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ANALYSING KEY PROCESS AREAS IN DEVELOPING THE CIRCULAR ECONOMY MATURITY MODEL FOR CONSTRUCTION ORGANISATIONS

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ABSTRACT

Adopting the circular economy (CE) at the individual project level offers only a short-term perspective and neglects strategic, long-term CE transformation in construction. Accordingly, organisation-level CE adoption was identified as the more suitable approach, as it provides strategic, long-term, and consistent results across the construction projects. Consequently, developing a maturity model for construction organisations was identified as a promising approach as it guides organisational processes from the initial to the desired state. Therefore, this study provides a foundation for a CE Maturity Model for Construction Organisations by systematically analysing Key Process Areas (KPAs), addressing a gap in previous studies that focused mainly on conceptual discussions of CE maturity. Initially, CE indicators for construction organisations were identified, providing the basis for identifying KPAs, as explained in the literature review section of this paper. Subsequently, Delphi-based expert interviews were conducted with 20 experts to verify the suitability of the identified KPAs, assess their importance, and justify KPA descriptions. The results identified 19 KPAs relevant to construction organisations, which were categorised into four tiers by importance. Accordingly, the most important KPAs for construction organisations, grouped within the Tier 1 category, were "Circularity in building design", "Material circularity improvement", "Waste circularity improvement", and "Greenhouse gas emissions reduction". The other 15 KPAs are clustered under Tier 2, 3 and 4. Theoretically, this study helps fill the existing research gap on CE adoption in construction organisations, while, practically, it provides a roadmap for construction professionals to adopt CE by focusing on the KPAs.

Keywords: *Circular economy; Construction Industry; Construction Organisations; Key Process Areas; Maturity Model.*

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1. INTRODUCTION

The construction industry is dominated by the Linear Economy (LE) model, based on the "take, make, use, discard" principle (Jayakodi et al., 2024b). In the construction LE model, the process begins with the extraction of raw materials, which are subsequently processed into materials/products and assembled on-site in a manner that cannot be disassembled. As a result, at the end of a building's service life, materials become obsolete and are either disposed of in a landfill or incinerated (Mangialardo & Micelli, 2017). In contrast to the LE model, the circular economy (CE) model has emerged over the past few decades as a prominent alternative, underpinned by the principle of sustainable resource management (Pomponi & Moncaster, 2017). Therefore, in recent years, there has been growing attention from academics, industry practitioners, and policymakers toward transitioning to the CE model in the built environment, which aims to substantially reduce waste generation and alleviate pressure on natural resources (Kirchherr et al., 2023).

In the built environment, substantial research over the past few decades has led to the development of several practical approaches to CE implementation at the various levels. Across these levels, existing literature shows a strong concentration of research at the nano (material) and micro (building or project) levels (Pomponi & Moncaster, 2017). This is largely attributable to the inherent characteristics of the construction industry: it is highly dynamic, project-based, involves numerous stakeholders, and operates through complex, often fragmented supply chains (Jayakodi et al., 2024a; Yang et al., 2023). As a result, circularity in construction has been commonly framed as project-specific rather than systemic. However, this project-centric focus has been increasingly challenged. Scholars argue that limiting CE to individual materials or projects restricts its potential, as it reflects a short-term lens and fails to capture strategic, long-term circular transformation (Gorecki, 2019).

Among several CE adoption approaches, circularity assessment is a prominent approach that facilitates the implementation, improvement, and monitoring of circularity levels (Jayakodi et al., 2024b). There are two types of circularity assessment evidenced: circular flow assessment and impact assessment (De Oliveira et al., 2021). The flow assessment primarily focuses on circularity outcomes using qualitative or quantitative indicators, whereas the impact assessment focuses on the environmental, economic, and social impacts of CE initiatives. Hence, many other sectoral studies have moved beyond output-based assessments at the organisational level by incorporating process-based assessments to ensure consistent circularity performance over time and to support continuous improvement (Uhrenholt et al., 2022). The authors further explained that output-based assessments are limited in their ability to capture complex organisational processes. In this context, the development of maturity models has emerged as a suitable approach for guiding organisational process improvement, as the transition to a CE and the required organisational changes call for a broader, more structured approach to organisational development (Bertassini et al., 2022).

Among these diverse organisations, it is imperative to identify the most effective avenue to achieve maximum circularity outcomes in construction projects. Jayakodi et al. (2024a) asserted that main contractor organisations (referred to as construction organisations in this study) play a crucial role in the adoption of circularity. Several researchers have studied the application of various CE adoption in main contractors, business models

(Jayakodi et al., 2024b; Kjerulf, 2023), waste management performance assessment (Torgautov et al., 2022), quantitative CE assessments (Núñez-Cacho et al., 2018), indicator analysis (Jayakodi et al., 2024a), and CE maturity concepts at higher levels (Gorecki, 2019; Jayakodi et al., 2025). To date, no studies have examined the detailed analysis of the Key Process Areas (KPAs) of maturity models. Hence, this study focuses on fulfilling three research objectives: i) to verify the suitability of identified KPAs (OB1), ii) to identify the level of importance of KPAs (OB2) iii) to justify the description of the KPAs (OB3). To achieve the research aim, this study adopted a qualitative approach through a critical literature review followed by a Delphi-based expert forum.

2. DEFINING CIRCULAR ECONOMY KEY PROCESS AREAS FOR CONSTRUCTION ORGANISATIONS

Maturity models assess the prevailing capability level and proffer the necessary capabilities for effective adoption in a systematic roadmap (Adekunle et al., 2022). Further, it can be identified as a tool that helps business transformation from an initial to a desired state by identifying characteristics that determine step-changes from a lower to a higher level of maturity (Becker et al., 2009). A maturity model comprises several components such as Process Categories, KPAs, Maturity Levels, Assessment Attributes and Maturity Characteristics. Maturity levels display the level of maturity of an entity (De Bruin et al., 2005; Paulk et al., 1993). At the core of maturity model design lies the concept of the process, typically defined as a structured sequence of interrelated activities undertaken to achieve a specific organisational purpose. While process-level analysis provides fine-grained analysis, assessing maturity at the level of individual processes is often impractical in large, complex organisations due to the sheer number of processes and their interdependencies. To address this challenge, maturity models aggregate related processes into higher-order constructs commonly referred to as KPAs or process areas (Becker et al., 2009; Paulk et al., 1993).

van Steenbergen et al. (2010) commented distinct from organisations in other sectors, construction organisations require significant attention when developing a maturity model due to their project-based nature. Hence, it is imperative to determine the project and organisational boundaries when implementing CE. Supportively, Jayakodi et al. (2024a) has defined two levels of implementing CE in construction organisations: the construction project level (project-specific processes) and the organisation level (non-project-specific/ organisational ongoing business processes). To identify the project-level KPAs, the scope of the construction organisations involved in the project must be determined. The scope of involvement of a main contractor in a construction project varies based on the procurement route (RIBA, 2020). It was identified that, except for the traditional procurement route, the main contractors are involved in the design and development of the construction project through to handover or the defect liability period. As this study focuses on the organisational perspective, it is crucial to identify the KPAs under the extended project scope to cover the holistic processes. Non-project-specific processes may have less direct impact on circularity in construction than project-specific processes; these processes remain essential, as the organisation drives project execution and influences the project environment (Jayakodi et al., 2024b). Hence, both project-specific and non-project-specific processes were identified to develop a comprehensive, holistic list of KPAs.

Table 1: Conversion of circular economy indicators to key process areas

No	KPA Name	KPA Description	Ref
01	Circularity in building design	The ability of the organisation to adopt circular-economy-driven building design techniques and methods to maximise functional use and end-of-life recovery in construction projects.	(1) (2)
02	Circularity in building construction	The ability of the organisation to adopt circular-economy–driven building construction techniques and methods to maximise functional use and end-of-life recovery in construction projects.	(3) (4)
03	Material circularity improvement	The ability of the organisation to source secondary (circular) materials, prioritise locally sourced and rapidly renewable materials, substitute hazardous materials with safer alternatives, and procure construction materials with accurate estimations and incorporate end-of-life strategies for the construction projects.	(5) (6)
04	Waste circularity improvement	The ability of the organisation to direct waste generated from construction projects to a secondary source and reduce overall waste generation.	(7) (8)
05	Water circularity improvement	The ability of the organisation to source water from circular sources, discharge water to circular systems for treatment and reuse, and reduce water-use intensity in construction projects.	(3) (9)
06	Energy management and optimisation	The ability of the organisation to generate on-site renewable energy, use renewable energy, and implement energy-efficiency practices in the construction projects.	(3) (8)
07	Greenhouse gas emissions reduction	The ability of the organisation to reduce energy-direct and energy-indirect greenhouse gas emissions in construction projects.	(1) (10)
08	Land and biodiversity rehabilitation	The ability of the organisation to adopt adaptive re-use and land-conservation practices enhances land-use efficiency and minimises biodiversity impacts associated with the construction projects.	(10) (11)
09	Social value creation	The ability of the organisation to create value for the community through the adoption of circular practices in construction projects.	(8) (10)
10	Economic value creation	The ability of the organisation to create economic value through circularity adoption, including investment in circular capabilities and diversification of revenue streams in construction projects.	(8) (10)
11	Supplier selection and management	The ability of the organisation to select and manage suppliers in line with circular economy requirements for construction projects.	(12) (13)
12	Stakeholder collaboration and engagement	The ability of the organisation to foster stakeholder collaboration and management to deliver circular economy objectives in construction projects.	(14) (15)

No	KPA Name	KPA Description	Ref
13	Client collaboration and guidance	The ability of the organisation to collaborate with clients and guide them to deliver circular economy objectives across construction projects.	(12) (16)
14	Digital technologies adoption	The ability of the organisation to adopt digital technologies for circular economy–driven processes to enhance efficiency.	(3) (10)
15	Workforce capacity development and engagement	The ability of the organisation to develop circular economy–driven capacities and increase workforce engagement.	(3) (17)
16	Circularity-driven strategic directives implementation	The ability of the organisation to develop and adopt circular economy–driven strategic directives.	(9) (11)
17	Circularity-driven research and innovation	The ability of the organisation to collaborate on research and development and to conduct circular economy–driven innovation projects.	(3) (12)
18	Establishment of circularity-driven logistics and mobility initiatives	The ability of the organisation to establish circularity driven logistics and sustainable mobility initiatives.	(18) (19)
19	Circularity-driven business model adoption	The ability of the organisation to adopt circularity driven business models across construction projects.	(4) (13)
20	Marketing and sharing circular economy initiatives	The ability of the organisation to publicly disclose and market circular economy initiatives in construction projects.	(20) (21)
21	Circularity driven management systems implementation	The ability of the organisation to adopt and implement circular economy–driven management and certification systems across its construction projects.	(20) (22)
22	Circularity driven culture establishment	The ability of the organisation to establish a circular economy–driven organisational culture.	(16) (20)

(1) Huovila and Westerholm (2022), (2) Deselnicu et al. (2018), (3) Tokazhanov et al. (2022), (4) Abadi and Sammuneh (2020), (5) Finch et al. (2021), (6) Beddaa et al. (2023), (7) Medina and Fu (2021), (8) González et al. (2021), (9) Zhang et al. (2021), (10) Piñones et al. (2023), (11) Foster et al. (2020), (12) Torgautov et al. (2022), (13) Antwi-Afari et al. (2023), (14) Kaipainen et al. (2023), (15) Droege et al. (2021), (16) Bianchini et al. (2022), (17) Núñez-Cacho et al. (2020), (18) Zhou et al. (2023), (19) Ding et al. (2023), (20) Ibáñez-Forés et al. (2023), (21) Sacco et al. (2021), (22) De Souza et al. (2022)

When defining the KPAs for maturity models, researchers employ several approaches. Most common approaches draw on maturity models in similar domains, identify the defined KPAs, and verify them against empirical findings (Das et al., 2023). However, when a lack of maturity models in a similar domain, researchers have adopted several other approaches, such as drivers and barriers analysis.

The CE maturity model was developed in the construction context, and a lack of comprehensive studies provides a basis for identifying the KPAs. Hence, this study relied on the circularity indicator approach. Considering the existing CE assessment frameworks developed in the construction context, most indicators focused on circularity flow or output assessment. Hence, this study used a structured reverse approach, using indicators to identify dedicated CE processes. The current paper builds on these previous studies and extends the already identified CE indicators to derive KPAs, as presented in Table 1. Each column of Table 1, from left to right, respectively, represents the identified CE indicators from previous work, the conversion of each indicator as a KPA, the description of each KPA, and supporting references.

3. MATERIALS AND METHODS

To achieve the aim, this study employed a qualitative approach. Most maturity models employ qualitative techniques, such as interviews, Delphi techniques, nominal group studies, and case studies, in addition to quantitative techniques (Adekunle et al., 2022). Among the identified methods, the Delphi method is an iterative procedure that uses multiple data-collection and analysis techniques, along with feedback, to gather and distil the anonymous opinions of experts (Skulmoski et al., 2007). Hence, the study employed Delphi-based expert interviews to achieve its objectives. In the authors' previous study, two systematic literature reviews (SLRs) were conducted to identify CE indicators, which served as the basis for formulating KPAs. Based on the findings of the literature review, the interview guideline was developed and comprised four sections. Section 1 included the experts' demographic details. In Section 2, experts were asked to verify the suitability of KPAs for construction organisations. Section 3 included a 10-point Likert scale to assess the importance of the identified KPAs in delivering the CE outcomes of the construction projects. Section 4 presented the identified KPA descriptions derived from the literature for verification or modification. Afterwards, 20 experts were recruited for the study from the Australian construction industry, considering three expert selection criteria: i) 5 years of experience in the construction industry ii) engages in a role in CE, sustainability or environmental management iii) works in a large building contractor organisation (managing large-scale mega-projects valued over $500 million), a consultant organisation or a sustainability alliance organisation. The experts were recruited through purposive sampling to ensure heterogeneity of the experts (Hasson et al., 2025). The rationale for selecting experts from large building contractor organisations was that the proposed maturity model was specifically developed for them; therefore, their expertise was considered essential. In addition, consultant organisations were included for their significant role as key project stakeholders, while sustainability alliance organisations were selected for their involvement in developing sustainability assessment tools.

Before undertaking the expert interviews, the study has taken necessary ethical approval. Delphi-based semi-structured interviews were conducted until data saturation was reached, as failure to achieve data saturation affects the quality of the research, undermining its validity (Aguboshim, 2021). By comparing experts' consensus rates across articles, Goodarzi et al. (2018) argued that limiting the number of Delphi rounds may hinder the attainment of full consensus; hence, 75% agreement was chosen as the consensus threshold for quantitative data, while consensus of the qualitative data was determined through content analysis. As this consensus threshold was achieved in Round 1 of the interviews, consolidated results from that round were sent to the 20 experts in Round 2 to test their level of agreement again. The study achieved a response rate exceeding 80% and corroborated the consolidated results. In the analysis, two types of data were analysed: qualitative data were analysed using content analyses (Boulkedid et al., 2011), while quantitative data were analysed using the mean (to assess the importance of KPAs) and standard deviation (to identify outliers) (Harpe, 2015). Although the quantitative analysis was conducted with a relatively small sample size (n = 20), this is considered acceptable in expert-based and Delphi-related studies where participants are selected purposively based on their specialised expertise rather than through probabilistic sampling (Okoli & Pawlowski, 2004). Figure 1 depicts the research process.

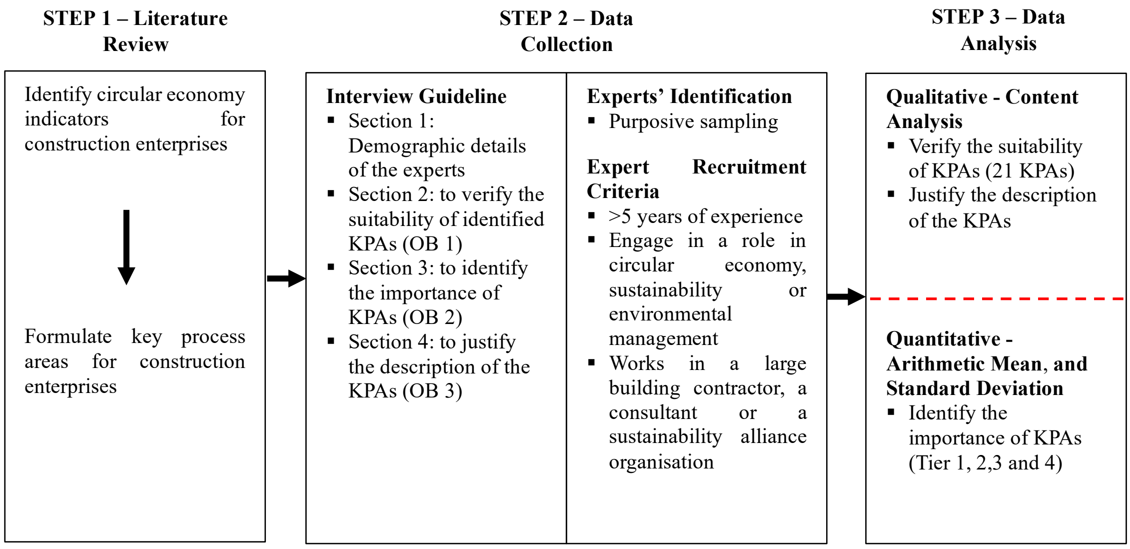

Figure 1: Research process

4. ANALYSIS

4.1 DEMOGRAPHIC DETAILS OF THE EXPERTS

As explained in Section 3, 20 experts were recruited for data collection, and Table 2 presents the experts' codes, roles, years of experience, and the types of organisations they represented.

Table 2: Demographic details of the experts

No	Role	Experience (In Years)	Type of Organisation
E1	National Sustainability Manager	08+	Main Contractor (Tier 1)
E2	Senior Sustainability Advisor	06+	Main Contractor (Tier 1)
E3	Senior Sustainability Advisor	17+	Main Contractor (Tier 1)
E4	Senior Manager - Environment Sustainability	18+	Main Contractor (Tier 1)
E5	Environment and Sustainability Manager	05+	Main Contractor (Tier 1)
E6	Sustainability Lead	17+	Main Contractor (Tier 1)
E7	Sustainability Manager	16+	Main Contractor (Tier 1)
E8	National ESG Coordinator	05+	Main Contractor (Tier 1)
E9	State Manager	20+	Main Contractor (Tier 1)
E10	Senior Environment Consultant	07+	Consultant
E11	Director - Sustainability	30+	Consultant
E12	Team Leader - Sustainability and Climate Change	08+	Consultant
E13	Associate Sustainability Consultant	12+	Consultant

No	Role	Experience (In Years)	Type of Organisation
E14	Senior Construction Consultant	10+	Consultant
E15	National Sustainability Lead & Section Manager	11+	Consultant
E16	Design Director and Circular Economy Leader	24+	Consultant
E17	Environment and Sustainability Manager	13+	Consultant
E18	Mining and Environmental Engineer	06+	Consultant
E19	Sustainability Design Leader	19+	Sustainability alliance
E20	Senior Manager- Sustainable Products and Materials	10+	Sustainability alliance

4.2 SUITABILITY AND IMPORTANCE OF KEY PROCESS AREAS

Based on the literature, twenty-two (22) KPAs were initially identified for construction organisations. Following verification of their suitability, nineteen (19) KPAs were retained. "Establishment of circularity-driven logistics and mobility initiatives" was deemed not relevant to construction organisations, as it primarily involves developing waste-infrastructure facilities and other infrastructure that fall outside the typical organisational scope. Accordingly, only sustainable mobility initiatives were incorporated into "Greenhouse Gas Emissions Reduction," given their materiality to Scope 1 (emissions from sources that an organisation owns or controls directly), Scope 2 (missions that a organisation causes indirectly and come from where the energy it purchases and uses is produced) and, Scope 3 (emissions that occur outside the organisation's boundary as a result of the organisation's actions). "Client collaboration for circularity," was subsumed under the broader stakeholder-engagement KPA, as treating it as a standalone area was not suitable, given the client's role as a principal stakeholder. Finally, KPA 2 "Circularity in construction" was integrated into "Circularity in building design", reflecting experts' consensus that circular construction methods, particularly modern methods of construction, are largely determined at the design stage.

Table 3: Importance level of KPAs

KPA ID	KPA Name	Importance	Tier	KPA ID	KPA Name	Importance	Tier
KPA1	Material circularity improvement	9.60	Tier 1	KPA11	Stakeholder collaboration and engagement	6.92	Tier 3
KPA2	Circularity in building design and construction	9.45		KPA12	Circularity-driven research and innovation	6.85	
KPA3	Waste circularity improvement	9.35		KPA13	Workforce capacity development and engagement	6.75	

KPA ID	KPA Name	Importance	Tier	KPA ID	KPA Name	Importance	Tier
KPA4	Greenhouse gas emissions reduction	8.55		KPA14	Circularity-driven business model adoption	6.65	
KPA5	Energy management and optimisation	7.95	Tier 2	KPA15	Circularity-driven culture establishment	6.54	
KPA6	Water circularity improvement	7.85		KPA16	Digital technologies adoption	6.35	Tier 4
KPA7	Circularity-driven management systems implementation	7.76		KPA17	Land and biodiversity rehabilitation	6.22	
KPA8	Circularity-driven strategic directives implementation	7.25		KPA18	Social value creation	6.18	
KPA9	Economic value creation	6.95	Tier 3	KPA19	Marketing public data disclosure	6.10	
KPA10	Supplier, sub-contractor and vendor selection and management	6.95					

After verifying the suitability of KPAs, a Likert scale was provided to experts to rate the importance of KPAs for CE implementation in construction organisations. Among the various types of Likert scales, it was selected 10 point liker scale is more efficient (Awang et al., 2016). To analyse the collected data, the mean was used, as it was identified that, when the data are at the interval or ratio level, it is statistically valid and meaningful for describing the central tendency. Furthermore, to detect outliers in the dataset, the mean and standard deviation were used. All KPAs reported an importance level greater than 5.5 on the 10-point scale. Based on average importance, KPAs are divided into four tiers: 1 (>8.5), 2 (7.4 – 8.5), 3 (6.5-5.5), and 4 (6.4-5.5). Tier 1 represents the most important KPAs, with the level of importance decreasing progressively across Tier 2, Tier 3, and Tier 4 KPAs. Since the midpoint of the scale is 5, values above 5.5 indicate that respondents perceived the KPAs as more important than neutral or average. Therefore, all KPAs were considered sufficiently important for improving circularity. Hence, it was decided that all KPAs are important to improve circularity. Table 3 presents the level of importance of each KPA.

4.3 JUSTIFICATIONS FOR THE DESCRIPTIONS OF THE KEY PROCESS AREAS

4.3.1 Tier 1 Key Process Areas

KPA1 "Material Circularity Improvement" was initially described as the organisation's ability to source secondary (circular) materials, prioritise locally sourced and rapidly renewable materials, substitute hazardous materials with safer alternatives, procure construction materials using accurate estimates, and incorporate end-of-life strategies for construction projects; following review, the 'locally sourced materials' element was removed from this KPA and its implications were relocated to KPA4 "Greenhouse Gas Emissions Reduction" under Scope 3 emissions, while experts recommended elaborating the term 'secondary sources' by referencing R-strategies (Refuse, Rethink, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, Recover, Renewable). KPA2 "Circularity in Building Design and Construction" was originally defined as the ability of the organisation to adopt circular-economy–driven building design techniques and methods to maximise functional use and end-of-life recovery in construction projects; however, E9 commented that "*it is practical to elaborate on the type of circularity-driven design and construction techniques which are adopted"*. Therefore, the description was expanded to include design and construction techniques and methods such as modularity, adaptability, maintainability, durability, flexibility, and design for disassembly, and to emphasise maximising resource recovery at the end of the building's life cycle (Alabdulrazzaq et al., 2025). KPA3 "Waste Circularity Improvement" was conceptualised as the organisation's ability to direct generated waste from construction projects to secondary sources and to reduce overall waste generation; the experts agreed with this description, though E1 commented that "*it is better to simplify by what it meant by the secondary sources mentioning the appropriate R strategies such as reuse, recycle, remanufacture, repair, etc*", and E13 also highlighted that diverting waste from landfill is the ultimate goal of waste circularity and should be made explicit (Pilipenets et al., 2024). The experts agreed with the KPA4 description on "Greenhouse Gas Emissions Reduction".

4.3.2 Tier 2 - Key Process Areas

Regarding KPA5 "Energy Management and Optimisation", three aspects were initially covered: renewable energy production, renewable energy use, and energy reduction; however, on-site energy production was excluded because it is not feasible for all projects. Furthermore, E20 from the sustainability alliance organisation stated that "*it is required to emphasise the fossil fuel-free construction project concept, as now we are on a journey to replace fossil fuels*". Accordingly, the description was defined as the ability to source renewable energy, reduce energy consumption, and ensure that construction projects are fossil-fuel-free (Simeone et al., 2023). For KPA6 "Water Circularity Improvement", the initial scope considered potable and non-potable water inflows from circular sources and outflows to circular sources; however, E6 highlighted that "*internal water recirculation is critical to consider*", so the description was defined as the ability of the organisation to source water from circular sources, discharge water to circular systems for treatment and reuse, reduce water-use intensity in construction projects, and enhance internal water recirculation in construction projects (Arora et al., 2022). The majority of the experts agreed with the description for KPA7 management systems; however, E1 commented that "*beyond management systems, certification systems should also be included in the description. In addition to adopting circular-economy* *management systems (e.g., ISO 59000-series standards), organisations can pursue project-level certifications via sustainability rating tools, such as Green Star, which also drive circular-economy outcomes."* The experts agreed with the descriptions for KPA8 "Implementation and Adoption of Circularity-Driven Strategic Directives".

4.3.3 Tier 3 - Key Process Areas

KPA9 "Economic value creation" through circularity was initially defined as the ability to create monetary value through CE adoption and implementation. However, E2 commented that "*as value creation, the ability to capture value is also crucial for contractors. This should be addressed in both economic and social value creation*" (Jayakodi et al., 2024b). Hence, the descriptions for both KPAs were revised accordingly. "Workforce capacity development and engagement", KPA name and scope remained unchanged based on the experts' opinions. Several experts endorsed KPA10, "Supplier Selection and Management," and its description; however, E7, E9, and E13 recommended expanding the scope to explicitly include subcontractors and vendors. Accordingly, the KPA description was revised to: The ability of the organisation to select and manage suppliers, subcontractors, and vendors in line with circular-economy requirements for construction projects. Consequently, the KPA name is also revised. Experts also agreed with the descriptions for KPA11 "Stakeholder collaboration and management", KPA12"Circularity-driven research and innovation", KPA14 "Circularity-driven business model adoption", KPA13 "Workforce capacity development and engagement" and KPA15 "Circularity-driven culture establishment"

4.3.4 Tier 4 - Key Process Areas

A review of the literature indicates that KPA17, "Land and biodiversity rehabilitation" remains underexplored in the CE context. The experts agreed with the description derived from the literature. However, E12 noted that, while adaptive reuse is considered, the KPA should also encompass brownfield development and greenfield conservation. Accordingly, greenfield conservation was explicitly incorporated into the KPA description, alongside adaptive reuse, brownfield development, land-use efficiency, and reduced biodiversity impacts. With respect to communication and sharing of CE initiatives, E16 recommended KPA 19 "Marketing and sharing CE initiatives". Substitute the term sharing CE initiatives with the term public data disclosure (Opferkuch et al., 2022). Consequently, the KPA was revised to KPA19"Marketing and public data disclosure". All experts agreed with the descriptions for KPA 16 "Digital technologies adoption", and KPA 18 "Social value creation".

4.4 VISUALISING THE IDENTIFIED KEY PROCESS AREAS FOR CONSTRUCTION ORGANISATIONS

Figure 2 depicts the verified KPAs along with the respective tiers. Further, the maturity levels have been indicated to illustrate the structure of the model.

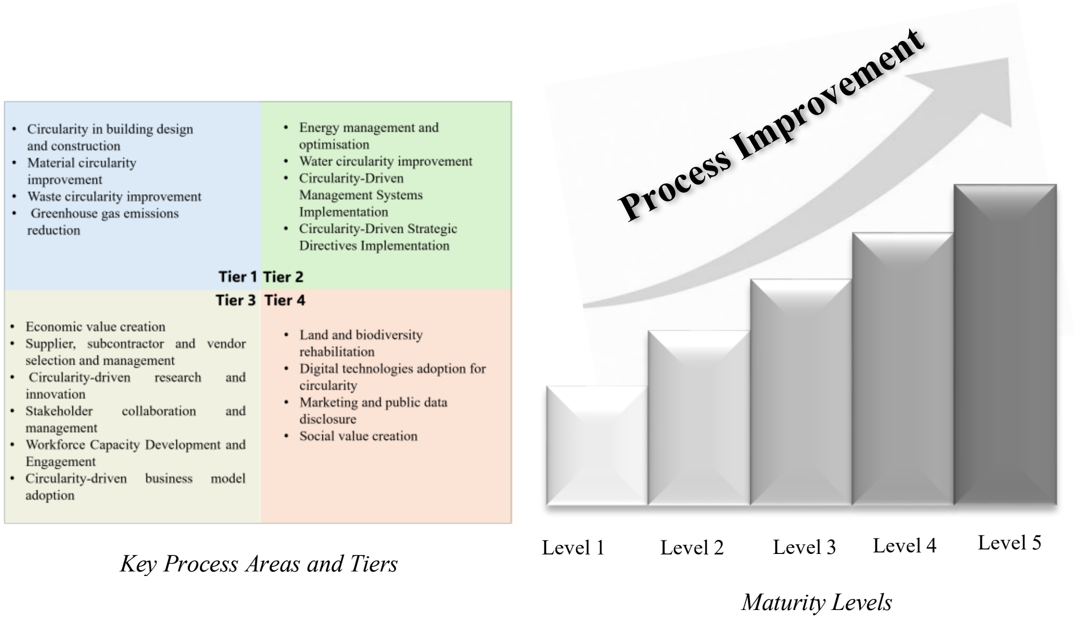

Figure 2: Key process areas for construction organisations

5. CONCLUSIONS

The study laid the foundation for the CE maturity model for construction organisations by identifying relevant KPAs to transform their linear practices into circular practices across both project-specific and non-project-specific processes. The key findings revealed 19 KPAs for construction organisations. Further, the identified KPAs were divided into four categories: Tier 1, 2, 3, and 4 KPAs, which clarifies which processes are crucial and need to be considered for a circular built environment. Moreover, the study justified the claim that the description of KPAs provided a clear context for circularity. This study offers significant practical and theoretical implications. Construction professionals use this as a navigation tool to identify the relevant KPAs within construction organisations to implement the CE, while, theoretically, the study contributes to organisational-level CE assessment in construction. This research identifies significant future directions for the construction management research domain. Researchers from other countries and regions may filter the findings of this study to adopt the most relevant KPAs, given that this study is limited to the Australian context. This publication is part of research aimed at developing a maturity model to assess and improve CE in construction organisations. Hence, subsequent publications will focus on developing a detailed maturity model with respective assessment attributes to assess KPAs. While acknowledging that data collection was limited to major stakeholders at this stage of the maturity model, the next stage of developing the detailed model will expand data collection to include additional stakeholders.

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