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Closing the loop with construction clients: relationship strategies for circular economy business model adoption

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Abstract

Purpose – Growing sustainability pressures are compelling the construction industry to adopt circular economy (CE) business models (CEBMs). However, weak client engagement continues to restrict this transition. This underscores the need to understand how client relationships can drive circular value creation. Hence, this study aims to examine the relationship attributes that will enable construction organisations to establish and maintain client engagement within the CEBM framework.

Design/methodology/approach – This study used an exploratory sequential mixed-methods design. Initially, qualitative data were collected and analysed until saturation was achieved. Subsequently, the insights from the qualitative phase informed the design of the quantitative phase. A structured questionnaire was then used to gather data from respondents. The data were analysed using descriptive statistics, the Kruskal–Wallis test and confirmatory factor analysis.

Findings – Five attributes emerged as significant in strengthening client relationships for CEBM in construction organisations. They are Web advertisements, emails, social media, electronic learning and one-to-one marketing. These findings demonstrate that digitally enabled and personalised engagement strategies play a crucial role in driving long-term client relationships in CEBM.

Practical implications – The study provides construction organisations with a clear guide for designing relationship strategies that engage diverse client groups and reinforce their transition towards circular practices.

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Originality/value – This study provides the first empirical examination, to the best of the authors' knowledge, of the client relationship construct within CEBMs for construction organisations. It advances understanding of how client engagement can be leveraged as a strategic mechanism to accelerate the adoption of a CE in the construction industry.

Keywords Business model, Circular economy, circular economy business model, client relationship, construction organisations

Paper type Research paper

1. Introduction

The construction industry is one of the largest global consumers of raw materials and is responsible for high levels of waste generation (Ghaffar *et al.*, 2020; Abdullahi *et al.*, 2023). Traditional linear models of "take–make–dispose" have contributed to resource depletion and environmental degradation. Hence, the circular economy (CE) promotes closed-loop systems where materials are reused, recycled and kept in circulation for as long as possible (Otasowie *et al.*, 2023a). In construction, CE aims to reduce waste and improve resource efficiency across the project lifecycle (Pomponi and Moncaster, 2017). Common circular strategies include material reuse, modular design and designing for disassembly (Adekunle *et al.*, 2024). These strategies offer both environmental and economic benefits for construction organisations (Adams *et al.*, 2017). CE also supports innovation in procurement, design and construction by using sustainable materials, digital tools and life-cycle assessment methods (Leising *et al.*, 2018). This shift aligns with global sustainability goals such as the United Nations Sustainable Development Goals, particularly SDG 12, on responsible consumption and production (United Nations Environment Programme, 2015). Thus, CE adoption is becoming a strategic requirement for long-term industry resilience.

However, CE adoption requires more than technical changes. Otasowie *et al.* (2024) argue that construction organisations require a circular economy business model (CEBMs) to implement CE principles effectively. The CEBM helps organisations develop circular value propositions, recover materials and remain competitive. Lüdeke-Freund *et al.* (2019) and Lewandowski (2016) identify nine components of CEBMs. Among these components is the client relationship construct. This construct is crucial because it drives trust, promotes long-term collaboration and enhances resource efficiency. It also helps organisations understand the needs of different client groups and design circular services that meet their expectations. Client relationships in CEBM differ from those in linear models. Linear relationships are often short-term and transactional. However, CEBM relationships require continuous collaboration to support strategies such as product–service systems, take-back agreements, refurbishment and maintenance services (Geissdoerfer *et al.*, 2018). Hence, effective client relationship strategies are necessary to improve loyalty and encourage sustainable behaviours.

Several studies have examined client relationships within CEBMs (Lüdeke-Freund *et al.*, 2019; Lewandowski, 2016). Nevertheless, most focus on sectors such as manufacturing and retail. They do not address the unique features of the construction industry. These features involve complex stakeholder interactions, lengthy project durations and high levels of uncertainty. However, clients are key drivers of innovation in construction (Blayse and Manley, 2004; Kulatunga *et al.*, 2011; Yusof *et al.*, 2022; Guerrero and Engström, 2024). Ahmed *et al.* (2023) note that CE implementation in construction is still in its early stages and highlight the need for active client involvement. Munaro and Tavares (2025) further emphasise the importance of

continuous collaboration. The study noted that it can provide clients with long-term benefits such as material flexibility, reuse and cost savings. This shows a clear gap in understanding the specific client relationship strategies needed to support CEBMs in construction organisations. This gap indicates that construction organisations may struggle to adopt CEBM without a clear understanding of the factors that shape client relationships. Hence, this study examines the attributes of the client relationship construct in CEBM for construction organisations. It also validates the construct's influence on CEBM adoption in the industry. In addition, this study provides an industry-specific analysis of client relationship attributes in CEBM. It offers new insights into how relationship strategies can support circular practices such as take-back schemes, reverse logistics and refurbishment. The findings contribute to the existing body of knowledge and provide practical guidance for construction organisations seeking to strengthen client engagement and support CE transitions.

2. Circular economy in construction

Adopting CE principles in the construction industry involves strategies for managing resources and waste to extend the useful life of materials (Oluleye *et al.*, 2022; Otasowie *et al.*, 2023b). According to Anderson *et al.* (2022), the CE approach can mitigate environmental degradation by reducing demand for virgin resources. It can also enhance product durability, incorporate alternative materials and promote the secondary materials market. The aim is to integrate innovative practices that minimise environmental damage (Upadhyay *et al.*, 2021). However, the construction industry struggles to translate CE principles into consistent practice. Studies argue that implementation remains fragmented because of limited awareness, weak organisational capabilities and a lack of industry-wide alignment (Hossain *et al.*, 2020). Further studies have identified industry-specific challenges. These challenges include complex building characteristics, fabrication constraints, diverse client demands, multi-stakeholder involvement and long building lifecycles of 30–60 years (Charef and Lu, 2021; Otasowie *et al.*, 2023b). These findings suggest that CE adoption in construction is not only a technical challenge but also a managerial and relational one.

The 10Rs framework of reuse, recycle, recover, refuse, reduce, remanufacture, repair, refurbish, replace and repurpose provides a structured path for reducing waste (Ghisellini *et al.*, 2018). However, its application in construction remains uneven. For instance, the industry often applies only a few of the Rs, mostly recycling and reuse, while higher order strategies such as refuse, reduce and remanufacture are rarely implemented. This gap indicates that the industry has not fully embraced the systemic and behavioural changes needed for CE transformation. In spite of these limitations, some studies document emerging opportunities. Nußholz *et al.* (2020) presented an organisation that adopted an innovative business model to collect and recycle secondary wood, glass and concrete from urban reserves. These materials were used to produce new construction products. This demonstrates the potential of closed-loop practices in high-material-intensity projects. Similarly, Guerra *et al.* (2021) identified CE strategies. These include modular design, design for disassembly and remanufacturing. These examples demonstrate that CE principles can transform traditional supply chains by enabling material recovery, urban mining and the utilisation of secondary materials without compromising product quality. However, these cases remain isolated. Thus, it raises questions about the conditions required for broader adoption across the industry.

A key challenge that emerges across the literature is the lack of a CEBM framework and the inconsistency of client requirements. This often limits the implementation of CE. Clients

influence design decisions, procurement choices and lifecycle objectives. This makes them central to the adoption of CE (Yusof *et al.*, 2022; Guerrero and Engström, 2024). However, their expectations differ from project to project. This creates uncertainty for organisations seeking to apply circular strategies. Studies (Ghaffar *et al.*, 2020) indicate that long-term collaboration and lifecycle thinking are essential in CEBMs. Nevertheless, these depend on active, informed and collaborative clients. This suggests that stronger client relationships can reduce mismatched expectations and support CE outcomes. Thus, existing studies have discussed CE principles, business model components and implementation challenges. However, there is a limited study on how client relationships shape CEBMs in construction organisations. Most CEBM studies focus on material loops, design strategies, or technological enablers, while relationship strategies have received little attention. This gap indicates that current CEBM studies have overlooked a critical component of construction practice. This is the variability of client relationships and their impact on circular outcomes. Hence, the present study contributes to the literature by addressing this gap. It provides a focused analysis of client relationship strategies in CEBMs for construction organisations.

3. Client relationship attribute in circular economy business model

The client relationship is a core element of the business model framework because it defines how an organisation interacts with its client segments to build trust and drive loyalty (Osterwalder and Pigneur, 2010). It also shapes the type and depth of connection an organisation develops with each client segment, thereby influencing how value is delivered. Traditional business models emphasise transactional and short-term interactions. However, modern organisations increasingly focus on long-term and client-centric relationships (Grönroos, 2017). Hence, organisations now rely on personalised services, after-sales support and value co-creation practices to strengthen engagement (Lee and Kotler, 2019). The growth of digital technologies further supports this shift. Websites, email newsletters and customer/client portals now enhance continuous communication (Chaffey and Smith, 2022). These tools enable client relationship management systems to track client behaviour and preferences. They also help organisations tailor their services and improve loyalty over time.

In the CEBM, client relationships assume a broader role. They support circular strategies such as reuse, repair and recycling (Lewandowski, 2016). Thus, client interaction extends beyond sales. It involves collaboration, shared responsibility and mutual value creation throughout the product life cycle. In construction, this may include involving clients in design decisions. Hence, it encourages the use of reusable components and engages them in material recovery at the end of a building's life. However, these practices are not yet well established in the construction industry. Linear project delivery, fragmented supply chains and limited post-handover engagement remain long-standing challenges (Ajayi *et al.*, 2017; Ghisellini *et al.*, 2018). Thus, organisations often struggle to maintain continuous and transparent relationships across project phases. Existing literature also indicates that clients may lack knowledge of circular solutions. This creates a barrier to their adoption. Adams *et al.* (2017) argue that organisations should invest in educating clients about the environmental and economic value of circular propositions. This is supported by studies indicating that awareness and shared understanding are crucial for establishing trust and driving long-term collaboration (Bocken *et al.*, 2014). Close client relationships also enable service-based models, such as product-as-a-service. This allows providers to retain ownership and remain connected to clients throughout the product life cycle (Bocken *et al.*, 2014). Maintaining such relationships is thus essential for long-term success and shared sustainability outcomes in CEBMs (Nußholz, 2017).

Hence, existing studies have highlighted the importance of client relationships. Nevertheless, they do not sufficiently address how construction organisations can structure these relationships within CEBMs. This implies limited attention to industry-specific issues such as project-based collaboration, temporary multi-organisational teams and heterogeneous client expectations in construction (Akintoye and Main, 2007). Little is known about which client relationship attributes are most relevant to construction organisations adopting CEBMs. This gap indicates that the current literature does not adequately explain how client relationship strategies should be adapted for CEBMs in construction or how the strategies influence the delivery of circular value. Thus, this study contributes to the literature by identifying construction-specific client relationship attributes and explaining how they support CEBM.

4. Methodology

This study adopted an exploratory sequential mixed-methods design to investigate client relationship strategies in the CEBM for construction organisations. This design was appropriate because the research area is still emerging and requires an initial qualitative phase to clarify concepts before testing them on a larger sample. Also, mixed-methods research facilitates the integration of the strengths of qualitative depth and quantitative generalisability (Jack and Raturi, 2006; Mangan *et al.*, 2004). Thus, using this approach made it possible to develop the survey instrument directly from expert insights and to validate the construct's structure through statistical analysis. The study was conducted between March 2023 and February 2024. A purposive sampling strategy was used for the qualitative phase. This approach was suitable because the study required participants with recognised experience in CE practices. Thirty construction professionals were selected and invited to participate in the study. Fifteen responded, and 13 agreed to participate. The selection criteria include senior professional roles, relevant academic qualifications (Bachelor's, Master's or PhD), experience in CE-related management and membership in professional bodies. Table 1 presents the demographics of the experts. Also, all experts are from grade 9 contracting organisations registered with the Construction Industry Development Board (CIDB) of South Africa. Semi-structured interviews were selected

Table 1. Experts' demographics

Interviewee code	Class of work	Years of experience	Highest academic qualification	Discipline/role
P1	General building	10	Masters	Construction manager
P2	Civil engineering	17	Bachelors	Civil engineer
P3	Civil engineering	14	Bachelors	Civil engineer
P4	Civil engineering	12	Bachelors	Civil engineer
P5	General building	16	Bachelors	Architect
P6	General building	14	Masters	Architect
P7	General building	8	Masters	Architect
P8	Civil engineering	13	Masters	Civil engineer
P9	General building	12	Masters	Construction manager
P10	General building	40	Bachelors	Quantity surveyor
P11	General building	5	Masters	Construction manager
P12	Civil engineering	11	Masters	Civil engineer
P13	General building	14	Masters	Construction manager

Source(s): Authors' own work

because they allow flexibility and help uncover insights that may not emerge in structured formats (Kallio *et al.*, 2016). The interview questions focused on client relationship strategies required for CEBM adoption (see Appendix). Each interview lasted 30–45 min and was conducted via Zoom. With participants' consent, all sessions were audio-recorded and transcribed *verbatim* using Microsoft Word to maintain accuracy (Braun and Clarke, 2022). The transcripts were uploaded into Atlas.ti for systematic coding and analysis. The recurring attributes of client relationships generated from this phase informed the development of the questionnaire used in the quantitative phase.

For the quantitative phase, a structured questionnaire was developed based on the findings from the qualitative phase. The instrument was piloted with five experts to test clarity and relevance (Hirshfield and Fowler, 2020). Thereafter, the survey was distributed to construction professionals across different contracting organisations through a stratified random sampling. This was used to ensure representation across grades 7–9 organisations. This method helped reduce sampling bias and improve the reliability of the analysis. Also, these professionals were included to allow a broader group to validate the expert recommendations. This provided a more comprehensive understanding of perceptions and the applicability of the identified attributes across the industry. A total of 208 completed questionnaires were collected. Furthermore, percentages were used to describe the demographic characteristics of the survey respondents. The Relative Importance Index (RII) was used to rank client relationship attributes based on their perceived importance. This provided a clear hierarchy of attributes within the CEBM. Also, the Kruskal–Wallis test was used to determine whether respondents' views differed significantly across professional groups. This nonparametric test is appropriate for comparing opinions across three or more groups (Pallant, 2020; Otasowie *et al.*, 2023c). A *p*-value above 0.05 indicates no significant difference, while a *p*-value below 0.05 signals a statistically significant difference. Finally, confirmatory factor analysis (CFA) was used to test the reliability and validity of the measurement items for the client relationship construct. The analysis was conducted using EQation software (EQS) version 6.4. A multidimensional set of model-fit indices was applied. These include the root mean square error of approximation, Satorra–Bentler scaled Chi-square (S-Bχ^2), standardised root mean square residual, goodness-of-fit index and comparative fit index. These indices provided a robust assessment of the model's adequacy. In addition, Cronbach's alpha value for the client relationships construct is 0.906. Because this exceeds the 0.7 reliability threshold, it confirms that the construct variables in this study are highly reliable. Hence, the questionnaire used in this research demonstrates acceptable internal consistency. Also, it supports its suitability for achieving the study's objectives.

5. Results and discussion

5.1 Attributes of the client relationship construct in the circular economy business model for construction organisations

The client relationship is a fundamental building block of the CEBM because it defines how construction organisations can engage with clients throughout a project lifecycle. It reflects the strategies used to attract, retain and support different client groups. The findings indicate that target client analysis is a key attribute of this relationship (P1, P3, P4 and P5). P3 noted that "analysing target clients is critical in building meaningful client relationships, especially within a circular economy business model… it involves understanding their sustainability goals, budget preferences and long-term needs." This supports the view that client knowledge is essential for tailoring circular offerings and strengthening engagement (Pitka and Bucko, 2023). Similarly, P4 stated that practical analysis enables organisations to align solutions with client priorities: "we can tailor circular value propositions that truly resonate

with them… a green-conscious client may be more interested in materials with low carbon, while a cost-conscious client might value modular designs that reduce waste and future renovation costs." This shows clear economic rationale because organisations can allocate resources to deliver options that maximise value for each segment while minimising unnecessary expenditure on misaligned offerings. P5 reinforced this rationale by explaining that analysing clients improves communication, enhances service delivery and builds trust: "it helps us group clients based on their priorities… clients feel their needs are acknowledged and addressed." This aligns with Lüdeke-Freund *et al.* (2019), who emphasise that understanding client needs enables value co-creation. This is crucial in circular models where collaboration reduces waste and improves lifecycle performance. Recent studies (Geissdoerfer *et al.*, 2018) also confirm that segment-oriented strategies support the economic viability of circular solutions. This is done by enabling organisations to match circular value propositions with measurable client outcomes such as cost savings, durability and reduced material use. Hence, the findings suggest that target client analysis enhances the client–organisation relationship and enhances the effectiveness of circular value delivery. By identifying client needs, behaviours and expectations, construction organisations can personalise their offerings. This will reduce misalignment between supply and demand and enhance long-term value creation. This contributes both theoretically and practically by showing that client analysis is not merely a relational exercise but an economic strategy that supports efficient resource use, competitive positioning and compliance with sustainability demands.

Also, participants P6, P7, P8, P9, P11, P12 and P13 identified four client relationship attributes within the CEBM. They include building client lifetime value, understanding client preferences, one-to-one marketing and selling complementary products. These attributes reflect how construction organisations can sustain long-term engagement, personalise value and expand services to support circular practices. P7 emphasised the economic relevance of client lifetime value, stating that "creating client lifetime value in a CE means building long-term relationships beyond a single project… offering services like maintenance, upgrades, or material take-back that extend beyond the initial build." This corroborates Mosaddegh *et al.* (2021), who define client lifetime value as the total contribution a client makes over the lifecycle of the relationship. In circular construction, long-term service agreements generate repeat business and stable revenue flows and reduce acquisition costs. Recent studies (Bocken *et al.*, 2023) also demonstrate that lifetime value is crucial for organisations transitioning from one-off transactions to service-oriented circular models. Understanding client preferences was also identified as a central attribute. P8 explained that "each client has different sustainability goals, budget constraints, or quality expectations," and that collecting feedback will enable organisations to tailor solutions such as modular components or recycled materials. This aligns with the findings of Antikainen and Valkokari (2016) and Lüdeke-Freund *et al.* (2019). The studies posit that preference-driven customisation improves circular adoption and reduces demand uncertainty. When organisations understand what each client values most (cost, durability, or environmental impact), they can adjust their circular offerings accordingly. P11 highlighted the importance of one-to-one marketing. The expert noted that "digital tools can support this by tracking client behaviour and preferences." This enables personalised communication and targeted updates on new circular products. This approach helps build trust and strengthens client retention. According to Manninen *et al.* (2018), personalised digital engagement reduces information asymmetry and increases clients' willingness to adopt circular services. Furthermore, P13 stressed the value of offering complementary circular products. The expert stated that "selling complementary product value, like offering reclaimed material supply or energy-saving

systems, can increase our clients' value." These complementary solutions enhance both environmental and financial outcomes. It also supports the economic rationale behind CE principles. Bressanelli *et al.* (2022) confirm that bundling complementary circular services increases project performance and improves the perceived value of circular offerings. Thus, these findings show that client lifetime value, understanding of client preferences, personalised marketing and complementary product offerings form a coherent set of relationship strategies that support CEBM adoption. They also demonstrate how construction organisations can move from transactional relationships towards long-term value partnerships, which is central to achieving circularity.

In addition, P2, P5, P7, P10 and P11 identified client segmentation, selling higher-value products, direct marketing and social media as important client relationship attributes within CEBM for construction organisations. These positions demonstrate how organisations use targeted communication and value-based propositions to drive long-term relationships. P2 explained that client segmentation supports effective client identification. The expert noted that "it allows us to understand our clients, whether they are green-conscious developers, cost-sensitive managers, or business-to-business partners, and tailor our communication accordingly." This reflects the economic rationale behind client segmentation. It enables organisations to reduce information uncertainty and enhance value alignment by categorising clients based on their sustainability preferences and procurement priorities (Wang, 2022; Bocken *et al.*, 2016). Such targeted engagement helps build trust and encourages repeat collaboration. P5 emphasised the importance of selling products with higher value. The expert stated, "Instead of focusing solely on cost, we highlight durability, recyclability and lifecycle performance." This perspective aligns with the literature on circular value propositions (Lewandowski, 2016; Guerola-Navarro *et al.*, 2024). The studies argue that clients respond positively when organisations demonstrate long-term economic and environmental benefits, particularly through lifecycle savings and reduced replacement costs. Communicating higher product value helps shift clients from a short-term price orientation to a long-term value mindset. This is central to the logic of a circular business model. Furthermore, P10 discussed direct marketing as a way to clarify the benefits of circular solutions through "case studies or personalised proposals." This is especially true when clients are unfamiliar with innovative options. Direct marketing reduces perceived risks by providing clear evidence and tailored information (Antikainen and Valkokari, 2016). This supports client education, which is crucial for adoption in markets where circular practices are still in their early stages of development. Similarly, P11 noted that social media serves as a "strategic tool" for showcasing circular projects and attracting new clients. Social platforms amplify visibility, support broader engagement and help organisations demonstrate credibility through accessible success stories. Todaro *et al.* (2023) opine that digital communication channels enhance client awareness of circular solutions and improve relational transparency. Hence, these attributes enhance how organisations understand, engage with and serve their clients while supporting circular transition goals. The findings corroborate those of Antikainen and Valkokari (2016) and Guerola-Navarro *et al.* (2024). The studies show that segmentation, value-based selling and digital communication are effective strategies for building client trust and supporting the implementation of CEBM. They also underline the economic rationale behind client relationship strategies. They will allow construction organisations to reduce uncertainty, create clearer value signals and support long-term collaboration by aligning their communication and offerings with client needs.

Finally, P3, P5, P6, P8, P11 and P13 identified complaint management, electronic learning, Web advertisements and emails as core client relationships. Their views underscore

the economic rationale for CEBM strategies that rely on ongoing feedback and long-term engagement. P3 explained that "complaint management is essential for client retention." This is because it signals responsiveness and builds trust. This aligns with Preuss *et al.* (2022). This indicates that effective complaint resolution strengthens loyalty and supports continuous improvement in circular systems. This is because user information helps refine material loops and enhance service quality. From an economic perspective, timely handling of client concerns reduces service failures and transaction costs and drives repeat business. Furthermore, P8 stressed the role of electronic learning. The expert noted that "electronic learning platforms can make a big difference in attracting clients." This can be done by educating clients on CE principles such as material take-back systems and lifecycle thinking. According to Mannan *et al.* (2023), e-learning enhances client awareness and facilitates better decision-making in sustainable construction. This shared understanding will reduce information gaps between construction organisations and clients, which is crucial for the efficient functioning of CEBMs. In addition, P13 added that "Web advertisements can promote our circular services to a broader audience, while emails provide personalised updates that strengthen routine communication." Hence, digital channels have been shown to enhance market visibility, attract environmentally conscious clients and facilitate ongoing exchanges essential for creating circular value (Tura *et al.*, 2019). These channels will enable construction organisations to communicate lifecycle value propositions and reduce the search costs associated with identifying partners willing to participate in circular practices. Hence, these findings suggest that client-relationship strategies contribute not only to better communication but also to more efficient circular operations. Complaint management supports continuous improvement; e-learning strengthens client capability; and digital outreach expands market reach. These attributes will help construction organisations maintain strong, informed and economically viable relationships within CEBMs. Table 2 summarises these attributes.

5.2 Quantitative respondents' demographic information

According to the responses, 3% of respondents hold a doctoral degree as their highest qualification, while 24% hold a master's degree. Furthermore, 29% of respondents hold an honours degree, whereas 34% hold a bachelor's degree. This suggests that the survey reflects the perspectives of mid- to early-career professionals with formal academic training. This may influence their awareness and adoption of CE practices. Also, 1.9% of respondents have less than one year of experience in the construction industry. In addition, 6.7% of respondents have between one and two years of experience, and 10.6% of respondents have between three and five years of experience. Also, 17.3% of respondents have between 6 and 10 years of experience, and 23.1% of respondents have between 11 and 15 years of experience. Furthermore, 12.5% of respondents have 16–20 years of experience, 4.8% have 21–25 years of experience and 23.1% have more than 25 years of experience in the construction industry. This indicates that the study captures both entry-level professionals and highly experienced professionals. This diversity in experience provides a comprehensive understanding of industry perceptions and practices across career stages. Similarly, 19.2% of respondents are engineers, 17.3% are construction managers, 39.7% are architects, 19.2% are quantity surveyors and 3.9% are project managers. The distribution shows a broad representation of key construction professionals. This suggests that the results reflect multi-disciplinary perspectives relevant to CE adoption.

5.3 Descriptive statistics and Kruskal–Wallis test

Table 2 shows that "understanding clients' choices and preferences" (client development strategy) was ranked highest in importance. This suggests that the quantitative respondents

Table 2. Ranking and Kruskal–Wallis *p*-values

S/N	Client relationship attributes	Label
	Client identification	
1	Target clients' analysis	CR1
2	Client segmentation	CR2
	Client attraction	
3	Direct marketing	CR3
4	Web advertisements	CR4
5	Emails	CR5
6	Social media	CR6
7	Electronic-learning	CR7
	Client retention	
8	One-to-one marketing	CR8
9	Complaint management	CR9
	Client development	
10	Client lifetime value	CR10
11	Selling a higher product value to the client	CR11
12	Selling complementary product value to clients	CR12
13	Understanding the clients' choice/preference	CR13

Label	*Relative important index (RII)*	*Kruskal–Wallis p-values*	*Rank*
CR13	0.85	0.01	1
CR10	0.85	0.01	2
CR1	0.84	<0.01	3
CR12	0.83	0.01	4
CR2	0.83	0.05	5
CR8	0.83	<0.01	6
CR11	0.81	0.00	7
CR3	0.81	0.01	8
CR9	0.80	<0.01	9
CR7	0.80	<0.01	10
CR6	0.80	0.00	11
CR4	0.78	0.00	12
CR5	0.75	<0.01	13

Source(s): Authors' own work

perceive client-centric alignment as the fundamental economic logic of a successful CEBM (Lüdeke-Freund *et al.*, 2019). When construction organisations understand what clients value, they can craft circular value propositions that mitigate perceived risk and enhance willingness to adopt circular solutions. This supports the principle that "long-term client value drives long-term business value" in circular systems. Also, creating lifetime value for the client emphasises that long-term relationships are just as important as immediate transactions. This suggests that circular business strategies perform better when trust, reliability and continuity are prioritised over one-off transactions. Hence, investing in relationship-building becomes a strategic requirement rather than a marketing option (Mosaddegh *et al.*, 2021). Target client analysis (client identification strategy) ranked second. This highlights the need for detailed profiling to understand client motivations in a circular market. Effective segmentation will allow construction organisations to match circular offerings to the right clients (Pitka and Bucko, 2023). This will reduce market uncertainty. The result reflects the economic argument that precise targeting reduces communication costs and increases uptake of circular products and services. Attributes such

as "selling complementary product value", "client segmentation based on preference" and "one-to-one marketing" each recorded RII = 0.83. These strategies show that personalisation strengthens client engagement. Tailored circular value propositions are more likely to generate interest because they directly address clients' functional and financial expectations. This aligns with the idea that personalised communication enhances perceived usefulness and reduces adoption barriers (Bocken *et al.*, 2016). "Selling higher product value to clients" and "direct marketing to organisations" followed with RII = 0.81. These findings underscore the importance of communicating clear value advantages, especially when circular offerings may appear costly or unfamiliar. Strong value communication reduces uncertainty, a key barrier to circular procurement (Guerola-Navarro *et al.*, 2024). Complaint management, e-learning and social media each scored RII = 0.80. These strategies facilitate continuous interaction and education, which are crucial for sustaining engagement in circular initiatives. They support ongoing learning and help clients understand the long-term benefits of circular practices (Preuss *et al.*, 2022). Web advertisements and emails ranked lower, but they still contribute to communication consistency. Their lower ranking suggests that clients in the construction industry respond more strongly to personalised and relationship-based strategies than to generic outreach. Finally, the Kruskal–Wallis test results further reveal statistically significant differences across all attributes, as all *p*-values were ≤0.05. This means that professionals hold differing views on which strategies are more important. This likely reflects variations in organisational priorities, client types or exposure to circular practices. These differences provide insight into the fragmented nature of circular adoption in the industry and reinforce the need for tailored engagement strategies.

5.4 Confirmatory factor analysis

The initial construct consisted of thirteen measurement variables. However, only five variables (CR4, CR5, CR6, CR7 and CR8) met the required statistical thresholds before conducting the CFA. Thus, these five indicators were retained for further analysis to evaluate the validity of the measurement model. According to Byrne (2013), an acceptable residual covariance distribution should be symmetrical and centred around zero. Hence, when a latent construct possesses these features, it is appropriate for CFA (Boomsma, 2000). Also, Gao *et al.* (2008) emphasised that this symmetry helps to manage issues such as multicollinearity and high inter-variable correlations. This could otherwise compromise the model's accuracy. The analysis of the residual covariance for the selected variables confirmed that the residual matrix satisfies the required standards. Thus, the model displays signs of convergence. In line with Bentler's (2005) recommendation, all residual values were within the acceptable range of −1.00 to +1.00, predominantly centred near zero. This indicates a strong model fit. In addition, the average unstandardised off-diagonal residual was 0.0231. Given that values exceeding 2.58 are considered too high (Byrne, 2013), this result further supports the model's goodness-of-fit. However, to fully validate the measurement model, the findings from the goodness-of-fit test will be examined further. This will confirm whether the selected indicators reliably represent the underlying construct and provide support for their inclusion in the final model.

The estimated parameters of a model are important because they help determine whether to accept or reject it (Lei and Wu, 2007). In addition, assessing model fitness involves verifying parameters such as reliability, validity and statistical significance (Lei and Wu, 2007; Hair *et al.*, 2013). Also, Hair *et al.* (2013) recommend using several criteria. This includes incremental and absolute fit indices, as well as the Chi-square test, to evaluate model fit. This study presents the results of these fit indices and estimates in Table 3. The goodness-of-fit index (GFI) and the comparative fit index (CFI) are 0.962 and 0.966,

Table 3. Fit indices for client relationship construct

Fit index	Cut-off value	Estimate	Comment
S-Bχ^2		22.224	
Df	$x > 0.00$	5	Good fit
CF1	$x \geq 0.90$ acceptable $x \geq 0.95$ good fit	0.966	Good fit
GFI	$x \geq 0.90$ acceptable $x \geq 0.95$ good fit	0.962	Good fit
SRMR	$0.08 \geq x$ acceptable $0.05 \geq x$ good fit	0.034	Good fit
RMSEA	$0.08 \geq x$ acceptable $0.05 \geq x$ good fit	0.023	Good fit
NFI	$x \geq 0.90$ acceptable $x \geq 0.95$ good fit	0.957	Good fit
NNFI	$x \geq 0.90$ acceptable $x \geq 0.95$ good fit	0.933	Acceptable
RMSEA 90% CI		0.000:0.070	Acceptable range
p-Value	$X > 0.05$	0.00	Acceptable range

Variable	*Unstandardised coefficient (λ)*	*Standardised coefficient (λ)*	*Z-statistics*	*R²*	*Significant at 5% level?*
CR4	0.8707	0.8065	6.578	0.650	Yes
CR5	0.5984	0.7197	10.839	0.518	Yes
CR6	1.2459	0.8634	14.008	0.745	Yes
CR7	0.9343	0.8012	9.543	0.642	Yes
CR8	0.4984	0.6091	7.238	0.571	Yes

Variable	*Factor loading*	*Cronbach's alpha*	*Rho coefficient*
CR4	0.8065	0. 873	0. 882
CR5	0.7197		
CR6	0.8643		
CR7	0.8012		
CR8	0.6091		

Note(s): (S-Bχ^2) = Satorra–Bentler scaled Chi-square; GFI = goodness-of-fit index; CFI = Bentler comparative fit index; SRMR = standardised root mean square residual; RMSEA = root mean square error of approximation; NFI = normed fit index; NNFI = non-normed fit index
Source(s): Authors' own work

respectively. According to Iacobucci (2010), values of 0.95 or higher indicate a good fit, although values above 0.90 are still acceptable. Thus, this study's GFI and CFI results confirm a good model fit. Furthermore, the standardised root mean square residual (SRMR) and the root mean square error of approximation (RMSEA) are 0.034 and 0.023, respectively. A value of 0.05 or lower for these indices suggests a good fit, while values up to 0.08 remain acceptable. Hence, these results provide further confirmation that the model accurately fits the data. The model analysis also yielded a S-Bχ^2 value of 22.224 with 5 degrees of freedom and a *p*-value of 0.000. However, Zhong and Yuan (2011) caution that the Chi-square test can be sensitive to sample size and data normality. Hence, it may sometimes give misleading results. For this reason, Kline (2005) recommends using the normed Chi-square, which is calculated by dividing the Chi-square value by its degrees of freedom. The normed Chi-square for this study is 4.445. According to Byrne (2013), a normed Chi-square value between 3.00 and 5.00 indicates a good fit. Thus, this value also supports the conclusion that the model is appropriate and fits the data well.

Furthermore, Table 3 presents the correlation coefficients, standard errors and test statistics for the model. It includes the coefficient of determination (R^2) and *z*-values. These help explain the significance and influence of the model's parameters (Bentler, 2005). The results show that all the correlation coefficients are below 1.00. Thus, this confirms the absence of multicollinearity among the variables. Also, the *z*-statistics for the path coefficients are all greater than 1.96. Hence, this indicates that the measurement variables are statistically significant. According to Hair *et al.* (2014), a *z*-value greater than 1.96 in a two-tailed test at the 5% level signifies statistical significance. The high *z*-values validate the strength and reliability of the model's inner paths. In addition, the R^2 value measures the model's predictive accuracy. As noted by Kline (2010), an R^2 value close to 1.00 indicates strong predictive power. The results show that the R^2 values for all measurement variables are above 0.5. Thus, this demonstrates that the client relationship attributes explain a significant proportion of the variation in the observed variables. Thus, the findings confirm that the selected measurement variables are suitable for defining and predicting the model. The analysis validates the model's parameter strengths, accuracy and significance in assessing client relationship attributes in the CEBM.

In addition, several statistical tests were conducted to ensure the internal reliability and consistency of the client relationship construct. These included factor loadings, Cronbach's alpha and the Rho coefficient. According to Hair *et al.* (2014), these tests provide the necessary information to assess the validity, reliability and consistency of a data set. The reliability coefficient should range from 0 to 1.00, with values closer to 1.00 being more desirable (Kline, 2005). The results in Table 3 show that the Cronbach's alpha value was 0.873, while the Rho coefficient was 0.882. These values exceed the recommended threshold and confirm that the indicator variables demonstrate strong internal consistency and reliability. Furthermore, factor loadings were examined to evaluate the strength of the relationship between the measurement variables and the client relationship construct. All measurement variables had loading coefficients above 0.70, except CR8. Kline (2005) recommends a minimum factor loading of 0.70 to confirm convergent validity. Thus, the high loading coefficients indicate that the variables strongly correlate with the construct and converge around a common conceptual point. Also, the average variance extracted for the client relationship construct was calculated. A value greater than 0.50 is considered acceptable to establish convergent validity. Thus, the results confirm that the measurement variables used in this study possess good convergent validity, reliability and internal consistency.

5.5 Comparative discussion of empirical findings

The client relationship is a core component of the CEBM because it defines how construction organisations can engage with clients throughout a project cycle. It also reflects the strategies used to attract, retain and develop different client segments (Lewandowski, 2016). Existing studies (Yusof *et al.*, 2022; Guerrero and Engström, 2024) suggest that clients have a significant influence on innovation and project performance. These studies confirm that clients are "co-creators of value" rather than passive end-users, notably when they share knowledge, support new ideas and align with project goals. When clients encourage innovation and collaboration, they strengthen both environmental and economic outcomes. This reinforces the assertion that "strong relationships support competitive and sustainable advantages" in construction projects (Munaro and Tavares, 2025).

The study began with a qualitative phase that revealed 13 attributes of client relationships for CEBM in construction organisations. The descriptive findings of the quantitative phase emphasise that client development strategies, particularly understanding client preferences and creating lifetime value, ranked highest. These strategies drive long-term engagement, mitigate uncertainty and reinforce commitment to circular solutions. Economically, this is important because construction organisations can reduce transaction costs by better understanding client expectations and improving value retention across multiple project cycles. Target client analysis and precise segmentation, two client identification strategies, also ranked highly. These results highlight the practical need for construction organisations to recognise "who the client is and what they want" to tailor circular offerings in ways that minimise waste and optimise resource flows. One-to-one marketing was also important, as it confirmed that personalised communication supports trust and repeat business. Nevertheless, attraction strategies such as Web advertisements and emails ranked lowest. This suggests that they may raise awareness but might not significantly influence the adoption of circular practices. This aligns with studies (Elghaish *et al.*, 2022) that show clients in the construction industry prefer direct, relational and trust-based communication over generic digital outreach. Hence, these results suggest that strategies focused on client development, identification and retention are more effective in enabling CE adoption. This is because they promote deeper engagement and long-term value alignment.

However, the causality results in Table 3 show that social media had the strongest influence on client relationships, followed by Web advertisements. This suggests that digital platforms are playing an increasingly central role in shaping client engagement. Elghaish *et al.* (2022) note that "digital tools reshape communication and value creation in modern construction projects." Social media provides a broader reach and drives active engagement, which can encourage clients to adopt circular solutions. It also enables transparent, real-time reporting of circular performance. This supports material tracking and component reuse in line with CE principles. Email and one-to-one marketing had lower causal effects. This means they may remain helpful in personalised communication but are less influential in shaping broad client perceptions about circularity. These insights suggest that client relationships in the CEBM are shifting towards digital engagement and a more robust online presence.

Adopting the CEBM requires collaborative, communicative and trust-based relationships between construction organisations and clients. CE adoption often involves procedural changes and new expectations, so client education is essential. Construction organisations might underestimate the importance of client relationship attributes. This may be because of limited research attention in this area. However, the industry is experiencing major shifts driven by sustainability goals, resource-efficiency demands and climate-resilience requirements. Construction organisations cannot ignore the economic and strategic value of

strong client relationships. Weak engagement may delay or prevent the successful implementation of CEBMs. The findings clearly demonstrate that client relationship attributes directly influence the effectiveness of CEBM adoption (Figure 1). Improving these attributes will enable construction organisations to strengthen stakeholder relationships, reduce resistance to CE innovations and communicate value propositions more clearly. These improvements are economically relevant because stronger relationships can reduce client-acquisition costs, promote loyalty and encourage repeat engagement across multiple projects. Furthermore, the study's insights support the industry's alignment with global sustainability goals and enhance its capacity to contribute meaningfully to the CE transition.

5.6 Implication of findings

Figure 1 presents a visual framework for CEBM adoption. It highlights client relationship attributes as fundamental enablers. This framework shows how relational and digital strategies work together to enhance client engagement and supports the practical, theoretical and policy implications of this study. Practically, the findings show that construction organisations can strengthen CEBM adoption by prioritising client identification, development and retention. Digital channels strongly influence engagement. Thus, investing in credible online communication and transparent reporting of circular performance will build trust, drive collaboration and reduce client acquisition costs. Trust-based, digitally enabled client strategies help integrate circular practices across multiple project cycles. This will support long-term industry resilience and align with SDGs, particularly responsible consumption (SDG 12) and sustainable infrastructure (SDG 9).

Theoretically, the validation of five attributes clarifies the multidimensional nature of client relationships in CEBM adoption. Clients act as co-creators of value, and their engagement shapes the effectiveness of circular strategies. The significant relationships among relational, behavioural and digital attributes highlight how digital platforms can support value creation in circular systems. This will strengthen the conceptual foundation of client relationships and provide a basis for future research on digital-enabled engagement.

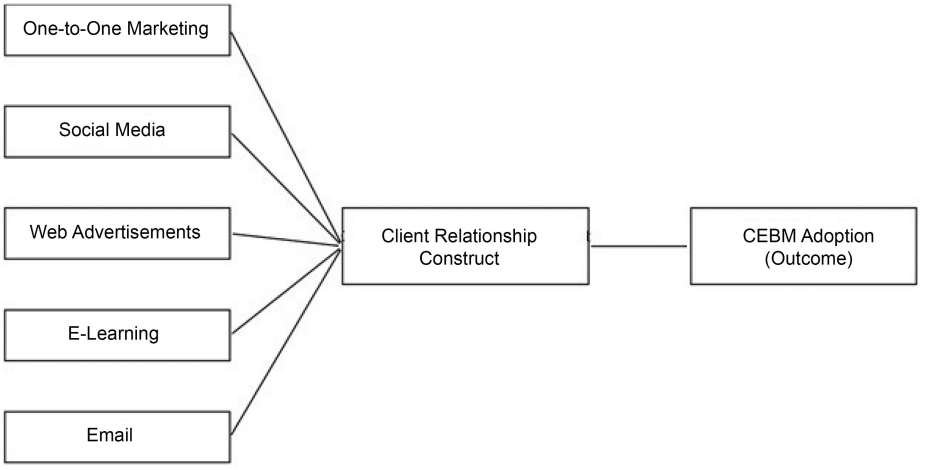

Figure 1. Client relationship framework for CEBM adoption
Source: Authors' own work

Finally, the findings underscore the need for policies that promote collaboration between clients and construction organisations. Policymakers could encourage the use of digital tools to track material flows, report circular performance and support client education. Also, incentives for personalised, trust-based engagement strategies can accelerate CEBM adoption. Similarly, integrating client relationships into national or regional CE frameworks can ensure policy aligns with organisational strategy. This will enable a more reliable transition to a sustainable and resilient construction industry.

6. Conclusion

This study examined the attributes that define the client relationship construct in construction organisations transitioning to CEBM. The findings showed that understanding client preferences, creating client lifetime value, target client analysis, selling complementary products and client segmentation are the most important attributes. These results highlight that client-focused actions are central to building strong, lasting relationships within CEBMs. The analysis also revealed differences in how professionals perceive these attributes. This reflects their varied backgrounds and experiences. Also, the CFA validated five attributes of client relationships in CEBMs. These attributes include Web advertisements, emails, social media, e-learning and one-to-one marketing. This underscores the need for ongoing engagement with informed and connected clients as the shift towards CEBM unfolds. In addition, the findings demonstrate that client relationships are a strategic driver of CEBM adoption. It shifts the focus beyond technical circularity to the human, relational and communication dimensions that shape implementation. Structured client engagement enables organisations to communicate value, tailor services and build trust, ultimately supporting circular procurement and material flows.

Furthermore, the study provides an empirical examination of the client relationship construct within CEBMs for construction organisations. Thus, by combining both relational and digital dimensions, it contributes to the global discourse on CE and shows that intentional client-focused strategies are essential for successful CEBM adoption in construction organisations. This implies that construction organisations should invest in digital tools, systematically apply client segmentation and focus on long-term client value. Also, policymakers can use these insights to encourage transparent communication, digital participation and circular-oriented service planning. Finally, the study has some limitations. It focused on contracting organisations in South Africa. Hence, future studies could examine consulting organisations and other countries to allow comparison across regions. Such studies will deepen understanding of how client relationship strategies can drive CEBM adoption globally.

References

Abdullahi, A.L., Otasowie, K., Lee, A., Awuzie, B.O., Aigbavboa, C. and Oke, A. (2023), "Conceptualising an ethno-mimetic model for effective buildings' end-of-life waste management: a Nigerian exemplar", *Business Strategy and Development*, Vol. 6 No. 3, pp. 322-332.

Adams, K.T., Osmani, M., Thorpe, T. and Thornback, J. (2017), "Circular economy in construction: current awareness, challenges and enablers", *Proceedings of the Institution of Civil Engineers - Waste and Resource Management*, Vol. 170 No. 1, pp. 15-24.

Adekunle, P., Aigbavboa, C., Otasowie, K. and Akinradewo, O. (2024), "Matching-up modularity methodology application within the built environment: a bibliometric review", *Journal of Asian Architecture and Building Engineering*, Vol. 24 No. 4, pp. 1-16.

Ahmed, S., Majava, J. and Aaltonen, K. (2023), "Implementation of circular economy in construction projects: a procurement strategy approach", *Construction Innovation*, Vol. 24 No. 7, pp. 204-222.

Ajayi, S.O., Oyedele, L.O., Akinade, O.O., Bilal, M., Alaka, H.A. and Owolabi, H.A. (2017), "Optimising material procurement for construction waste minimization: an exploration of success factors", *Sustainable Materials and Technologies*, Vol. 11, pp. 38-46.

Akintoye, A. and Main, J. (2007), "Collaborative relationships in construction: the UK contractors' perception", *Engineering, Construction and Architectural Management*, Vol. 14 No. 6, pp. 597-617.

Anderson, J.C., Narus, J.A. and Van Rossum, W. (2022), "Customer value propositions in agrawal, R., majumdar, a., majumdar, K., raut, R. D., and narkhede, B. E. (2022). attaining sustainable development goals (SDGs) through supply chain practices and business strategies: a systematic review with bibliometric and network analyses. Business strategy and the environment, 31(7), 3669-3687.business markets", *Harvard Business Review*, Vol. 84 No. 3, p. 90.

Antikainen, M. and Valkokari, K. (2016), "A framework for sustainable circular business model innovation", *Technology Innovation Management Review*, Vol. 6 No. 7.

Bentler, P.M. (2005), "EQS 6 structural equation program manual, multivariate software", Encino, CA, available at: www.econ.upf.edu/~satorra/CourseSEMVienna2010/EQSManual.pdf (accessed 7 March 2025).

Blayse, A.M. and Manley, K. (2004), "Key influences on construction innovation", *Construction Innovation*, Vol. 4 No. 3, pp. 143-154.

Bocken, N.M., De Pauw, I., Bakker, C. and Van Der Grinten, B. (2016), "Product design and business model strategies for a circular economy", *Journal of Industrial and Production Engineering*, Vol. 33 No. 5, pp. 308-320.

Bocken, N.M., Short, S.W., Rana, P. and Evans, S. (2014), "A literature and practice review to develop sustainable business model archetypes", *Journal of Cleaner Production*, Vol. 65, pp. 42-56.

Bocken, N., Pinkse, J., Darnall, N. and Ritala, P. (2023), "Between circular paralysis and utopia: organizational transformations towards the circular economy", *Organization and Environment*, Vol. 36 No. 2, pp. 378-382.

Boomsma, A. (2000), "Reporting analyses of covariance structures", *Structural Equation Modeling: A Multidisciplinary Journal*, Vol. 7 No. 3, pp. 461-483.

Braun, V. and Clarke, V. (2022), "Conceptual and design thinking for thematic analysis", *Qualitative Psychology*, Vol. 9 No. 1, p. 3.

Bressanelli, G., Saccani, N. and Perona, M. (2022), "Investigating business potential and users' acceptance of circular economy: a survey and an evaluation model", *Sustainability*, Vol. 14 No. 2, p. 609.

Byrne, B.M. (2013), *Structural Equation Modeling with EQS: Basic Concepts, Applications, and Programming*, Routledge.

Chaffey, D., and Smith, P.R. (2022), *Digital Marketing Excellence: planning, Optimizing and Integrating Online Marketing*, Routledge.

Charef, R. and Lu, W. (2021), "Factor dynamics to facilitate circular economy adoption in construction", *Journal of Cleaner Production*, Vol. 319, p. 128639.

Elghaish, F., Matarneh, S.T., Edwards, D.J., Rahimian, F.P., El-Gohary, H. and Ejohwomu, O. (2022), "Applications of industry 4.0 digital technologies towards a construction circular economy: gap analysis and conceptual framework", *Construction Innovation*, Vol. 22 No. 3, pp. 647-670.

Gao, S., Mokhtarian, P.L. and Johnston, R.A. (2008), "Nonnormality of data in structural equation models", *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2082 No. 1, pp. 116-124.

Geissdoerfer, M., Vladimirova, D. and Evans, S. (2018), "Sustainable business model innovation: a review", *Journal of Cleaner Production*, Vol. 198, pp. 401-416.

Ghaffar, S.H., Burman, M. and Braimah, N. (2020), "Pathways to circular construction: an integrated management of construction and demolition waste for resource recovery", *Journal of Cleaner Production*, Vol. 244, p. 118710.

Ghisellini, P., Ripa, M. and Ulgiati, S. (2018), "Exploring environmental and economic costs and benefits of a circular economy approach to the construction and demolition sector. A literature review", *Journal of Cleaner Production*, Vol. 178, pp. 618-643.

Grönroos, C. (2017), "On value and value creation in service: a management perspective", *Journal of Creating Value*, Vol. 3 No. 2, pp. 125-141.

Guerola-Navarro, V., Gil-Gomez, H., Oltra-Badenes, R. and Soto-Acosta, P. (2024), "Customer relationship management and its impact on entrepreneurial marketing: a literature review", *International Entrepreneurship and Management Journal*, Vol. 20 No. 2, pp. 507-547.

Guerra, B.C., Shahi, S., Mollaei, A., Skaf, N., Weber, O., Leite, F. and Haas, C. (2021), "Circular economy applications in the construction industry: a global scan of trends and opportunities", *Journal of Cleaner Production*, Vol. 324, p. 129125.

Guerrero, J. and Engström, S. (2024), "Clients as drivers of innovation in the infrastructure sector: implications of hard and soft project management approaches", *Construction Innovation*, Vol. 24 No. 7, pp. 239-256.

Hair, J.F., Hult, G.T.M., Ringle, C.M., and Sarstedt, M. (2013), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, Sage, Thousand Oaks.

Hair, J.F., Sarstedt, M., Hopkins, L., and Kuppelwieser, V.J. (2014), "Partial least squares structural equation modeling (PLS-SEM): an emerging tool in business research", *European business*.

Hirshfield, L. and Fowler, R. (2020), "Developing and piloting a survey to assess dissatisfaction of women in student teams", In ASEE Virtual Annual Conference Experience.

Hossain, M.U., Ng, S.T., Antwi-Afari, P. and Amor, B. (2020), "Circular economy and the construction industry: existing trends, challenges and prospective framework for sustainable construction", *Renewable and Sustainable Energy Reviews*, Vol. 130, p. 109948.

Iacobucci, D. (2010), "Structural equations modeling: Fit indices, sample size, and advanced topics", *Journal of Consumer Psychology*, Vol. 20 No. 1, pp. 90-98.

Jack, E.P. and Raturi, A.S. (2006), "Lessons learned from methodological triangulation in management research", *Management Research News*, Vol. 29 No. 6, pp. 345-357.

Kallio, H., Pietilä, A.M., Johnson, M. and Kangasniemi, M. (2016), "Systematic methodological review: developing a framework for a qualitative semi-structured interview guide", *Journal of Advanced Nursing*, Vol. 72 No. 12, pp. 2954-2965.

Kline, R.B. (2005), *Principles and Practice of Structural Equation Modelling*, 2nd ed. Guilford Press, New York, NY, p. 1593850751.

Kline, R.B. (2010), *Principles and Practice of Structural Equation Modelling*, 3rd ed. Guilford Press, New York, NY, p. 1606238760.

Kulatunga, K., Kulatunga, U., Amaratunga, D. and Haigh, R. (2011), "Client's championing characteristics that promote construction innovation", *Construction Innovation*, Vol. 11 No. 4, pp. 380-398.

Lee, N.R., and Kotler, P. (2019), *Social Marketing: Behavior Change for Social Good*, Sage Publications.

Lei, P.W. and Wu, Q. (2007), "Introduction to structural equation modeling: issues and practical considerations", *Educational Measurement: Issues and Practice*, Vol. 26 No. 3, pp. 33-43.

Leising, E., Quist, J. and Bocken, N. (2018), "Circular economy in the building sector: three cases and a collaboration tool", *Journal of Cleaner Production*, Vol. 176, pp. 976-989.

Lewandowski, M. (2016), "Designing the business models for circular economy—towards the conceptual framework", *Sustainability*, Vol. 8 No. 1, p. 43.

Lüdeke-Freund, F., Gold, S. and Bocken, N.M. (2019), "A review and typology of circular economy business model patterns", *Journal of Industrial Ecology*, Vol. 23 No. 1, pp. 36-61.

Mangan, J., Lalwani, C. and Gardner, B. (2004), "Combining quantitative and qualitative methodologies in logistics research", *International Journal of Physical Distribution and Logistics Management*, Vol. 34 No. 7, pp. 565-578.

Mannan, M., Mustafa, Z.B., Aziz, S.F.B.A. and Maruf, T.I. (2023), "Technology adoption for higher education in Bangladesh–development and validation", *Journal of Education and Social Sciences*, Vol. 24 No. 1, pp. 1-9.

Manninen, K., Koskela, S., Antikainen, R., Bocken, N., Dahlbo, H. and Aminoff, A. (2018), "Do circular economy business models capture intended environmental value propositions?", *Journal of Cleaner Production*, Vol. 171, pp. 413-422.

Mosaddegh, A., Albadvi, A., Sepehri, M.M. and Teimourpour, B. (2021), "Dynamics of customer segments: a predictor of customer lifetime value", *Expert Systems with Applications*, Vol. 172, p. 114606.

Munaro, M.R. and Tavares, S.F. (2025), "Design for adaptability and disassembly: guidelines for building deconstruction", *Construction Innovation*, Vol. 25 No. 2, pp. 665-687.

Nußholz, J.L. (2017), "Circular business models: Defining a concept and framing an emerging research field", *Sustainability*, Vol. 9 No. 10, p. 1810.

Nußholz, J.L., Rasmussen, F.N., Whalen, K. and Plepys, A. (2020), "Material reuse in buildings: Implications of a circular business model for sustainable value creation", *Journal of Cleaner Production*, Vol. 245, p. 118546.

Oluleye, B.I., Chan, D.W., Saka, A.B. and Olawumi, T.O. (2022), "Circular economy research on building construction and demolition waste: a review of current trends and future research directions", *Journal of Cleaner Production*, Vol. 357, p. 131927.

Osterwalder, A., and Pigneur, Y. (2010), *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, John Wiley and Sons.

Otasowie, K., Aigbavboa, C., Oke, A., and Adekunle, P. (2023c), "Perceived benefits of circular economy adoption in the South African construction sector", In *International Conference on Engineering, Project, and Production Management*, Springer Nature Switzerland, Cham, pp. 709-721.

Otasowie, O.K., Aigbavboa, C.O., Oke, A.E. and Adekunle, P. (2024), "Mapping out focus for circular economy business models (CEBMs) research in construction sector studies–a bibliometric approach", *Journal of Engineering, Design and Technology*, Vol. 23 No. 5.

Otasowie, O.K., Aigbavboa, C., Adekunle, P., and Oke, A. (2023a), "Drivers of circular economy adoption in the South African construction industry" In, *International Conference on Sustainable Buildings and Structures towards a Carbon Neutral Future*, Springer Nature Singapore, Singapore, pp. 197-205.

Otasowie, O.K., Aigbavboa, C., Adekunle, P., and Oke, A. (2023b), "Challenges to circular economy adoption: South African built environment professionals' perspective", In *International Conference on Sustainable Buildings and Structures towards a Carbon Neutral Future*, Springer Nature Singapore, Singapore, pp. 207-215.

Pallant, J. (2020), *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS*, Routledge.

Pitka, T. and Bucko, J. (2023), "Segmenting customers with data analytics tools: understanding and engaging target audiences", *Acta Informatica Pragensia*, Vol. 12 No. 2, pp. 357-378.

Pomponi, F. and Moncaster, A. (2017), "Circular economy for the built environment: a research framework", *Journal of Cleaner Production*, Vol. 143, pp. 710-718.

Preuss, M., Santini, F.O. and Marconatto, D.A. (2022), "Complaint management: the impact of post-complaint satisfaction on organizational behavior", *RAM. Revista de Administração Mackenzie*, Vol. 23 No. 2, p. eRAMG220145.

Todaro, N.M., Gusmerotti, N.M., Daddi, T. and Frey, M. (2023), "Do environmental attitudes affect public acceptance of key enabling technologies? Assessing the influence of environmental awareness and trust on public perceptions about nanotechnology", *Journal of Cleaner Production*, Vol. 387, p. 135964.

Tura, N., Hanski, J., Ahola, T., Ståhle, M., Piiparinen, S. and Valkokari, P. (2019), "Unlocking circular business: a framework of barriers and drivers", *Journal of Cleaner Production*, Vol. 212, pp. 90-98.

United Nations Environment Programme (2015), "Global waste management outlook", available at: www.unep.org/ourplanet/september-2015/unep-publications/global-wastemanagement-outlook

Upadhyay, A., Mukhuty, S., Kumar, V. and Kazancoglu, Y. (2021), "Blockchain technology and the circular economy: Implications for sustainability and social responsibility", *Journal of Cleaner Production*, Vol. 293, p. 126130.

Wang, C. (2022), "Efficient customer segmentation in digital marketing using deep learning with swarm intelligence approach", *Information Processing and Management*, Vol. 59 No. 6, p. 103085.

Yusof, N.A., Lai, K.S. and Marisa, A. (2022), "Influences of client focus and company type on innovation and financial performance in the construction industry", *Construction Innovation*, Vol. 22 No. 4, pp. 749-767.

Zhong, X. and Yuan, K.H. (2011), "Bias and efficiency in structural equation modeling: maximum likelihood versus robust methods", *Multivariate Behavioral Research*, Vol. 46 No. 2, pp. 229-265.

Further reading

Gummesson, E. (2002), "Relationship marketing and a new economy: it's time for de-programming", *Journal of Services Marketing*, Vol. 16 No. 7, pp. 585-589.

Morgan, R.M. and Hunt, S.D. (1994), "The commitment-trust theory of relationship marketing", *Journal of Marketing*, Vol. 58 No. 3, pp. 20-38.

Takona, J.P. (2024), "Research design: qualitative, quantitative, and mixed methods approaches", *Quality and Quantity*, Vol. 58 No. 1, pp. 1011-1013.

Vargo, S.L. and Lusch, R.F. (2004), "Evolving to a new dominant logic for marketing", *Journal of Marketing*, Vol. 68 No. 1, pp. 1-17.

Appendix

Interview questions:

(1) What criteria can be used, or do you use, to assess whether a client is suitable for circular construction projects?

(2) What strategies can a construction organisation use to attract clients seeking circular economy solutions?

(3) How can a construction organisation maintain long-term relationships with clients involved in circular projects and retain them?

(4) How can construction clients be supported in developing their understanding of circular economy practices?

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