowledge – to claim ownership of knowledge and to control the exploitation and use of it. Yet, knowledge is elusive and needs to be transformed into forms that lend themselves to such control and appropriation. Thus, we aspire to make resources of knowledge. Most of the organization's knowledge is stored in the minds of its employees, and thus the central resources of the organization go home at five o'clock in the afternoon – not a very reassuring fact in view of the desire to protect the organization's resources.
- c) We want employees to share knowledge. We use knowledge sharing as a coordinating mechanism. This makes sense because organizational members will face so much turbulence and variety that we cannot prescribe and control behaviours – standard operating procedures are not dead, but they are less prescriptions of actual behaviour than they are of how to determine appropriate action. Thus, if you cannot coordinate and control outcomes, you are bound to coordinate and control inputs – in this case the input of knowledge. Thus, we build huge intranets and make immense amounts of information available to our employees, so that their individual, local action may benefit from the experience of others in the organization.

Admittedly, this is very brief, but I hope to have convinced you that knowledge is not only a central resource; it is also a central problem and challenge in modern economies and societies.

The construction sector

Then, what makes the challenges special to the construction industry? The problem is that all production is organized in temporary organizations. For each construction project a new organization is created. The rationale behind this way of organizing work is flexibility in face of highly fluctuating demands for the sector's services. Construction is an investment good, and we know that demands for such goods vary more than demands for consumption goods. Experiments with forming stable units have all failed, simply because they cannot respond to fluctuations in the market. Temporal organizations ouster such stable, but rigid organizations – and in all their inefficiency, we should remember that these temporal structures are more efficient under the circumstances than the alternatives.

Compatibility versus efficiency

Still, we need to consider the particular knowledge and innovation challenges under such a regime of temporarily organized production. We know that flexibility requires that the individual units of production can be combined effortlessly. This means that to some extent the individual firm cannot develop its own technology in idiosyncratic ways, because whatever would be gained in the local production efficiency would be lost on additional costs of coordination with the rest of the temporary production system. The rule of the game is **compatibility**, not **efficiency** in a narrow sense.

Sender versus receiver logic

The communication of knowledge and information is normally less complicated inside organizations than communication between organizations. The sender-receiver problem may be handled by building organizational cultures so that information sent and received is interpreted within the same paradigm. In between organizations, much more information needs to be transferred in order for the coded message to be decoded in a reliable manner. Since transformation of information has become virtually costless, nobody can be surprised to find that the amount of information sent among the parties in a construction project has increased tremendously. Every piece of material, and every little can of paint arriving at the construction site, is loaded with information: about content, instructions for use, warnings against health hazards, etc. This information comes on top of meters of shelves full of documentations of the construction project. Furthermore, start-up seminars add more information when they are conducted to provide additional opportunities for briefing the participants about the tasks and the intentions.

Thus, we have a picture of a totally structured, immensely expansive informational landscape that provides all the participants in the temporary organization with the best possible way of calibrating their own efforts with the efforts of everybody else in the construction project.

And yet, we find so many problems caused by lack of coordination, mistakes and poor quality. Something is wrong, and part of it is the strategy underlying the creation of this rationalized and coordinated knowledge foundation for the performance:

- 1) **Information overload:** the ability to coordinate behaviour relies on the ability of individuals and participants to process information. We all know that most of the information arriving at the construction site is never processed: instructions are not read. People in construction claim (and I tend to believe them) that it would take the full working day to read all the incoming information, which would prevent them from actually doing the task. So the processing of information is necessarily selective, in which case the crucial issue becomes how participants select the information to attend to (and the information to ignore) – and next, how we are able to distinguish between information that is crucial and information that is nice, but not necessary to process.
- 2) **Information reliability:** if people base their performance and their planning on the information they receive, the reliability of the information becomes crucial for the behavioural coordination. This is one of the most problematic aspects about handling information and knowledge in construction. The idea that all conditions are known at the planning stage has proven wrong again and again. People often blame the problems on poor planning, but in my view it is the planning in itself, the ambition to plan everything, that under realistic assumptions about turbulence and interactive complexity results in an

over-reliance on planning. The planned project is efficient when the planning premises are fulfilled – and hopelessly inefficient when things deviate from the predicted paths. The ability to improvise in the unforeseeable situation is an obvious critical issue that has so far received very little attention in the construction sector.

- 3) **Information relevance:** Information is used not only to inform but also to assert power and influence, and to distribute risks. Thus, much information has a ritual or symbolic nature. The multiple functions that information serves raise the issue of how to interpret information – when to take information and instructions literally, and when to frame the understanding as a case of over-communication.

In search of solutions

For none of these issues we have yet found a proper solution – or rather an efficient strategy. For sure, there are no easy solutions, and likely solutions will have to be found by looking at the issues from radically new perspectives. Let me give you just a few examples of where we are looking for solutions and strategies.

- How little do we need to know in common in order to collaborate? The fact is that under certain conditions we may need to know close to nothing in common and still be able to collaborate. In the market economy a huge number of individual economic actors collaborate on creating equilibrium. Actually, this collaboration is an indirect side-effect of pursuing other projects. Perhaps, in construction we focus too much on creating collaboration, and too little on the conditions under which collaboration and coordination may develop spontaneously.
- People base their action on formal instructions plus their own interpretation of the situation and the task. In practice instructions are often neglected, but even when they are in fact taken serious, they need some amount of interpretation to have efficient consequences. We underestimate the need for people to make sense while following instructions and obeying orders. This we refer to as sense making, and the conditions under which people make reliable sense of the situation have been underprivileged as a managerial responsibility. We are conducting a study of the ways in which people are misled by the situation to make mistakes and accidents. They try to make sense and do well; they sensibly interpret what they are supposed to do, and yet they miss the right solution. Small changes in the situation in which people make sense would make a whole lot of difference to the efficiency of production. A focus on the work situation rather than on the individual employee may be very important for successful knowledge management.
- The ways in which the knowledge and information problems are approached suggest that knowledge and information are cognitive phe

nomena. Maybe knowledge and information is much more of a behavioural phenomenon. Maybe knowledge and information is most efficient when they are hidden in behavioural routines and collective action. Knowledge is present when things work – when a collective is able to coordinate its performances to produce a complex outcome. Some of the routines that have developed in construction and which we normally claim are liabilities in relation to innovation etc. could be seen and treated as knowledge resources – and the resistance to innovation that undermines such routines might be a rational protection of the knowledge base of construction work. If we aimed to protect and exploit this hidden knowledge base, maybe we might find ways of creating innovations in construction that really work, i.e. that do not destroy but create and exploit knowledge.

Conclusion

These are just ideas that we will pursue in the new **Center for Management Studies of the Building Process**. We hope soon to be able to find the particular construction solution to the knowledge problem that not only this sector, but the economy and society as a whole are facing.

Kristian Kreiner

Professor

Head of the Center for Management Studies of the Building Process

Copenhagen Business School