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Researching complex projects: Using causal mapping to take a systems perspective

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Abstract

Extant literature has called for researchers to be more pluralistic in their approaches to researching projects. Responding to this call, this paper offers an exposition of a causal mapping technique. In the project management literature, there already exists a small number of articles reporting effective use of causal mapping. However, these are not dedicated to detailed explanation of the technique itself and so lack consideration of its features beyond those relevant to a particular application. Consequently, an exposition of the technique is needed to enable comprehensive understanding of causal mapping to be gained and its suitability for research designs assessed. Specifically, this paper examines causal mapping's theoretical grounding, explores its strengths and weakness, presents example applications, compares alternative causal mapping approaches, and overall, explains how causal mapping can support a systemic perspective on projects. These issues will be of interest to researchers who wish to incorporate causal mapping into their project management research designs.

Keywords: Causal mapping; Project risk management; Project overruns; Systems thinking

1. Introduction

Reports continue of project's having 'failed', running over time and over budget (Love et al., 2012). This suggests that, despite a wealth of research and the availability of project management handbooks (Turner, 2009; Morris and Pinto, 2007), there remain gaps in our knowledge concerning projects. A number of authors have stressed that to attend to these gaps new approaches to research are needed (Turner et al., 2010; Smyth and Morris, 2007; Cicmil et al., 2006; Williams, 2005; Morris, 2002; EURAM Sig). Underpinning these calls is an acknowledgment that the conventional positivist based approach to researching projects is, on its own, insufficient to provide a comprehensive understanding of project phenomena. Williams (2005), for example, highlights that the conventional approach takes only limited account of human factors and intricate relationships between project components and that both these are highly salient in explaining project behavior such as cost and time overrruns.

The need to widen approaches to project management research is echoed by Winter et al. (2006) who, in rethinking project management, call for more research to be undertaken with particular emphasis on Theory ABOUT Practice, Theory FOR Practice, and Theory IN Practice. This reflects a more integrative and potentially systemic approach to research which is in contrast with the atomic, discrete approach of the conventional positivist perspective. The emphases put forward by Winter et al. (2006) are elaborated by Bredillet (2013) who adds three further emphases, namely Theory From Practice, Theorising In Practice and Theorising As Practicing. Additionally, both of these calls reflect project management researchers' growing interest in management research in general, in particular Mode 2 research (Pettigrew, 2001; Tranfield and Starkey, 1998). Mode 2 research combines rigour and relevance to produce research that achieves the dual objectives of applied use (contribution to practice) and advancing fundamental understanding (contribution to theory) (Van De Ven and Johnson, 2006). This widening of research

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emphases in project management resonates with Turner et al.'s (2010) identification of nine schools of project management research.

In response to the above calls for a broadening of approaches to researching projects, this paper proposes a causal mapping technique (Bryson et al., 2004; Eden, 1988). In the project management literature a small number of researchers have already reported effective use of causal mapping (Williams, 2015; Edkins et al., 2007; Maytorena et al., 2004; Williams et al., 1995). However, with few exceptions (Edkins et al. (2007)), these are not dedicated to exploration of the technique itself but rather they concentrate on illuminating features germane to a particular application. Consequently, issues such as the theoretical grounding, strengths and weakness, and alternative ways of applying causal mapping remain under explored in a project management context. If causal mapping is adopted without consideration of these issues, the danger is that methodological confusion might ensue bringing the integrity of the approach and resultant findings into question.

With causal mapping as its sole focus, this paper reveals the technique's theoretical underpinnings, identifies key considerations in its adoption, and examines its value-add to project management research. Importantly, the paper also positions the technique within the methodological debate taking place in contemporary project management concerning the need for new perspectives (Bredillet, 2013; Turner et al., 2010). Finally, limitations and future research possibilities using the technique are examined. The discussion is grounded in the extant literature using sources within and beyond the field of project management, in particular drawing from operational research and strategy making where causal mapping has had greater exposure. The paper aims to provide project management researchers with a point of entry to the technique by attending to important methodological considerations and highlighting what the technique can offer in the way of revealing news insights into projects.

2. Evolution and applications of causal mapping

The causal mapping technique focused upon in this paper originated in the field of Operational Research (OR) and has become strongly associated with a collection of 'soft' OR techniques called Problem Structuring Methods (Rosenhead and Mingers, 2001). Beyond its origins in OR, the technique has been used to support industries and academics in a range of applications. These have included strategy development (Ackermann and Eden, 2011; Bryson et al., 2004; Eden and Ackermann, 1998b), information systems development (Narayanan and Armstrong, 2005), modelling of disruption and delay claims in projects (Williams et al., 2003), and more recently modelling project risk (Ackermann et al., 2014).

Alongside techniques such as repertory grids (Fransella and Bannister, 1977) and influence diagrams (Richardson and Pugh, 1981), causal mapping belongs to a wider collection of techniques referred to as cognitive mapping techniques (Huff, 1990; Axelrod, 1976; Tolman, 1948). Although there are a diverse range of approaches to causal mapping (Narayanan and Armstrong, 2005; Eden and Spender, 1998; Huff, 1990) a particularly salient categorisation is whether they are idiographic or nomothetic in nature (Eden and Ackermann, 1998a) as this imposes different methdological considerations. Idiographic causal mapping is concerned with developing nuanced comprehension of a situation (Cossette and Audet, 1992) whereas nomothetic approaches aim to reveal themes or patterns that can be statistically generalised (Hodgkinson and Clarkson, 2005). As idiographic casual mapping has already begun to demonstrate utility in project management research (e.g. Edkins et al., 2007; Maytorena et al., 2004; Williams et al., 2003) this paper concentrates on this particular type and specifically the approach developed by Eden and colleagues (Bryson et al., 2014; Ackermann and Eden, 2011; Eden, 1988) as this is the form used extensively in the aforementioned applications. In a section describing alternative approaches to causal mapping, the paper also provides a more detailed comparison of nomothetic and idiographic mapping to expose fully their distinguishing features.

The theoretical foundation of Eden's approach is located in psychology (Ackermann and Eden, 2001; Eden, 1988), adopting George Kelly's Personal Construct theory as its fundamental basis (Kelly, 1955). Three of Kelly's corollaries strongly influence the approach. These are individuality (recognising individuals interpret events in unique ways), commonality (the development of a common language through shared understanding of the different interpretations) and sociality (agreement based on a shared understanding towards a common outcome). Placing the corollaries in the context of project management research, Eden's approach enables the creation of causal maps that (i) represent how individual project actors perceive situations (individuality); (ii) can be shared and woven together to form a single interconnected whole (commonality); and, consequently, (iii) provide researchers (and practitioners) with a holistic view of the project that can be used to improve understanding. Moreover, among project actors, the holistic view can be used as a basis for negotiation and reaching shared agreement for action (sociality).

Eden's approach takes into account Weick's work on sensemaking (Weick, 1995), Ackoff and Emery's conceptualisation on problem definition (Ackoff and Emery, 1972), and McHugh's views regarding the sociology of defining situations (McHugh, 1968). To ensure methodological rigour, a set of coding rules (Bryson et al., 2004; Eden, 1988) and methods of analysis (Eden and Ackermann, 1998a) have also been developed and refined over the last 25 years (for a history of the technique's development see Ackermann and Eden (2010b)). With its own coding guidelines, and processes for construction and analysis, causal mapping is a distinct technique. Moreover, it is important to note that there are examples of its incorporation into quantitative modelling techniques like system dynamics (Howick et al., 2009) further illustrating its contribution to project management research.

Causal maps are in essence directed graphs (Fig. 1) representing perceptions of situations as statements (nodes) connected by causal links (Eden, 1992). As representations of perception, the artefacts of causal mapping (the maps) capture subjective data. Causal mapping's acknowledgement and attendance to subjective data enable it to effectively get at mental models and thus take cognisance of 'soft' intangible