The Impact of Outbound Collaboration Behavior on Service Performance in Tanzania's Construction Projects: The Mediating Role of Knowledge Infusion

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ABSTRACT

Knowledge infusion (KI) within consultant-supplier interfaces has a significant impact on the service delivery performance (SP) of architecture, engineering, and construction (AEC) industry construction service firms (CSFs). However, despite significant consultant-supplier interactions in Tanzania, knowledge-induced SP among AEC professionals is limited, which may harm SP. The inadequacy of these CSFs to stimulate performance may be attributable to inadequate KI. Utilizing a convenience sampling technique, a survey dataset of 171 consulting CSFs in Tanzania was generated. Consequently, Structural Equation Modelling was used to hypothesize and empirically investigate the mediating role of KI in the relationship between outbound collaboration behavior (OCB) and service performance (SP) within construction service supply chains (CSSCs). The results indicate that when mediated by KI, the indirect effect between OCB and SP becomes significant and positive, whereas its direct effect is insignificant. This demonstrates that OCB has a marginal effect on SP. Theoretically, KI primarily affects the interrelationships between the relevant variables, thereby providing novel insights into practical (managerial) implications. Thus, CSFs can strengthen their KI competencies, such as adherence to material specifications, internal transforming capacity, product data, system application, and quality control, to achieve (sustained) competitive advantage among CSSCs.

KEYWORDS: Outbound Collaboration Behaviour, Knowledge Infusion, Service Performance, Construction Service Supply Chain Networks, Consultant-Supplier Interfaces, Mediation Effects.

INTRODUCTION

Knowledge (intellectual asset) has become a subject of increasingly heated academic debate in management research (in general). Contemporary research considers knowledge the "brainpower" behind an organization's performance (Chen, Yao, & Zhou, 2021; Cheng, Liu, & Chang, 2022; Faraji et al., 2022). The unprecedented globalization challenges and dynamics, supply chain disruptions, competitions, and volatile construction business environments have exerted pressure on Architecture, Engineering, and Construction (AEC) firms to begin enhancing their strategic network positions to secure key knowledge resources (intangible assets) (Fuentes, Smyth, & Davies, 2019; Khamaksorn, Tah, & Kurul, 2022; Pemsel et al., 2014; Rehman & Ishak, 2021; Wiedmer et al., 2020; Xue et al., 2018).

Moreover, construction consumers (clients and/or employers) are becoming increasingly knowledgeable about building products' attributes, substitutes, and sustainability (Bäckstrand & Fredriksson, 2022; Peltokorpi & Seppänen, 2022; Yu et al., 2022). Owners, consumers, and administrators are interested in the traceability of the building's products and services (Peltokorpi & Seppänen, 2022). These parties would like to know, for example, what products are implemented in the building, their source, composition, and how they should be maintained and utilized (Peltokorpi & Seppänen, 2022; Song et al., 2017; von Grafenstein, Iweala, & Ruml, 2022). Moreover, life cycle costs, environmental data, health, and safety are becoming increasingly important (Peltokorpi & Seppänen, 2022; von Grafenstein et al., 2022; Yu et al., 2022).

These pressing demands require construction consulting service firms (CSFs) to leverage their relative 'know-how,' 'know-that,' 'know-when,' and 'know-where' of their service offerings (Balouei Jamkhaneh et al., 2018; Cheng et al., 2022; Reid, Matthias, & Bamford, 2019). Enhanced knowledge infusion (KI) ultimately results in improved service quality and performance (SP) (Forkmann et al., 2017; Kowalkowski et al., 2017; Peltokorpi & Seppänen, 2022; Sogaxa & Simpeh, 2022). The acquired new heterogeneous external knowledge is then integrated into CSF's existing knowledge framework, enhancing product informatics comprehension.

In addition, CSFs have relied on irrelevant, unhelpful, obsolete, and fragmented project data devoid of context for new projects (Zhao et al., 2022). Due to global innovative competition, for instance, building product manufacturers (BPMs) rapidly develop new material models/systems and related service solutions (Sahib et al., 2022). Therefore, designers (i.e., CSFs) must rapidly adopt new technologies that meet quality, attribute, and sustainability requirements. The relationship between the causes of low KI and SP and the source, content, real-time, and quality of product informatics within construction service supply chains (CSSCs) has been largely overlooked (Peltokorpi & Seppänen, 2022; von Grafenstein et al., 2022).

If these deficiencies are not addressed, the likelihood of poor project planning, designer errors, poor product selection, rework, delays, conflicts, poor estimating, and pricing analysis increases (Emmitt, 2006; Eze et al., 2021; Kerzner, 2017; Peltokorpi & Seppänen, 2022; Raphael, Samuel, & Dipeolu, 2022; Yap et al., 2022).

Consultant-supplier (C-S) interfaces (collaborations and interactions), which are prerequisites for professional KI (Gold, Seuring, & Beske, 2010), provide conducive inter-organizational learning environments. Despite substantial consultant-supplier interactions in Tanzania, there is a lack of knowledge dissemination among AEC professionals, which hinders SP. This contradicts the theoretical premise in several publications (Jia, Zhang, & Yang, 2022; Pemsel et al., 2014; Zhang & Chen, 2016; Zhao et al., 2022) that collaborative networks have the potential to infuse knowledge (and innovation), thereby contributing to SP (Kwofie, Aigbavboa, & Matsane, 2019; Xue et al., 2018).

There is a wealth of literature on knowledge creation and SP in social networks and project alliances (Cheng et al., 2022; Khamaksorn et al., 2022; Xue et al., 2018; Zhao et al., 2022). Even though several studies (Kwofie et al., 2019; Meng, 2020) have conceptualized the direct relationship between collaboration and project performance as an output of construction supply chain actors, few recent empirical studies disclose contradictory findings that provoke debate and further investigation. According to Zhao et al. (2022), perceived external knowledge utility negatively moderates the relationship between perceived internal knowledge usefulness and cross-project learning intention. In addition, while some studies contend that firms with high service-innovation intensity have significantly stronger ecosystem-related capabilities to sense, seize, and reconfigure external resources than firms with lower service-innovation intensity (Lütjen et al., 2019), others have investigated innovation within (inbound) collaborating construction project-based organizations (PBOs) themselves (Kwofie et al., 2019; Xue et al., 2018).

Moreover, whereas small-sized and non-state-owned enterprises are more concerned with the effects of interaction frequency on relationship strength, medium- and large-scale enterprises tend to focus more on the effects of reciprocal exchanges on relationship strength to compensate for the lack of internal resources (Xue et al., 2018). Few studies have examined the mediating role of KI on SP in outbound cross-sector networks (i.e., C-S interfaces) at the firm level within CSSCs in the context of AEC projects (Moshood, Rotimi, & Rotimi, 2022; Xue et al., 2018).

To address these issues, the purpose of this paper is to empirically investigate the mediating role of KI between outbound collaboration behavior (OCB) and service performance (SP) using Structural Equation Modelling (SEM) of survey data collected from 171 consulting service firms in Tanzania's AEC sector and the relational view (RV) theory. This theory explains how organizations can achieve sustainable competitive advantages at the organizational level by combining the firm's internal valuable (knowledge) resources with complementary external resources.

The results indicate a positive (and complementary) mediation effect, implying that OCB significantly influences SP when mediated by KI.

This study makes two contributions. The RV and the knowledge coupling theory (KCT) are centered on the service-dominant logic (SDL), the first observation made. The RV of inter-organizational competitive advantage postulates that "critical resources (knowledge) are not solely housed within a single firm, but may span firm boundaries and be embedded in inter-firm routines and processes" within CSSCs (Gold et al., 2010). While the KCT serves as the foundation for CSFs as institutions that integrate knowledge, the SDL focuses on "value-in-use" and suggests that "real" value is created through the interactions of value-creation actors (such as customers and suppliers) (Lusch & Vargo, 2014).

Second, our research contributes to expanding the current KI and CSSC research stream into theory, practice, and policy formulation. This is because transforming the CSF's internal knowledge, capacity, and innovation activities necessitates a robust OCB and policy and cooperative norms among multiple strategic suppliers. Therefore, the significance of this study emphasizes that knowledge creation, improvisation, and incorporation within strategic alliances and social network interactions among actors in the construction supply chain are deemed essential for enhancing consulting services and processes (Cheng et al., 2022).

The remaining sections of this article are organized as follows. The following section discusses the research framework and hypotheses, followed by a section highlighting the research methodology and data statistics. Section 4 presents the results, Section 5 discusses the findings, and Section 6 provides the study's conclusions, ramifications, and limitations that inform the future research agenda.

LITERATURE REVIEW AND HYPOTHESES

Service delivery performance (SP) within CSSCs

The literature review and hypotheses are formulated following the conceptualization presented in Figure 2 of our research model. Fuentes et al. (2019), Malla and Delhi (2022) and Meng (2020) are among the studies that have focused on measuring project performance (quantitatively and qualitatively) by examining the final performance outputs and outcomes alone ('tangibles') without actually linking them with initial inputs ('intangibles') and knowledge spillover effects. SDL defines service as "the application of competencies (knowledge and skills) for the benefit of another entity or the entity itself" (Lusch & Vargo, 2014). This study proposes that professional service KI due to interactions with outbound (indirect) value-adding partners (i.e., specialized BPSs) is crucial to SP (Yap et al., 2022). The efficacy and success of a project are determined by achieving its objectives. These include, among others, attaining quality.

Bäckstrand and Fredriksson (2022); Weretecki et al. (2021); Wiewiora et al. (2014) demonstrate visually enticing facilities, time & cost savings, and satisfaction. Kerzner (2017), Raphael et al. (2022) and Yap et al. (2022) discuss project team members' problem-solving abilities. Satisfaction is a function of the difference between actual and desired performance (Raphael et al., 2022). Moreover, prospects may be concerned with cost-effectiveness (Ashworth, 2004). This ensures additional service quality outcomes such as responsiveness, empathy, dependability, and assurance (Raphael et al., 2022).

Outbound collaboration behavior (OCB)

Gold et al. (2010) identify four determinants of inter-organizational competitive advantage: relation-specific assets, knowledge-sharing protocols, complementary resources and capabilities, and effective governance. The robust collaboration of supply chain participants orchestrates these four aspects. To realize their (sustained) competitive advantage and SP, CSFs supplement their internal intangible resources with export cross-sector resources (via knowledge networks & alliances) (see Figure 1) (Cheng et al., 2022; Gold et al., 2010). Despite being socially complex, causally equivocal, and historically developed, these intangible knowledge resources exhibit rareness (scarcity), imperfect imitability & substitutability attributes and are deemed to be of high-end value required by CSFs (Gold et al., 2010).

Based on collaboration within CSSCs, the theory of choice is the relational view (RV) (Carmeli, Levi, & Peccei, 2021; Gold et al., 2010), which is an extension of the relational business view (RBV) on an inter-firm or network level. The RV concentrates on generating, developing, and deploying inter-organizational capabilities and resources via network interactions (Barraket & Loosemore, 2018; Gold et al., 2010; Khamaksorn et al., 2022). To maintain KI and SP, organizations must ensure "continuous alignment and realignment of specific tangible and intangible assets" among key ecosystem actors (Lütjen et al., 2019).

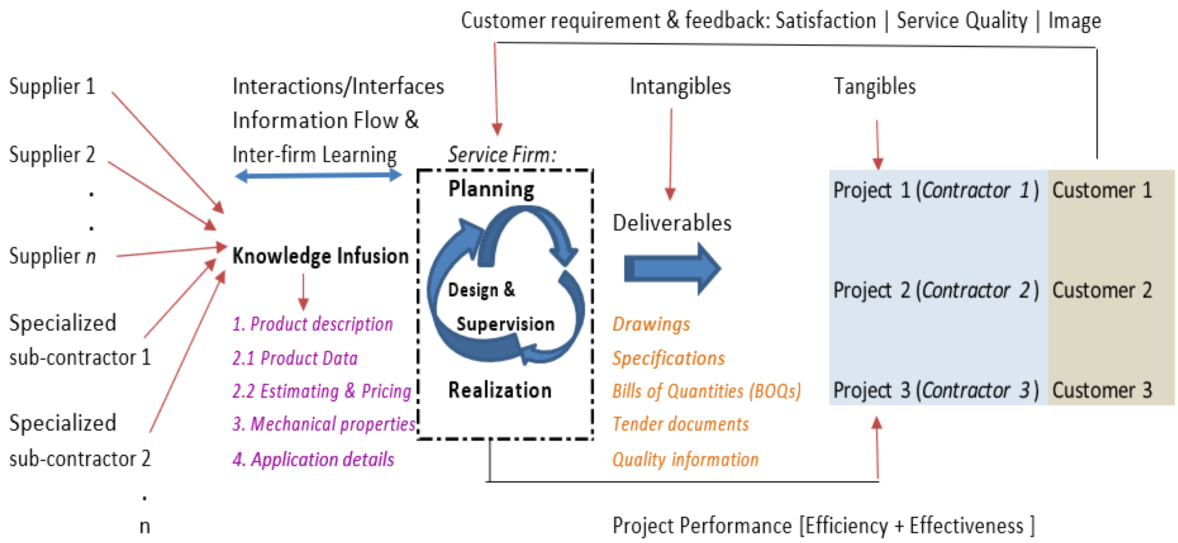


Figure 1. Knowledge infusion within CSSCs (Source: Author's construct)

Strategic and altruistic (relational or open innovation) alignments are the primary lenses through which supply chain collaboration behaviors can be viewed. The strategic or long-term partnership between supply chain actors, according to Zimmermann, DF Ferreira, and Carrizo Moreira (2016), is a step forward in enhancing products, services, and processes. According to Jayaram and Pathak (2013), it entails the interaction of goal alignment, inter-organizational teams, information systems integration, and the constant exchange of knowledge and data. A relationship-centric approach to managing construction supply chains aims to maintain an effective operational and strategic engagement with suppliers (Cheng et al., 2022; Lütjen et al., 2019).

Altruistic behavior refers to the act of self-sacrifice for the benefit of others (Wiedmer et al., 2020). In construction, mutual benefits cannot be realized until a consultant/CSF specifies particular products from a particular BPS and/or BPM. It is closely related to open innovation, in which companies leverage and integrate external and internal ideas to develop or enhance their products, processes, and business models (Chiu & Lin, 2022; Zimmermann et al., 2016).

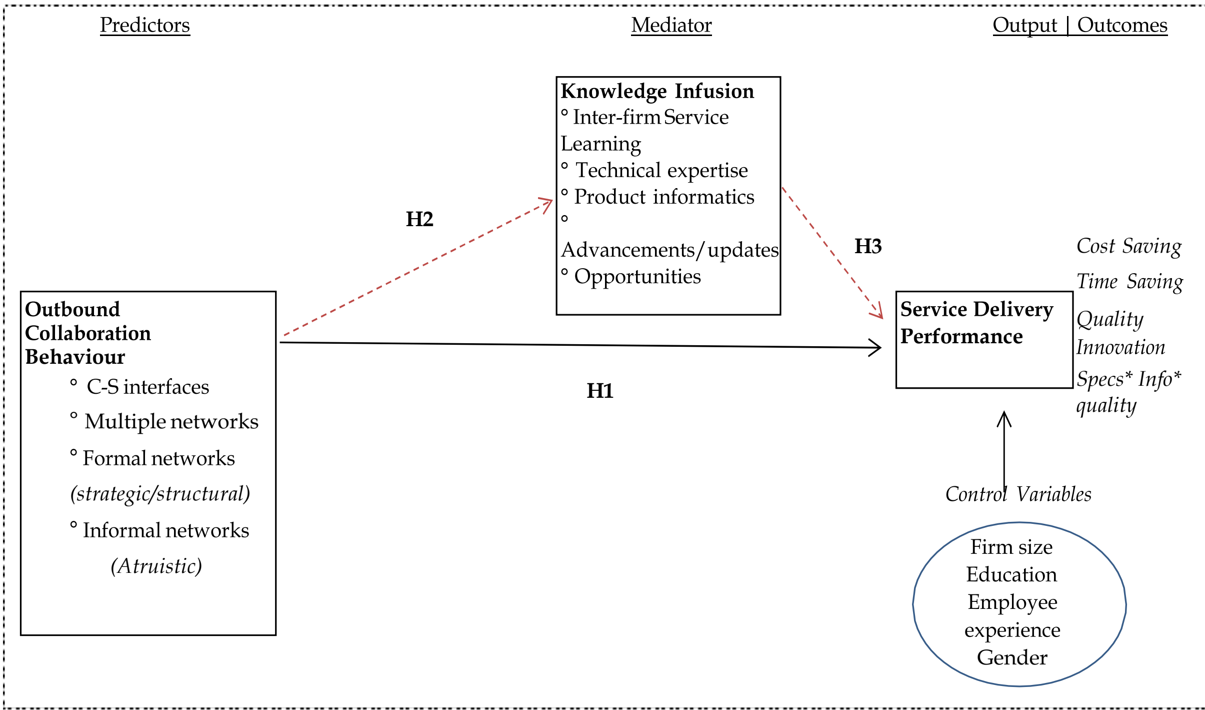
While strategic/structural alignment reflects formal knowledge infusion associated with organizational structure, reward systems, job design, and leadership (Barraket & Loosemore, 2018; Chen et al., 2021), altruistic/relational alignment reflects informal knowledge infusion characterized by varying levels of trust, management styles, organizational culture, and communication flows and channels (Chen et al., 2021; Jia et al., 2022). It depends largely on the project context (Cheng et al., 2022; Meng, 2020). We therefore postulate:

H1: OCB positively contributes to SP.
H2: OCB positively and significantly contributes to KI.

The mediating role of knowledge infusion (KI)

More than one-third of knowledge units from external sources contribute to resolving technical issues (Cheng et al., 2022). Inter-firm learning refers to creating and transferring knowledge between businesses (Zhao et al., 2022) (see Figure 1). Knowledge coupling theory, an extension of the knowledge-based view (KBV), considers an organization to be an "institution for integrating knowledge, and technologies (innovations) are embodiments of knowledge" (Grant, 1996; Jia et al., 2022). We also hypothesize that a CSF's innovation-related collaboration strategy with external outbound BPSs/BPMs has the potential to transform its internal capacity, skills development, and innovation activities for the better. Internal knowledge expansion and utility cannot remain static. This deficiency is mitigated by the utility and accessibility of dynamic external knowledge (Cheng et al., 2022; Medase & Abdul-Basit, 2020; Zhao et al., 2022). Multiple networks, C-S interfaces, and interactions are theorized to have the potential to transform internal capacity and innovation activities, thereby enhancing SP. Thus, infusing knowledge (Dobrzykowski, Hong, & Soon Park, 2012; Yepeng et al., 2022; Zhao et al., 2022). Therefore, we believe:

H3: KI positively contributes to SP.
H3a: KI positively mediates the relationship between OCB and SP, such that the greater the collaboration, the greater the knowledge spillover effects.



Note: Specs* = specification; Info* = information, C-S = consultant-supplier

Figure 2. Research model

METHODOLOGY

Measures: operationalization of variables and survey questionnaire development

Table 1 displays the complete list of measurement items (observed variables) used to measure the latent constructs derived from previously published literature with favorable psychometric properties (Hair et al., 2014). Utilizing an exploratory cross-sectional design, we used a five-point Likert scale (i.e., 1 = strongly disagree to 5 = strongly agree) to measure respondents' opinions; this scale has been extensively utilized in numerous previous SEM studies.

Service delivery performance (SP)

To operationalize SP, we used four (4) valid indicators from Emmitt (2006), Kerzner (2017), Mennens et al. (2018) to evaluate the service delivery capabilities of CSFs (such as meeting project capital cost, life cycle cost, and time limits, quality, minimal contractual disputes, and a well-perceived image). Other items are illustrated in Table 1.

Outbound collaboration behavior (OCB)

In consultant-supplier interfaces, OCB (the predictor variable) influences the utilization and intention to collaborate to acquire essential inter-firm resources (Mennens et al., 2018; Parida et al., 2017; Wiedmer et al., 2020). According to the theory of planned behavior (Ajzen, 1991), these interfaces may have a lengthy lifespan. To evaluate OCB within consultant-supplier interfaces (interactions), we utilized five (5) valid indicators (such as collaboration policy, effective communication, and feedback). Additional indicator variables are listed in Table 1.

Knowledge infusion (KI)

To measure 'KI' as the mediating variable, we adopted and modified the indicator scales provided by Cheng et al. (2022), Medase and Abdul-Basit (2020), Mennens et al. (2018) and Yepeng et al. (2022). We theorize that professional knowledge transfer effects result from inter-firm service learning and information sharing between consultants and outsourced specialized suppliers (such as internal transformation, capacity, innovation, enhanced specialized knowledge, real-time learning, etc.). As shown in Table 1, four (4) valid items were used to measure KI within CSSCs.

Table 1. Constructs, survey instruments, and factor loadings

Constructs	Item code	Item code description	Factor Loadings (0.5-1.0)
Outbound Collaboration Behaviour (OCB)		(Parida et al 2017; Mennens et al., 2018; Wiedmer et al. 2020; Ortquist, 2020); CA=0.700, CR=0.736, AVE = 0.415	
	OCB1	Our firm has a supply chain strategic alignment policy to collaborate with multiple supplier linkages (to create new service delivery competencies).	0.693
	OCB2	A shared strategic governance & decision-making mechanism enhances collective outcomes.	0.611
	OCB3	Our top leadership supports consultant-supplier collaborations	Eliminated
	OCB4	Our firm has a set of cooperative norms with suppliers towards effective structural collaboration alignments.	0.649
	OCB5	Our effective communication enhances inter-firm structural and procedural alignment	0.636
	OCB6	We get updated the soonest a new material model/system enters the construction market	0.611
	OCB7	We feel that suppliers trust consultants and always work closely with them in the service innovation process.	Eliminated
Knowledge Infusion (KI)		(Dobrzykowski et al.,2012; Mennens et al., 2018; Yepeng et al., 2022); CA=0.746,CR=0.776,AVE = = 0.410	
	KI1	Our innovation-related collaboration strategy has positively transformed our internal capacity and innovation activities	0.554
	KI2	Our priorities have always been to recognize theusefulness of new external knowledge.	*Eliminated*

	KI3	Our firm has access to material/product catalogs.	*Eliminated*
	KI4	Our specialist knowledge is enhanced via RFx (request forquotation, proposal, and information).	0.590
	KI5	Our firm attends formal training workshops organized byour specialized suppliers (+ manufacturers etc.).	*Eliminated*
	KI6	Material knowledge of our professionals in our firm isenhanced via multiple networks with suppliers.	0.779
	KI7	Our communication policy with multi-tier suppliersenhances real-time learning of material informatics*.	0.630
Service Performance (SP)		(Emmitt, 2006; Kerzner, 2017; Mennens et al., 2018); CA = 0.728, CR = 0.765, AVE = 0.453	
	SP1	Our projects are always within capital cost limits (andauthorized variations).	*Eliminated*
	SP2	We have always aimed to manage our projects withinoperational/life cycle cost limits.	0.565
	SP3	We have always aimed to manage our projects within timelimits (and approved extensions).	0.801
	SP4	We have always aimed to achieve the required quality inmanaging our construction projects.	0.670
	SP5	We have supervised our projects without contractualdisputes.	*Eliminated*
	SP6	Our new services give us an important competitiveadvantage and a well-perceived image.	0.636

*Product Description, Product Data, Mechanical/Physical Properties, System/Application Details, and Price; CA stands for Cronbach Alpha, CR stands for Composite Reliability, and AVE stands for Average VarianceExtracted.

Data and sample characteristics

The data from the survey topics were used to evaluate the role of KI as a mediator between OCB and SP. In the first phase, a catalog of consulting firms from Tanzania's Architects and Quantity Surveyors Registration Board (AQRB) and Engineers Registration Board (ERB) was utilized (AQRB, 2021; ERB, 2021). Table 2 displays the respondents' categorical population and sample size in five sub-disciplines (strata). Between May 2021 and March 2022, one dataset was collected from CSF representatives who attended continuous professional development (CPD) seminars, conferences, and consultative meetings. This cohort included respondents registered with AQRB and the Tanzania Institute of Quantity Surveyors (TIQS). Respondents were recruited based on their availability and willingness to participate, and the researchers specifically sought out experienced participants who maintained the required professional diversity. To guarantee our samples' accuracy, we took several precautions. Initially, during the session's break, the session chief introduced the topic and purpose of the survey. Second, we ensured that only one respondent completed each CSF questionnaire.

ERB-registered representatives of professional engineering firms compiled the second dataset (see Table 2). Following Zhao et al. (2022), this group received the questionnaire via email and WhatsApp, which contained a network platform link (https://kf.kobotoolbox.org/) to an online survey. To ensure the accuracy of our samples, we took the same precautions for the second group as we did for the first. First, each IP address could only respond to one questionnaire per company. Second, we sent several reminders if we did not receive a response within one week. A total of 274 surveys were administered, and 184 were collected (see Table 2) from various regions of Tanzania, most of which were located in Dar es Salaam, the country's largest commercial center. Thirteen of the 184 respondents' questionnaires were incomplete or contained inconsistencies, so they were excluded from the sample. Therefore, the final sample consisted of 171 CSFs or 62% of the total sample size. According to Sekaran and Bougie (2016), a response rate of at least 30% is acceptable for positive assessment surveys.

Table 2. Population and sample size for AEC consulting firms (at 99% confidence level)

	Firm	Architectural	Quantity Surveying	Structural/ Civil/ Material Engineering	Environmental Engineering	MEP*+ICT*Engineering*(service engineers)*	Total
Population	Local	263	143	144	13	41	604
	Foreign	5	1	45	1	9	61
	Total	268	144	89	14	50	665
Sample	Local	72	58	59	11	29	229
	Foreign	4	1	31	1	8	45
	Total	76	59	90	12	37	274

MEP* = mechanical, electrical & plumbing; ICT* = information and communication technology

Data analysis

IBM Amos 21.0 was utilized for SEM to assess the model and hypotheses using covariance-based SEM with the maximum likelihood estimation method. The original data were first subjected to exploratory factor analysis (EFA), which excluded insufficiently loading items (see subsection 4.3). The retained items (indicators) of the respective constructs were then evaluated using covariance of error terms based on modification indices (MI>10) in the confirmatory factor analysis (CFA). To prevent excessive data reduction, however, items with factor loadings below 0.7 but above 0.5 were retained for practical purposes because they hover above the 0.5 thresholds (Anderson & Gerbing, 1988; Fornell & Larcker, 1981). Consequently, we evaluate the measurement model that links manifest variables to their latent variables. Then, we test the structural model, which reveals the relationships between latent variables (Fornell & Larcker, 1981), as described in Section 4.

RESULTS

Demographics

The profiles of respondents featured in the empirical investigation are presented in Table 3. Quantity surveyors (28.7 percent), architects (34.5%), structural/civil engineers (24.6%), MEP & ICT engineers (11.1%), and environmental engineers (1.2 percent) are among the respondents' professional backgrounds. Bohari et al. (2020) state that the CSSC involves multi-disciplinary professions and that the findings pertain to a cross-section of construction project stakeholders. In addition, most respondents were registered professionals with regulatory bodies (junior level and above), and 78.9 percent had more than five years of experience in the construction industry, which is deemed acceptable for an opinion-based survey analysis (Bohari et al., 2020).

Table 3. Demographic information of respondents

Variable	Categories/attributes	Number	Frequency
		(*N* = 171)	(%)
Gender	Male	153	89.5
	Female	18	10.5
Education	PhD	14	8.2
	Masters	54	31.6
	Bachelors	101	59.1
	Diploma/FTC*	2	1.2
Profession	Architect	59	33.3
	Civil/Structural Engineer	42	24.6
	Quantity Surveyor	49	28.7
	MEP+ICT Engineer	19	11.1
	Environmental Engineer	2	1.2
Job position level	Principal/Director	46	26.9
	Senior	67	39.2
	Junior	32	18.7
	Graduates	26	15.2
Working experience	<5 years	36	21.1
	5-10 years	56	32.7
	>10 years	79	46.2

FTC* = Full Technician Certificate

Normality test and descriptive statistics on sample data

Before the empirical test, we assessed whether the data were normally distributed. Therefore, we performed a univariate normality test on each variable's items. The results showed that the absolute values of skewness and kurtosis of most items were less than 2, featuring within the acceptable thresholds of |skewness|≤ 2 and |kurtosis|≤ 7, respectively (Kim, 2013) (see Table 4). Most variables had negative coefficients for both skewness and kurtosis, possibly due to the similarity of the respondents (Xue et al., 2018). Thus, the sample dataset of this study meets the conditions of normal distribution for empirical analysis.

Table 4. Normality test and summary of descriptive statistics

Variables	Mean	Std. Deviation	Variance	Skewness	Kurtosis
KI1.	3.78	0.969	0.939	-1.111	1.383
KI4.	3.67	1.034	1.069	-0.698	-0.004
KI6.	3.86	1.059	1.121	-0.979	0.502
KI7.	3.85	0.952	0.906	-0.808	0.548
OCB1.	3.26	1.141	1.301	-0.268	-0.697
OCB2.	3.63	1.029	1.059	-0.868	0.420
OCB4.	3.42	0.926	0.857	-0.486	-0.226
OCB5.	3.67	0.86	0.739	-0.436	-0.107
OCB6.	3.22	1.196	1.429	-0.343	-0.824
SP2.	3.61	1.025	1.051	-0.611	-0.105
SP3.	3.70	1.057	1.116	-0.77	0.194
SP4.	3.84	0.992	0.985	-1.163	1.369
SP6.	3.59	0.968	0.937	-0.83	0.496
N = 171					

Sampling adequacy and Principal Component Analysis (PCA) test

We conducted EFA with PCA as the pre-factor analysis to assess sampling adequacy. A Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-MSA) value greater than 0.50, and a significance level for Bartlett's test of sphericity less than 0.05 indicate that the data exhibit substantial correlation. In addition, the rotated component matrix demonstrates that the indices are classified into four (4) corresponding factors, satisfying the criterion that the factor loadings are above an acceptable threshold of 0.50 (Xue et al., 2018). Each index corresponds to only one of the largest common factors of the loading values. The extraction information is shown in the footnote of Table 5. The test demonstrates that the sample data satisfy the prerequisites for factor analysis using SEM.

Table 5. Rotated Component Matrix

Variables	Components			
	1	2	3	4
SP3.	0.856	0.086	-0.057	0.087
SP2.	0.759	0.037	0.208	-0.077
SP4.	0.699	0.155	0.028	0.311
SP6.	0.490	-0.047	0.267	0.381
OCB1.	0.072	0.821	-0.057	0.224
OCB4.	0.06	0.754	0.288	0.032
OCB2.	-0.011	0.552	0.482	0.085
OCB5.	0.179	0.498	0.43	0.096
KI4.	0.097	0.126	0.758	0.017
OCB9.	0.131	0.261	0.616	0.169
KI1.	-0.005	-0.008	0.583	0.576
KI7.	0.120	0.138	0.017	0.858
KI6.	0.222	0.348	0.181	0.626

Extraction method: PCA; Rotation: Varimax with Kaiser Normalization (rotation is convergent after the seventh iteration); KMO statistic: 0.784 (acceptable); Bartlett's Test of Sphericity probability: 0.000)

Measurement model assessment, reliability, and validity checks

After modification, the CFA results revealed that the revised model had acceptable fit statistics (see Table 8 and Figure 3). Cronbach's alpha and composite reliability (CR) values were examined to assure construct reliability (Hair et al., 2014). Table 6 demonstrates that values for all variables were above or near 0.70, indicating that our variables were reliable.

Additionally, we examined construct validity. To assure convergent validity, all retained items had adequate factor loadings (above 0.50) for their respective latent construct (Hair et al., 2014). However, AVE values ranged between 0.41 and 0.45, which is below the recommended threshold of 0.5. As an exception to this norm, convergent validity can also be determined when the AVE is less than 0.50, and the CR is greater than 0.70 (Fornell & Larcker, 1981). Idealistically, all CR values should exceed AVE values. Consequently, convergent validity was achieved. Finally, the discriminant validity was evaluated. Only one construct ('SP') in Table 6 had an MSV value less than its respective AVE value, indicating validity issues with the other two constructs ('OCB' and 'KI') (Fornell & Larcker, 1981; Hair et al., 2014).

Table 6. Reliability and validity results

Construct	Means	Cronbach's alpha (α)	CR	AVE	MSV	KI	OCB	SP
KI	15.16	0.700	0.736	0.415	0.423	**0.644**		
OCB	17.2	0.746	0.776	0.410	0.423	0.650***	**0.641**	
SP	14.74	0.728	0.765	0.453	0.204	0.452***	0.331**	**0.673**

***p<.001; **p<.01; AVE = Average Variance Extracted; MSV = Maximum Shared Squared Variance

Nonetheless Anderson and Gerbing (1988), proposed a second method to evaluate the discriminant validity of the constructs if the first method failed. In this instance, we assessed discriminant validity by comparing the pair of constructs (OCB and KI) in two-factor CFA models, with one model constraining the correlation between the constructs to be 'one' and the other permitting free estimation of the parameter. A model has discriminant validity if the model in which the correlation is not constrained to 'unity' yields a substantially lower chi-square value (Anderson & Gerbing, 1988; Hair et al., 2014). This condition was satisfied, so demonstrating discriminant validity is not an issue, according to Table 7.

Table 7. Fixing discriminant validity concerns

Pair of Constructs	Constrained (1-factor)		Unconstrained (2-factor)		Chi-square difference		Discriminant validity
	$\chi 2$	df	$\chi 2$	df	$\Delta\chi 2$	Δdf	
OCB + KI	72.023	23	30.325	22	41.698	1	Yes

Structural path model assessment and goodness-of-fit check

The final structural model (see Figure 3) is generated after the conditions for the measurement model are all satisfied. In addition, the correlations between the constructs are replaced by the hypothesized causal relationships (Bohari et al., 2020). The fit indices were within acceptable range (Table 8: CFI = 0.940; TLI = 0.920; RMSEA = 0.058; SRMR = 0.066; X2/df = 1.578).

Table 8. Model fit summary*

Measure	Estimate	Threshold	Remark
CMIN	89.929	--	--
DF	57	--	--
CMIN/DF	1.578	Between 1 and 3	Excellent
CFI	0.939	>0.95	Acceptable
SRMR	0.066	<0.08	Excellent
RMSEA	0.058	<0.06	Excellent
PClose	0.262	>0.05	Excellent

*(Gaskin & Lim, 2016)

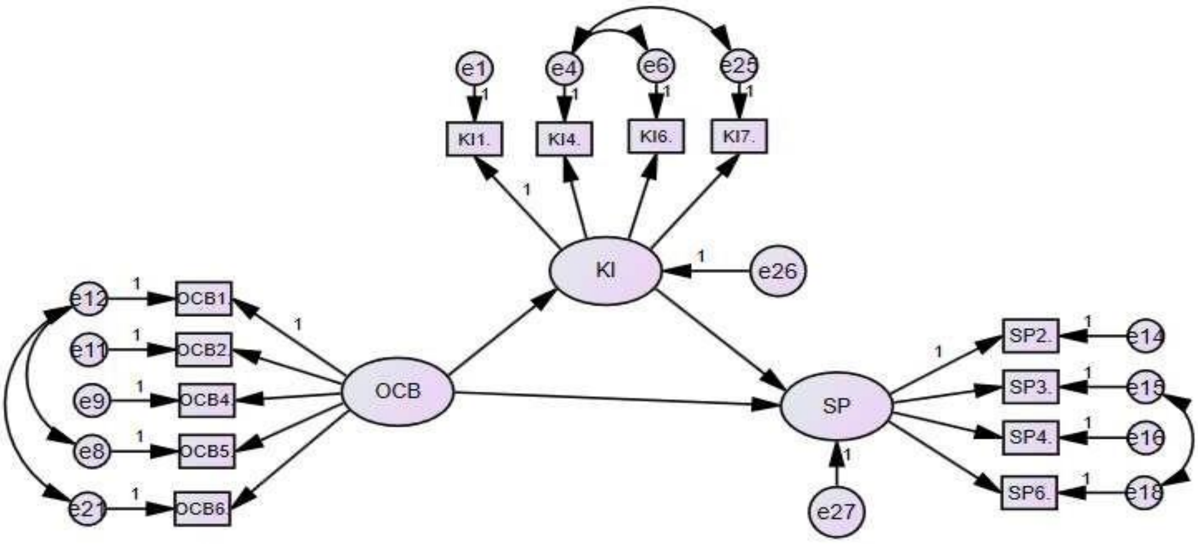


Figure 3. Final structural model

(Model fit statistics: $\chi 2$ =89.929, df = 57, X^2/df= 1.578, p-value=0.004, GFI=0.927, PGFI=0.884, TLI=0.916, CFI=0.939, RMSEA=0.058, pClose=0.262)

Analysis of main and mediation effects

We conducted a significance test using the bootstrapping technique with 1000 randomly-replaced samples. Consequently, the significant results demonstrate that KI mediates the relationship between OCB and SP in CSFs. The total effect, direct effect, and indirect effect of the research model are presented in Table 9. The mediation analysis results demonstrated a significant indirect effect of outbound collaboration on service performance via knowledge infusion (= 0.267, p =.005), thereby supporting the partial mediation hypothesis (H3a). The fact that the mediated and direct effects point in the same direction demonstrates complementary mediation (Baron & Kenny, 1986). In addition, the results indicate that non-significant effects of control variables such as employees' work experience (WE), education (EE), gender (EG), and firm size (FS) on service performance (SP) are completely independent.

Table 9. Standardized direct, indirect, and total effects

Construct	Direct effect	Indirecteffect	Total effecton SP	Are the total effects on SP significant?	Results
OCB <--- SP	*0.063^{ns}*	0.267**	0.331**	YES (+ Sig.)	Indirect
OCB <--- KI	0.650***	-	0.650***	YES (+ Sig.)	Indirect
KI <--- SP	0.411**	-	0.411**	YES (+ Sig.)	Indirect

Note: ***p < 0.001, **< 0.01, ns. = Not significant, Sig. = Significant, If *Indirect* = Partial Mediation, If *Direct* = Full Mediation

Hypotheses test results

Four hypotheses (postulated in Section 2) were tested based on the findings extracted from the path analysis in SEM. The hypotheses are summarized in Table 10 below.

Table 10. Hypothesis testing results

Hypothesis	Relationships	Path Coefficient	*SE*	*t*-value (C.R.)	*p*-value	Results
H1	OCB <--- SP	0.063	0.094	0.501	0.617	Not-Supported
H2	OCB <--- KI	0.650	0.156	4.671	***	Supported
H3	KI <--- SP	0.411	0.092	2.838	0.005	Supported
H3a	KI mediation	0.267**	-	-	0.005	Supported

***p < 0.001, **< 0.01

Our findings indicate that H1 was unsupported, while H2, H3, and H3a were. Possible repercussions are discussed in greater detail in Section 5. Our data analysis supports the positive and significant effects of OCB on KI (= 0.650, p = 0.001) (H2), followed by the positive and significant effects of KI on SP (β= 0.411, p = 0.009) (H3). The indirect effect (β= 0.267, p = 0.005) and total effect (β = 0.331, p = 0.004) of OCB on SP are significant and positive (see Tables 9 and 10). In addition, while KI partially mediates this relationship, its direct effect is not statistically significant (β= 0.063, p = 0.617), confirming that OCB had a marginal effect on SP.

DISCUSSION OF THE FINDINGS

Today, knowledge economies dominate the global economy (Cheng et al., 2022). Medium and large construction projects typically necessitate complex, diverse, and distinct specialized knowledge. However, we emphasize that it is difficult for a single organization to manage such initiatives without alliances and networks with multiple stakeholders (suppliers, subcontractors, financiers, and clients, among others) (Cheng et al., 2022). To contain the pace and quality of service delivery (SP), the most important factor for most projects (Balouei Jamkhaneh et al., 2018; Reid et al., 2019), consultants must have the required professional knowledge. Therefore, the Relation View (RV) is the foundation for our discussion in this discourse. We hypothesize that (1) relation-specific assets, (2) knowledge-sharing routines, (3) complementary resources and capabilities, and (4) effective governance underlie this study (Gold et al., 2010).

The study aimed to examine the role of KI as a mediator between OCB and SP among PBOs, specifically CSFs within CSSCs in Tanzania. OCB has various effects on KI and SP. The study reveals that KI (learning spillover effects) within consultant-supplier interfaces intensifies the impact of the relationship. Consequently, robust supply chain collaboration behavior, governance, and policy significantly impact the processes of knowledge creation, improvisation, and infusion (Parida et al., 2017). Likewise, effective communication improves real-time learning of product informatics (i.e., product description, product data, mechanical/physical properties, system/application details, and price) (Yepeng et al., 2022).

Xue et al. (2018) demonstrate that as collaborative innovation spreads across all industries, its adoption in the construction industry is progressively taking shape within the CSSC architecture Zhao et al. (2022). state that specialized BPSs and BPMs possess the required knowledge, skills, and competencies for standard and premium construction materials (products) and services. CSFs must seek to supplement their existing knowledge and skills with external knowledge resources (exploration) (Chen et al., 2020). Effective collaboration strategies can bolster explicit knowledge over tacit knowledge. In contrast to tacit knowledge, which is characterized by the human mind through experience and occupations, explicit knowledge is dominated by concepts, experiences, and information that are readily accessible. Documents and related reports could be codified or digitized (Chen et al., 2021; Chiu & Lin, 2022).

Moreover, our findings indicate that OCB alone does not necessitate SP for CSFs unless coupled with KI strategies. Collaboration strength significantly enhances internal innovation, KI, and eventually SP (Xue et al., 2018). As stated previously, even though AEC professional services are characterized by proprietary knowledge, competencies, skills (intangible assets), and service-intensiveness, the KI and SP of numerous AEC projects have been deemed dubious (Raphael et al., 2022; Zhao et al., 2022). We contend that the persistently low KI and SP may be attributable to the absence of consistent and strategic outbound inter-firm collaboration networks (Barraket & Loosemore, 2018; Khamaksorn et al., 2022; Malla & Delhi, 2022). Our conceptual and theoretical framework demonstrates that an inter-firm service learning environment enhances SP knowledge, skills, and competencies. These capabilities are enhanced by assuring vigilant outbound C-S interactions and collaboration strategies well supported by KI strategies. Therefore, for effective and efficient KI within CSSCs, a relevant and strategic framework, governance, and policy for downstream supplier-consultant interfaces is essential. KI strategies and policies can include adherence to material specifications, internal transforming capacity, formal and informal training, and real-time product data, system application, and quality control (Balouei Jamkhaneh et al., 2018; Mennens et al., 2018; Yepeng et al., 2022).

Previous research has demonstrated that external knowledge benefits internal innovation (Jia et al., 2022; Zhao et al., 2022). Our findings are consistent with these findings. Controlling knowledge inertia is essential for guaranteeing multiple, sustainable outbound consultant-supplier interfaces instead of relying solely on routine problem-solving procedures using the same sources (Jia et al., 2022). Quality product information, content, source, accessibility, and dependability are essential to the success of this endeavor (Bäckstrand & Fredriksson, 2022; Raphael et al., 2022; Weretecki et al., 2021). Moreover, interaction frequency and reciprocal exchange facilitate the realization of this strategy (Xue et al., 2018).

CONCLUSIONS AND IMPLICATIONS

The following are our conclusions and implications. This Paper emphasizes the critical role of KI (and its improvisation) as a mediator between OCB among consulting (service) firms and BPSs for SP. The ability to actualize KI and manage OCB is a crucial success factor for CSFs to maintain their competitive advantage in the fast-paced AEC industry to achieve SP. Our empirical research indicates that OCB has a significant direct effect on KI among CSFs and BPSs. In addition, the results indicate that while the direct effect of OCB on SP is insignificant, its indirect effect becomes significant and positive when mediated by KI, thus providing support for three out of four hypotheses.

This study makes two significant theoretical contributions. First, we propose that the KI of service firms is facilitated and orchestrated via multiple connections (networks) with outbound specialized BPSs. To realize collective outcomes, achieving sustainable KI, i.e., transformation of internal capacity and innovation activities, real-time learning, and a shared strategic governance & decision-making mechanism, requires a robust OCB coupled with an effective communication policy, cooperative norms, and altruistic and structural collaboration alignments. In this manner, SP deficiencies such as errors in project design, delays, cost overruns, a negative perception of service delivery, contractual disputes, poor quality, and environmental concerns will be significantly reduced.

Finally, we expand the literature on KI and OCB within CSSC networks. KI and OCB for SP in the CSSC networks context have been the subject of relatively little research (Carmeli et al., 2021; Moshood et al., 2022; Song et al., 2017; Zhao et al., 2022). We contribute to the literature by highlighting how CSFs can rely on their diversified supply chain networks to supplement their inadequate internal knowledge resources, thereby contributing to the sustainability of SP. To leverage CSF's knowledge foundation, acquiring, assimilating, transforming, exploiting, and infusing external knowledge is essential (Khamaksorn et al., 2022; Mennens et al., 2018; Pemsel et al., 2014).

Practical (managerial) implications

Our research exposes new insights that motivate CSFs to strategize their professional KI competencies to maintain a sustainable competitive advantage in the ever-expanding high-tech, service-oriented, and innovative AEC industry. In addition, these strategies should ensure the availability, consistency, content, source, and quality of accurate product information. The primary challenge is mitigating information-sharing risks while ensuring that outbound actors (BPSs and/or BPMs) provide the right information at the right time, in the right location, in the right manner, and to the right focal firm (Weretecki et al., 2021). This will provide invaluable assurances that the product's data, geometry, and behavior are precisely aligned with the client's project requirements (Emmitt, 2006; NBS, 2017).

Xue et al. (2018) Construction markets and advanced technologies influence the current service delivery mode. Consequently, reconfiguring the KI strategy within CSSCs will enable CSFs to create more flexibility and agility in their processes to respond more quickly to customers' market requirements (Balouei Jamkhaneh et al., 2018) and during times of uncertainty (e.g., the COVID-19 pandemic, border-hostile wars, etc.).

Limitations and areas for future research needs

A number of limitations are emphasized by cautiously emphasizing the most significant contributions of this research. First, our dataset was compiled by a single group of CSSC collaborators. By integrating the data from the various stakeholders (e.g., clients, suppliers, and/or manufacturers), the future dataset can be enriched and the results refined. These refined outcomes can advise and provoke new insights. Second, the cross-sectional character of our data prevents us from conclusively establishing causal relationships. Future longitudinal data may provide additional and possibly conclusive evidence for the temporal implications of these effects.

Thirdly, the focus of this Paper has been on OCB, which contributes to inter-firm learning to enhance the required professional knowledge (KI). Future researchers could use Zhang and Chen (2016) SECI (socialization, externalization, combination, internalization) model to investigate the effects of collaboration alignment structure (strategic vs. altruistic and lateral vs. longitudinal) to determine whether or not there are variations that appear to influence KI differently. Moreover, consultant-supplier interaction network strength (frequency, intensity, size) and network position (density, centrality) may differentiate KI. Filling this void may entice additional research.

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REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, *103*(3), 411. https://doi.org/10.1037/0033-2909.103.3.411

AQRB. (2021). *Directory list of registered architects, quantity surveyors and practicing firms*. Architects and Quantity Surveyors Registration Board. https://ors.aqrb.go.tz/professionals_list

Ashworth, A. (2004). *Cost Studies of Buildings*. Pearson Education Limited.

Bäckstrand, J., & Fredriksson, A. (2022). The role of supplier information availability for construction supply chain performance. *Production planning & control*, *33*(9-10), 863-874. https://doi.org/10.1080/09537287.2020.1837933

Balouei Jamkhaneh, H., Safaei Ghadikolaei, A. H., Madhoushi, M., & Yahyazadehfar, M. (2018). Excellence criteria of services supply chain in management consulting institutes of Iran. *Journal of Science and Technology Policy Management*, *9*(1), 42-65. https://doi.org/10.1108/JSTPM-04-2017-0013

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, *51*(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Barraket, J., & Loosemore, M. (2018). Co-creating social value through cross-sector collaboration between social enterprises and the construction industry. *Construction management and economics, 36*(7), 394-408. https://doi.org/10.1080/01446193.2017.1416152

Bohari, A. A. M., Skitmore, M., Xia, B., Teo, M., & Khalil, N. (2020). Key stakeholder values in encouraging green orientation of construction procurement. *Journal of Cleaner Production, 270*, 122246. https://doi.org/10.1016/j.jclepro.2020.122246

Carmeli, A., Levi, A., & Peccei, R. (2021). Resilience and creative problem-solving capacities in project teams: A relational view. *International Journal of Project Management, 39*(5), 546-556. https://doi.org/10.1016/j.ijproman.2021.03.007

Chen, H., Yao, Y., & Zhou, H. (2021). How does knowledge coupling affect exploratory and exploitative innovation? The chained mediation role of organisational memory and knowledge creation. *Technology Analysis & Strategic Management, 33*(6), 713-727. https://doi.org/10.1080/09537325.2020.1840543

Cheng, Q., Liu, Y., & Chang, Y. (2022). The incentive mechanism in knowledge alliance: based on the input-output of knowledge. *Journal of Innovation & Knowledge, 7*(2), 100175. https://doi.org/10.1016/j.jik.2022.100175

Chiu, M.-L., & Lin, C.-N. (2022). Developing supply chain open innovation capability: The mediating role of the knowledge creation process, governance mechanism and technology as a driver. *Journal of Innovation & Knowledge, 7*(4), 100264. https://doi.org/10.1016/j.jik.2022.100264

Dobrzykowski, D. D., Hong, P. C., & Soon Park, J. (2012). Building procurement capability for firm performance: a service-dominant logic view. *Benchmarking: An International Journal, 19*(4/5), 567-584. https://doi.org/10.1108/14635771211258016

Emmitt, S. (2006). Selection and specification of building products: Implications for design managers. *Architectural Engineering and Design Management, 2*(3), 176-186. https://doi.org/10.1080/17452007.2006.9684614

ERB. (2021). *Directory list of registered engineers and practicing firms*. ERB-Tanzania. https://www.erb.go.tz/registered-engineers

Eze, E. C., Ugulu, R. A., Onyeagam, O. P., & Adegboyega, A. A. (2021). Determinants of sustainable building materials (SBM) selection on construction projects. *International Journal of Construction Supply Chain Management, 11*(2), 166-194. https://ijcscm.com/menu-script/index.php/ijcscm/article/view/79

Faraji, O., Asiaei, K., Rezaee, Z., Bontis, N., & Dolatzarei, E. (2022). Mapping the conceptual structure of intellectual capital research: A co-word analysis. *Journal of Innovation & Knowledge, 7*(3), 100202. https://doi.org/10.1016/j.jik.2022.100202

Forkmann, S., Henneberg, S. C., Witell, L., & Kindström, D. (2017). Driver configurations for successful service infusion. *Journal of Service Research, 20*(3), 275-291. https://doi.org/10.1177/1094670517706160

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research, 18*(1), 39-50. https://doi.org/10.1177/002224378101800104

Fuentes, M., Smyth, H., & Davies, A. (2019). Co-creation of value outcomes: A client perspective on service provision in projects. *International Journal of Project Management*, *37*(5), 696-715. https://doi.org/10.1016/j.ijproman.2019.01.003

Gaskin, J., & Lim, J. (2016). *"Model Fit Measures", Amos Plugin*. Gaskination StatWiki. https://statwiki.gaskination.com/index.php/Plugins

Gold, S., Seuring, S., & Beske, P. (2010). Sustainable supply chain management and inter-organizational resources: a literature review. *Corporate social responsibility and environmental management, 17*(4), 230-245. https://doi.org/10.1002/csr.207

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic management journal, 17*(S2), 109-122. https://doi.org/10.1002/smj.4250171110

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. (2014). *Multivariate data analysis (Pearson new internat. ed)*. Harlow: Pearson. https://www.pearson.com/store/p/multivariate-data-analysis-pearson-new-international-edition/GPROG_A100061040593_learnernz-availability/9781292021904

Jayaram, J., & Pathak, S. (2013). A holistic view of knowledge integration in collaborative supply chains. *International Journal of Production Research, 51*(7), 1958-1972. https://doi.org/10.1080/00207543.2012.700130

Jia, J., Zhang, M., & Yang, G. (2022). Factors influencing BIM integration with emerging technologies: Knowledge coupling perspective. *Journal of Management in Engineering, 38*(2), 04022001. https://doi.org/10.1061/(ASCE)ME.1943-5479.0001018

Kerzner, H. (2017). *Project management: a systems approach to planning, scheduling, and controlling*. John Wiley & Sons. https://www.wiley.com/go/kerzner/projectmanagement13e

Khamaksorn, A., Tah, J. H. M., & Kurul, E. (2022). Social Networks and Knowledge Transfer in International Construction Joint Venture Projects: A Case Study in Thailand. *Journal of Construction in Developing Countries, 27*(1), 111-137. http://dx.doi.org/10.21315/jcdc2022.27.1.7

Kim, H.-Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative dentistry & endodontics, 38*(1), 52-54. https://doi.org/10.5395/rde.2013.38.1.52

Kowalkowski, C., Gebauer, H., Kamp, B., & Parry, G. (2017). Servitization and deservitization: Overview, concepts, and definitions. *Industrial Marketing Management*, *60*, 4-10. https://doi.org/10.1016/j.indmarman.2016.12.007

Kwofie, T. E., Aigbavboa, C. O., & Matsane, Z. S.-S. (2019). Key drivers of effective collaborative working in construction supply chain in South Africa. *International Journal of Construction Supply Chain Management, 9*(2), 81-93. https://ijcscm.com/menu-script/index.php/ijcscm/article/view/53/43

Lusch, R. F., & Vargo, S. L. (2014). *The service-dominant logic of marketing: Dialog, debate, and directions*. Routledge. https://doi.org/10.4324/9781315699035

Lütjen, H., Schultz, C., Tietze, F., & Urmetzer, F. (2019). Managing ecosystems for service innovation: A dynamic capability view. *Journal of Business Research*, *104*, 506-519. https://doi.org/10.1016/j.jbusres.2019.06.001

Malla, V., & Delhi, V. S. K. (2022). Determining interconnectedness of barriers to interface management in large construction projects. *Construction Economics and Building, 22*(2), 69-101. https://doi.org/10.5130/AJCEB.v22i2.7936

Medase, S. K., & Abdul-Basit, S. (2020). External knowledge modes and firm-level innovation performance: Empirical evidence from sub-Saharan Africa. *Journal of Innovation & Knowledge, 5*(2), 81-95. https://doi.org/10.1016/j.jik.2019.08.001

Meng, X. (2020). Proactive management in the context of construction supply chains. *Production planning & control, 31*(7), 527-539. https://doi.org/10.1080/09537287.2019.1657977

Mennens, K., Van Gils, A., Odekerken-Schröder, G., & Letterie, W. (2018). Exploring antecedents of service innovation performance in manufacturing SMEs. *International Small Business Journal, 36*(5), 500-520. https://doi.org/10.1177/0266242617749687

Moshood, T. D., Rotimi, F. E., & Rotimi, J. O. B. (2022). Knowledge transfer and management in the construction industry: Trends and future challenges. *International Journal of Construction Supply Chain Management*, *12*(1), 72-102. https://ijcscm.com/menu-script/index.php/ijcscm/article/view/94

NBS. (2017). *NBS National BIM Report 2017*. NBS Enterprises Ltd. https://www.thenbs.com/knowledge/nbs-national-bim-report-2017

Örtqvist, D. (2020). Performance outcomes from reciprocal altruism: a multi-level model. *Journal of Small Business & Entrepreneurship, 32*(3), 227-240. https://doi.org/10.1080/08276331.2019.1661616

Parida, V., Pesämaa, O., Wincent, J., & Westerberg, M. (2017). Network capability, innovativeness, and performance: a multidimensional extension for entrepreneurship. *Entrepreneurship & Regional Development, 29*(1-2), 94-115. https://doi.org/10.1080/08985626.2016.1255434

Peltokorpi, A., & Seppänen, O. (2022). Managing Product Information for Lean Construction: Use Cases and a Proposed Process. In *Annual Conference of the International Group for Lean Construction* (pp. 388-398). IGLC. net. https://doi.org/10.24928/2022/0142

Pemsel, S., Wiewiora, A., Müller, R., Aubry, M., & Brown, K. (2014). A conceptualization of knowledge governance in project-based organizations. *International Journal of Project Management, 32*(8), 1411-1422. https://doi.org/10.1016/j.ijproman.2014.01.010

Raphael, A. O., Samuel, O. S., & Dipeolu, A. A. (2022). Evaluation of Service Quality Gaps in Construction Professional Service Firms in Nigeria. *Journal of Construction in Developing Countries, 27*(1), 25-40. http://web.usm.my/jcdc/vol27_1_2022/jcdc2022.27.1.2.pdf

Rehman, M. A., & Ishak, M. S. B. (2021). Moderating role of government Acts, laws and policies between team competency and skills and construction risk management among KSA contractors. *International Journal of Construction Supply Chain Management*, *11*(2), 144-165. https://ijcscm.com/menu-script/index.php/ijcscm/article/view/78

Reid, I., Matthias, O., & Bamford, D. (2019). Management consultancy's role in delivering lasting [triple bottom line] benefits. *Production planning & control, 30*(5-6), 479-492. https://doi.org/10.1080/09537287.2018.1501815

Sahib, A. A., Mohammed, A., Shaker, R. M., Ali, M. H., Ahmed, M. D., & Shannan, M. A. A. (2022). The Relationship among Team Skills and Competencies, Construction Risk Management and Supply Chain Performance with Moderating Effect of Government Laws Acts, and Policies: A Study from Iraq Construction Contractors. *International Journal of Construction Supply Chain Management, 12*(1), 127-146. https://ijcscm.com/menu-script/index.php/ijcscm/article/view/120

Sekaran, U., & Bougie, R. (2016). *Research Methods for Business: A Skill-Buliding Approach*. John Wiley & Sons. http://hdl.handle.net/123456789/3821

Sogaxa, A., & Simpeh, E. K. (2022). Efficient material management strategies for enhancing the performance of SMEs in the South African construction industry. *International Journal of Construction Supply Chain Management, 12*(1), 147-166. https://ijcscm.com/menu-script/index.php/ijcscm/article/view/121

Song, J., Migliaccio, G. C., Wang, G., & Lu, H. (2017). Exploring the influence of system quality, information quality, and external service on BIM user satisfaction. *Journal of Management in Engineering, 33*(6), 04017036. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000549

von Grafenstein, L., Iweala, S., & Ruml, A. (2022). Information source and content–Drivers for consumers' valuation of fairly traded chocolate. *Cleaner and Responsible Consumption, 6*, 100071. https://doi.org/10.1016/j.clrc.2022.100071

Weretecki, P., Greve, G., Bates, K., & Henseler, J. (2021). Information management can't be all fun and games, can it? How gamified experiences foster information exchange in multi-actor service ecosystems. *International journal of information management, 61*, 102391. https://doi.org/10.1016/j.ijinfomgt.2021.102391

Wiedmer, R., Whipple, J. M., Griffis, S. E., & Voorhees, C. M. (2020). Resource scarcity perceptions in supply chains: The effect of buyer altruism on the propensity for collaboration. *Journal of Supply Chain Management, 56*(4), 45-64. https://doi.org/10.1111/jscm.12242

Wiewiora, A., Murphy, G., Trigunarsyah, B., & Brown, K. (2014). Interactions between organizational culture, trustworthiness, and mechanisms for inter-project knowledge sharing. *Project Management Journal, 45*(2), 48-65. https://doi.org/10.1002/pmj.21407

Xue, X., Zhang, X., Wang, L., Skitmore, M., & Wang, Q. (2018). Analyzing collaborative relationships among industrialized construction technology innovation organizations: A combined SNA and SEM approach. *Journal of Cleaner Production, 173*, 265-277. https://doi.org/10.1016/j.jclepro.2017.01.009

Yap, J. B. H., Lim, B. L., Skitmore, M., & Gray, J. (2022). Criticality of project knowledge and experience in the delivery of construction projects. *Journal of Engineering, Design and Technology, 20*(3), 800-822. https://doi.org/10.1108/JEDT-10-2020-0413

Yepeng, W., Jiao, Y., Hui, X., & Lyu, C. (2022). The more engagement, the better? The influence of supplier engagement on new product design in the social media context. *International journal of information management, 64*, 102475. https://doi.org/10.1016/j.ijinfomgt.2022.102475

Yu, S., Abbas, J., Álvarez-Otero, S., & Cherian, J. (2022). Green knowledge management: Scale development and validation. *Journal of Innovation & Knowledge, 7*(4), 100244. https://doi.org/10.1016/j.jik.2022.100244

Zhang, L., & Chen, X. (2016). Role of lean tools in supporting knowledge creation and performance in lean construction. *Procedia Engineering, 145*, 1267-1274. https://doi.org/10.1016/j.proeng.2016.04.163

Zhao, D., Jiang, Y., Lin, C., Liu, X., & Wu, Y. J. (2022). Impacts of knowledge expectations on recipients' continuous cross-project learning intention. *International Journal of Project Management, 40*(2), 120-131. https://doi.org/10.1016/j.ijproman.2021.10.003

Zimmermann, R., DF Ferreira, L. M., & Carrizo Moreira, A. (2016). The influence of supply chain on the innovation process: a systematic literature review. *Supply Chain Management: An International Journal, 21*(3), 289-304. https://doi.org/10.1108/SCM-07-2015-0266