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Complex project management as complex problem solving: A distributed knowledge management perspective

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Abstract

Traditional project management (PM) privileges planning and downplays the role of learning even in more complex projects. In contrast, this paper draws inspiration from two organisations that were found to have developed complex PM expertise as a form of complex problem solving (CPS), a practice with implicit learning because complex projects are unable to be *completely* specified in advance (Hayek, 1945). Central to this view of complex project management as a form of complex problem solving is the governance challenge of knowledge management under uncertainty. This paper proposes that the distributed coordination mechanism which both organisations evolved for this contingency can best be characterised as a 'common will of mutual interest', a self-organising process that was fostered around project goals and paced by the project life cycle (Kogut and Zander, 1992). The implications for theory, research, and practice in complex PM knowledge management are examined.

Keywords: Complex project management; Distributed knowledge management; Bounded planning; Problem solving; Common will

1. Introduction

In the project management (PM) literature, the management of complex projects as an important focus for more intensive research is an emerging tradition, along with the need to understand the particular governance challenges associated with it (Baccarini, 1996; Miller and Hobbs, 2005; Morris and Hough, 1987; Müller, 2009). This research paper highlights and examines knowledge management as a key aspect of governance in the case of complex projects, based on an empirical study of complex project management featuring two Irish state-owned organisations, referred to here as GovCo-1 and GovCo-2. In the late 1990s and early 2000s, each of these complex organisations (Pollitt and Bouckaert, 2000; Thompson, 1967) was challenged to take on major infrastructural development projects of a scale and complexity well beyond what had been the norm for either organisation up to then. In GovCo-1, the stimulus was provided by the government's National Development Plans for infrastructure investment (NDP, 2000, 2007) and the stimulus for GovCo-2 was provided through EU deregulation in the energy sector. In this context, GovCo 1&2 provided a valuable opportunity to explore more closely in what ways the management of 'complex' projects differs most from that of other kinds of projects reflected in the mainstream PM literature (APM, 2011, 2012; PMI, 2013).

The main empirical finding was that complex project management (PM), as manifested in the two organisations under study, could best be understood as a form of complex problem solving (CPS) that does not lend itself to being *completely* specifiable in advance. In the mainstream PM literature, such projects undertaken by GovCo 1&2 tend to be viewed as just more 'complicated' projects that can still be planned and managed in the traditional way as "the *application* of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (PMI, 2013, p. 5, italics added). In this approach, there is little learning anticipated beyond the application of prior knowledge. In contrast, the empirical finding that complex PM is a form of complex problem solving

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(CPS) means that managing project knowledge becomes more problematic.

In terms of governance, this alternative perspective means that a central aspect of knowledge management in complex PM settings involves managing intrinsic knowledge uncertainty. This is manifest as incomplete pre-given knowledge in complex projects that necessarily limits complex PM to 'bounded planning', which implies the need in complex PM to continuously create knowledge over the project life cycle that is not specifiable at the outset (Engwall, 2002). This, in turn, requires the development of an effective mechanism for coordinating this emergent knowledge. In the cases of GovCo 1&2, both were found to have evolved a distributed governance approach to knowledge management that revolved around problem solving as a mode of learning and organising. In effect, in order to create project knowledge that was unspecifiable at the outset in project designs, plans, etc., the project team became a community of learners that was *learning the project* though organisational CPS. In order to coordinate this emergent knowledge, GovCo 1&2 harnessed the agency of what this paper terms a 'common will of mutual interest' that was fostered around project goals and paced by the project life cycle. This can be thought of as a high-level organising principle that is irreducible to individual project actors (Kogut and Zander, 1992), by which the project team can know more than it can tell (Polanyi, 1967) and can know more than its individual members can know separately.

The full empirical inquiry that led to these findings is reported elsewhere (Ahern, 2013), which is an exploratory case study investigation of two complex organisations in the public sector using a Contextualist research perspective that includes 51 semi-structured interviews (Pepper, 1942). This longitudinal process approach facilitates the study of the development of organisational processes that are 'in flight' during periods of important change in organisations (Pettigrew, 1990, 1997, 2012). The primary purpose of this paper is to examine some of the main conceptual and practical implications for the traditional PM literature associated with the above two important empirical insights in complex PM, namely, incomplete pre-given knowledge and coordinating emergent knowledge. This will be done by reviewing the literature on related themes and drawing on further findings from the data (Siggelkow, 2007).

The remainder of the paper is organised as follows: Section 2 reviews the literature on complex PM with particular attention to the contrast in knowledge management assumptions between traditional PM and those implied by viewing complex PM as complex problem solving (CPS). In addition, learning modes are reviewed for generating knowledge in complex PM, which can be coordinated through a distributed organising approach. Section 3 discusses the implications for governance in complex PM of knowledge management as a process of learning and organising under 'bounded planning' rather than 'total planning' assumptions. This includes the scaffolding of distributed learning and organising using documented procedures as well as the fostering and pacing of a common will of mutual interest for coordinating emergent project knowledge. In Section 4, the concluding section, the implications of inherent knowledge uncertainty in complex PM as a form of organisational CPS are discussed in relation to the following areas of research and practice: (i) planning, knowledge creation, and knowledge coordination; (ii) leadership; (iii) knowledge transfer; and (iv) PM complexity.

2. Complex project management as complex problem solving

Informed by the two empirical findings highlighted earlier, this section will review the literature on complex projects in relation to the management of knowledge under the traditional PM paradigm, which assumes full pre-given knowledge, and under more recent pragmatist perspectives of PM, which accept the idea of incomplete pre-given knowledge in projects and the need for learning. In this, a distinction will be made between 'complicated' projects that can be completely specified in advance and 'complex' projects that are *unable* to be completely specified in advance. Finally, different modes of problem solving learning are discussed, including complex PM as a form of organisational CPS, which facilitates the creation of emergent knowledge that is un-specifiable at the outset; and the coordination of this emergent knowledge through what this paper terms a 'common will of mutual interest' as a distributed tacit dimension. This term is new to the literature and is inspired by an interaction between the case study data and the literature to represent the synergy that is achieved in projects when a team spirit is successfully fostered to the extent that it becomes self-reproducing as a common will around an interest that is mutually desired and experienced. In this way, it becomes a self-organising process for coordinating the behaviour and, hence, the collective learning of project teams in complex PM settings.

2.1. Complex PM as applied science — planned knowledge

In early work on the complexity of project settings, Shenhar et al. (1995) distinguish two dimensions of project complexity—'technological uncertainty' and 'system scope'. This typology is used in advocating a contingency approach to PM (Lawrence and Lorsch, 1967; Shenhar, 1998, 2001; Shenhar and Dvir, 1996), rather than the "one size fits all" approach of traditional PM (Shenhar, 2001, p. 394). In subsequent research, Shenhar et al. (2002) extend the framework to encompass three dimensions of project complexity, namely, 'uncertainty', 'pace', and 'complexity/scope' (UPC Model), where 'pace' is added to reflect the "speed and criticality of time goals" (*ibid.*, p. 101). Implicit in this research is the assumption that knowledge relating to project complexity can be analysed and integrated as 'technical' complexity under the norms of technical rationality (Ashby, 1956; Cleland and King, 1968; von Bertalanffy, 1950), rather than as 'social' complexity that requires a socio-technical approach (Davies and Hobday, 2005; Nightingale and Brady, 2011; Sapolsky, 1972; Williams, 1999, 2005). Under the former approach, knowledge is detached from the knowing subject like a commodity and is pre-given at the outset, while, under the latter, knowledge is integrated with the knower as a process of knowing over time, because it is not *completely* pre-given at the outset.