QUALITATIVE BREAKTHROUGH FOR INNOVATIONS IN COMPLEX ENGINEERING PROCESSES – A CASE STUDY IN CROSS-DISCIPLINARY RESEARCH APPROACH

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ABSTRACT

Malaysia building stakeholders need to mitigate the knowledge flows' problem is urgent since Malaysia has to prepare them for impacts of globalization when the services sector opens up in 2012. This paper is proposing an alternative approach to seek related solutions in a hard engineering study to understand how team members perform in their highly uncertain operating context. The paper illustrates an example cross-disciplinary mixed-method case study research methodology developed by combining research methodologies from the field of anthropology (ethnography), sociology (knowledge network analysis), and computer science and engineering (computational organizational theory—COT). It concludes that discontinuity in organizations is a factor in the K-loss phenomenon in property development where a discontinuous member's inaccurate knowledge cognition could cause a functional error at personal level that is not obvious at the enterprise's overall performance level. The paper outlines the engineering problem, presents theoretical points of departure, explains the mixed-method case study research methodology, and describes the results. In conclusion, it illustrates how the findings become foundations for current researches at Universiti Putra Malaysia.

Keywords: *Mixed-method Research Methodology, Dynamic Knowledge Flows, Organizational Behaviors, Integrated Design Management*

1. INTRODUCTION

This article describes how we can utilize qualitative research methodology in obtaining rich detailed information for solving an engineering problem. The study by Ibrahim (2005) was motivated by the need to extend the movement of tacit knowledge from individuals to other members of a property development team with *discontinuous membership*. She defined discontinuous membership as an organizational situation where a position in a project team is added or omitted as and when it is required during a workflow process. This type of study is becoming urgent since Malaysia's building stakeholders need to mitigate the knowledge flows' problem in order to prepare them for impacts of globalization when the services sector opens up in 2012. The case chosen as illustration was conducted in the context of property development within the construction industry in California, USA but the results can be generalized in many countries. The ultimate intent was to develop a flexible database system for the enterprise's knowledge management, which could capture both tacit and explicit knowledge during a property development life-cycle process in order to mitigate this knowledge loss (K-loss) phenomenon. The challenge was how researchers could develop such a user-friendly knowledge management system that captures the inherent tacit knowledge of individuals or the enterprise. However, in order for the study to reach the higher goal, it must first understand why K-loss is still recurring despite measures by project sponsors to invest in information technology to help curb the loss. While recent construction researches have successfully enabled American general contractors to maintain their profit margins during construction phase, more efforts are needed to mitigate development cost increment during the pre-construction design process. Studies have found that a majority of reasons for these cost