

Co-Creation of Value and the Project Context: Towards application on the case of Hinkley Point C Nuclear Power Station

Executive Summary

- The service-dominant logic (SDL) was adopted. A key SDL concept is the co-creation of value, to which was added an exploration of the co-destruction of value.
- The front-end is examined through the megaproject, Hinkley Point C Nuclear Power Station as a UK-French joint venture that is part funded by the Chinese.
- Decisions taken by the key stakeholders are considered as events and processes that have outcomes that can be related back to the co-creation or destruction of value to the point reached in the project lifecycle and the consequences for long-term value realization.
- The results have implications for both theory and practice in terms of the conceptualizing co-creation, managing the project front-end and megaproject decision-making.
- A contribution is made to the methodological examination of projects.
- The implication is a shift away from the preoccupation on political and financial risks around mega and large projects to a greater complementary focus upon value realized in use over the long term.

Abstract

The research analyzes key decisions as evaluative outcomes regarding project value. An empirical focus is provided by a megaproject case study, the proposed Hinkley Point C Nuclear Power Station as a UK-French joint project. Value is traditionally assessed as inputs and outputs. Here, value is conceptualized in terms of co-creating the value proposition at the front-end and the implications for the qualitative realization in use. The service-dominant logic (SDL) is applied as the theoretical lens and contributes to a methodological approach for examining projects. Decision-making outcomes provide the evidence from a range of indirect data sources, including reports and commentaries. The methods are interpretative, combining phenomenological perspectives with historical research methods aligned to outcomes. The findings show that the decision-making extends beyond the time-cost-quality/scope dimensions. The long term issues regarding value realized are often overlooked. Indeed, stakeholders (institutions and organizations) and individual actors have mainly focused upon managing the political and financial risks, especially around time and cost. The research poses challenges to project management analysis, SDL theorization and research design in assessing the evidence. Addressing these issues facilitates contributing to knowledge both for SDL theorization and taking the field of project management forward.

Keywords: Co-creation of value, Co-destruction of value, Decision-making, Interactions, Project front-end, Service-dominant logic

Introduction

Large complex projects pose considerable project management challenges (e.g. Turner, 2009; Turner et al., 2013; Daniel and Turner, 2016). The execution of large projects and megaprojects have come in for a lot of criticism over many years (Morris and Hough, 1987; Miller and Lessard, 2000; Flyvbjerg et al, 2003; Mellow, 2011; Xue et al, 2013). For example, Morris (1994; 2013) has argued for more attention being strategically paid to project scoping on the client side. Flyvbjerg has particularly singled out decision-making in the planning stages, especially for public sector megaprojects (e.g. Flyvbjerg et al, 2003; Flyvbjerg, 2008; 2009). Moreover, the iron triangle criteria of time-cost-quality/scope frame the scoping and briefing documents on the demand side. These criteria are subsequently referred to in order to assess performance, especially during execution. The criteria are formalized in the contract and the value proposition in the transition from the project front-end to execution. These criteria are used by practitioners and commentators alike to assess progress. They have dominated academic and media assessments. Flyvbjerg has considered initial estimates against the contract and outturn prices (e.g. Flyvbjerg and Stewart, 2012). While traditionally value is assessed against the inputs, little attention has been given to the qualitative nature of value realized in use of the project (Smyth, 2015). This frames the research focus and the research aims. The research focus is to apply the service-dominant logic (SDL) as a theoretical lens to analyse a single megaproject. The research aim is to use the SDL concept of the co-creation of value as an analytical means to evaluate the extent to which value is shaped at the front-end. Conceptually, how value is co-created at the front-end scopes the potential for value realization in use. This is a different approach to analyzing projects and therefore makes a methodological contribution to the study of projects. It represents the first analysis of a megaproject using SDL.

Specifically, this paper addresses how events and decision-making outcomes affect the value proposition in terms of framing subsequent value co-creation over the project lifecycle and value realization in use. In SDL, the co-creation of value is a central concept, whereby inputs are proposed prior to provision in the value proposition, yet value is realized in use (Vargo and Lusch, 2004) or consumption (e.g. Chandler and Vargo, 2011; Akaka et al, 2013; 2015). The specific value realized in use depends on how effectively and efficiently the value proposition has been configured and the facility is employed by the users. The value also depends upon end-user perceptions, the owner and other stakeholders. The content is assessed in exchange and imagined at the point of exchange in operational context. For projects, SDL application is different: production does not occur ahead of exchange and imagining value in use is problematic for complex projects with high uncertainty levels. Value is co-created at the front-end through through a series of interactions of information provision, communication and relational dialogue to determine what to provide in the value proposition (Ballantyne and Varey, 2006). It is then produced. The whole lifecycle is also part of the service value and is therefore experienced at the front-end. This makes a secondary contribution to SDL theorization as it translates the central tenets into the asset specific context of projects.

Co-creation occurs through interactions. Decisions are events arising from interactions. Decisions are themselves outcomes during the front-end that embody the scope for value realization within the shape of the value proposition at the stage reached. At the front-end, decision-makers therefore scope and shape the project at a more detailed level (Cova and Salle, 2011) to evolve and form the value proposition that becomes accepted when the contract is signed. Key interactions are centred around decision-making events at the front-

end, hence framing the value proposition and subsequent realization in use post-completion. The proposed UK-French new nuclear power station at Hinkley Point C (HPC) provides the empirical case context where reviews of decisions have been prevalent.

This paper not only applies the SDL concept of co-created value but challenges the adequacy of this concept. Through the literature analysis and case findings, value is subject to co-destruction as well as co-creation (Mills and Razmdoost, 2016), exacerbated by the social and spatial distance of the front-end decision-makers from the project during execution and in use. Value propositions may also be re-assessed during execution against inputs and short run benefits, that is, 'value-for-money' (Vaesken and Alii, 2011), but that is premature for this case study. HPC provides a complex set of institutional arrangements, amplifying issues faced at the front-end.

The research poses challenges for the research design and empirical investigation. Decision-making events are difficult to research, especially where there is political and commercial sensitivity. The research method utilizes indirect evidence derived from public statements from the actors and informed commentators who are reporting on the decision outcomes. This is entirely in line with SDL and value co-creation, which emphasizes the value embodied in the outcomes. The media represent a means of outcome assessment during the project lifecycle. Taking decisions around decision events provide opportunity to evaluate outcomes, from which it is possible to trace the potential scope for value realization post-completion in use.

The paper is structured to first address the literature, then methodology and methods prior to presenting and analyzing the findings. The conclusion draws attention to the main points raised, the limitations and original contributions from the research.

Literature Review

Expected value and value creation

Turner (Turner et al., 2013; Xue et al., 2013) argues that the only possibility to improve the results and success of complex projects is a diverse and complete approach to the management of projects with a focus on the link between strategy, design and development. This provides a focus upon inputs, which is the traditional approach to considering value. The quality of the planning, from the design of inputs to specifying outputs, contributes significantly to the achievement of successful results. The project outputs are expected to deliver benefits, which is defined as a prior step between the outputs and realizing the benefits or value from the project in use (Ashurst and Doherty, 2003; Ward et al., 2007). Benefits as outputs are therefore delivered after execution. Yet, the expected value outcomes arise as subsequent steps as the project content is utilized. Both benefits and value outcomes are shaped at the front-end. This is not always straightforward in relation to the management of projects. At one extreme the iron triangle may be met in execution, but because the project was ill-conceived and poorly shaped, the expected value is either inadequately proposed or is not realized in use. At the other extreme of the iron triangle criteria may not be met, but the realized value exceeds expectations (e.g. Lim and Mohamed, 1999).

Project management has emphasized meeting the response to the stated requirements and brief, which forms the value proposition in terms of time-cost-quality. Less emphasis has been placed upon benefits delivery and impact. There have been repeated calls to consider

benefits and impact (e.g. Morris, 2013). Yet, the value realized by the organizational stakeholders combining their resources are seldom considered. Indeed, the value realized by different end-user stakeholders and individual actors can vary because of the resources they have available and their perceptions of the derived value. In summary, this is described in terms of value as inputs → outputs → benefits delivery, which potentially leads to value in use as a neglected area in project management.

Goals around time-cost-quality/scope provide the socially constructed measures that are used internally by primary stakeholders and individual actors, and by external commentators, to assess the potential value at the front-end and during execution (Turner and Müller, 2003; Xue et al, 2013). Yet these criteria, important as they are, distract from the value derived post-completion in terms of benefits delivered and valuable outcomes. The front-end will be considered in some detail later, but first value in terms of SDL will be addressed.

SDL and co-created value

SDL is a theorization of marketing that has broader implications. It conceives provision as a service to others, who combine their resources in dynamic ways to realize value in use and context (Vargo and Lusch, 2016). The customer is a contributor and interpreter of value (Gummerus, 2013), and therefore, value is assessed experientially, whereby individual actors and organizational users can derive different value and unique experience from the same resources. However, where the combined resources provided are unique, as in the case of most projects, different stakeholders derive different value from provision. This process under SDL literature has given rise to the concept of co-created value to evaluate qualitative value outcomes (Vargo and Lusch, 2004). Combining organizational and actor resources on projects informs the configuration of value propositions for exchange that can optimize value realization in use and in context (cf. Akaka et al., 2013, 2015).

The concept of the co-creation of value has been widely adopted across the management and marketing literature (e.g. Prahalad and Ramaswamy, 2004; Payne et al, 2008; Maglio and Spohrer, 2008; Edvardsson et al, 2011). Yet, Vargo and Lusch do not precisely define it within SDL, relying upon a description: “we describe the process of value co-creation through interaction and integration of resources within and among service systems” (Vargo et al., 2008:146). Elsewhere it is defined by Prahalad and Ramaswamy as:

The joint creation of value by the company and the customer; allowing the customer to co-construct the service experience to suit their context. (2004:8)

The definition addresses the outcomes experienced by customers, clients and other stakeholders as both measurable and qualitative assessments, including subjective perceptions of value. Therefore, assessments are not necessarily comparable. This also aligns with project characteristics due to their differentiated content and uniqueness in locational and social space.

However, SDL co-creation does not align precisely with the meanings associated with the management of projects, which may invoke meanings of alliances and collaborative practices. Co-creation and the combining of resources is not quite the same as alliances, partnering and collaboration. These are normative concepts that have been mobilized to reduce adversarial behaviour and improve performance. Vargo and Lusch (2004; 2016) conceived co-created value as what occurs in all value creation, where organisations and individuals are interdependent in creating value. It is the case that Prahalad and Ramaswamy

(2004) conceive of co-created value as having a normative dimension to support co-creation, but this is more a matter of emphasis than a conflict in conceptualization.

SDL conceives co-creation as a process. The key process mechanism under SDL is interaction. Interactions have been defined in different ways. They are considered as actor-to-actor (A2A) through mental, physical and virtual social exchanges involving two or multiple actors (Grönroos and Voima, 2013). Actors are largely conceived as individual rather than organizational. A2A is considered to be direct interaction. End-users and stakeholders embedded in organizations are implicitly excluded regarding value realization of projects, for example those operating power plants or those consuming the power. Payne et al. (2008) view interactions as communications, useage and service encounters, but this excludes front-end and execution interaction for projects. Informational, communicational and dialogical is a further definition (Ballantyne and Varey, 2006). Dialogue is relational in this definition. All three elements are applicable to any stage of a project lifecycle. Interactions as a process provide integration mechanisms, whereby a value creating operational network is created at the front-end to initiate the process (Artto et al., 2015).

Value emerges through interactions in two ways. First, on projects as part of the service experience prior to completion, and second, the skills and expertise applied to frame the value proposition and support realization in use (Smyth, 2015). Value propositions are the content that is shaped to form the product or services exchanged in the market. The proposition frames the maximum or optimal scope that the users can realize from the completed project. Framing the value proposition requires knowledge of the stated content, learning of the underlying business case and problem the project is addressing, and understanding of the organizational modus operandi to know what is valuable and how it is likely to be valued by the client as sponsor and/or owner, end-users and other stakeholders.

In project markets co-creation at the front-end forms the value proposition at the bid stage, including the understanding as to how execution will be experienced as a service. The project is executed and outputs are delivered. The value derived from the project content is realized post-completion, therefore, value is realized in context and in use. In summary, this is described as value proposition → outputs → value in context and use. In this context, SDL focuses upon co-creation, which is the value experientially realized in use. The value proposition that is shaped at the project front-end scopes the potential for subsequent value realization.

Vargo and Lusch have refined SDL (2008; 2016). For example, recognizing the contextual aspect to realization, which is important for projects as they are typically uniquely situated in social and locational space. Another significant addition is the institutional dimension (Friedland and Alford, 1991; Scott, 2008), which is familiar in project markets and management (e.g. Orr and Scott, 2008). Institutions had received little attention in the marketing literature until recently for understanding co-creation processes:

Arguably, the most important feature of this structure consists of institutions—rules, norms, meanings, symbols, practices, and similar aides to collaboration—and, more generally, institutional arrangements—interdependent assemblages of institutions.
(Vargo and Lusch, 2016:6).

The role of institutions as organizations to induce routinized, coordinating mechanisms of various types for value co-creation (Vargo and Lusch, 2011). Institutions are the

arrangements or rules of the game to enable service exchange and value co-creation under constraints of time and cognition (Scott, 2008; Vargo and Lusch, 2016). It raises the issues concerning the rules, norms, mechanisms and routines for managing a project at the front end, especially a megaproject, and how interactions across institutions and in networks support integration and the co-creation of value (Artto et al., 2015).

The front-end includes co-creation to shape the supply chain and broader network of resources for service provision and hence value realization. While the interface between the client and project-based firm are important, professional and supply networks, government, consumers and other stakeholders are important in influencing and contributing to the co-creation process. Vargo and Lusch (2016) call this the service ecosystem to identify the critical flow in service provision. A service ecosystem is defined as a relatively defined set of resource-integrating organisations, which are linked by shared institutional arrangements and interactive value creating service exchange that is subject to change and renegotiation (Lusch and Vargo, 2014). The rules of the game are therefore subject to change too. As Scott states, “institutions provide guidelines and resources for taking action as well as prohibitions and constraints on actions” (2008:50), which is based upon normative, regulative and cognitive structuring and implemented through stratified processes (Friedland and Alford, 1991).

There is an institutional bridge between co-creation described by Vargo and Lusch (2016) and Macneil’s (1978) relational contracts seen in alliances and other collaborative practices. This influences norms and behaviour during execution, yet does not provide a mechanism for conducting interactions of co-creation at the front-end. The quality of the interactions in general and around the decision-making events and processes can be positive. The processes of scoping, strategy development, review and re-reviewing can induce negative outcomes: “...creative destruction, is heavily intertwined with deinstitutionalization and reinstitutionalization” (Vargo and Lusch, 2016:20).

Co-creation and interactions on projects

Theoretical development has identified co-creation occurring through interactions, which are defined as information, communication and relational dialogue (Ballantyne and Vary, 2006) and as actor-artifact interactions (Vargo and Lusch, 2007), although some authors insist on direct face-to-face contact for co-creation (Grönroos and Voima, 2013). SDL assumes exchange takes place after the provision of the goods and services, whereas projects are produced post-contract and exchange comprises serial events during execution and up to the final account. Exchange is specifically represented in the form of stage payments.

Interactions help establish the scope, hence feasibility and financial viability of the project, prior to shaping the project ready for execution (Smith and Winter, 2010) to meet client criteria (Cova and Salle, 2011) and during execution and the points of exchange. The process anticipates meeting client and stakeholder expectations and imagines the value derived in operation (e.g. Turner et al., 2013; Smyth, 2015). The inputs proposed in the value proposition at the front-end becomes the bid considered for the contract of exchange. The project is completed as the outputs sufficiently match or align with the specification and contract terms. This changes the timing and sequencing of co-creation and realization of value. As noted, the value in use is twofold: the service experience prior to and during execution, and, the use realized from using the project post-completion (Smyth, 2015).

SDL has faced criticisms (e.g. Grönroos, 2011; Grönroos and Voima, 2013), which have led Vargo and Lusch to refine the foundational principles and axioms (2008; 2016). There have

been few empirical studies. A few recent studies are notable for the close fit of the sectoral features to the theorization, for example in hotel and tourism management (e.g. Shaw et al., 2011; Wang et al., 2013). There is largely an absence of empirical SDL research in more challenging sectors, for example business-to-business (B2B) service markets and for specific assets, such as projects, where concrete inputs are configured after the contract of exchange is agreed.

SDL, projects and the co-destruction of value

There have been a few studies in project and construction management. These studies are supportive of the value co-creation concept (e.g. Wikström et al., 2009; Chang et al., 2013; Liu et al., 2014). Leiringer (Leiringer and Bröchner, 2010; Leiringer and Cardellino, 2011) has been critical from the perspective of service-led projects. Smyth and his colleagues have offered some recent criticisms for further investigation, including the increasing emphasis upon value and the demotion of exchange, stating: “marketing has increasingly been decoupled from the exchange with price as the measure of value” (2016:209). Financial dimensions provide singular and very partial assessment of co-creation and value realization. Theorization has also largely assumed that the outcomes are positive. Mele (2011; cf. Vargo and Lusch, 2016) identified that conflicts in projects may yield positive or negative results for value co-creation. Mills and Razmdoost (2016) further criticized the positive conceptualization of co-creation, building on the concept of the co-destruction of value (Echeverri and Skälén, 2011).

Co-destruction is an important concept in the light of the prevalence of project failures and the critical examination of megaprojects. It links with the criticism posed by Grönroos (2011) as to when and where co-creation and value realization begin. It is important in the improvement of project management practices (e.g. Turner, 2009; Turner and Müller, 2003; Morris, 2013; Shenhar and Dvir, 2007). Improvement and proposing value starts with the scoping and shaping at the front-end. It is linked to changing institutional arrangements. Value can therefore be co-created or co-destroyed at the front-end according decision outcomes. Value co-creation and co-destruction also occurs during execution, although this are not the focus for this study.

The front-end is particularly interesting from a marketing perspective because little attention has been given to the value co-creation process this stage of the project. The marketing literature tends to assume a manufacturing, consumer, financial or service provision. Projects challenge to this body of work. Therefore, interactions that encompass the dark side of relationships at the front-end (Villena et al., 2011; Razmdoost and Mills, 2016) not only help address project markets, but also critically evaluate SDL and the co-creation of value.

The project front-end

The front-end, the stage when value propositions are formulated, is rich in interactions, especially for large complex megaprojects. As noted elsewhere:

...many of the things that cause projects not to succeed have their origins in decisions made in the project's front-end and that the front-end is the part of the project that has the greatest opportunity for creating value. (Edkins et al., 2013:72)

Edkins and his colleagues define the front-end in terms of “strategic project shaping”, yet “reserving the option to stall or cancel” (Edkins et al., 2013:80). The management of the front-end involves more than agreeing and documenting the requirements (Morris, 2013). It

covers, establishing the business/policy case, managing the work to establish the requirements, managing iterations and the trade-offs between the requirements and the fully worked-up project proposal, defining the budget, schedule and quality, developing the project strategy, and preparing project documentation against which to sanction approval (Edkins et al., 2013). There are considerations of risk, innovation strategy, stakeholder management, and supply chain engagement. Drilling down, the range of the work to be completed is diverse requiring a range of competencies and leadership skill sets, including leadership in decision-making, selecting key team members, technology assessment, scoping skills, value assessment, and oversight linked to control mechanisms (Williams and Samset, 2010; Edkins et al., 2013), which are all largely inputs. These factors and tasks are critical, yet underplay the broader institutional pressures, politics and opportunities for co-creation at the front-end. The front end is where institutional involvement is likely to be both broad and extensive, especially for megaprojects. Yet the institutional actors at this stage are typically far removed, both spatially and socially, from project execution and post-completion operations. They do not necessarily understand the detailed consequences of their decisions for the co-creation or co-destruction of value.

Co-creation involves a range of internal and stakeholders as part of the service ecosystem. There is a need for interactions and decisions to be made in appropriate institutional and organizational arrangements that use sound protocols supported by control mechanisms that form part of the management of projects whether the project has public and/or private sector sponsors (Artto et al., 2011; Morris, 2013). Yet there is no guarantee that interactions and attendant decisions will lead to co-creation; a lack of integration and co-destruction of value can and does occur (cf. Artto et al., 2015; Mills and Razmdoost, 2016).

Projects are designed to produce specific outcomes, but these outcomes are likely to change over time (Kreiner, 1995), which at the front-end emanates from internal factors as organizational actors change, scope is reviewed and the shape of the project changes. Co-creating value propositions therefore needs flexibility with awareness of the resources that can be combined to create the value over the project lifecycle. Change also emanates from external factors, such as changes in business strategy, policy and spending. Political factors are present in all projects to a degree. Policy factors are prevalent where the public sector is the project sponsor and/or end-user. Megaprojects are highly politicized compared to many other projects, partly due to public sector involvement, but also within the private sector. These factors are amplified by the complexity of context, content and range of stakeholders involved.

Background literature

There is a background literature relating to the main organizational stakeholders providing the facilities for HPC. Ruuska and her colleagues focused upon execution of the new nuclear power station, Olkiluoto 3 in Finland, which has the same EPR nuclear reactor design as HPC. It was commissioned by Areva, now part of EDF, which will act as sponsor for HPC. They found the objectives were misaligned. The roles and responsibilities were unclear, there was a lack of trust with actions informed by assumptions rather than the facts and no prior experience of interaction and joint working in Olkiluoto 3. It was also found that the aggregate capabilities in the project network framed the extent to which the organizational actors can effectively address execution (Ruuska et al., 2009).

They further found the social, temporal and geographical distance between the decision-making actors. The distance and delivery are mediated by both the organizational and

network attributes of the stakeholders, the outworking affecting project practices, which act back to affect the distance between the organizations and actors. The shorter the distance the greater the capacity for co-creating robust value propositions and for subsequent value realization. In the HPC context, the key spatial and social distance occurs between the decision-makers at the front-end and their potential lack of awareness of the consequences of their decisions for value creation or destruction. These are high level strategic decision-makers representing institutions that form the front-end network (cf. Artto et al., 2015). They may not have the necessary high level interaction competencies to protect or co-create value on projects (Chandler and Vargo, 2011; Karpen et al., 2012). Consciously or unconsciously they engage in the co-destruction of value where value realization in use is insufficiently addressed. Further, as institutional arrangements change during the project lifecycle, particularly where there are reviews at the front end, value is easily destroyed (Vargo and Lusch, 2016). Here, distance is defined by institutional interests and associated power, and changes shift the political ground between such interests.

Spatial and social distance also arise from differing cultural norms. There is temporal distance as projects are not only formed around temporary project teams, the actors have no prior interaction nor necessarily continuity of interaction as the project is scoped and shaped at the inter-organizational level (Ruuska et al., 2009). Below the organizational level, the individual actors as public sector servants and politicians change. There is also churn in senior positions in the private sector organizations (cf. Mills and Razmdoost, 2016). Further research examined governance (Ruuska et al., 2011). Good governance and leadership is proposed across a rich and diverse literature as a solution to managing these complex issues, yet there is little agreement as to what constitutes good governance (Müller, 2012) or leadership (e.g. Turner and Müller, 2003), especially on megaprojects, such as Olkiluoto 3 (Ruuska et al., 2011). However, value, and not governance, is the focus in this research.

Turning specifically to the background literature on HPC, Ansar and Flyvbjerg (2016) argue that HPC is fragile. It has a large number of interdependent components. The degree of complexity and customization is considerable when placed in the context of previous project failures, different cultural and actor perceptions, and the “distance in the relationships” located in complex networks (Ruuska et al., 2009:142). Megaproject decisions events investigated elsewhere have tended to use financial measures of value and time criterion (Flyvbjerg et al., 2003; Flyvbjerg, 2008; 2009). Flyvbjerg largely ignores qualitative value and the detailed dynamics in megaprojects.

Morris takes a broader critical perspective for HPC, arguing that the decision-makers have failed to address the project by taking into account what is known about the management of projects at the front-end:

The problems stem from three sources: first, technical difficulties being experienced with the new reactor; second, the financial impact of the resulting overruns on the already stretched suppliers, given the form of contract under which HPC is to be built; and third, the way governance is forcing the go-ahead of the project while ignoring many of the principles of the discipline of managing projects. (Morris, 2016:1)

Knowledge contribution

The research applies SDL as a theoretical lens to analyse a single case megaproject, HPC. The research aim is to use SDL’s conceptualisation of the co-creation of value as an

analytical means to evaluate the extent to which value is shaped at the front-end through interactions, and specifically how the outworking of interactions are evidenced in decision outcomes. Decision outcomes affect value outcomes. Conceptually, how value is co-created or co-destroyed at the front-end scopes the potential for later value realization in use. Co-creation is a different approach to analyzing projects, making a methodological contribution to the study of projects.

The extent to which value realization and thus value outcomes are constrained, indeed ignored to a considerable degree at the project front-end, is under-researched, especially concerning the decisions emanating from the institutional arrangements and organizational activities. Exploring the extent of co-creation and co-destruction of value is a gap where a contribution is to be made, helping analyze the megaproject fragility in a more comprehensive fashion than hitherto. It will contribute to the understanding of SDL, hence the co-creation of value from the viewpoint of management and marketing theorization, and the understanding of large projects and megaprojects, in particular at the front-end.

Methodology and Methods

Methodology

An interpretative methodology is employed for the single case study, HPC. The methodology accommodates the subjective value judgments emitted from the organizational stakeholders that will inform subsequent actions and outcomes (Denzin, 2002). The interpretative methodology informed by phenomenological analysis of value (Vargo and Lusch, 2004; 2016) is used to understand human experiences that are essential to the participants (e.g. Kong et al., 2016; Aydin et al., 2017). Interpretations by the individual actors and from the analysis give meaning to events and decisions. Patterns and experiences are identified, and attention can be drawn to outcomes of significance. The range of evidence used includes public statements from the stakeholders, the individual actors involved and reporting about the decisions. Using this evidence is entirely in line with SDL and value co-creation as both emphasize outcomes. Taking decisions as types of outcomes in their own right are part of the co-creation process, through which it is possible to trace the potential scope for value realization post-completion. Statements by commentators are similarly outcome assessments at the point reached in the project.

Methods

The research poses challenges for its design and empirical investigation. Decision-making is difficult to research, especially for contentious projects such as HPC, because there is considerable political and commercial sensitivity. Further, the UK Department for Business, Energy & Industrial Strategy in its previous ministerial form as the Department for Energy and Climate Change resisted requests submitted by Dr Lowry, a senior research fellow at the Institute for Resource and Security Studies, Cambridge, Massachusetts, under the Freedom of Information Act, to provide documents that were submitted to the European Commission (The Guardian, 2016a).

The data comes from the reports and statements made by stakeholders, individual actors involved and indirectly through commentators. Reliability is an issue:

The problem with using the press as a source of event data is that the validity of newspaper information is questionable. (Franzosi, 1987:6)

Editorial policies and selectivity of information are influenced by commercial criteria. The result reflects intention and provides meaning. However, the data does provide strong evidence of decision outcomes. Reliability is enhanced by viewing a range of publications as evidence. It is in line with historical methods and the more phenomenological viewpoint adopted by Vargo and Lusch (2004). Yin (1989) supports the use of archival material. Secondary data, including reports and media analysis is an established method in this research context (Ruuska et al., 2009; 2011). There is an additional ethnographic element. Indirect evidence provides social and societal reflection upon social interactions. Further, historical methods do not so much discover a past as give meaning (Tuchman, 1994):

*The historian's basic task is to choose **reliable** sources, to read them **reliably**, and to put them together in ways that provide **reliable** narratives of the past.* (Howell and Prevenier, 2001:2, emphasis in original)

Analyzing decision outcomes aligns with this method. The researchers are not present at the decision-making events yet have access to reflections of others after the event. The analysis involves analyzing patterns, processes and events of importance, such as reviews and turning points (Smyth and Morris, 2007). Individual decisions and events are not in themselves always decisive, but contribute to forming a coherent overview. This essentially means that a weight of evidence argument is employed (Lakatos, 1970), whereby research progressively presents additional evidence to point towards particular outcomes, in contrast to verification or falsification arguments. In this case the evidence is qualitative and subject to interpretation.

SDL, methodology and methods

The interpretative methodology with a phenomenological element is introduced via SDL. SDL as a theoretical lens also offers a methodological approach to examining project research. Project management has traditionally been concerned with inputs and outputs. Value has been defined accordingly. Even benefits delivery is focused upon the outputs that are subsequently put to use, although there has been some broadening to include impact (e.g. Morris, 2013). Value has not been considered in terms of value realization. Realisation is phenomenological as it depends upon realization in use within the context of operations and also depends upon the perceptions of the users. This is what Vargo and Lusch meant by saying all market activity renders a service (Vargo and Lusch, 2004; 2016).

SDL is providing a different methodological approach to considering projects, requiring greater examination and understanding of sponsors and users to co-create value propositions that scope the potential for value realization. It also requires data on how different types of projects are used, which can only be addressed with longitudinal analysis (Smyth et al., 2016).

Vargo and Lusch (2004) also indirectly challenged the resource-based view of the firm by arguing that value is created by combining resources between providers, which is familiar in project research for multi-organisational project teams and their supply chain. It is less familiar regarding end-user resources. It is seen on projects through normative and prescriptive alliances and collaborative practices. Vargo and Lusch say co-creation is always occurring, even where relationships are self-interested and adversarial. Thus, service provision and value co-creation begins at the front-end and continues post-completion. It is not bound by execution timeframes where provision is outsourced.

In these ways, SDL also provides a different methodological approach to examining projects. Developing SDL makes a potential methodological contribution to examining projects, and developing this in the future will also make a contribution to SDL, especially theorization around asset specific service provision undertaken by contract. The specific and first contribution towards SDL as a methodological approach is to examine SDL at the front-end of a megaproject.

Case description

The examination is conducted by assessing the front-end of Hinkley Point C (HPC) Nuclear Power Station, which is to be built as a UK-French joint venture, supplemented with Chinese finance. HPC was proposed in the mid-2000s by British Energy with an estimated construction cost of c.£6bn or six million million (c.€7bn at first ¼ 2017 currency rates). This was considered by the former UK Labour Government. EDF bought British Energy for £12.4bn (c.€14.5bn) in 2009, which included 8 UK nuclear sites, including Hinkley Point. The key stakeholders are currently:

1. The British Government represented by the Ministry responsible for energy, which has undergone a series of name and organizational changes, alongside three changes in government (Labour, Conservative-Liberal Democrat coalition, Conservative);
2. Electricité de France (EDF) is the sponsor and owner, the French state owning 80% of EDF;
3. The China General Nuclear Power Company (CGN) agreed to provide £18bn (c.€21bn) or 33% of the estimated finance in 2015 when a memorandum of understanding was signed. The CGN finance includes the China Development Bank (CDB), which in turn provides CGN with low-cost financing and a full range of financial services (China General Nuclear Power Company, 2015, cited in Wang et al., 2016), and has Chinese state support for involvement in UK nuclear power. CGN set up four UK subsidiaries during 2016, three of which are for managing 3 UK nuclear projects including HPC (Ministry of Commerce of the People's Republic of China, undated, cited in Wang et al., 2016);
4. The UK power companies are responsible for electricity distribution and paying the strike price for the electricity;
5. The UK utility companies, which also includes EDF, supply the electricity to customers who will pay for the electricity at the prevailing market rate, which may differ from the strike price, the current assumption being that there is no government subsidy to bridge any difference between the strike and market price.
6. The contractors and supply chain, which have been responsible for the enabling work and those that will be responsible for execution of the project.
7. External stakeholders, such as electricity consumers.

All the stakeholders are involved in the events and decisions prior to starting on site, although the first four sets of stakeholders have greatest input to and impact on the decisions. The particular focus is upon key decision outcomes. These have implications for what enters into the HPC value proposition. It has been argued that the value proposition frames the scope and potential for subsequent value realization in context and use. The project falls into the category of a large project or megaproject (cf. Miller et al., 2000; Flyvbjerg et al., 2009).

Analysis of Centrale Nucléaire Hinkley Point C or Hinkley Point C Nuclear Power Station (HPC)

The UK government gave the go-ahead for a new generation of nuclear power stations in January 2008. These are to be built by private sector firms. EDF Energy is considered for these purposes to be private sector though it is largely a state-owned French firm. EDF's involvement in HPC is uncontested. As Morris stated:

No other suppliers were invited to bid. It is not clear why not. Perhaps because the bid costs would be very high and the danger of major issues being obfuscated and under-recognized were quite real – as indeed has proved the case at Olkiluoto 3 and Flamanville 3. Partly too no doubt because EDF were the incumbent and had embedded knowledge of the project. But also because the British Government wanted someone who could arrange the financing and building of the plant itself. They were in effect asking EDF, as supplier, to finance the cost of the power station – a form of DBFO – Design-Build-Finance-Operate. (2016:10-11)

The further reason is that EDF has a monopoly of the site through acquisition of British Energy in 2009 and site ownership became conflated with the right to build the plant. This is a decision by default that led to a lack of public accountability and transparency. The interactions are largely political and appear to involve minimal consideration of consultations over which parties became the key stakeholders. It is more communicative than dialogical (cf. Ballantyne and Varey, 2006). It may have implications for value co-creation either because it potentially increases the integration, hence frames co-creation, or obscures co-destruction of value at the front-end and during construction of the plant.

In support of integration to frame co-creation, France has the largest nuclear programme in Europe. There are 58 Pressurized Water Reactors (PWRs), which are tried and tested forerunners to the new EPR design. These plants operated without undue problems, minimal incidents and their life has been extended by 10 years as a result. The generation costs for these plants is in the range of €40-50/MWh (circa. £34-43/MWh following Brexit referendum devaluation, November 2016).

The intention is to consider in turn cost, time, scope as these are the main criterion others have employed, and then look towards value realisation.

Cost and related issues

The tried and tested PWR design was followed by the new EPR technology for HPC in line with Olkiluoto, Finland and Flamanville, France. The EPR is designed to withstand terrorist or enemy attack once in operation. This makes the EPR extremely expensive to build (Financial Times, 2016a). Many issues are rooted in this change and the failure of the design from the construction viewpoint. The cost has been seriously underestimated for both the Olkiluoto and Flamanville nuclear power stations by a factor of three and the costs have escalated at the front-end for HPC. Capital cost was estimated at £6bn (c.€7bn) mid-2000s, rose to £16bn (c.€18.6bn) by 2013 and £18bn (c.€21bn) by August 2016. Academic and media debates focused upon capital cost escalation (cf. Flyvbjerg et al., 2003). These evaluations refer back to the original cost estimates rather than look at the value that is expected to be derived in use. These evaluations do not consider cost estimates and revisions on their own terms, hence any necessity for them, nor traditional cost-benefits analysis, and ignore potential value outcomes from the value proposition. Cost escalation is somewhat

meaningless without an assessment of the outputs and value outcomes. Capital cost is only expensive in relation to the escalation of the estimates, which may reflect growing realism and certainty, rather than misrepresentation. A case in point is the analysis of the Olympics, which under most criteria proved very valuable and useful despite the difference between the estimate submitted when bidding and outturn costs for the Olympic Park. Yet, Flyvbjerg and Stewart (2012) only focused on the cost measure, and ignored both traditional value for money assessments (inputs and outputs) and more fundamental value outcomes both during the Olympics and subsequently for the legacy, which however tentative is still being realized.

The strike price for electricity has changed over the period. The UK government committed to pay £92.50/MWh, which is over double the current market price of £40 (c. €46.6) in the UK, although within the range of French rates (Financial Times, 2016b). The price paid by consumers is an important part of the use value. The outturn costs have a use value, which economists tend to assess in terms of opportunity costs, others in terms of cost-benefit, and yet overlook value propositions and value realization post-completion.

SDL has moved away from cost and price factors, yet finance and profit do have use values (Smyth et al., 2016). There is clearly a cost issue to consider, although the UK government argued the critical factor is having continuity and consistency of supply for commercial and domestic users. The implication is that the high cost represented in the strike price is justified, even though market prices will go up or maybe will be forced up to bridge the gap without a government subsidy. A subsidy could cost government £37bn (c.€43.2bn) over a 35-year period (The Guardian, 2016b). The argument is predicated, not so much on the project, but on the businesses models of government and the large private organizations involved. The motivation to the decision outcomes appears to be mainly about political inputs rather than value in use as an outcome. Those driving the political decisions are at considerable social distance from the project and plant operations with the consequence that the value in use criteria are difficult to assess, even if there were desire to consider these. This threatens delivery of value and invokes the potential for value co-destruction over the project lifecycle, for the plant in use and for the cost of electricity supply.

Decentralized supply from a diverse set of regional and local suppliers with very different business models could yield an entirely different result. There is an apparent shortcoming in addressing this type of option in policy and firm selection – a consequence of the UK political drivers rather than value in use criteria. A further option that appears to have received scant consideration is electricity importation directly from France or elsewhere, such as thermal power from Iceland. One commentator goes as far as to claim there will be “no demand for continuous and expensive nuclear power in the UK” by 2029 as renewables develop, leaving the UK exporting electricity to France or elsewhere that is subsidized by UK consumers through the strike price (Barham, 2016).

EDF executives commissioned a report, *The Cardiff Report*, from auditors about whether time and cost targets could be met. The assessment is that there is a 50% chance of meeting the cost, estimated at £16bn (c.€18.6bn) (Financial Times, 2016b). The management of decisions around cost points to what is referred to in terms of the destruction of value (Daily Mail, 2016a), where the political considerations drove decisions towards the high cost centralized model of provision. Managers in EDF advised their board members that they could be held personally responsible if they continue to support HPC. EDF’s finance director resigned in March 2016, one of a series of resignations, including the state representative on the board and the former chief executive. The director stated: “I no longer want to support a

strategy that I do not agree with” (Daily Mail, 2016b). Yet the directors continue to support the scheme, despite delaying the decision over the summer of 2016. The business model for the increasingly overstretched firm, EDF, became seemingly untenable by early 2016 in the face of UK-French politics to press ahead. The French economy minister, Emmanuel Macron, exerted pressure on EDF to proceed following the Brexit vote. According to an ex-French government nuclear advisor, “There is now a large front inside EDF, inside the nuclear establishment in France, advising against the construction because the sheer size of it could not only put EDF at risk, but the whole state finances as well” (Daily Mail, 2016b). French politics represent inputs that are driving the decisions, and the “large front inside EDF” are concerned that the project outcomes are not going to prove useful for the company. The political decision-makers driving the outcomes operate at considerable social distance from the project and plant operations. At a more detailed level, the churn of decision-makers creates discontinuity, disrupting the norms from an institutional perspective, and introducing personnel that have been at greater social distance from prior decisions. Further co-destruction of value could be an outcome.

The UK Department for Energy and Climate Change (DECC) claim: “Hinkley will generate enough low-carbon electricity to power six million homes and around £10” per household representing 7% of Britain’s total electricity, and that the UK government “have set the strike price to protect bill payers if energy costs go up or down, so the cost of the project to consumers will not change” (The Guardian, 2016b). This is an example of use value being considered, yet fails to challenge the type of proposition arising from the business models employed and hence what alternative propositions may be capable of achieving. At the next layer of decision-making, this is also the result of perceived lock-in to EDF rather than selection of a provider driven by value in use criteria.

In addressing the business model against alternatives, other supply options or combinations could change the cost profile and the safety issues around new nuclear without increases to the carbon footprint. Such an approach would potentially yield different outputs in terms of value around the point of exchange and could dramatically alter the realized value in use, especially in the context of the environment and safety. However, ‘what if’ arguments are limited in themselves, yet serve to highlight the shortfall in addressing value outcomes.

Further, the UK government is no longer accounting for the true costs. As with historical nuclear power programmes in the UK, the cost of storing and processing radioactive material is excluded. The UK government released the *Nuclear Waste Transfer Pricing Methodology Notification Paper*, marked “commercial in confidence” and stated, “unlimited exposure to risks relating to the costs of disposing of their waste ... could not be accepted by the operator as they would prevent the operator from securing the finance necessary to undertake the project”. This forms part of a confidential cap on the costs to be incurred by EDF for costs covering waste and the eventual decommissioning of the plant, but the level of the cap is not being made entirely transparent according to Dr Lowry, a senior research fellow at the Institute for Resource and Security Studies, Cambridge, Massachusetts, who made a Freedom of Information request. But what became clear is that cost overruns had been transferred from EDF to the UK taxpayer, the paper stating, “The UK government accepts that, in setting a cap, the residual risk, of the very worst-case scenarios where actual cost might exceed the cap, is being borne by the government” (The Guardian, 2016a). The UK government subsequently denied the taxpayer will foot the bill above the cap. The co-destruction of use value to consumers is being concealed in the process.

Flyvbjerg argues that privately funded projects are more realistic in their estimation of risk (Flyvbjerg et al., 2003). That does not accord with the current cost estimates for the 'private' provision of HPC through EDF, with some critics estimating the capital cost could rise to £29bn (c.€33.8bn) (Daily Mail, 2016b). The costs are so high and potential overruns are too large to be acceptable to private sector funders according to Morris (2016). Ansar and Flyvbjerg (2016) argue that a shock during execution will expose the fragility of the project, resulting in immense investment losses. China's involvement through CGN is less about yielding a return on the investment and probably more about having a stake in key assets. While it is unnecessary to refer back to original estimates to evaluate costs, available data strongly points to costs seriously undermining value for money in terms of the outputs and that the potential realised value in use will not justify the cost of the project or for electricity supply.

At an overall level, this analysis shows that the financial structure and cost potentially undermines the co-creation of the value proposition, and hence the potential qualitative value in context and use. This supports SDL as a lens of analysis at this general level. At a more detailed level of analysis, the evidence on cost supports the challenge to SDL that marketing may have moved too far away from exchange value (cf. Smyth et al. 2016) for both the project and electricity supply. Cost needs to be more centrally addressed in the value proposition, profit as use value to providers and cost for the use value than is current practice in SDL theorization. This section has shown that rising costs and indirect costs are major contributors to the co-destruction of value.

Time

The timetable for HPC slipped in the wake of selecting the EPR design and technology being used for Olkiluoto and Flamanville power stations. The cost issues resulted in changes of stakeholders, for example the co-investor, Centrica, pulled out in 2013 and was replaced by CGN of China, the changes causing delay as interactions had to be restarted. The discontinuity of the institutional arrangements, the resultant interactions and delays have the consequence of the potential retardation of value co-creation and potential for co-destruction of value at worst, especially where new individual actors are more skeptical and wish to make fewer long commitments and reduce risk in the value propositions. There have been multiple changes at UK government level – three different governments with 4 different prime ministers and multiple changes in the minister responsible as well as restructuring in the ministry for energy. On the French side, there have been changes to the key EDF decision makers. Institutional arrangements are challenged without challenging the norms concerning the value criteria, indeed, the changes probably reinforce the current norms as the social distance from the project is amplified and the spatial distance from the operational site impinges the potential to learn or increase awareness around value related issues.

All the changes combine to make the interactions difficult to build and co-create value at the front-end. They leave open the suspicion that value may be being destroyed during these interactions. It certainly resulted in decision-makers being drawn into defending cost as the primary concern in relation to original estimates. France's standing as a leader in nuclear power generation, EDF's financial standing, UK government and taxpayer exposure to debt and cost risks are all at stake. Political and commercial management to address the concerns all tend to incur delay, and with delay costs rise and discontinuity increases. Change among the organizational stakeholders and individual actors is part of the flux and discontinuity of interactions that leads to co-destruction (Mills and Razmdoost, 2016). Therefore, co-

destruction is being compromised regarding co-creation during front-end interactions, as well as being compromised for post-completion as the previous subsection showed.

Less attention is being given to the Chinese motivations for being involved and whether there are implications for the very long term value derived by the UK, especially if there are extensive delays or further cost escalation. That could result in even greater Chinese involvement and greater dependency. Dependency on France has implications too in negotiating Brexit. Interactions around such dependencies could cause further delays. By 2016, coal fired power stations were closing more quickly than the UK government policy anticipated (Financial Times, 2016b). This increases dependency on HPC provision. This may not look unreasonable from the political standpoint, but as Morris states:

...the real problem area is not so much the schedule but the contract laid upon EDF that would determine how such delays and difficulties should be dealt with. And here the proposed arrangements are very worrying. Given the worsening financial position of EDF and the likelihood of delay and cost growth, the procurement strategy seems back-to-front. Risk is not allocated appropriately. (2016:13)

The more that the contractors during execution have to focus on tight schedules to meet the contract, the more likely compromises in the work quality and reduction in the scope may be agreed to meet time and cost criteria. This will destroy value in use.

Overall, this analysis on time shows the potential for co-creation of value to be compromised, hence both value for money to be reduced as an output measure at the completion stage and for value realization to be compromised in use. Value is probably being co-destroyed in the process. Again, SDL as a theoretical lens is of use as a means of analysis at this general level. It is difficult to penetrate the exact implications for time until execution begins and SDL does not help evaluate that any more than other means of analysis. Although SDL also claims to take account of the broader ecosystem and institutional layers, this is only partially addressed. For example, for a project such as HPC, the discontinuity of stakeholders and individual actors changes the value proposition, hence potential co-destruction and co-creation of value. This arises from change in the institutional arrangements, and arises from the social and locational distance of decision-makers at the front-end from the project.

Scope

Two central factors to scope have already been raised above. First is the reliance on a single power station to plug the demand gap, in other words the risk of centralized business models that result in scaling up electricity generation plants. Whether diverse provision could reduce costs is addressed above, but scaling up sources of provision does not mean that the resultant projects can necessarily be successfully scaled up, and here Ansar and Flyvbjerg (2016) have made a good argument. There are also safety issues beyond the reactor design. Large single plants carry operational risks. The consequence of a major accident is considerable upon the locality, region and nationally, not least because of the direction of prevailing wind. Assessments also exclude risk under destabilized political and social conditions in a changing world. Second is the exclusion of waste management from the project scope. This is essentially a cost issue underpinned by political reasoning about wanting to see certain types of political outcome that fit the political mindset and firm business models rather than what is valuable for society. Yet the UN has found the UK to be non-compliant with Convention requirements regarding transboundary impact in the wake of a major incident (UN Economic

and Social Council, 2016). This is raises the spectre of the co-destruction of value in scoping the overall value proposition.

According to Lessard (2016), we are moving into the post-megaproject era towards large or “minimega” projects facilitated by regulations and market mechanisms, in particular to meet the needs of a low carbon economy. However, it is the large scale nature of HPC that governments uncritically see as serving future needs. The UK Secretary of State for Business, Energy and Industrial Strategy recently states that HPC plays an important part in ensuring our future low-carbon energy security. The EDF Energy CEO stated:

Hinkley Point C will kickstart Britain’s nuclear revival. It has overcome obstacles and challenges which will benefit our next nuclear projects in Britain. This huge investment has been made possible by the consistent policies of successive Governments to provide secure, affordable, low carbon electricity. I want to thank our team, our suppliers, trade unions and the people of Somerset for their dedication, determination and patience. Their support has been vital to our success. (EDF, 2016)

The notion of not proceeding with the project because the scope may be inappropriate appears to be inadequately addressed by the UK government. Political drivers rather than project management criteria are to the fore of decision-making. Yet, the Finnish electricity company, TVO, cancelled building a second plant currently because of delays and problems with the EPR being built by Areva and Siemens at Olkiluoto (Ecologist, 2015). France's nuclear safety regulator state the flaw in the steel housing of the EPR core at the Flamanville plant is “serious”, and unless put right the project could be halted, although the pertinence of such action would be questionable as many believe it is fundamentally a design problem (Broomby, 2015). Redesign to defend the value of the content would only result in further delays and increase costs, hence a potential net value loss.

The review by the UK government led to the approval of HPC in September 2016. Additional safeguards are claimed to have been secured. EDF are bound into share ownership to prevent sale to foreign investors. Additional safeguards over security due to Chinese involvement are being incorporated, although this adds complexity. The Chinese have been invited to submit a further proposal to build a new reactor at Bradwell to a Chinese design, perhaps as compensation for political disruption and embarrassment. Finally, the UK government state they will hold a “golden share” or controlling stake in future infrastructure projects, which is tacit recognition of the risks and front-end failure associated with HPC, yet recognition of political imperatives, as Simon Jenkins writing in *The Guardian* bluntly noted:

The prime minister has to get this one right. She needs to show herself rational, decisive and immune to the blandishments of the Downing Street old guard... Downing Street knows what the Treasury knows and every pundit and commentator knows. They know what the Chinese and French know. They all know that Hinkley is a dud, a rip-off, a blunder. (Jenkins, 2016).

The French government also faces political pressures. As Ansar and Flyvbjerg noted:

...the decision not to build the megaproject [would be] politically embarrassing for EDF and the French government who have pursued a policy of resurrecting the global nuclear industry under French leadership. (2016:40)

The decision made in September 2016 is to press ahead.

Conclusion

The research has applied SDL as a theoretical lens to analyse a single case megaproject, and in so doing make a methodological contribution researching projects. The research has used the co-creation of value as an analytical means to evaluate the extent to which value is successfully shaped at the front-end. The resultant co-created value proposition scopes the potential for value realization in use. The analysis focused upon decisions at the front-end as evaluative outcomes regarding the co-creation process. The evaluations came from the stakeholders, individual project-related actors and other informed commentators under conditions of changing institutional arrangements and key decision-makers.

The primary findings show that the decision-making has ramifications beyond the time-cost-quality/scope criteria of project management. Indeed, these criteria detract from the co-creation of value through interactions at the front-end to form value propositions with consideration for value realized in context and use post-completion. At a more nuanced level, it is found that cost is treated somewhat as a standalone absolute in project management, using the SDL lens; while SDL theorization pays insufficient attention to cost in exchange, as this is part of the value proposition agreed at the contract stage. Indeed, for providers, profit embodied in the costs are part of the value in use for supply-side stakeholders.

The long term issues around benefits delivery and the extent to which this leads to successful value realization remain largely overlooked in project management, especially for megaprojects. Indeed, organizational stakeholders, individual actors representing them and commentators have focused upon managing the political, financial and temporal risks. While these motivations may be sound, the resultant decision-making constrains interactions to co-create value. It will lead to subsequent co-destruction of value due to institutional change, discontinuity of interactions and social distance of decision-makers, delays and cost escalation.

Political factors around national and international issues above and beyond the project are to the fore in the case of HPC. Political considerations further limit the scope for value realization. The overall *raison d'être* for HPC has been brought into question. Set alongside traditional project management criteria the *raison d'être* is extremely weak.

The reliability of the findings is a limitation for the research. The approach adopted has precedence in prior research (Ruuska et al., 2009), and reliability has been pursued in using historical methods for interpretation (Franzosi, 1987). However, the evidence is largely indirect because of the nature of the project sensitivities around decision-making. Nonetheless, the patterns, processes and important events build into a reasonable picture that provides a qualitative weight of evidence (Lakatos, 1970).

There are several contributions to knowledge arising from the choice of HPC and the analysis. First, applying SDL as a theoretical lens to both the front-end and a megaproject makes an original contribution. Second, SDL offers a methodological approach to the qualitative study of projects. The phenomena of co-creation and value realization in context and use is a further related contribution. Third, few SDL empirical studies have been conducted, especially in asset specific markets. This research contributes alongside other

project related studies (e.g. Wikström et al., 2009), although projects remain an under-researched area of marketing (Smyth, 2015). Fourth, the co-creation of value in SDL is further complemented by building upon the dark side of the concept, the co-destruction of value (Mills and Razmdoost, 2016). Indeed, the findings highlight the co-destruction of value at HPC's front-end which compromises value outcomes in use.

There are several recommendations for further research. Employing SDL as a theoretical lens and methodological approach along all project lifecycle stages, including longitudinal studies in use provides an important impetus for research, perhaps enabling identification of generic categories of phenomenologically experienced value in use and context. Examining profit as value outcomes on the supply side is overlooked in SDL and requires examination. Interactions of co-destruction regarding both benefits delivery and value realization in use are important areas for research. The political dimension on megaprojects warrants more research attention. Further research on governance will also be useful (cf. Ruuska et al., 2011).

To conclude, large projects and megaprojects are subject to front-end forces that constrain the scope for co-created value and value realization post-completion. Co-destruction of value appears a dominant factor. This accords with the work of Flyvbjerg (e.g. Flyvbjerg et al., 2003; Flyvbjerg, 2008), yet has far broader and deeper implications beyond the bounds of behavioural economics. This paper has applied SDL as a conceptual means to secure a finer grain of understanding of value through processes of co-creation and co-destruction of value proposition content that affects subsequent value realization of the project in use.

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