

Developing “Owner Project Capabilities” for Public Sector Clients Delivering Infrastructure Projects: A Dynamic Capabilities Approach

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Abstract

Infrastructure lies at the very heart of social and economic development of a country and the world at large. Yet, despite its importance the delivery outcomes of infrastructure projects have been far from satisfactory. Infrastructure projects face issues of cost and schedule overruns as well as failure to realise expected benefits. Research in the field of project management has emphasized the importance of a 'strong owner' to the success of projects. To act as strong owners, public sector clients that deliver infrastructure projects need to have project capabilities to perform various roles. This paper presents an initial framework on how public sector clients can develop 'owner project capabilities', so as to improve infrastructure project delivery outcomes. The theoretical perspective of dynamic capabilities is employed to study how these public sector clients can develop the requisite 'owner project capabilities'. It is suggested that learning is the mechanism by which owner project capabilities are developed, based on the concept of routines development, and argues for the incorporation of the organizational learning theory within the dynamic capabilities framework. Theoretically the paper contributes to the extension of the current application of organizational capabilities into the public sector infrastructure context. Additionally, it also provides initial insights into the relationship between owner project capabilities and (organizational) learning; and the difficulties faced by public sector clients during the process of capability development.

Keywords: infrastructure development, client capabilities, project capabilities, project owner, project learning

1 Introduction

Infrastructure lies at the very heart of social and economic development of a country and the world at large (Stevens *et al.*, 2006). It serves as the bedrock of a nation's competitiveness, economic development, and social well-being (World Economic Forum, 2014). Notwithstanding the importance of infrastructure, most countries experience difficulties in providing for their infrastructure needs, in addition to ensuring that delivered infrastructure provides planned benefits. Whilst the advanced or developed countries face the challenge of maintaining extensive transport, energy supply, water, and telecommunications network as well as upgrading and modernizing them, developing countries face the challenge of meeting their basic infrastructure needs such as access to water and sanitation, electricity, roads and health facilities (McKinsey Global Institute, 2013). The result is an increasing infrastructure deficit, or 'gap', estimated at US\$ 1 trillion per annum (McKinsey Global Institute, 2013; World Economic Forum, 2014).

This expanding infrastructure gap comes at a time when public sector clients, around the world, are increasingly being questioned regarding their ability to achieve value for money, and face the grinding pressures of improving infrastructure project delivery while cutting administrative costs. In short, they are being asked to do more for less, i.e. produce more public value with fewer resources. Key issues, frequently brought up, include the lack of appropriate levels of procurement skills that will allow them engage with their private sector supply chain partners on equal terms; sub-standard efficiency and productivity in the production phase; and unnecessarily large organizations with high administrative costs. Furthermore, cost and time overruns are increasingly highlighted (Flyvbjerg *et al.*, 2003; Miller and Lessard, 2000; National Audit Office, 2009) and subjected to public scrutiny.

This paper sets out to investigate how these public sector clients charged with project delivery could develop capabilities they need to improve on project delivery outcomes. The paper starts by reviewing the outcomes of completed infrastructure projects and draws attention to the role of the project owner to these outcomes. It argues that to improve project outcomes, project owners need to become strong owners by having the capability to perform various roles. We then review the literature on organizational capabilities with particular focus on addressing the capabilities subset of project capabilities. It is suggested that project owners need 'owner project capabilities' made of three distinct subsets to act as strong owners. The rest of the paper is devoted to answering the question of how public sector clients may develop the desired level of owner project capabilities. In answering this question, the theoretical framework of dynamic capabilities, which focuses on how organizations undertake change by creating, extending or modifying its resources is reviewed and suggested as an appropriate lens to study how capabilities are developed by public sector clients. In particular, how routines - the building blocks of capability - develop and evolve is suggested as giving an insight to capability building. We then give an initial insight into how routines could be developed via project learning and some difficulties that are faced by public sector clients during this process. The paper concludes by arguing that there is no 'one-size fits all' capability set for public sector clients, and that it is a matter of knowing the scope of capabilities they need to manage their projects and how to develop it. Additionally it also suggests that there is also the need for further insights into the relationship between capabilities and learning so as to better understand how capabilities are built.

2 Project Outcomes and the Importance of a Strong Owner

As noted above, the delivery outcomes of infrastructure projects worldwide have over an extended period been poor and far from satisfactory. This has led to increasing scrutiny and questioning of the performance of project owners and operators by their stakeholders. Typically, project owners are being questioned on: their commercial capabilities, i.e. their ability to interact on equal and professional terms with the private sector (e.g. National Audit Office, 2009); project assurance capabilities, i.e. their ability to independently and objectively verify whether a project is on schedule, within budget and will meet future performance (e.g. National Audit Office, 2010, 2012); and their project delivery capabilities (e.g. LEGCO, 2014). Such accusations are supported by a plethora of studies conducted on completed infrastructure projects. These studies show that projects are usually subjected to substantial cost and schedule overruns, fail to realise expected benefits and meet projected demands (Flyvbjerg *et al.*, 2003; Flyvbjerg, 2014; Merrow, 2011; Morris and Hough, 1987). For example, in a series of studies on transportation projects in different jurisdictions, Flyvbjerg (2014) suggests that nine out of ten projects face cost overruns, while the demand and benefit side of the projects were out of forecast by between 20-70%. Indeed, it seems that issues of cost and schedule overruns and, failure to derive expected benefits are the norm rather than the exception in infrastructure delivery (Flyvbjerg, 2014; Flyvbjerg *et al.*, 2009).

Perhaps the most influential work on the poor outcome of infrastructure projects in recent times has been that of Bent Flyvbjerg and colleagues (e.g. Flyvbjerg *et al.*, 2003; Flyvbjerg *et al.*, 2009; Flyvbjerg, 2011). This work has done much to clarify project escalation, and how optimism bias and strategic misrepresentation contributes to cost and time overruns on many projects. However, these two concepts have a higher degree of explanatory power in economic infrastructure than in social infrastructure, and it remains the case that many projects experience cost and time overruns without optimism bias or strategic misrepresentation being present (Love *et al.*, 2012). Other studies have instead identified factors such as the inability of the project owner to: properly control the front end definition; shape project strategy and cope with political, economic and social turbulence and outside institutions; drive the project and deal with partisanship and contractual turbulence, as factors that affect project delivery outcomes (e.g. Merrow, 2011; Miller and Lessard, 2000; Morris and Hough, 1987). Ultimately, what many studies, on this topic have in common is the conclusion that causes of project failures usually lay in areas that are within the remit of project sponsors rather than that of project execution or implementation by the project supplier or contractor (see Flyvbjerg *et al.*, 2003; Meier, 2008; Miller and Lessard, 2000; Morris and Hough, 1987).

In consequence, there is now a growing body of work focusing on the owners and sponsors of infrastructure projects. Although it is still the case that majority of the project management literature is supplier focused. A major scholarly contribution in this regard has been the work of Peter Morris (Morris, 1997, 2013; Morris and Hough, 1987). Arising out of his research on major projects he advocated for the concept of a 'strong owner' as a dimension of project success (Morris and Hough, 1987). This perspective of the role of project owners has recently been reinforced by Merrow (2011), who also advocates for a strong, distinct owner team that will be able to interface authoritatively with the supply side. This view is succinctly summarized as: "The contractor's job is to deliver a project as specified, on time and on budget. The owner's job is to specify the right project" (Merrow, 2011, p. 126). This basically means that the contractor cannot do the owners' work, and *vice versa*, as they have different sets of roles, goals and expectations on the project. This conclusion is supported by the

findings of Hui, Davis-Blake, and Broschak (2008) who showed that project owners who demonstrated or exhibited high ‘owner dominance’ tend to achieve better outcomes.

2.1 The role of the infrastructure owner

Infrastructure projects are delivered within a temporary organization domain created by the coalition of two principal types of organizations: the relatively permanent owner and operator that supplies capital resources to the project and the relatively permanent project-based firm (supplier) that provides human and material resources to the project organization (Winch, 2014). In general terms, the difference between these two organizations is that the latter are project based and work predominantly on projects, while the former are not. The relatively permanent owner and operator on infrastructure projects, is usually a public sector organization in the form of Governmental agencies, departments, municipals, counties, bureaus or any such similar designation that owns and operates completed infrastructure. These permanent owners and operators may also be referred to as ‘public sector clients’. Generally the core concern of such ‘public sector clients’ is that of operations and maintenance of completed infrastructure such as the regular supply of power, ensuring roads are in good condition for transportation purposes, etc. (Winch, 2014). As such, they tend to develop competencies or capabilities in areas core to their operations other than that of infrastructure delivery. However, it is the case that these public sector clients engage in the delivery of infrastructure projects on a periodic basis as the need for them to extend their infrastructure base arises. This may be due to ongoing business concern such as the need to grow, perceived inadequacies in existing infrastructure, or policy initiatives (Winch, 2014). To do so, they are required to define the project thereby delineating its scope and specifications. They are also required to procure and manage project suppliers to ensure project is delivered to specifications, set up internal control measures to ensure the project is completed within budget and schedule, and integrate the completed infrastructure into existing operations. Achieving the above objectives for these infrastructure owners is, however, fraught with challenges. A prime challenge is how to make use of their limited existing resources to develop and promote infrastructure projects whilst maintaining core capabilities necessary to operate and maintain delivered infrastructure. In effect, public sector clients face the tension of using limited resources to develop and maintain capabilities for infrastructure delivery while also performing their core duties of operating and maintaining completed infrastructure.

2.2 Owner capabilities

Organizational capabilities are commonly defined as the particular combination of skills, competences, resources, routines, and behaviours, which enable effective performance and generate competitive advantage. The capabilities literature is vast and varied but is usually divided into two main types: ‘operational capabilities’ which capture the day-to-day, month-by-month ability of the organization to deliver on its mission; and ‘dynamic capabilities’ which capture the ability of the organization to change and develop in order to meet new challenges. In other words, operational capabilities deal with the ability of the organization to deploy its resources and to efficiently execute its daily activities; whilst dynamic capabilities deal with how the organization could undergo change and in the process extend its resource base (Helfat *et al.*, 2007; Winter, 2003). What is either an operational or dynamic capability is an issue of context and very much dependent on the core activities of the organization. Thus, what may be an operational capability for one organization may be a dynamic capability for another.

A sub-set of the capabilities literature is that of ‘project capabilities’ stemming out of research on innovation in complex product systems and the project-based organization. These project capabilities refer to the specific knowledge and experience required to engage with internal and external customers, develop bids and implement and execute projects, and can be summarised as the appropriate knowledge, experience and skills necessary to perform pre-bid, bid, project and post-project activities (Brady and Davies, 2004; Davies and Hobday, 2005). The conceptualisation of project capabilities and associated empirical studies has mainly been supplier focused. However, as the literature in the previous section shows, the project owner needs to act as a strong owner for successful delivery of projects. To be a strong owner the project owner may have to perform roles such as being able to manage its interface/interaction with the project supplier, defining the project, and setting up internal control measures among others during project delivery. This ability of the owner organization to mount temporary projects may be viewed as its project capabilities - ‘*owner project capabilities*’ (Winch and Leiringer, 2016). Owner project capabilities are made up of three conceptually distinct sets of capabilities: ‘*Strategic capabilities*, ‘*Commercial capabilities*, and ‘*Governance capabilities*’ (Winch and Leiringer, 2016). *Strategic capabilities* are those which the owner needs in order to successfully implement its investment projects and required at the strategy or front end stage of a project. *Commercial capabilities* are the set of capabilities needed to manage the interface between the owner organization and the project based supplier firm. It is mainly outward facing as it focuses on the interaction between the owner organization and project supplier. *Governance capabilities* are those needed to manage the interface between the owner organization and the temporary project organization involved in the project.

A major question that arises, and the one that is of main interest in this paper, is how the desired level of owner project capabilities can be developed. The answer is by no means straightforward. Investment in infrastructure assets is inherently lumpy compared to managing operations, and therefore poses a number of challenges. To further complicate things different sets of capabilities are acquired in different ways, and the process is heavily influenced by historical factors (i.e. path dependent). Some capabilities can be seen as the outcome of learning through repeated interactions and will follow different learning trajectories depending on if, for example, they concern formal or trust based relations. Other capabilities are the result of specific human resource investments. This means that some capabilities can be developed rather quickly whilst others can only feasibly be developed over time. It also follows that where the investment programme is particularly lumpy or where the size of the client organization is restricted, as will be the case if attempts are made to reduce head count and cut overhead costs, there might be a strong temptation to use third party consultants. However, the use of third party consultants entails the risk of failing to develop adequate in-house capability, even if it is viable (Morrow, 2011). Possessing adequate owner capabilities in-house and the process of developing these capabilities is useful for public sector client organizations if they are to act as strong owners and in the process improve project outcomes.

3 Dynamic Capabilities

In answering the question of how the desired level of owner project capabilities could be developed, the theoretical framework of dynamic capabilities, which focuses on how organizations rely on internal resources to undertake change, offers itself as a useful theoretical lens. Infrastructure projects, which are temporary in nature, fundamentally, are about change in the client organization, as they either extend in scope the existing operational capabilities or create new ones to meet new challenges.

As such it is possible to view the view owner project capabilities as the permanent organization's ability to mount temporary projects by making use of internal resources to undertake this change.

Dynamic capabilities, defined as “*the capacity of an organization to purposefully create, extend, or modify its resource base*” (Helfat *et al.*, 2007, p. 4), explains how organizations renew competences and undergo change in order to achieve congruence with changing environmental and business conditions (Teece *et al.*, 1997). In general, organizations renew their competencies, develop new capabilities and undergo change by modifying their resource base – the tangible, intangible and human assets the organization owns, controls or has access to on preferential basis and enables it undertake its activities or routines (Helfat *et al.*, 2007). This ability to purposefully create, extend, or modify the resource base is very much dependent on the ‘managerial’ and ‘organizational’ processes available to the organization as these are the mechanisms by which organizations either develop or put dynamic capabilities to use (*ibid*). These processes show how things are done, and are used to achieve two main functions: search and selection procedures – decision making; and configuration and deployment of selected decision – implementation. The search and selection procedure is more of a managerial process whilst the configuration and deployment of selected decision combines both the managerial and organizational processes. Managerial processes specifies strategic paths of decision making during search and selection procedures. The combination of managerial and organizational processes specifies which routines will be used to undertake change processes such as creating new routines, extending or modifying existing ones (*ibid*). Integral to the deployment of organizational processes are strategic routines such as *resource integration routines; resource configuration routines; routines to gain and release resources; and exit routines* which are used in undertaking the change process (Eisenhardt and Martin, 2000).

In addition to the processes available to an organization, the development of dynamic capabilities is very much dependent on its current ‘position’ and the ‘path’ it has taken (Helfat *et al.*, 2007). Positions form the base of any future capability development as they represent investments made by the organization over the years. This includes current specific endowments of technology, intellectual property, complementary assets, customer base, and its external relations with suppliers and complementors (Teece *et al.*, 1997). Renewing the existing capabilities of an organization without regard to the prior investments it has made has significant implications. There are substantial cost elements involved in discarding existing positions in addition to the fact that some positions, which give the organization its current capabilities and performance advantages, are difficult to replace. Furthermore, capabilities are largely cumulative and rely on previous knowledge. As such, the path travelled by an organization determines its existing capabilities, as well as possible future ones. Thus, past investment may either enhance or constraint the future direction of the organization. This has led to the general notion of capabilities being seen as path dependent and subjected to historical factors (Helfat *et al.*, 2007; Teece *et al.*, 1997). Accordingly, the paths and positions of an organization guide and shape up the processes during capability development.

3.1 Development and Evolution of Capabilities

The actual process of developing capabilities is by no means a trivial affair. This is partly due to the organization specific nature of capabilities where a collection of routines and resources gives an organization its unique capabilities. Also, the unobservable nature of capabilities in addition to embedded tacit knowledge makes it difficult to observe how they develop. A perspective that gives an

initial insight into capability development is the process of how routines develop. Routines are argued to be the fundamental unit or building block of organizational capabilities. As such, capabilities are sometimes defined in terms of routines. Winter (2003) for instance describes capabilities as a high-level routine or collection of routines that enables an organization produce an output. Understanding how routines develop within the organization may give an insight into capability development.

Routines encompass the accumulation of knowledge. Organizations accumulate and/or gain knowledge, leading to the development of routines, by engaging in learning to retain practices or activities that improve efficiency and are deemed beneficial to existing operations; or searching for new knowledge that brings in new practices and development of new routines. Various learning mechanisms, or processes, guide the type of knowledge that is accumulated. Notwithstanding the type of learning mechanism(s) engaged in, one of two major outcomes results: a change or modification of existing routines (and capability), or an improvement of existing routines (and capability). To improve existing routines, organizations undertake *exploitative learning* where they learn from practice, trial and error (experiential learning), and selection and retention of behaviours or routines that are beneficial to the activities of the organization (Zollo and Winter, 2002). This leads to the development of routines that are highly patterned, repetitious or quasi repetitious in character (Gavetti and Levinthal, 2000). Developing new routines in contrast represents a change in how the organization operates, and requires the organization to use *exploratory learning* mechanisms to bring in novel knowledge into the organization to enable the generation of new routines (and capabilities). This is achieved through engaging in a purposeful action and learning, so as to gain new knowledge (Pandza and Thorpe, 2009).

Dynamic capabilities is known to cause change or modification to the existing routines or resource base. This suggests that organizations have to rely more on exploratory learning mechanisms during the development of dynamic capabilities as novel knowledge is what is needed to change existing knowledge trajectories and routines (Pandza and Thorpe, 2009). This has, however, not been the general perspective taken in research that has sought to establish linkage between dynamic capabilities and learning. Existing research seeking to link the two concepts has focused mainly on exploitative learning arising out of experiential learning and knowledge transfer mechanisms with less emphasis on how novel knowledge that leads to the development of new routines and knowledge is brought into the organization. For example, Zollo and Winter (2002) suggest that dynamic capabilities evolves via three learning mechanisms: behavioural learning mechanisms of *experience accumulation*; and more deliberate cognitive processes of *knowledge accumulation* and *knowledge codification* derived from reflection on past experience. Similarly Eisenhardt and Martin (2000) identified the experiential learning mechanisms of: *repeated practice, mistakes, and pacing of experience*. This perspective could, however, be questioned, as the change role nature of dynamic capabilities makes it unlikely that experiential learning is solely responsible for dynamic capabilities development (Pandza and Thorpe, 2009). Instead, it could be argued that the focus should be on integrating into the dynamic capabilities framework an organizational learning theory that has both exploratory and exploitative concepts.

4 Learning for Public Sector Clients

It is evident from the discussion above that learning plays an important role in the development of dynamic capabilities. Learning is, however, a broad concept consisting of different types (or subsets)

based on the context and organizational type. The type, or subset, of learning used by public sector clients to develop their project capabilities is that of 'project learning' defined as "... that which encompasses the generation, capture and transfer of learning by individuals and groups within project settings" (Scarborough *et al.*, 2004a, p. 492). Project learning thus occurs: from and in between projects; within and between the temporary project organization and the permanent parent organization; and across various levels such as individual, group (project) and the organizational levels (Artto *et al.* 2011; Scarborough *et al.*, 2004a). The different ways by which project learning occurs may usefully be classified into two main categories: intra- project learning and inter-project learning (Swan *et al.*, 2010). Intra-project learning occurs during interactions with other actors on a project and may lead to the generation of novel knowledge. Inter- project learning in contrast occurs when the novel knowledge, or efficient ways of undertaking existing activities, is deployed within the wider organization and on various projects sites. This type of learning leads to improvement in existing routines.

It is commonly stated that the multidisciplinary background of the various actors on a project allows for cross disciplinary problem solving which enhances learning. However, despite the assertion that project environments are appropriate for learning the evidence suggests otherwise – it is generally difficult to engage in project learning (Edmondson, 2003). This is due to a multiplicity of factors such as: the one off and non-recurring nature of projects which makes it difficult to apply knowledge gained from one project to another (Hobday, 2000); the lack of formal structures and incentives to enable learning be institutionalized (Ekstedt *et al.* 1999; Scarborough *et al.*, 2004b); and the decentralized nature of organizations engaged in projects where knowledge gained by one unit is not transferred to others (Eriksson 2013). The multi-level layer of project organizations also affects learning as they tend to act as learning boundaries. This arises when learning at one level generates new shared practices that are different from practices elsewhere in the organization (Scarborough *et al.*, 2004b). This may result in a situation where the transfer of learning from one context (level) to another becomes more arduous due to the need to transfer practices which are completely different to the wider organization.

Public sector clients in particular face other challenges that affect their ability to learn and subsequently develop capabilities. They commonly do not possess all the resources needed to undertake the project. Thus, rather than deploy its own resources and in the process engage in learning, they are forced to outsource and use consultants for duties that are not core to their domain. Outsourcing, although having some positive effects especially in the short term, has long term implications as it affects the ability of public sector clients to engage in learning and subsequently develop capabilities. Consultants and suppliers become repositories of knowledge, as well as are the direct recipients of experience on a project, with the client having no technical input to the project. Furthermore, even where public sector clients decide to engage in learning, they may find it challenging to value, assimilate and exploit the new or novel knowledge being brought into the organization due to a lack of prior related knowledge for infrastructure project delivery. Or put somewhat differently, they may not have sufficient absorptive capacity (Cohen and Levinthal, 1990). Additionally, where the public sector client organisation is able to engage in learning, it faces the challenge of maintaining and making use of the knowledge so it does not atrophy due to infrequent use.

5 Concluding remarks

Many countries presently face massive investments in social and economic infrastructure. The economic role of social and economic infrastructure in modern societies is well understood; and the many contemporary pressures put on the scarce resources available, such as citizens' rising expectations, ageing infrastructure, urbanisation, and sustainability are well rehearsed. What has received significantly less systematic research attention is the role of government bodies in the execution of the projects through which they acquire such infrastructure assets. In this paper, we have tried to take a first step in partially rectifying this imbalance by investigating the public sector organizations charged with the definition and delivery of large infrastructure projects, what capabilities they need and how they can develop the capabilities they need to do so.

History has shown that it is neither feasible nor desirable to establish client organizations that are literally one-stop shops. Thus, it is not a matter of adding extra capabilities to the organization just for the sake of it. However, the whole cycle of making a capital investment infrastructure through ensuring that funds and human resources are available; engaging with suppliers of vital inputs to the new infrastructure and stakeholders with interests in that infrastructure; engineering the facility and coordinating the project to deliver it; and sharing the knowledge gained both within the program of projects to deliver the strategic initiative and capturing it for future investment projects, demands that sufficient resources are allocated to do so. There are many willing suppliers of the specialist services required to move through this life-cycle, but they all demand managerial attention. Further, various procurement types and client organization may demand different combinations of capabilities to manage the whole life cycle. Thus, it is not the case that client organizations should possess all owner project capabilities, but rather knowing the scope of capabilities it will need to manage projects, i.e. what capabilities it may need in-house based on its own unique case, in addition to how it can develop such capabilities to properly manage its suppliers and resources.

We have attempted to demonstrate that approaching the evolution, or development, of dynamic capabilities from the perspective of wholly integrating organizational learning theory will ensure that there is a better understanding of how novel knowledge is brought into the client organization as well as the various learning mechanisms needed at the exploratory and exploitative stages of learning. There is, however, the need for further insights into the relationship between owner project capabilities and learning. This means conducting empirical research on how client organizations undertake learning leading to capability development. These findings will help unravel various learning mechanisms that public sector clients can use to develop their project capabilities.

Acknowledgment

The work described in this paper is supported by a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (Project No. HKU 1751214)

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