

Ontology-based knowledge management for joint venture projects

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Abstract

When enterprises engage in strategic joint venture projects, communication, knowledge sharing and management issues are inevitable and complex problems. Problems relating to communication, knowledge sharing and management issues generally occur in more than one phase of joint venture projects and involve various different domains. This study reviews issues related to knowledge management in the context of joint ventures (JV) from both macro and micro perspectives by using an ontology-based approach to analyze complex knowledge management (KM) issues in the context of the Integrated Circuit (IC) industry. This study presents a framework for an ontology-based model to analyze the knowledge management processing of joint ventures in the IC industry, and uses the IC foundry industry as an example to explore implementation issues. This framework uses a conceptual enterprise ontology (EO) model and domains of EO to analyze the process of EO. Moreover, data from the IC foundry industry is used as a case study. This study aimed to assist managers in increasing the possibility of success in dealing with complicated JV projects.

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Keywords: Enterprise ontology; Knowledge management; Joint ventures; IC foundry industry

1. Introduction

Communication between project teams comprising members from within extended enterprises and different organizations is often hampered by, among other things, confusion in terms and vocabulary (Lin, Harding, and Shahbaz, 2004). Extended enterprise collaboration, such as joint venture (JV), will raise the difficulty and complexity of communication between the cooperating companies. One of the main technical issues is the knowledge management problem when processing shared implicit and explicit knowledge with different systems. Enterprise collaboration faces knowledge confliction during knowledge sharing and development. Poor knowledge management for involved enterprises can mislead the business processes and cause serious wastage of resources, and even the failure of the JV.

Guarino (1997) defined ontology-based knowledge management (KM) as follows: “For KM systems in enterprises, ontology can be regarded as the classification of knowledge”. Moreover, O’Leary (1998) described ontology-based KM as follows: “In enterprise KM systems, . . . Ontologies define the shared vocabulary used in the KM system to facilitate communication, search, storage, and representation”. The issue of enterprise ontology (EO) derives from enterprises having their own professional terminology for use in different tasks.

This study proposes a novel solution for KM problems and thus enhances collaboration during JV projects. A framework of ontology-based KM is developed to help managers and participants find solutions to various KM problems. Ambiguous knowledge acquisition from either of the JV organizations can cause serious problems in collaboration. By using an ontology-based analysis of knowledge sharing and development, enterprises involved in JVs can also reduce intellectual property leakage and increase the efficiency and effectiveness of their

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communication. The ontology-based approach can also help enhance collaborative relationships among knowledge workers from different domains. Finally, the approach advocate in this study is likely to increase the likelihood of success for the JV project.

The remainder of this paper is organized as follows: Section 2 discusses the development of a particular EO in relation to the high technology industry. Additionally, this section reviews the recent literature on KM and JV. Section 3 presents the overall EO framework that forms the central focus of this paper. Issues concerning the processing of the EO, its verification, and the respective domains of joint alliance EO are also described. Moreover, Section 4 discusses an IC industry case in detail. This case is used to demonstrate the generic types of problem that are likely to occur with respect to KM in JVs. Finally, Section 5 provides a conclusion and discussion of future research directions.

2. Literature review

2.1. Literature review of related issues for JV projects

JVs are considered an important strategy for industries. JVs are typically defined as an alliance between two or more parties in researching, developing, producing, selling, or distributing a product or service for profit (Kukalis and Jungemann, 1995). JVs involving international competitors have attracted growing interest among both researchers and participants (Richter and Vettel, 1995). Many scholars and researchers are working on the issues related to enterprises engaging in JVs.

The literature on this subject can be sorted into five categories: strategic issues, relationship management issues, enterprises modeling issues, performance measurement issues, and KM issues (Table 1).

2.2. EO and KM issues for JVs project

Gruber (1993) defined an ontology as a specification of a representational vocabulary for a shared domain of dis-

course – including definitions of classes, relations, functions, and other objects. The use of the term has a long history in philosophy, where it refers to the nature of existents and existence. In a broad sense ontologies form the basis of what is relevant, what can be referred to and discussed, and what can be modeled in a particular domain. Research into ontologies has become increasingly important to knowledge-based systems and KM.

In the context of modern organizations it has been argued that any ontology must take account of activities, agents, roles, positions, goals, communication, authority, and commitment (Fox, Barbuceanu, and Gruninger, 1996). In this context, EO is a collection of terms and definitions relevant to enterprises (Uschold, King, Moralee, and Zorgios, 1998). Much of the previous research has focused on developing ontologies for particular organizations.

Recent studies on EO and KM for JV projects are shown as follows: Kidd in 2000 proposed a novel development in knowledge brokering based on a ‘trusted agent’ located off-shore. In this agent-based model, the data warehouse concept is adopted as the basis of a search for prospects and an attempt to gain benefits from a JV. This study first raised issues concerning KM in the context of collaboration among JV. Madni, Lin, and Madni (2001) presented the IDEON™ extensible EO for enterprise design, management and control processes. This work first provides a reference model for the interoperability between new and legacy business applications to integrate and adapt business strategies and ongoing operations to external and internal environmental changes.

Jolly (2002) conducted an investigation to identify decision and knowledge sharing problems in JVs. This study showed the importance of KM and trust for inter-firm collaboration. Moreover, Wong, Maher, and Luk (2002) outlined the development and attraction of the “JV” approach to foreign investment in China. Attempting to discover what strategic management knowledge was transferred from the Western partner. This study examines the issue of international KM for JV projects.

Table 1
Literature review of JVs research

Strategy	Relationship management	Enterprises modeling	Performance measurement	Knowledge management
Kukalis and Jungemann (1995), Mills and Chen (1996), Naylor and Lewis (1997), Vanhonacker (1997), Maccoby (1997), Chen and Chen (2002), Rigby and Zook (2002), Yasuda (2005)	Shaughnessy (1995), Littler and Leverick (1995), Martinsons and Tseng (1995), Beamish and Inkpen (1995), Gifford (1998), Norwood and Mansfield (1999), Fey and Beamish (2000), Hobbs and Andersen (2001), Steier (2001), Meyerson (2001), Ghosn (2002), Buckley et al. (2002), Walker and Johnnes (2003), Bayona et al. (2006)	Mesak and Mayyasi (1995), Richter and Vettel (1995), Nakamura et al. (1996), Williams et al. (1998), Wang et al. (2004), Storey (2005)	Luo (1996), Park and Kim (1997), Pearce and Hatfield (2002), Beamish and Berdrow (2003), Swierczek and Dhakal (2004), Mohr and Puck (2005)	Abecker et al. (1998), Kidd (2000), Jolly (2002), Wong et al. (2002), Tsang (2002), Walker and Johannes (2003), Li et al. (2003), Gerwin and Ferris (2004), Chadam and Pastuszak (2005), Revilla et al. (2005), Wong (2005)

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