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## INNOVATION AND THE CO-CREATION OF VALUE IN CONSTRUCTION

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### ABSTRACT

Construction businesses balance market and project risks in resourcing innovation and value creation. Technical, technological and management innovation are considered using the marketing lens of the service-dominant logic. The co-creation of value is a primary concept, which is largely unexplored in construction, especially related to innovation. Co-created by main contractors and clients is defined as value generated in context and use.

The paper is part of a programme of work, applying an interpretative qualitative approach. The method for data collection was semi-structured interviews, derived from six major international main contractors. Thirty-nine interviews were conducted with a range of senior management, functional heads and project managers responsible for identifying innovation and value creation opportunities.

The overall findings fall into three main areas. First, management perceived construction to be suppliers of technical expertise. Second, projects are perceived in terms of expert inputs. Third, associated tasks are conducted to meet programme schedules and requirements. Opportunities to co-create value are largely pursued reactively and opportunities to innovate through top down or project induced capabilities are largely overlooked. Where innovation occurred it was largely initiated through a combination of co-creation drivers supported by management pull factors rather than innovation drivers and a technology push.

Keywords: Contractors, Innovation, Marketing, Service-dominant Logic, Value Co-creation

### INTRODUCTION

Research has found low innovation levels in construction (e.g. Winch 1998; Barrett, et al. 2008; Ozorhon, et al. 2010). The *co-creation of value* is an emergent concept in construction (Liu, et al. 2014). Bringing co-creation together with *innovation* makes an original contribution to understanding innovation in construction. Value co-creation emanates from the service-dominant logic (SDL) in marketing theory (e.g. Vargo and Lusch 2008). This new perspective in this research combines innovation with an exploration of value co-creation. SDL is defined as follows:

*Whereas goods-dominant logic sees services as (somewhat inferior to goods) units of output, service-dominant logic sees service as a process – doing something for another party. The locus of value creation, then, moves from the ‘producer’ to a collaborative process of co-creation between parties.* (Vargo and Lusch 2008: 255)

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Innovation is traditionally perceived and analyzed in terms of inputs. SDL conceives innovation not in input-output or exchange-price terms, but in terms of “how firms can better serve” their customers (Vargo and Lusch 2008: 5). The aim of this approach is to link outcomes relating to context and value in use (e.g. Akaka, et al. 2013). The *co-creation of value*, as a major tenet of SDL, implies that customers and providers are jointly responsible for solving customer problems (Vargo and Lusch, 2008). Innovation brings forward new value propositions either by developing solutions to integrate practices and resources (Skålén, et al. 2015) or through joint problem solving, thus inducing new service capabilities (e.g. Barlow 2000).

The research *aim* is therefore to evaluate innovation through value co-creation. The data comes from six international contractors. The *objectives* are to examine linkage between innovation and co-creation, hence, theory-practice gaps between the two.

## LITERATURE REVIEW

Main contractors are service organizations acting as systems integrators (Davies, et al. 2007). Integration includes innovation for the provision of value propositions in use by clients (Blindenbach-Driessen and van den Ende 2006). SDL goes further, where innovation and co-created value involves integrating dependent and dynamic resources on both the demand and supply side. Yet the traditional construction focus is upon inputs, where innovation is the generation, development and implementation of ideas (e.g. Dulaimi, et al. 2005). The source of innovations can be driven from the supply side, deemed to be fundamental *push factors* for construction innovation (Manley, et al. 2009). Push factors cover technical, technological and management capabilities (e.g. Slaughter 1993; Brady and Davies 2004). Yet main contractors try to minimize investment and expenditure to survive (Keegan and Turner 2002). Gann (1997) argued other specialist subcontractors and suppliers are better placed to innovate. Innovations arising on the demand side are termed *pull factors*. The source may be clients or can emerge on site for management through project team problem-solving (e.g. Barlow 2000). Technical adaptation is a common innovation in response to emergent problems (e.g. Manley, et al. 2009).

Projects do not inherently promote innovation; they lack organizational memory (Dubois and Gadde 2002). All innovation therefore requires management at three levels: organizational level, programme management level for embedding and pan-project spreading innovation, new project capabilities. The barriers to innovation include project manager (PM) mindsets (Dulaimi, et al. 2005), a task focus (Smyth 2015), cost and risk criteria without an innovation champion to overcome the barriers (Nam and Tatum 1992) and competencies, capabilities, and collaboration practices to facilitate it (e.g. Brady and Davies 2004). In these ways management can also be a source of innovation.

Innovation can yield efficiency gains and reduced costs, derived from analysis based upon inputs. SDL challenges this conception, focusing beyond exchange by considering the potential value to be realized by customers and stakeholders in use and in context (Akaka, et al. 2012). Products and services as inputs render a service in use (Vargo and Lusch 2008). Value is therefore always co-created through the combined integration of resources on the supply and demand sides (Vargo and Lusch 2008). In construction co-creation is also conducted simultaneously through collaborative and

dialogical processes (Grönroos and Gummerus 2014), which are pertinent to the extended exchange period represented by project execution.

Under SDL service innovation occurs through configuring value propositions through provision, representational, management and organizational practices and capabilities (Skålén, et al. 2015), derived from resource allocation decisions in portfolio management, programme management, project management, and the network level. In projects, value in context and use means service provision along project lifecycles and the realized post-completion value (Smyth 2015). For example, BIM as an innovative technology is grafted onto existing practices, but to induce the maximum value in use and context, it also requires management innovation to reconfigure delivery by changing the business model to reconstitute service design (cf. Romme 2003). This engages with portfolio, programme and project management. Whether optimal value is realized also depends on how clients and end-users engage and use the inputs, applying them to solve the specific and organizational issues that led to commissioning the project. What this encapsulates is the co-creation activity where the supply and demand sides are mobilizing and integrating resources for value generation. Integration is a management function at organizational, project and network levels.

## **METHODOLOGY AND METHODS**

This research applies an interpretative methodology. The qualitative method for data collection was data derived from 39 semi-structured interviews in 6 international main contractors (see Table 1). The research did not specifically set out to explore innovation, yet a benefit of employing open-ended questions is the unanticipated findings that arise. Thus, the interview questions were not purposively structured around innovation, and there was only one question specifically on co-created value. However, the responses yielded data for analysis for the focus of this paper. The findings generated both patterns and outcomes of significance (Smyth and Morris 2007), where the capacity to act innovatively was a moderating condition that invoked value co-creation processes.

<b>Firm Alias</b>	<b>Primary Activities</b>	<b>Divisions Interviewed</b>	<b>Interview Respondents</b>
EUCo	Civil Engineering & Infrastructure and Specialist Subcontracting	Civil Engineering & Infrastructure	Chief Executive (CEO) 2 Regional Business Development Managers (BDMs) Senior BDM 2 BDMs Head of Public Relations and Communications Contracts Manager Head of Business Processes & Sustainability
EuroCo	Building, Civil Engineering & Infrastructure and Specialist Subcontracting	Building, Civil Engineering & Infrastructure	Customer Solutions Director Head of BD Sector BDM BD Coordinator Head of Procurement Commercial Director Technical Service Director 2 Project Directors
AntCo	Construction and Development	Construction	Head of New Business Head of Procurement BM Head of Project Management
UKCo	Building, Civil Engineering & Infrastructure, Consultancy	Infrastructure & Consultancy	BD Director 2 BDMs Head of Procurement 2 PMs
BritCo	Project Management, Contracting in Building and Civil Engineering	Main Contracting in Refurbishment and Fit Out markets	Procurement Director Head of Bid Development BM Estimator Marketing Manager
FinCo	Construction and Development	Building and Property Development	Senior VP for Marketing and Bid Strategy Director responsible for Bid Management and Sales Director for Business Premises Chief Estimator

Table 1: Schedule of case study contractors and personnel

## FINDINGS AND DISCUSSION

Construction projects are innovative prototypes, creating the preconditions for other routinized activities. Projects were repeatedly reported as incurring risks, which together with market risks inhibit investment for innovation. Value was perceived as technical inputs, bundled into packages for ease of management and risk control rather than value optimization (Head of BD, EuroCo; see Table 2). An exception was EUCo, which bid for complex projects using its own specialist subcontractors.

Projects were managed during business development (BD) and bid managers (BMs) to meet stated requirements rather than proactively mobilizing value through organizational resources and capabilities, supply chain procurement and trying to add value (e.g. BM, BritCo). Business development managers (BDMs) were reluctant to make commitments or provoke any potential for innovation; they had difficulty in securing resources from main Boards and lacked confidence that PMs would align delivery (BDM, EUCo). One view was that value identification occurs solely during BD and in prequalification submission documents (CEO, EUCo).

There was evidence of selective network and cross-functional project learning leading to technical and technological innovation in execution. FinCo developed a “space genius” for mechanical and electrical services’ to co-create solutions around air, light, heat and space utilization. This increased the attractiveness of the commercial developments for its property subsidiary despite carrying higher capital service costs (Director for Business Premises, FinCo; Table 2).

A low resource base at portfolio and programme levels incurred minimal opportunities to build innovative project capabilities before and during execution. Yet, respondents were committed to using available resources to solve emergent problems. Early contractor involvement and collaborative practices enabled problem solving and were said to facilitate value co-creation (e.g. BDM and PM, UKCo). Only two respondents had heard of the co-creation of value (Senior Vice President, FinCo; Contracts Manager, EUCo). Respondents associated the term with partnering, alliances and collaboration (e.g. BM, BritCo). Post-2008 informal partnering and collaboration were used to drive down supply chain prices (e.g. CEO, EUCo). This represents a retreat from technical innovation through the use of corporate capability development, although project level collaboration was perceived as an effective source of responsive problem solving (e.g. Head of Project Management, AntCo; Contracts Manager, EUCo). There was recognition for the need to use collaboration as a major source and stimulus of value co-creation (BM, AntCo; Table 2).

BDMs were mainly project pipeline managers rather than client managers trying to understand what clients valued. BMs were cost, not value driven, responding to client requirements rather than opportunities to innovatively configure value propositions (BDM, EUCo). Value was discussed in terms of cost reduction (e.g. Regional BDM, EUCo; Table 2), including value management and engineering (PM, UKCo). Innovation around management capabilities was present. For example, four of the six firms recently introduced key account management (KAM) into client management, made in response to demands for greater service consistency during construction and increase service continuity. KAM implementation was partial, especially at programme level, including the potential to co-create value (Table 2).

Respondents saw management capabilities as a source of improving inputs and task conduct around technical expertise connected to specialist disciplines. They did not perceive management capabilities as service innovations nor construction and project management as a service, which is a barrier to innovation and value co-creation.

The supplier network was important for innovation due to the technologies of specialist subcontractors (BDM, EuroCo), mobilized through procurement expertise (Head of Procurement, EuroCo) rather than what clients saw as valuable. Overall, there was limited innovation; it was largely client driven (e.g. CEO, EUCo), where innovative co-creation was described as “intense collaboration”.

<b>Issue</b>	<b>Responses</b>	<b>Respondents</b>
Market Risk and Organisational Investment	Bidding for projects assessed centrally for projects in relation to market conditions	Commercial Director, EuroCo
Project Risks and Organisational Investment	A gateway process to mitigate risks	Head of BD, EuroCo
	Risk aversion in project management leads to diminution of specialist in-house technical expertise	CEO, EUCo
	Lack of resource commitment, thus BDMs do not have the authority to “make significant promises” that are “differentiators”	BDM, EUCo
Business Development (BD) and Procurement	Resources committed at project level for problem solving to meet client stated requirements and emergent demands	BDM, UKCo
	Lack of cross-functional dialogue and activities conducted as expert inputs rather than coordinated activities	Head of Procurement, EuroCo
	Lack of cross-functional dialogue and coordination for value identification and configuration for execution	PM, UKCo
Learning and Capability Development	Concerning adding potential value, “We give it all away to win a job is the brutal truth”.	Technical Service Director, EuroCo
	Added value M&E innovations, co-created with the property development company	Director for Business Premises, FinCo
Awareness of Co-creation	There was a lack of awareness of the value co-creation, most perceiving it as associated with “collaborative problem solving” when introduced to the concept	BM, BritCo
Collaboration as an innovative organizational and project capability	Collaboration as an innovation and source of innovation through effective problem solving	e.g. CEO and Head of Business Processes & Sustainability, EUCo; Sector BDM, EuroCo; Head of New Business, AntCo; PM, UKCo
	Early Contractor Involvement provided opportunities for the co-creation of value	PM, UKCo
	Collaboration enabled through “partnership discussions with our subcontractors” and innovation driven through partnerships with suppliers, e.g. for windows and doors	Senior VP, FinCo
Execution	PMs are largely disengaged from the front-end	PM, UKCo
	Value management and engineering as cost control functions	e.g. Commercial Director, EuroCo; PM, UKCo; BM, BritCo
	Key Account Management (KAM) is potentially offering a focus for improving service value and collaboration	Head of New Business, AntCo
Service and co-created innovation	The task orientation leads to contractors being not very “joined up” and so co-creation is reactive and tactical but effective when conducted	Technical Service Director, EuroCo; Head of New Business, AntCo
	The notion of construction and project management as a service was stated by several respondents as “off the radar”, and thus is a barrier to collaboration and co-creation	e.g. Head of Procurement and BD Director, UKCo; Sector BDM and Technical Service Director, EuroCo
	It is being in “a small way” with supply chain members, for example customizing elevator design	Senior VP, FinCo
Service and co-created innovation	Cost drivers are to the fore so adding potential value is about “how can we deliver more for less”; “We do do it in some respects”	Regional BDM, EUCo
	Innovative co-creation was described as “intense collaboration” during execution	Contracts Manager, EUCo

Table 2: Schedule of case study contractor examples of empirical evidence

## CONCLUSION

Clients are the primary force for innovation due to low portfolio investment, and weak programme management among contractors. The project level depends on reactive responses through problem solving (cf. Manley, et al. 2009). Repeating generic solutions involves escalating learning up from the project to form new firm capabilities; largely absent due to the low investment in programme systems for the effective embedding of new capabilities (cf. Davies, et al. 2007). Projects continue to have no organizational memory, the evidence at the organizational and project levels showing constrained value creation and innovation, including across project networks (e.g. Dubois and Gadde 2002). The limited utilization of technological platforms, such as BIM, constrained interactions between project stakeholders to share information, knowledge and integrate resources to jointly solve project problems and create an organizational deposit.

Low innovation levels were confirmed (cf. Winch 1998; Ozorhon, et al. 2010). Evidenced outcomes included: i) main contractor management perceive construction to be about technical expertise; and, ii) projects value to be seen as a series of inputs; with, iii) project being conducted as tasks to meet schedules and requirements at the expense of opportunities to co-create value. Innovation was reactive to emergent problems rather than proactive to co-create value. Innovation was informally facilitated by collaborative practices rather than through partnering and alliances.

On the positive side KAM has been introduced on a selective and partial basis for client management. Operationally, early contractor involvement and collaborative practices, such as the co-location of experts, enable problem solving, and are said to facilitate value co-creation. There was selective network and cross-functional project learning leading to technical and technological innovation in execution. These practices mainly improve the extent of interaction, which is the building block of value co-creation (Grönroos and Gummerus, 2014). Indeed, findings showed that enhancing the quantity of interaction, the quality and level of interaction, and the efficiency of interaction is a core determinant of innovation. In other words, enhanced interactions facilitate communication, knowledge sharing and knowledge integration for innovation through value co-creation.

An original contribution to innovation research is provided by use of the marketing lens, specifically SDL's co-creation to analyze and enable innovation with an emphasis upon management's role to establish a link between innovation and co-created value. An original contribution is made to the co-creation of value because empirical studies on SDL remain thin on the ground especially in asset specific markets such as construction. The marketing perspective remains underdeveloped in construction research, the research offering a contribution in this way too.

There are limitations in using SDL, which is insufficiently linked to business model theory thus the earning logic, hence revenue and profit generation. Earnings are a prime supply side motivation that is not covered here. Developing from this, the shift away from exchange in SDL to value also requires the bid price and project costs to be linked to value from innovation. Further, a tension exists between processes, for example data technologies that potentially dehumanize services and management systems for a service orientated (Ostrom, et al. 2015), a category in which BIM

potentially falls. This could be unpacked regarding BIM adoption. Further, recent advancement in the SDL literature on service ecosystem (Vargo and Lusch, 2016) provides a theoretical lens to investigate value co-creation in a multi-level and multi-actor setting where monetary exchanges can be analyzed in terms of their overall impact on service ecosystems. Research needs to look at innovative value co-creation in service ecosystems to explore issues, which are inexplicable at the project level.

In summation, this paper has been explorative. The prime research recommendations are: a) further empirical research into the service-dominant logic (SDL) for projects and construction; b) further research into the co-creation of value in construction; c) further examination of co-creation for stimulating innovation. The prime recommendations for management in construction firms are: a) increased investment in programme management capabilities; b) increased awareness of the co-creation of value in general and for innovation; c) complement the current emphasis on time, cost and quality with an equal emphasis on value in use and context, that is, benefits delivery and impact; d) complement the project focus with an equal emphasis upon client management.

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