Chapter 5
Knowledge Management

ABSTRACT

The chapter reviews the definitions of knowledge and distinguishes it from data and information. Different perspectives of knowledge and their implications for knowledge management are also discussed. From this, the concepts of knowledge management are explained, first, in generic terms, second, as a process, and third, on its relevance to construction. The chapter also defines the basic types of knowledge, those that are tacit or explicit and those that relate to the individual or the organization in a collective form. Project knowledge is discussed in the context of construction, including barriers to knowledge management, the shortcomings of current practices, and how the industry is addressing the problems identified. Communication is key to effective knowledge management, and the chapter discusses the importance of knowledge sharing, including the main factors involved when individuals share knowledge, and knowledge communication and its barriers. Specifically, the central role of communication in organizations is emphasized as it is seen as the foundation for most organizational actions. Learning is discussed in two aspects – organizational learning and collaborative learning. The first aspect is dealt with in generic terms, while the second aspect relates mainly to construction projects. The requirements and problems of learning in construction projects is given focus. The chapter also explains the crucial link between knowledge management and innovation since the latter depends on the generation of new ideas or new knowledge that leads to the development of new products or organizational practices. For integration of knowledge among individuals or teams, the pivotal role of information systems is explained. The relevance of knowledge management to SMEs, especially its impact on small businesses, in enabling them to innovate to meet changing demands in an intense competitive environment is also explained. The chapter concludes with a summary of the main points covered on knowledge management.

CONCEPTS OF KNOWLEDGE MANAGEMENT

In general terms, knowledge can be defined as information in context with an understanding of how to use it (Brooking, 1999). Applying the general definition to organizations, knowledge is defined as a justified belief that increases an entity's capacity for effective action (Huber, 1991; Nonaka, 1994). It is also defined as a mix of experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information (Davenport and Prusak, 2000). However, knowl-

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edge in the context of IT is seemingly defined by how it is different from data or information. Data is raw numbers and facts, information is processed data, and knowledge is authenticated information (Machlup, 1980; Dretske, 1981; Rainer and Turban, 2009). It is argued that knowledge exists which, when articulated, verbalized and structured, becomes information which, when assigned a fixed representation and standard interpretation, becomes data, and knowledge does not exist outside of an agent and is therefore the result of cognitive processing triggered by the inflow of new stimuli (Fahey and Prusak, 1998). In other words, it can be understood that information is converted to knowledge once it is processed in the mind of individuals and knowledge becomes information once it is articulated and presented in the form of text, graphics, words, or other symbolic forms. In a holistic way, knowledge is described as the full utilization of information and data coupled with the potential of people's skills, competencies, ideas, intuitions, commitments, and motivations (Gupta, Sharma, and Hsu, 2008). On different levels of complexity, the hierarchy of data, information, and knowledge is presented in Table 1, including their applicable tools.

There are alternative perspectives of viewing knowledge, as explained by Alavi and Leidner (2001). When viewed as 'a state of mind', it is described as a state or fact of knowing with knowing being a condition of understanding gained through experience or study. In other words, it is the sum or range of what has been perceived, discovered or learned. When viewed as 'an object', it is regarded as a thing to be stored and manipulated. Alternatively, knowledge can be viewed as 'a process' of simultaneously knowing and acting, and this view focuses on the applying of expertise. Another view of knowledge is that of 'a condition of access to information' and, in this view, organizational knowledge must be organized to facilitate access to and retrieval of content. It stresses on the accessibility of knowledge as an object. Knowledge can also be viewed as 'a capability' with the potential for influencing future action. With knowledge, there is capacity to use information and, in turn, through learning and experience creates the ability to interpret information and to ascertain what information is necessary in decision making. In essence, knowledge is information that is contextual, relevant and actionable – knowledge is information in action (Rainer and Turban, 2009). The implications for knowledge management range from enhancing individual's learning and understanding through the provision of information as in 'a state of mind' view to focusing on knowledge flows and the process of creation, sharing and distributing knowledge as in 'a process' view, and building core competencies and understanding strategic know-how as in 'a capability' view.

There are many definitions of knowledge management depending on the context that it is being described in, such as, organizational or

Table 1. The hierarchy of data, information and knowledge

Level of Complexity	Tools Involved
Data	Online transaction processing systems; databases, servers, local and network-based file systems; email; etc.
Information	Ad hoc query and reporting applications; content tagging (with metadata); indexing and categorization; text processing and mining.
Analysis	Online analytical processing applications; data mining.
Knowledge	Human insight derived from data, information and/or analyses.
Wisdom	The mind of the knowledgeable beholder.

(Source: Gupta and Sharma, 2003)