Fostering Value Co-creation in Construction: A Case Study of an Airport Project in India

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Abstract: Infrastructure projects are often large in scale and have great impact on the public in terms of environment, finance, safety and international status. Research studies have been conducted extensively to investigate ways to enhance performance of construction projects, but little emphasis has been put on the importance of the value co-creation process. The airport project in this study adopts the collaboration and value co-creation process between the client and the contractor from the initial stage towards project completion. In the traditional value creation process, clients and construction firms have distinct roles of consumption (i.e., value receiver) and production (i.e., value creator), in which value is created by the design and development of construction products and the value is then exchanged in the markets, amongst consumers and producers. However, value created in this way is created independently of clients. The service-dominant logic, on which value co-creation is grounded, provides a new paradigm for re-examination of value provision through construction projects. The paper aims to explore the importance of value co-creation in the context of an airport project and, more importantly, how value co-creation can be fostered in the construction industry. The project case demonstrates the client and contractor as value co-producers. Different from the traditional procurement approaches which often lack comprehensive consideration of alternatives and/or common goals in the project inception stage, the client and contractor collaborated early in the alternative bidding process and in value management workshops conducted before the inception of construction. In the process of building the client-contractor relationship to achieve the above (value) outputs, two key features are (1) early contractor involvement in the contribution of constructability expertise and (2) the change in the client’s attitudes to embrace value co-creation.

Keywords: Value co-creation, client-contractor relationship, infrastructure megaprojects

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1 INTRODUCTION

The concept of value co-creation is not only critical to the allocation and enhancement of values amongst multi-stakeholders in mega project environment, but also of practical importance to the creation of mutual values between both clients and contractors in construction projects - a key to enhance project success. The impact of large scale complex infrastructure projects is significant and their success is critical to all the parties concerned. Unsatisfactory results in quality, time and cost not only decrease project values, but also induce social discontent and negative voices from the public towards the Government. Most studies focus on the management issues such as role configuration, contract provisions, risk allocation, cost-benefit analyses and performance measurements (e.g., Abednego and Ogunlana 2006; Chan et al. 2010), while neglecting the importance of the value co-creation process.

The co-creation of value is an issue with increased attention in the management literature over recent years. The roots of the concept of value co-creation are multiple but the most significant one is provided by the service-dominant (S-D) logic (Vargo and Lusch 2004), i.e., value resides in the services rendered by the product and services together. Co-created value is one of ten foundational principles in the service-dominant logic (Vargo et al. 2008) because, at the very least, the customer is always a co-creator of value through the perception of use value, if not through direct action.

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While there is a growing trend in service management research to view (and manage) customers as human resources in the supplier’s internal processes (e.g., McEwen and Fleming 2003; Novicevic et al. 2006; Novicevic et al. 2011; Rieger and Koning 2004), researchers in construction management tend to address the client-related issues in “partnering” research where clients are treated as independent. Construction firms, particularly those engaged in mega projects, focus on how to develop and increase business opportunities through managing external relationships to enhance values and manage risks; this perspective demonstrates the importance of value co-creation with the client. The concept of value co-creation in the construction sector, in which the customer-supplier relationship in manufacturing is replaced by the client-contractor relationship, is discussed. The paper aims to explore the importance of value co-creation in the context of an airport project and, more importantly, how value co-creation can be fostered in the construction industry.

2 CONCEPT OF VALUE CO-CREATION

2.1 Value and Value Co-creation

Co-creation implies dyadic or multi-actor value creation, including identification, formation, leverage and realization of value in products and services as well as value embodied in participation and perceptions. Direct creation involves activities spanning organizational boundaries. Colloquially, co-creation is value that is more than the sum of the parts that individual organizations can create on their own and in-house. In academe it has been defined as synergy: the whole (of a system’s output) is greater than the arithmetic sum of the constituent parts, due to the inter-connections and relationships between the parts (Blanchard 2004). Although there is some reference to co-creation in the project management literature (e.g., Pinto and Rouhiainen 2001; Wells and Smyth 2011), the co-creation of value has yet to be systematically considered in construction.

The construction industry emphasizes “best practices”, guidelines and norms; often implicitly assuming that if best practices are adopted, values will follow - thus, implying common best practices and common sets of values for all participants. The term “values” should be distinguished from “norms”. Norms are generally accepted attitudes, behaviors, and beliefs amongst members of a particular group of people, whereas values are “individual or commonly shared conceptions of the desirable” (Morris 1956). In other words, norms must be shared and applied amongst oneself and others, but values can be subjective, individual, and without sanction by others.

From the perspective of economic scholars, value is often perceived as “value-in-exchange” under the services-dominant logic (e.g., Vargo and Lusch 2004). Under this logic, a firm creates values by manufacturing goods (or services); the values are later exchanged in the market for money in return. “(T)here is no value until an offering is used - experience and perception are essential to value determination” (Vargo 2006).

The service-dominant logic puts emphasis on “value-in-use”, rather than “value-in-exchange” only. As an example in the construction industry, any BIM software would have no value if such software does not fit the needs of customers; value in using BIM is created with the engagement of customers, i.e. construction participants. In fact, it is common for customers nowadays to interact with suppliers in various stages of product design, production and delivery. Through the interactive knowledge exchange process, the suppliers and customers interact, learn and finally co-create value, which is customized and fitted to the needs of customers (Ballantyne 2004; Lusch and Vargo 2006).

Although the exchange of product in return for money still exists at the product delivery stage, the service-dominant logic treats the product as a vehicle for delivery and application of knowledge and skills, while money is spent for service rights (Vargo et al. 2008).

Schwartz (1992) defines values as desirable, transnational goals, which vary in importance and serve as guiding principles to individuals’ attitudes and behaviors. Since values are not necessarily common amongst members in a society, there is a need to identify and create unique value for clients who have different personal characteristics and specific objects (e.g., infrastructure with special purposes) and in different environment (e.g., different locations). Co-creation integrates value of the project or service with the value generated (perceived by the participants, especially the customer) in the specific tailoring and securing of the product and service. As such, it goes beyond the concepts of exchange value and of use value to include “satisfaction through participating. Experience of clients, though it may be governed by individuals’ emotion and perception, is essential to business success (Pine and Gilmore 1999). Participative value is generated through quality interactions between construction parties, such as clients, architects and contractors. Due to the different needs of clients, infrastructure projects are unique in nature. This sheds light on the importance for the design and /or construction teams to closely interact with the clients to transfer and exchange information and knowledge on project processes and performances. In these processes, relationships are built to enhance the participative values of the clients by satisfying their emotional needs and co-developing their perceptions.

2.2 Value Co-creation in Construction Projects

Value co-creation is one of the most essential antecedents of innovation (e.g., Ramaswamy 2010).
Client-contractor relationship building can facilitate the innovation process by deeper exchange of knowledge and enhancing innovation competencies of both parties. However, project businesses are less dynamic and less innovative than many other businesses (Barrett et al. 2008). Morris and Pinto (2010) state the "fragmented nature of the construction industry, lack of coordination and communication between parties, the informal and unstructured learning process, adversarial contractual relationships and the lack of customer focus" all militate against a more facilitative approach to value creation. In the traditional value creation process, clients and construction firms have distinct roles of consumption (i.e., value receiver) and production (i.e., value creator), in which value is created by the design and development of construction products and that value is then exchanged in the markets, amongst consumers and producers. However, value created in this way is created independently of the customers. In addition, construction clients nowadays adopt design and build approaches, which tend to integrate the design and production functions within the construction process (RICS 2010). The role of construction parties has, thus, changed from a passive one (building structures/facilities based on design of the architect) to a more active one (liaising with the client directly, participating in/responsible for the design and project management process), thereby laying the foundation for value co-creation between clients and contractors in the construction processes.

Producers or service providers in the traditional value creation process tend to produce the identical products/services for different clients, ignoring the characteristics and special needs of individual clients and the specific contexts of time, place, social setting, and so on (Vargo et al. 2008; Vargo and Akaka 2012). In view of the increasingly competitive market, some organizations now customize their products or services. However, it should be noted that value co-creation does not mean the marginal customized products and/or services, which customers choose from the various offerings by the organizations. That is just a one-way process.

Value co-creation is a two-way process of personalized interactions and exchanges of knowledge which are conducted for and meaningful to a specific client (Prahalad and Ramaswamy 2004a). It is the "experience" or process of the value co-creation which is of value, rather than the passive receiving of final products offered by the producers. In view of this, stakeholders who strive for project performance should enlarge their focuses from quality of the project outcomes towards the relationships and collaborations with clients, which are essential in value co-creation.

Marketing literature has begun to include examinations of co-creation as a concept by which parties (usually producer and customer) act together to create value through collaboration and cooperation. Such conceptualization represents a progression in the development of marketing concepts from the competitive (opportunistic) perspective of transaction marketing (Kotler 1972; cf. Borden 1964; McCarthy 1964), the more person-oriented and longer term perspective of relationship marketing (Berry 1983; Grönroos 2004; Gummesson 2000), to the collaborative perspective of co-creation (Vargo and Lusch 2004). Whilst transaction and relationship marketing expressly acknowledge and address the separate and competing forces of supply and demand, co-creation subdues them and, akin to so-called "lean thinking", couples customer satisfaction with cooperative collaboration and synergistic mutual benefit through performance improvement. That is achieved through fairly extensive involvement of customers in definition and design (and "production") of the supply (offering - product/service) which, itself, is viewed as a major creator of value for the participants, stressing use value rather than exchange value.

2.3 Value Co-creation in Complex Systems

Kaufmann (1993) classifies systems as ordered, complex, and chaotic. Complex systems are, commonly, regarded as being "at the edge of chaos" in that they exhibit some order through interactions of their internal components, notably the feedback loops which generate dynamical attractors. Indeed, chaotic behavior is probable when the number of agents exceeds two (Feigenbaum 1978; Feigenbaum 1979). Equilibria are determined largely by the natures of feedbacks within the system (Thiétart and Forgues 1995) and the state of a system is dependent upon the natures and strengths of relationships between its agents as in the power-based perspective on behavior of project temporary multi organization (TMO) participants. Negative feedbacks, via their effect of dampening the influences of variables, act to return a system to its prior/initial state - stable equilibrium (yielding an ordered system). Positive feedbacks reinforce changes made by variables and so, small changes increase geometrically - explosive equilibrium (leading to collapse of the system: total chaos). When both positive and negative feedbacks are present in a system simultaneously, the system may reach a stable equilibrium, may return to a previous state periodically (reach periodic stability; periodic attractor), or its behavior can be more complex, including being completely erratic, or "chaotic". Recognition of the essential impact of the relationships between the agents in a system is important. Feedback is, essentially, a monitoring/reporting mechanism to inform management so that control (and performance improvement) can be exerts; feed forward, analogously, operates for predictive control - both feedback and feedforward endeavor to change the otherwise prevailing conditions, often on an incremental and iterative basis. It is the space between "equilibrium" and "chaos" that provides the opportunities for co-creation.
Prahalad and Ramaswamy (2000;2003;2004b) articulate a variety of examples of businesses giving customers greater involvement - customers are co-opted and are experientially involved (e.g. IKEA). In the case of medical care, the situation is somewhat different - there is a reduction of boundary (greater permeability and boundary spanning) through increased dialogue between patient and doctor (general practitioner) as a more participative experience for both which, hopefully, results in more appropriate treatment through improved diagnostics; in production contexts, developments in greater involvement of component producers in aerospace and automotive industries operate similarly. The analysis leads Prahalad and Ramaswamy (2004a) to produce a process model of co-creation comprising “…dialogue, access, risk assessment, and transparency - the DART model…”.

From DART model (Prahalad and Ramaswamy 2004b), the value co-creation process in construction can be articulated following the service-dominant logic: “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 et al. 2008), e.g., the continuous improvement initiatives such as partnering and supply chain management. However, the latter is insufficient when it comes to recessive times and the enhanced value received is considered too little to stave off cost drivers re-emerging to the fore, arguably because the supply side has failed to embed lessons derived from project improvements as would be expected in S-D theory or in the resource based view (RBV) of the firm. Similarly co-creation is not a series of independent one-off experiences, but development of capacity and capabilities between systems “equilibrium” and “chaos” to facilitate co-creation.

3 CASE BACKGROUND

The project is a new airport in India on a greenfield site let under BOT arrangements to a Special Purpose Vehicle (SPV) joint venture (JV) organization. There are 3 main phases comprising site formation, passenger terminal building works, and the runway. The passenger terminal building was let under competitive design and build to a major, international Chinese contractor’s operating company based in Hong Kong. The details of the project are summarized in Table 1. The contractor was provided with an outline performance specification, based on passenger number throughput per annum, gross floor area (GFA) allocation to different zones, and a schematic design. The project was to be executed by a tri-partite grouping of the contractor, a leading civil engineering consultancy, and an environmental engineering consultancy, set up to collaborate in design and construction (i.e., to foster co-creational practice). Timely completion was critical.

Open interview covering three main areas related to the value co-creation process and outputs was conducted with the contractor, which involves: i) the willingness of the contractor and the client to span organizational boundaries to establish interconnections, ii) the interaction between the parties during the value co-creation process (one-way versus two-way), and iii) any issue they recognized as essential in the process. The following is based on information provided by the contractor.

3.1 Value Co-creation Outputs

By making major changes to the location and design of the building facilities and services, two valuable outputs occurred. The client was provided with a building (1) of significant increased capacity for revenue generation and (2) with reduced excavation works. The first (value) output was achieved by relocating the building services to bespoke designed and prefabricated floor slab panels which “housed” the building facilities, thus freeing space for passengers-related activities such as airline counters, shops, baggage circulation areas etc. The second (value) output was based on the contractor’s “constructability” principles to improve substructure design that allowed extra loading of the bespoke panels but achieving increased overall floor area with reduced excavation which was originally for basement areas. Because of the re-design by the contractor, the annual passenger throughout capacity was estimated to increase by 40%. Advantages of the alternative design are summarized in Table 2.

<table>
<thead>
<tr>
<th>Table 1. Project case details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project scope</td>
</tr>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Contract type</td>
</tr>
<tr>
<td>Tender period</td>
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<tr>
<td>Project period</td>
</tr>
<tr>
<td>Total Area</td>
</tr>
<tr>
<td>Total cost</td>
</tr>
<tr>
<td>Passenger p.a.</td>
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</tbody>
</table>
### Table 2. Advantages of alternative design

<table>
<thead>
<tr>
<th>Design</th>
<th>Area in tender (m²)</th>
<th>Alternative Design (m²)</th>
<th>Differences (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General area</td>
<td>38,819</td>
<td>41,071</td>
<td>5.8</td>
</tr>
<tr>
<td>Beverage and shops</td>
<td>11,714</td>
<td>13,092</td>
<td>11.8</td>
</tr>
<tr>
<td>Airline lounges</td>
<td>1,854</td>
<td>3,032</td>
<td>63.5</td>
</tr>
<tr>
<td>Offices</td>
<td>7,018</td>
<td>9,272</td>
<td>32.1</td>
</tr>
<tr>
<td>Storage area</td>
<td>3,257</td>
<td>3,654</td>
<td>12.2</td>
</tr>
<tr>
<td>Services area</td>
<td>4,450</td>
<td>4,957</td>
<td>11.4</td>
</tr>
<tr>
<td>Staff area</td>
<td>2,920</td>
<td>3,148</td>
<td>7.8</td>
</tr>
<tr>
<td>Facilities area</td>
<td>34,316</td>
<td>21,234</td>
<td>-38.1</td>
</tr>
<tr>
<td>Total</td>
<td>109,833</td>
<td>104,592</td>
<td>-4.8</td>
</tr>
</tbody>
</table>

### 3.2 Value Co-creation Process

In the process of building the client-contractor relationship to achieve the above (value) outputs, two key features are (1) early contractor involvement for contribution of constructability expertise and (2) the turn-around of the client’s attitudes in the value management workshops from cost reduction to that of value co-creation. The latter was achieved through much effort of the contractor as the value management consultant was taking a very cost-reduction oriented approach.

In the negotiation of the alternative design submitted by the contractor, the client was keen to build up a client-contractor relationship conducive to value co-creation. The dialogues during their re-design discussions were useful, participative and collaborative. At the same time, the consultants were suggesting a “partnering” approach and the client was receptive to the idea. However, the client wanted to use the FIDIC contract (with client amendments) due to the client’s and consultants’ experience and familiarity with FIDIC; that proved unworkable for the contractor due to back-to-back contractual issues with subcontractors, which had to be Indian companies. Desirous of an integrated project delivery and partnering approach, the contractor suggested using the NEC contract for partnering but that was rejected by the client.

In addition to involving both the client and the contractor in the design and production process, client education is also essential in value co-creation. The contractor’s statement was as such:

“...We (the contractor) had to educate the local people (e.g., the local Fire Services Department), as there was no suitable code of practice available in India and the local parties did not know how to handle it. We needed to educate them in the design and installation of our F.S. system and the use of various fire services facilities in the project”

The construction firm in this case transferred their knowledge in fire services to the local authorities in India. Through the knowledge transfer process, the client realized that value was added to the project.

Value management studies were employed throughout design development - that involved addressing integration of the elements and attuning to local conditions and practices. The client was oriented to (unit) cost reduction while the contractor endeavored to increase value for the client (based on reasonable assumptions). The contractor stated:

“The client was involved in the value management (workshop) before the (contractor) was awarded the project... The value management aimed to cut cost, but not to increase efficiency... In order to cut cost, the project quality level has decreased (i.e., no longer a class A one) after value management...From the eyes of the client, value management aimed at cost reduction and the project design should orientate towards this goal of cost reduction...”

Through effort of the contractor to convince the client of the value-added redesign, the client was receptive to paying the extra cost of the bespoke floor panels and building facilities to have the increased floor area for passenger-related activities while reducing the volume of excavation works. The contractor explained:

“Although the project was over budget, it incorporated the most updated design to organize activities and services for enhancing efficiency and achieving LEED. The proposed design also provided the best value, in terms of cost saving in excavation, concrete usage, RC usage, etc. When comparing with the original design, it also decreased the engineering areas and increased the area for revenue. Because of the increase in space, the passenger throughput p.a. was increased from 7 to 10 million.”

There are a few focal aspects in this project’s value co-creation process. First, there is willingness to span (contractor and client’s) organizational boundaries to establish inter-connections and relationships between the parts. Value co-creation is dependent upon the accomplishment of common objectives and the satisfaction of each participant’s aspirations; such motives being identified in the negotiation stage of the alternative design and developed/elaborated in subsequent value management workshops. In addition, it is the
willingness of both parties to work across their organizational boundaries that foster innovation in construction projects. As mentioned by the contractor:

“Although all designs were available and were not new in this project, the ‘integration’ was new. The client and architects talked a lot and worked collaboratively for the best of the project (e.g., flat slab, platform, formwork types, etc.)…”

A key component of the successful cooperation is the willingness of individual participants to contribute efforts to achieve mutual benefits. Examples in this case includes increasing GFA for passenger-related activities and improving construction scheduling for contractor based on constructability considerations in the re-design.

Second, there is recognition from both parties of value co-creation being a two-way process. Interactions for knowledge exchange are meaningful to both parties - participative values are generated through these interactions where the client is not passively receiving the final product (the airport terminal) built by the contractor.

Third, trust is established throughout the process through various interactions, feedback, and exchange of knowledge between the contractor, the client and the consultants. Without adequate trust, co-creation is likely to be constrained by reluctance to communicate, and the requirement to ‘check and audit’ with a tendency not to go beyond a “comfort zone”. The value management workshops were conducted from the “traditional” perspective of cost reduction; the alternative design proposal from the contractor cost more than the original scheme design, thus bringing the consultants out of their “comfort zone”. However, the client was receptive to the increased GFA but was initially unconvinced of the “worth” of the extra money to be spent (based on the consultant’s cautioning of the “cost/worth” ratio); the client was also advised of the risk of ordering the bespoke floor/slab panels as they would not be manufactured locally; the suggestion from the contractor to adopt the NEC partnering contract was definitely turned down as it was out of the “comfort zone”. However, the client was receptive to the increased GFA but was initially unconvinced of the “worth” of the extra money to be spent (based on the consultant’s cautioning of the “cost/worth” ratio); the client was also advised of the risk of ordering the bespoke floor/slab panels as they would not be manufactured locally; the suggestion from the contractor to adopt the NEC partnering contract was definitely turned down as it was out of the “comfort zone”. The contractor focused on the benefit of extra revenue generated by the increased GFA (which was partly allocated to shop areas), the increased operation efficiency from having extra baggage handling area, the ease of maintenance from relocating building facilities and services, and the reduction of unforeseen ground risk from decreasing the volume of excavation works in the original design. It required a few iterations and many workshops to reach mutual understanding and the build-up of trust. That is a successful example of a shift away from the traditional confrontational scenarios and adversarial standpoints adopted in the construction industry. In the airport case, dispositional trust is apparent and there is a win-win outcome although the size of the benefits or pay-offs may be different for the parties. The risk is small and yet there may be potential to build rewards beyond the initial willingness to trust. It is estimated that there is mutual short-term advantage in trusting the other party. Relationship management can be used to develop trust and the contractor has been proactive in this case to “manage” the client-contractor relationship - “trust can only contribute to an enhanced win-win where parties understand how trust is developed and managed” (Smyth 2006). As the contractor stated:

“An integrated project delivery approach worked in this project. However, trust (between client and contractor) is very important”

4 DISCUSSION

In the airport project, client identification with architects and contractors enhance the capability in value co-creation through contractor’s early involvement and the systematic relationship management during the project.

4.1 Contractor’s Involvement in Design

The widest known models of construction project realization remain rooted in the “traditional” “design - tender - construct” approach with a “main contractor” and the architect as lead designer (and “project manager”) of the (commissioning) client. However, most models are incomplete as they deal with realization only rather than the full lifecycle of a (potential) project (which fosters only limited analysis for the client) and commence with an “inception” stage rather than the germination of the potential project as “conception” (Walker 2007).

In co-creation, the suppliers, designers and contractors are not the passive recipients of requirements and brief, nor are they merely entering a requirements solicitation process to reduce uncertainty. They are actively engaged, recognizing that the latent and unarticulated requirements need to be teased out, reflected upon and sense made in the dyadic, triadic and multiple relationships to lever content and service value through the relationships. This builds upon relationship marketing and a relationship approach to managing complex projects (Pryke and Smyth 2006). The initiation of co-creation may come from the supply side under S-D logic, but the value identification and realization is co-created overall (whilst recognizing the degree of co-creation to identify value and in its realization will change the balance between the parties over the project lifecycle).

The initiation of a potential project starts with the client. The early contacts between a (commissioning) client and the construction industry have been documented and analyzed as ‘briefing’ which, most usual-
ly, comprises interfacing of the client and the designer(s); likewise, value management studies, almost always, are focused on the commissioning client (Kelly et al. 2004). Whilst this is a narrow perspective within S-D theory and for maximizing co-creation, it, nonetheless, provides a forum for co-creating within existing practices. Thus, briefing endeavors to make the desires and constraints relating to the potential project explicit. However, it is vital to regard the brief as a continuously evolving set of statements as desires and parameters emerge. In this way co-creation builds upon concepts of agile production and agile project management methodologies, where iteration is encouraged. Many desires emerge / change as the project evolves (hence, variations) in response to environmental changes, technical developments, etc., as well as through reactions to exchanges of (tacit) knowledge and emerging desires in the co-creation of the project, including feedback and reflection.

However, the vast majority of models persist in considering briefing as a linear, plan-driven process which is focused on the commissioning client and which occurs at an early stage of project development and over a short period of time; many approaches to value management operate similarly. As noted, approaches such as those of “Agile” project management, if implemented with consistency (Wells and Smyth 2011), are more appropriate for co-creation. Additional costs of, possibly, longer durations and do-and-revise design (and some construction) may be perceived as detriments of co-creation; however, those additional costs are likely to be quite insignificant from a life cycle perspective as well as dwarfed by value gains. On the Terminal project, the airport company which owned and operated the airport, actively contributed to a climate conducive to co-creation by absorbing a variety of risks normally assumed by designers and constructors (Brady and Fellenz 2007; Smyth 2011).

4.2 Supplier-Customer Relationship

The definition of “customer (client in the construction sector) relationship management” varies significantly amongst different authors in literature related to marketing. For instance, Kutner and Crippes (1997) define customer relationship management as data-driven marketing, while Glazer (1997) refer it as an information-intensive strategy which aims at establishing long-term relationships and profitability by connecting information technology and marketing strategies. It has also been defined as methodologies, technologies and e-commerce capabilities adopted by organizations to manage customer relationships (Stone and Woodcock 2001). The above definitions of customer relationship management tend to be narrow and tactical, focusing on the technological aspects. A broader and strategic definition refers to customer relationship management as a strategic process of acquiring, retaining, and partnering with particular customers to create values for both the organization and the customer (Parvatiyar and Sheth 2001). Instead of focusing on how to collect data from customers via various technologies, customer relationship management should be extended to cover the ability of customers to co-create value with the organization via partnering. The underlining belief is that customers do not only serve as informants and sources of revenue for an organization, they can contribute as partners of an organization, or even step inside the boundary of an organization and be part of the organization’s human resources in the value co-creation process. This paper applies this concept to the construction industry, in which the roles of customer and suppliers can be represented by construction clients and construction firms respectively.

Quality and quantity of value co-creation are determined by the relationships and interactions between a client and a construction firm, which depends on the ability of the firm to establish an innovative platform or channel to enable diversified interactions and to foster clients to take the role as values co-creators. In this regard, the concept of client relationship management (CRM) is elaborated to encompass the role of the project client in the provision of business to construction firms. Construction project clients fall into various categories such as the sophisticated-naive client model, the public-private client model, the innovative client model (Walker 2007).

In co-creation, boundaries are extended/opened through collaborative involvement of others and mining of their tacit knowledge in relation to the creative process. As participants are operating together for mutual benefit, goals are more aligned and cooperation and commitment are fostered which should operate to reduce opportunistic behavior and enhance trust/assurance.

Payne et al. (2008), following the S-D logic (Vargo and Lusch 2004), determine the main components of a “…process-based value co-creation framework…” to be “Customer value-creating processes…Supplier value-creating processes…Encounter processes…”. The three primary elements of customer processes in co-creation are analyzed to be cognition (using conscious and subconscious memory – hence, both explicit and tacit knowledge), emotion (including feelings and affect - attitudes and preferences), and behavior (making purchase decisions and user experiences). Thus, customers are involved in “…thinking, feeling and doing as an integral part of their role in value creation [which] leads to customer learning” (ibid).

In view of Payne et al. (2008), the supplier’s role is extended significantly beyond the “traditional” role of providing the good/service to include “…providing experiential interactions and encounters which customers perceive as helping them utilize their resources”. They attribute two essential customer-oriented preliminaries for a supplier: understanding the customer’s
value-creating processes, and customer process mapping; those preliminaries are likely to challenge the boundaries between the customer and the supplier (notably, aspects of boundary permeability and flexibility). Supplier-customer relationships are seen to develop temporally alongside value creation and appropriation and arise through communication, usage and service encounters, which support emotion, cognition, and behavior. They conclude, “The more the customer understands about the opportunities available, the greater the value that can be created”; that is likely to apply in reverse also so that it is proposed that “mutual understanding of each other’s value processes maximizes value creation in supplier - customer encounters”.

4.3 Client/Contractor as Value Co-producer

Based on Bowen and Jones (1986) organization-customer relationship model, Novicevic et al. (2011) developed the value co-creation model which focuses on performance ambiguity and goal incongruence - performance ambiguity refers to the inability of organizations to assess the performance of their counterpart; and goal incongruence refers to the different goals of the counterparties which lead to barriers in forming and maintaining fair agreements. The differences in performance ambiguity also result in different customer roles in the value co-creation process (Bateson 2002; Novicevic et al. 2011): customer as buyer, customer as user, customer as co-developer and, customer as co-producer. High performance ambiguity results in customers participating in the production process (client as co-producer or co-developer), while low performance ambiguity results in customers participating in production outcomes (client as buyer or user). Similarly, high goal incongruence results in customers being trusted to participate in standardized organization-customer interaction activities (client as buyer or user), while low goal incongruence results in customers being trusted to participate in customized interactions (client as co-producer or co-developer).

In the construction industry, low performance ambiguity is associated with client participation in the construction product, i.e., in traditional lump sum contracts adopting the design-bid-build process where the contractor is given the design completed by the client’s design consultants. From the perspective of the contractor, it is relatively clear what is required to be constructed, i.e., performance ambiguity is low. High performance ambiguity is associated with client participation in input to the construction process, e.g., in design and build projects where the contractor is given the performance specification and the conceptual design.

“When goal incongruence is low, the (client) is trusted to participate in an idiosyncratic, customized way, while when goal incongruence is high, the (client) is trusted to participate only through standardized activities” (Novicevic et al. 2011). In the construction industry, goal incongruence is considered to be low when the client and contractor work collaboratively in the non-traditional procurement systems, e.g., partnering projects advocate mutual goals and benefits between the client and the contractor. On the other hand, client participation is often limited in traditional design-bid-build projects. (See Figure 1).

Due to the differences in cultural and industrial backgrounds, performance ambiguity (e.g., comparatively lower standard of workmanship in India) between the client and construction firm was high. There was also high goal incongruence at the beginning of the project (e.g., client’s goal of cost reduction versus construction firm’s goal of value creation). However, after extensive interactions, the client finally understood and agreed with the contractor’s alternative design which delivered added value. As aforementioned, under situations of high performance ambiguity and low goal incongruence, process-related client engagement and cus-

![Figure 1. Framework for contractor participation in value co-creation with the client](image-url)
monized client-contractor interactions are suitable, i.e., contractor and client taking co-producer roles. Since performance ambiguity is high, trust is very important in the integrated project delivery approach. Contractors should be trusted to participate and engage in the design and construction process. In the airport project, the construction firm also recognized the importance of trust throughout the process.

Under situations where goal incongruence is low and performance ambiguity is high, the contractor-client exchange is governed by a relational hierarchy market, in which the client has a co-producer role. The growing complexity of business philosophies and technologies has escalated the demands for innovations in the construction sector. Construction projects, infrastructure projects in particular, are compelled to adopt innovations in various aspects, such as innovative procurement methods (Kumaraswamy and Dulaimi 2001), construction methods (Staquet et al. 2004), and building materials (Merklein and Geiger 2002). To overcome the problem of high performance ambiguity, it is essential for clients to accept/invite contractors to take the role of co-producers.

However, the customer as co-producer model (Novicevic et al. 2006) from the S-D logic should not directly translate the “customer” to “client” and the “supplier” to “contractor” in the context of the construction industry. While the contractor is a value co-producer from the perspective of the client, the client is also a co-producer of the construction output from the perspective of the contractor. Both construction firms and clients need to cooperate and interact to resolve their differences in the production process, which can, then, reduce their deviation in evaluating performance. Contractors need to allow clients to step inside the boundaries of their organizations so as to co-produce the construction products (e.g., buildings and infrastructure). On the other hand, the inclusion of contractors as human resources of the clients’ organizations does not only help the contractors in reducing performance ambiguity, but also helps to enhance the quality performance of the clients’ organizations - as in the case of real estate developers having in-house contractors.

4.4 Limitations and Future Directions

The airport case reported here has focused mainly on the design-and-build procurement path where the contractor was invited to submit an alternative design. It has been much the initiative of the client to make that invitation which, subsequently, demonstrated the usefulness of drawing on the contractor’s expertise in the early design stage. The applicability of the value co-creation model from the design-and-build project to other procurement systems is still to be examined.

The airport case primarily showcases the contractor (supplier) in managing the co-creation of value. Since the concepts of value co-creation and S-D logic emphasize cross-functional activities, an area worthy of further investigation is mapping client processes in complex projects in the business-to-business context and the role of intermediaries (supply chain members) in co-creation. The measurement of client-contractor relationship performance can encompass a range of metrics which span the processes, functions and channels used to engage and interact with clients (See Gummesson 2004, for the notion of “return on relationships”). More needs to be done to identify key measures of co-creation and how to organize these measures into systems for monitoring and improving performance.

5 CONCLUSIONS

Throughout project realization, especially the early stages, construction project realities are social constructions, each of which is an interpretation by a participant (stakeholder), likely to be framed as a narrative of what that participant would like the project to be (facilitate for that participant). In the airport case, the basic requirements of the client are translated through the client’s brief, the performance specification and the conceptual design to the contractor. Hence, project management involves exposing and communicating those emerging narratives and facilitating the development and agreeable adoption of a solution, which is both feasible and acceptable (satisficing). In the airport case, the contractor’s alternative design was scrutinized by the team of consultants including the designer, the engineers and the value management consultant. The JV client was seemingly in favor of the alternative design subsequent to debate/deliberations among the stakeholders in the client body. That process is fraught with politics as the emerging project outcome constituents are contested through the constantly changing power distribution and the adopted solution is negotiated.

Conceptualizations of schemes relating to identified and realistic demands, whether produced entirely in-house or in conjunction with consultants (frequently, architects), represent the initial, tangible possibilities which begin to make sense of options and alternative demands, capturing both explicit requirements and elements of further and more tacit desires to express what the potential projects comprise. Those initial expressions trigger feedback, debate and other interactions as selection of how to proceed; progressively ideas emerge and develop, conflicts arise and are addressed. Therefore, these are viewed as early stages of co-creation involving reflective practice by the participants; hence, leading to development of the re-design for the project(s) being adopted.

The S-D logic, on which co-creation is grounded, provides a new paradigm for re-examination of value provision through construction projects. Especially for
major construction projects, which have high impacts throughout their lives, the notion of co-creation is opposite for application beyond the immediate project participants - as may be inferred by the use of public inquiries, cost benefit analyses, planning balance sheets and other methods of appraisal which encompass social as well as private aspects of (proposed) developments. Thus, stakeholder management is not simply a matter of taking what others say into account (and, sometimes, acting on these), but can develop to work with others to deliver added value, reconcile problems that appear in conflict and synthesize some areas that began in contradiction to each other.

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REFERENCES


