Available online at www.sciencedirect.com

ScienceDirect

International Journal of Project Management 32 (2014) 676–686

International Journal of Project Management

www.elsevier.com/locate/ijproman

To learn or not to learn from project monitoring feedback: In search of explanations for the contractor's dichromatic responses

Peter S.P. Wong [a,*], Sam K.S.Wong [b]

[a] Property Construction and Project Management, The Royal Melbourne Institute of Technology (RMIT University), Australia
[b] Construction Dispute Resolution Research Unit, Department of Civil and Architectural Engineering, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon Tong, Hong Kong

Received 1 May 2013; received in revised form 21 September 2013; accepted 24 September 2013
Available online 21 October 2013

Abstract

Organizational learning (OL) seems to be a legitimate contractors' response to project monitoring feedback. However, findings from previous studies reveal that contractors' responses to feedback are mercurial and difficult to model by using conventional approaches. This study applies catastrophe theory to model the contractors' learning behavior in response to feedback. An industry survey was conducted in Hong Kong for data collection. To test the conceptual model, Cusp fit program was employed. The results indicate that not until they perform worse than the client's anticipation, the contractors may not practice double-loop learning as a response to the project monitoring feedback. Contractors' learning from feedback may be conditional. This study demonstrates a new approach to model a dynamic characteristic of the contractors' learning behavior.

Keywords: Project monitoring feedback; Organizational learning; Performance; Catastrophe theory

1. Introduction

Project monitoring system (PMS) is widely recognized as a means to guard against underperformance of the construction contractors (Crawford and Bryne, 2003; Wong et al., 2008). In this study, PMS refers to a system that provides regular feedback to the construction contractors. In contractors' perspective, feedback derived from the PMS (described as project monitoring feedback hereafter) enables them to discover if they have achieved the pre-determined standards. In this regard, some researchers described project monitoring feedback as a vital learning resource (Franco et al., 2004; Kululanga et al., 1999). They portrayed that when a contractor takes improvement action in light of feedback, an organizational learning (OL) process occurs (Chan et al., 2005). OL can be defined as a process by which an organization imbibes and applies the acquired knowledge to take an improvement action (Kululanga et al., 1999). In other words, taking improvement action has been coined as an outcome of OL.

In previous research studies, PMSs were purposefully developed for fostering contractors' OL (Dikmen et al., 2005; Franco et al., 2004; Crawford and Bryne, 2003). A contractor was often postulated as a rational entity who responds optimally to the project monitoring feedback (Everett and Farghal, 1997; Love and Josephson, 2004). Researchers seemingly assumed an exclusive relationship between the provision of project monitoring feedback and the contractor's practice of OL (Everett and Farghal, 1997; Franco et al., 2004). The extent of contractor's learning may also be dependent on how frequent the project monitoring feedback is being generated and received (Everett and Farghal, 1997). However, should the contractors learn and consequently take improvement actions simply because they were provided project

* Corresponding author at: School of Property, Construction and Project Management, Design and Social Context Portfolio, RMIT University, Melbourne, Australia. Tel.: +61 2 99253978.
E-mail addresses: peterspwong@rmit.edu.au (P.S.P. Wong), samksw@gmail.com (S. K.S.Wong).

0263-7863/$36.00
http://dx.doi.org/10.1016/j.ijproman.2013.09.007

monitoring feedback? Negative views were found from some recent studies (Martin and Root, 2010; Wong et al., 2010). Based on the results obtained from a survey conducted in South Africa, Martin and Root (2010) found that the contractors did not capitalize on the project monitoring feedback to take improvement actions as the developers desired. A case study conducted by Lau and Rowlinson (2011) revealed that equity and fairness are not entrenched in the client–contractor relationship and thus inhibit OL. In this regard, Wong et al. (2010) empirically tested the effect of project monitoring feedback on the contractors' performance. They discovered that many contractors cease to improve when they reach a performance level that meets the client's minimum requirement. As such, the above findings suggest that perhaps contractors' learning is a subtle process that embodies the '*discontinuous transitions of behavior*' (Raijmakers et al., 1996, p.105). The situation is similar to ice-melting that involves the transition from solid to liquid phase of water. To take or not to take improvement action is possibly a discontinuous decision that may be associated with the contractor's expectation of the performance (Wong et al., 2010). In other words, a sudden change in learning behavior may occur when the contractors' performance surpasses (or in vice versa falls below) expectation (Wong et al., 2010). Regrettably, empirical studies focused on such sudden transition of learning behavior remain scant (Wong et al., 2008). This may because such behavior entails the concept of discontinuity — which is mathematically not possible to be presented by linear models like multiple regression or structural equation models (Cheung et al., 2008; Dou and Ghose, 2006).

In this aspect, the use of non-linear models to conceptualize organizational behavior change is well documented in other research fields (Dou and Ghose, 2006; Garud and Van de Ven, 1992). Garud and Van de Ven (1992) emphasized that the use of linear and non-linear models to display an organization's decision outcome is not mutually exclusive. However, linear model may not offer a good explanation on a decision made by an organization during an ambiguous and uncertain period of time. They utilized catastrophe theory to capture the non-linear dynamics of the internal corporate venturing decision. Similar approach was adopted by Dou and Ghose (2006) who captured the inherent non-linearity and complexity of the online retail competition. They found that if the visitors' hit-rates between the rival online retail pages progressively change in the opposite direction, the customer-base can suddenly shift from one company to another. Catastrophe theory was used to provide a theoretical explanation of the sudden behavioral change. Following this stream of studies, it is noted that catastrophe theory may be applicable for explaining the change of the contractor's learning response to the project monitoring feedback.

This study aims to examine the inherent dynamics among (1) the contractors' practice of OL; (2) their attention to their project monitoring feedback and (3) their anticipated performance in project by using the catastrophe theory. It posits that the contractor's learning from project monitoring feedback can be triggered by their anticipation of the project performance and can be modeled as a sudden attitudinal change. The following hypothesis is thus proposed:

H1. The contractors' practice of OL (OL) in response to their attention to project monitoring feedback (AF) is contingent on their anticipation of project performance (PP) in the construction projects.

This study offers a different approach to model the relationship between OL and performance improvement actions. This may assist in unveiling the tactics utilized by the contractors in light of regular project monitoring feedback. Learning behaviors of the contractors are studied because, among those construction organizations, contractors are responsible for converting building designs into physical facilities. Their learning capabilities and decisions thus would directly affect project success and the competitiveness of the entire construction supply chain (Sense and Antoni, 2003; Xiao and Proverbs, 2003).

The rest of this paper is organized as follows: The second section provides an introduction to the catastrophe theory. Based on the catastrophe theory a conceptual model depicting the hypothesized relationships among (1) contractors' practice of OL; (2) their attention to project monitoring feedback and (3) their anticipated performance in a project is developed. The third section describes the methodologies employed for examining the hypothesized relationships. The fourth section reports and discusses the implications of the findings.

2. Catastrophe theory

Catastrophe theory is a mathematical model of non-linear relationships developed by Thom (1975) and subsequently popularized by Zeeman (1977). It expresses an abrupt transition of equilibrium behavior (i.e. the dependent variable) which is caused by a smooth gradual change of the control factors (i.e. the independent variables). Thom (1975) described catastrophe theory as a hypothesis of structural stability. He hypothesized that inherent stability (i.e. a state of equilibrium) of a system can be maintained by a set of parameters which values are changing over time. However, such inherent stability may not sustain when a particular value or values of the parameters reach a threshold. Consequently, the state of equilibrium of the system would undergo a sudden change. In other words, the discontinuity in behavior can be modeled as a function of a progressive change of values of a set of parameters (Grasman et al., 2009; Thom, 1975; van der Maas and Molenaar, 1992; van der Maas et al., 2003). Stamovlais and Tsaparlis (2012) applied catastrophe theory in the field of education science. They described catastrophe theory as a concept that can provide quantitative based explanations for the sudden behavioral change in student learning. Dou and Ghose (2006) described catastrophe theory as a tool for modeling operational systems which inner workings may not be effectively depicted by using linear models. Under this logic, the catastrophe theory may be considered appropriate for modeling the inherent complexity of the contractor's behavior. In the construction research field, Yiu and Cheung (2006) conceptualized conflict behavior of the construction professionals by using a cusp model. Cusp is one of the simplest models in the family of catastrophes (van der Maas et al., 2003). A typical cusp model consists of one dependent variable and two independent variables. The two independent variables