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Conditions of success for earned value analysis in projects

David Bryde *, Christine Unterhitzenberger, Roger Joby

Liverpool Business School, Liverpool John Moores University, Redmonds Building, Brownlow Hill, Liverpool L3 5UG, UK

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Abstract

Earned Value Analysis (EVA) is a method that has gained traction in some business sectors to report project progress and help control performance. Yet the literature reports mixed results as to its effectiveness in helping deliver successful projects and, additionally, much of the previous studies on the topic is conceptual in nature focusing on the design of the EVA system. We therefore extend knowledge on EVA by analysing the impact of EVA on the levels of success of two projects that utilised the method. This is done through the prism of agency and organizational justice theories. A framework is proposed of EVA conditions of success, incorporating both design and operational aspects of the EVA system. The framework is used to develop testable propositions that can guide further research into the effects of EVA-based systems on the creation of agency-related characteristics in the project environment that are conducive to project success.

1. Introduction

An effective performance measurement system (PMS) is a key element to achieving organizational effectiveness (Upadhaya et al., 2014). It needs to encompass all key actors (Jääskeläinen et al., 2014) and facilitate collaboration where multiple parties are involved (Pekkola and Ukko, 2016). In many outsourced project environments, the key actors come together in a temporary organisation, with multiple parties often comprising of different companies that work together for the common good of the project.

Two key criteria of project management (PM) success that are typically measured by the PMS in such environments are the extent to which the project is delivered to cost and to time; with performance typically being measured quantitatively in terms of: adherence to, and variance from, baselined budgets (cost) and schedules (time). Traditionally the PMS would comprise of two separate and un-linked systems, one focused on the budget and one on the schedule. This lack of integration between the two systems is a potential weakness in terms of quality of the feedback given to the project team. For example, the cost-based data might show that the project is over-spending, yet without cross-reference to the time-based data, which might be difficult and cumbersome to do, given that it will be held in a completely different system, the reason for the over-spend is not immediately clear. It could be that the project is in trouble in terms of adhering to the budget i.e. the work scheduled was completed to plan but cost more than was originally estimated. Alternatively, it is in trouble in terms of adhering to the schedule i.e. the cost estimates were accurate but there was less work done than planned. A similar lack of clarity can exist when trying to understand the reasons for and the implications on the budget of a lack of progress against the schedule.

It is in response to these shortcomings that Earned Value Analysis (EVA), a method that utilises a distinct set of metrics and analysis tools, has gained traction in many business sectors. EVA brings together the cost and time-related data and integrates them into one metric: the Earned Value (EV). Hence it gives a more complete picture as to the reasons for and consequences of over-spend, under-spend, early and late delivery. In doing so, it potentially passes one test of a well-designed PMS, which is to align at both the strategic and operational levels (McAdam et al.,

* Corresponding author.
E-mail addresses: D.J.Bryde@ljmu.ac.uk (D. Bryde), c.unterhitzenberger@ljmu.ac.uk (C. Unterhitzenberger), r.joby@ljmu.ac.uk (R. Joby).

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2014). It does this by providing detailed information at the project level, useful for managing the day-to-day activities, whilst also providing information of the overall performance of the project, through reporting the EV, which is particularly useful for those at a strategic level above the project.

Yet EVA-based performance measurement is far from being universally adopted in all projects and, whilst there are reports of its effectiveness (see, for example, DeMarco et al., 2009; Chou et al., 2010), there are also reports that highlight negative outcomes of using EVA (i.e. Vargas, 2003; Lukas, 2008). In addition, with some notable exceptions, there is still a paucity of empirical studies focused on the experiences of using EVA on live projects and an over-reliance on anecdotal data when selling its benefits. Much of the recent EVA literature is conceptual in character, looking to refine and extend, with illustrative examples or simulations, the EVA techniques (see, for example, Chen et al., 2016; Acebes et al., 2015; Colin et al., 2015; Narbaev and De Marco, 2014). Whilst such work is worthy, the need for empirical work on the topic provides a rationale for this paper, which seeks to answer the research question: What are the conditions of success for EVA-based methods for performance measurement in project environments?

In terms of the empirical-based research reported in the paper, the focus is on performance measurement in project environments involving more than one organization/company working together in some way. Such projects can be particularly complex and problematic from a PM point of view, partly due to the nature of the relationship between two key stakeholders: the client and the contractor, who reside in different organizations (Owen and Linger, 2011). In these project environments social and relational aspects add a layer of complexity in terms of undertaking performance measurement, as such projects create coalitions (Winch, 1989) made up of temporary multi-organizations (TMOs) (Cherns and Bryant, 1984). In a TMO, the project team comprises of people that differ not only in their roles and responsibilities but also in their affiliation to different companies. Overcoming the differences is a further challenge to meet for effective performance measurement to take place.

To address the research question we view the use of EVA-based methods in such outsourced projects through the theoretical lenses of agency theory and organizational justice theory. Given our study's emphasis on the crucial role of the relationship between the dyad of client and contractor, agency theory appears to provide a suitably firm alternative theoretical anchor for our research. In addition, our study has novelty by using a second theory, namely organizational justice, to support the analysis of the conditions for success of EVA in such project environments.

In the next section of the paper we present a review of the literature relating to the agency problem in these projects, the role of organizational justice, and the potential of EVA to address the agency problem. We then provide an illustrative example of EVA. Section 3 outlines the research method. It provides an overview of the rationale and the sampling procedure for the case study methodology selecting the two cases that utilised EVA and the method of data collection and analysis. Section 4 contains a summary of the two project case studies, one taken from construction and one from clinical research. Section 5 provides a cross-case analysis in relation to the use of EVA, viewed through the lenses of agency theory and organizational justice theory. Section 6 presents the results derived from the data analysis and Section 6.1 details a framework of EVA conditions of success comprising of design-related and operations-related conditions. Section 6.2 details future work and sections 6.3 and 6.4 have practical implications and limitations of the work respectively. The concluding Section 7 states the contribution of the study, its limitations and proposes areas for future work.

2. Literature review

2.1. The agency problem in projects

Many projects involve clients and vendors from different companies and create potentially difficult to manage principal-agent relationships – leading to the so-called "agency problem". A principal-agent relationship exists where there is a contract by which a person "the principal" engages another person "the agent" to perform a service on his or her behalf; and which involves the delegating of decision-making authority by the principal to the agent (Jensen and Meckling, 1976). In such projects, the principal is in an owner (client) organisation and the agent is a different project (contractor) organisation (Turner and Műller, 2004). (In the remainder of the paper, the terms "client" and "contractor" denote principal and agent, respectively, in an outsourced project environment. The term "outsourced project(s)" denoting those where the principal and the agent reside in different companies.)

Agency theory has proved useful in facilitating understanding of a variety of non-project specific outsourcing environments. See for example: Zhang et al. (2015), Van der Valk and Iwaarden (2011), Bhattacharya et al. (2013), Ruth et al. (2015), Gorla and Somers (2014), Chen and Anandhi (2009), Taylor (2007), Lamminmaki (2011), Gefen et al. (2008), Liberatore and Wenhong (2010) and Handley and Gray (2013). Hence, our confidence that it would provide useful insights relating to the use of EVA for measuring performance in outsourced projects.

The theory is concerned with resolving the agency problems that can exist in principal/agent relations. For example, in some project contexts, a high degree of conflict over the goals of the project between the client and contractor exist, resulting in dysfunctional agency relations, which in turn can lead to unnecessary costs, delays, mistrust, concealment of information and win/lose gaming. Given that the contractor may have more information than the client might have about project issues and progress etc., referred to as "information asymmetry" (Eisenhardt, 1989a), mistrust may again build up. Particularly on the part of client relating to the perceived appropriateness of decisions being made by the contractor, referred to as the "adverse selection problem" (Turner and Műller, 2004). There may also be opportunistic behaviour on the part of the contractor if they decide to act on information not shared in ways that are not beneficial to the client. Such opportunistic behaviour is a fundamental assumption of agency theory, where people act in their own self-interest. Which is referred to as the "moral hazard problem" (Turner and Műller, 2004). In this context, they act in the interest of their own company at the expense of the project.

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