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ScienceDirect
International Journal of Project Management 29 (2011) 396–407
International Journal of Project Management
www.elsevier.com/locate/ijproman

Systems thinking in innovation project management: A match that works

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Received 28 July 2010; received in revised form 5 January 2011; accepted 6 January 2011

Abstract

This paper discusses why conventional project management practices lead to the failure of publicly funded innovation deployment projects, and investigates how the use of systems thinking in project management can help projects be more successful. Based on 12 case studies of two EU innovation policies, we provide evidence that by using systemic project management, which entails providing flexibility in planning, communicating and controlling activities, innovation projects are more successful. This research refutes previous theory that claims that we should formalize to manage complexity and uncertainty. The key finding is that systems thinking methods provide the flexibility to manage innovativeness, complexity and uncertainty in innovation projects more successfully. Suggestions for further research include suggestions of how to embed flexibility in project management methods using the constructs of equifinality and causal embeddedness.

Keywords: Systems thinking; Innovation project management

1. Introduction: the need for systems thinking in project management

This paper advocates the application of systems thinking in the management of innovation projects. The argument is that there is a lack of effective project management practice suitable for innovation projects and that systems thinking can be a suitable conceptual framework to provide constructs for the development of better theory and practice.

The argument is developed thus. First, we discuss the application of conventional project management methodologies in publicly funded innovation deployment projects in this way. Deployment projects differ from NPD projects in terms of innovativeness, complexity and uncertainty because they are not developing a technology but they diffuse, customize, modify and market already mature technologies to users. These projects have lower levels of technological uncertainty and novelty, but higher levels of complexity because they deal with different types of users and markets. These facts influence the organization of project activities. Current theory claims that publicly funded innovation deployment projects need careful process control over activities, a formalized communication process and detailed planning. However the consistently high levels in failure of publicly funded innovation deployment projects make us question this argument. The questions remain: How can systems thinking be applied to projects in order to manage for innovativeness, complexity and uncertainty?

Evidence from 12 case studies reveals that an overemphasis on operational control and the lack of flexibility to manage boundary relations and operational change are the critical factors for the successful project management of complexity and uncertainty. These are two important functions in systems thinking, which is a conceptual framework, providing constructs for the attributes and functions of systems. How can systems thinking help the practice of control and planning in projects? To apply systems thinking in project practice, this study suggests that further research into the constructs of equifinality and causal connectedness is needed to embed flexibility in project management.

2. Boundary and operational control practices of conventional project management

Because of the lack of agreement in existing theories (Fitzerald, 1996) conventional project management theory and practice were

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doi:10.1016/j.ijproman.2011.01.003

created as a basis for facilitating project evaluation (Crawford and Pollack, 2004). These were founded on engineering/construction practitioner led models (Söderlund, 2004; Shenhar et al., 2002) which achieved a universal status through the monopolization of accreditation (Cicmil, 2006, 1997). However, there are two concerns with conventional project management as it stands now. Firstly, theory and practice treat the project as an 'island', with closed boundaries that relies upon prescribed formulae to manage boundary relations and change through formalized communications procedures (Engwall, 2003; Hodgson, 2000; Heeks and Mundy, 2001). The second issue is problematic change management, which is a consequence of tight operational control over scope creep (unauthorized activity changes).

Two problems are caused by this emphasis on closed boundaries and operational control in innovation projects. The first problem relates to assumptions of rationality and linearity about control and boundaries, which create a paradox and an irony in project management theory and practice. The paradox is that projects, while being temporary organizations, serve long-term organizational goals (Turner and Keegan, 2001) and the irony is that project activities are being managed using planning tools which are applicable to more predictable operational activities (e.g. batch production) mimicking the way operations management exercises control on conventional production processes (Lamers, 2002; Turner, 2000). However, the fact that project processes are externally evaluated weakens internal operational control, makes the tensions within feedback loops through the project boundaries intense and in reality raises the need to balance actual performance with external expectations, thus increasing the need for operational flexibility (Müller and Turner, 2005; Lundin and Söderholm, 1995). Control through boundaries is designed around project tasks and action, while in permanent organizations control is linked to hierarchy and governance structures. Project boundaries are defined by tasks, while in permanent organizations boundaries are institutionally legitimized (Lundin and Steinthorsson, 2003). The uncertainty, complexity, and uniqueness of project activities make control more difficult and deviation from plans more probable, because plans are formulated for a set of contingencies that cannot be preconceived because they have no precedent (Sydow and Staber, 2002). The rationale behind conventional project planning assumes decomposition and predictability of activities, treating relational instability and operational change as aberrations (Sauer and Reich, 2007). This narrow emphasis is an obstacle to producing an explanatory and predictive framework for innovation projects (Müller, 2003) because theoretical prescriptions become irrelevant to practice due to the lack flexibility. When tasks are uncertain, change is unpredictable and creativity is required, managers need flexibility to deal with evolutionary, non-linear innovation processes (Smyth and Morris, 2007; Engwall, 2003; Koskela and Howell, 2002).

The second problem is that the conventional approach cannot cater for the practice and theorizing of project innovativeness, because of its weakness to deal with different levels of uncertainty and complexity discussed above. Innovativeness refers to the level of novelty or originality by virtue of introducing new ideas or innovations, originality depending on the ability to think and act independently in order to achieve innovativeness; innovativeness also refers to the tendency to adopt–use innovation and is also an (cap)ability to create something new or make renewals and changes through a process of idea generation (Salavou, 2004; Hilmi et al., 2010; Hult et al., 2004; Dormann and Lindgaard, 2004) which very much depends on interaction and communication. Novelty, originality and creativity can be viewed from many different angles, depending on the unit of analysis; either project, person or whole system. One can assess innovativeness by the levels and types of change the innovation brings when implemented (Gemünden et al., 2007). This stream of research can use measures like product and process technical uniqueness, change etc. Another way to assess innovativeness is the level of diffusion and adoption of the technology by the intended users (Mudd, 1990; Midgley and Dowling, 1978). This area of research has used the user(s) as a unit of analysis, assessing their adoption and psychological/cognitive patterns. A third stream of research focuses on the firm's external and/or internal process of innovation and a fourth stream focuses on the determinants of innovation and/or its impact on organizational performance (Salavou, 2004; Subramanian and Nilakanta, 1996). In the public sector, innovativeness refers to the adoption levels of innovation within macro-systems, and depends on factors such as the diffusion instruments designed within public policy programmes and the way policy communicates and incentivises markets and stakeholders (Stoneman and Diederen, 1994). Innovativeness, therefore, is a multicomplex and broad concept and there is substantial obscurity around its definition (Salavou, 2004; Midgley and Dowling, 1978) as it lies and intersects in the boundaries of all the innovation actors (policy–academia–producer–market–user) and innovation elements (technology, social institutions) and its definition springs out of their interaction and interpretation (Dormann and Lindgaard, 2004). It is this interaction across the boundaries that will determine the levels of innovativeness, by negotiating and co-producing ideas on the use of innovation, where boundary roles exert particular significance (Salomo et al., 2007). However, the question remains how much of this interaction can possibly be predetermined and planned, or its outcomes predicted. Innovativeness, with its embedded element of originality, brings with it unpredictability and self-emergence (Gemünden et al., 2005). This unpredictability is beneficial for creativity, but raises the need to compromise planning and controlling levels, as it is necessary for innovative projects to function under certain levels of autonomy (Gemünden et al., 2005). By the same token, lower levels of innovativeness increase the need for formalized communication, and higher levels of complexity in planning and tightening control.

Therefore, the question about the amount of control and levels of formalization that should be exercised remains unanswered and prominent in public policy innovation deployment projects (Brown and Eisenhardt, 1997). When measuring innovativeness in public innovation deployment projects by using the model of Gemünden et al. (2007) (see also Table 1), we question what kind of approach these innovation projects might be better off with.