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COMPETENCIES OF CONSTRUCTION PROFESSIONALS TO PERFORM CIRCULAR ECONOMY PRACTICES: A SYSTEMATIC REVIEW

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ABSTRACT

The urgent shift towards sustainable construction is not merely a technical endeavour but also a transformation in professional practices. Central to this transformation is the Circular Economy (CE), which champions resource efficiency, design for reuse, and waste minimisation. Despite this, the successful implementation of CE in the construction sector hinges on professionals equipped with the required and evolving competencies. Hence, this research aims to investigate the competencies required by construction professionals to perform CE practices. To achieve this aim, the study synthesises fragmented literature to construct a cohesive and comprehensive understanding of CE competencies of construction professionals. A systematic literature review was conducted using 29 articles, applying the PRISMA framework and the Scopus database, and employing both content and descriptive analyses. The analysis revealed a rich compilation of competencies, clustered into several categories including critical and creative thinking, project coordination and interface, and software and data proficiency. Moreover, it identifies profession-specific competencies for key roles such as project managers, engineers, architects, BIM managers, and quantity surveyors. However, the findings also underscore a considerable gap in both geographic and professional representation, highlighting the marginalisation of certain regions and roles in existing CE literature. Finally, this study offers a common and profession-specific compilation of CE competencies, which can guide academia in curriculum development, inform industry training programs, and support policymakers in designing frameworks to accelerate CE adoption across the built environment.

Keywords: *Competencies; Construction Professionals; Circular Economy (CE).*

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1. INTRODUCTION

Amidst the crisis of resource scarcity and the urgent call for sustainability, the Circular Economy (CE) has emerged not merely as a solution but as a transformative vision for the future of industry (Mies & Gold, 2021). As described by the Ellen MacArthur Foundation (EMF), CE is a regenerative and restorative industrial model that embraces both technical and biological cycles (Ellen MacArthur Foundation, 2013). Since its bold entrance in the late 1990s, the CE has been able to infiltrate industries globally, while promoting reuse, recycling, and the extension of product life cycles (Mhatre et al., 2021; Victar et al., 2024). Being responsible for 40% of the total global waste, the adoption of CE strategies in the construction sector is considered essential for creating a more sustainable, resource-efficient, and resilient future (Vergani et al., 2024). Traditional linear waste management practices of generating, collecting, and disposing of waste have significantly contributed to resource depletion, increased greenhouse gas emissions, and environmental degradation (Quashie et al., 2024). To counter these impacts, the CE concept has been introduced to reshape the industry's future (Quashie et al., 2024). Accordingly, the CE-applied construction industry is referred to as ‘circular construction’ (Gamage et al., 2024). Circular construction is a regenerative process that seeks to eliminate unnecessary resource consumption, environmental degradation, and ecological harm (Vergani et al., 2024). Furthermore, Ghisellini et al. (2018) emphasised the importance of embedding circular thinking throughout the construction supply chain. Moreover, with its vast environmental, social, and economic footprint, the construction sector can drive CE forward and create lasting value (Çimen, 2021).

The construction sector today remains fragmented, often hinging on the contributions of individual actors and small enterprises (Bakos & Schiano-Phan, 2021). As Stephan and Athanassiadis (2018) argued, CE becomes attainable only when professionals step forward not just as participants, but as pioneers driven by the motive to create circular construction solutions. Chang and Hsieh (2019) supported this, highlighting the urgent need for professionals who understand value beyond the linear. This transition is not just a technical shift but a profound transformation that hinges on human capability (Victar et al., 2024). Professionals now stand at a crossroads, bearing the weighty responsibility of translating sustainability visions into practical, project-level realities as the circular built environment does not materialise on its own but by those with the courage and competencies to lead it (van Stijn & Gruis, 2020). To rise to this challenge, professionals must be armed with a dynamic portfolio of competencies. According to Kibert (2016), the successful implementation of CE practices demands technical precision, managerial foresight, and entrepreneurial daring. Recent literature, including Bertozzi (2022) highlighted that construction professionals need to bridge knowledge gaps, adopt technical skills, and embrace collaboration to effectively integrate CE principles into their projects. Authors further mentioned that technical competence powers the innovation of circular systems, managerial competence ensures these systems are not just imagined but executed, and entrepreneurial competence fuels the discovery of untapped opportunities that CE unlocks. Despite the growing emphasis on the CE, professionals in the construction industry still lack clarity on the specific competencies needed to implement it effectively (Quashie et al., 2024). Although literature outlines various Competencies for the linear-to-circular transition, translation of this knowledge into practice is still lacking. As a result, the uncertainty among professionals becomes a major barrier, and

CE efforts often fail not due to a lack of ambition but because the professionals lack the competencies to deliver it (Vergani et al., 2024).

To better understand the human capabilities required to drive circular construction forward, it is important to clarify what is meant by "skills" and "competencies." In the literature, the terms have often been used interchangeably. For example, Vergani et al. (2024) referred to them as skills, while others such as Quashie et al. (2024) used the term “competency skills.” In contrast, Victar et al. (2024) and Bjerke and Amoudi (2024) emphasised “competencies” as a more comprehensive concept. The term ‘competency’ itself is rooted in the Latin word competentia, meaning “is authorised to judge” or “has the right to speak” (Caupin et al., 2006), pointing to its deeper connotation of legitimacy and authority in action. In this research, competencies are understood as a blend of knowledge, skills, and capabilities that individuals must possess to effectively carry out their responsibilities (Wong, 2020). Since the majority of reviewed articles refer to them as competencies and professional organisations similarly adopt the term, this study consistently uses the term competencies throughout. The individuals this study focuses on are “construction professionals”. The construction industry comprises a workforce and professionals. The workforce comprises skilled and semi-skilled labourers, technicians, support staff, and supervisors whose roles typically do not require advanced professional qualifications (Chan & Kaka, 2007). In contrast, Construction professionals are specialised experts such as architects, surveyors, engineers (civil, mechanical, electrical), quantity surveyors, and other key actors who contribute to decision-making and implementation throughout the construction lifecycle (Vergani et al., 2024). They manage various aspects of a project, including design, structural stability, financial oversight, and resource organisation (UKEssays, 2018).

Despite the growing body of literature on CE competencies in the construction industry, existing studies tend to focus either on general, non-role-specific competencies or on selected professions. Sanggoro et al. (2024) examined how core engineering competencies support CE implementation using Importance-Performance Analysis (IPA) with certified engineers in Indonesia. Dautremont and Gobbo (2025) explored collaborative CE practices across micro, meso, and macro levels in circular construction ecosystems, identifying interlinked activities among all stakeholders. Bjerke and Amoudi (2025) discussed the role of architects in integrating CE principles, while Vergani et al. (2024) emphasised the importance of systems thinking and interdisciplinary collaboration for engineers and architects working towards circularity. Gibbin et al. (2023) highlighted project managers’ roles in translating CE goals into project execution strategies through leadership and coordination. Studies, including Victar et al. (2024), addressed quantity surveyors’ involvement in recycling and reuse across multiple project stages. Existing research often explores CE from a general or role-specific perspective, but the findings are scattered and lack integration. Without a synthesised understanding of the professional competencies necessary to support circular construction, efforts to embed CE principles into construction practice would be difficult and uninformed. Therefore, this research aims to investigate the competencies required by construction professionals to perform CE practices, achieved through a systematic literature review. The following objectives were addressed.

1. Conduct a descriptive and content analysis of competencies required by construction professionals to perform CE functions.
2. Compare and contrast the competencies required by different professionals

3. Identify the common competencies required by construction professionals to perform CE practices

2. RESEARCH METHODOLOGY

A systematic literature review (SLR) is crucial in construction research to expand knowledge on specific topics (Chen et al., 2022). SLRs offer a transparent, unbiased, and replicable approach to synthesising existing research by following a predefined protocol, enabling comprehensive analysis and evidence-based conclusions that support credibility (Jesson et al., 2011). This study used the Scopus database to locate scholarly articles on competencies required for professionals in circular construction due to its reliability and extensive use in the field, as revealed by Ghaleb et al. (2022). The PRISMA framework was adopted for its clarity, transparency, and structured methodology (Shahruddin & Zairul, 2020). PRISMA integrates the PICO approach to formulate precise research questions (Hosseini et al., 2024), essential for a successful review. To ensure transparency and the rigorous review process, Figure 1 presents the PRISMA flow diagram used to illustrate the systematic screening and selection of literature.

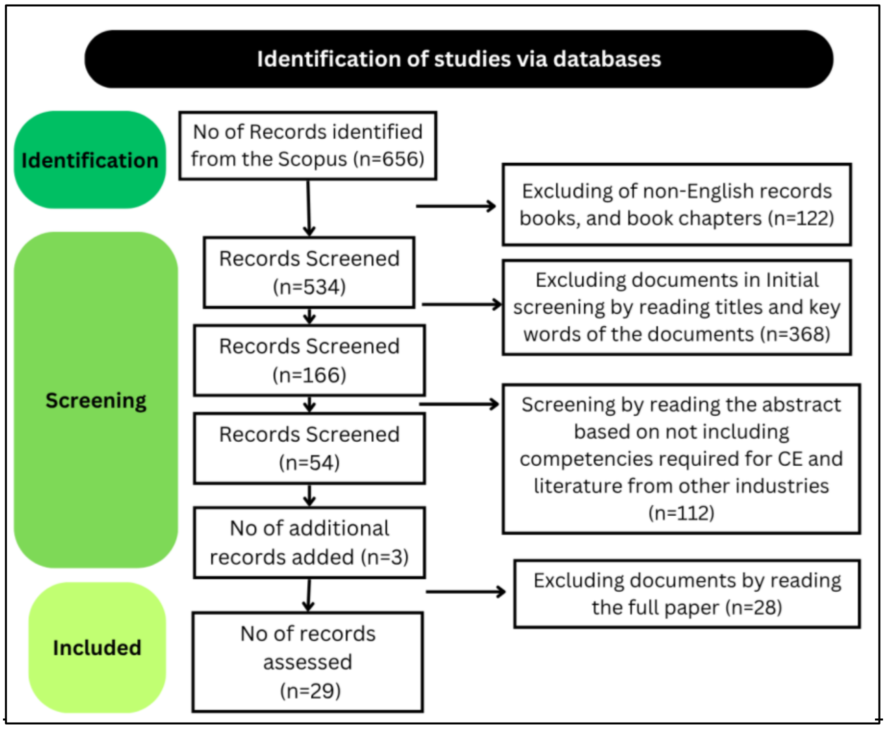

Figure 1:PRISMA flow diagram used for the study

The main search string used to retrieve bibliometric data related to the research area of concern was: ("Circular Economy" OR “Regenerative economy” OR “Zero-waste economy” OR “Cradle-to-cradle” OR “Circular built environment”) AND ("Competenc*" OR "Skill*" OR "Capabilit*" OR "Qualificat*" OR "Expertis*" OR "Knowledg*" OR "Train*") AND (“Construction industry” OR “Construction projects” OR “Construction field” OR “Construction business” OR “Construction sector” OR “Built Environment” OR “Building sector” OR “Quantity Surv*” OR “Project Manag*” OR “Civil Enginee*” OR “Archit*”). Next, the screening process was performed by including journals, conference papers, reviews, etc. Accordingly, 656 articles were selected from the search protocol. Due to language barriers, 11 non-English articles were excluded. 111 books, book chapters, letters, and notes were excluded as they lack peer review and are prone to becoming outdated.

From the remaining pool of 534 papers, 166 were initially shortlisted based on their titles and keywords. Subsequently, 112 documents were excluded as they were either product-focused or unrelated to the construction sector. Meanwhile, three additional articles were incorporated into the repository after a comprehensive review of their full text, as the title or the abstract did not imply any relevance towards skills, but the full body text did. During the final screening phase, papers that offered limited insight into the CE competency requirements of professionals, or those that focused on occupations only tangentially related to the construction industry, such as real estate agents, were also removed. As depicted in Figure 1, this rigorous process resulted in a final selection of 29 papers. These shortlisted studies were examined through both content analysis and descriptive analysis. The content analysis was used to review the paper's contents thoroughly in broader themes, such as (1) Common competencies required by construction professionals and (2) competencies required by different professionals to perform CE functions. The research findings are presented in the two sections of the 'Findings and Discussion' section.

3. FINDINGS AND DISCUSSION

The findings and discussion section discloses the findings generated by descriptive and content analysis. Content analysis analyses sources in a systematic and objective manner, providing reliable insights that inform action (Mayring, 2021). Meanwhile, descriptive analysis supports identifying trends and variations through a focus on the who, what, where, when, and extent of phenomena (Cote, 2021). This combination provides a comprehensive understanding of the subject researched.

3.1 DESCRIPTIVE ANALYSIS

The publication trend of empirical studies conducted over the past years and the profession-wise distribution of related studies across geographical areas are insights through descriptive analysis.

3.1.1 Publication Trend from 2019 to 2025

The rise of CE principles in construction has increasingly drawn academic attention, particularly in terms of the competencies required for effective implementation. Figure 2 illustrates how scholarly publications on CE-related competencies in the construction sector have evolved over recent years.

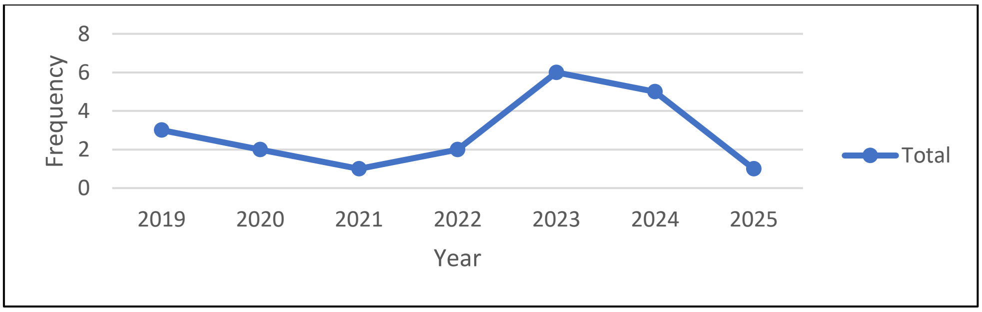

Figure 2: Publication Trend since 2019

The temporal distribution of the reviewed journals reveals a clear upward trend in academic interest surrounding CE competencies within the construction sector. Although the concept of CE began gaining traction globally in the late 1990s, its application to construction professional competencies did not appear in the academic literature until 2019, based on this dataset. This delay could be attributed to the initial focus on establishing a theoretical foundation for CE in construction, while comparatively limited attention was given to identifying and developing the specific competencies required by professionals to effectively implement CE principles. The earliest contributions in 2019 include three publications. This level of output remained relatively modest through 2020 and 2021, representing a formative phase in the discourse. However, a notable increase occurred in 2023, with six publications, followed by five more in 2024. This surge likely reflects a post-pandemic shift in priorities, with increased emphasis on professional competencies, and CE transitions within the built environment. However, the observed reduction in publications for 2025 is due to the SLR being conducted during the first quarter of the year, and publications from the remaining months were not included.

3.1.2 Geographical Distribution

Understanding the geographical origins of research on CE competencies within the construction sector provides vital insights into patterns of global scholarly engagement and regional research priorities. Figure 3 presents the distribution of reviewed publications by country, thereby highlighting both the breadth of international contributions and existing gaps in the current body of literature.

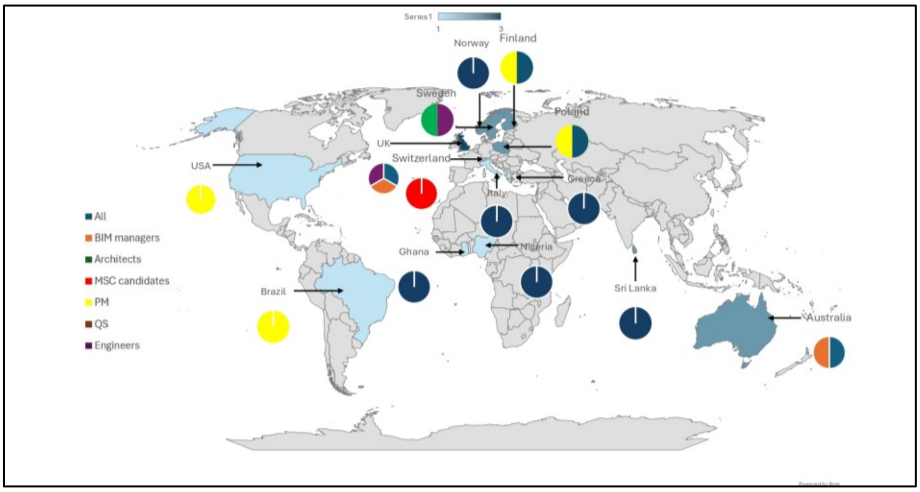

Figure 3: Geographical distribution of publications

The systematic literature review reveals a geographically diverse interest in the competency requirement of construction professionals, with journal articles originating from 17 different countries. As Figure 3 presents, the United Kingdom leads with three publications, covering roles such as engineers, BIM managers, and general CE practices, suggesting a strong national focus on sustainable construction leadership. Countries like Finland, Poland, and Norway follow closely with two studies each, demonstrating notable contributions from Europe. A promising aspect of the review is the inclusion of developing countries such as Nigeria, Ghana, Sri Lanka, and Brazil, each contributing at least one study. These contributions align well with the findings of Quashie et al. (2024), which emphasised the relevance of CE principles in contexts where rapid urbanisation, waste management challenges, and the need for resource efficiency are becoming increasingly critical. However, the relative lack of representation from Asia and the Middle East points to gaps in the global dialogue that future research could address.

Figure 3 further demonstrates a variety of construction professionals, emphasising that CE adoption requires cross-disciplinary engagement identified during the SLR. Project managers appeared most frequently, with four studies focused on their role in enabling CE through project planning, procurement strategies, and lifecycle thinking. Engineers, while only represented in a few studies, are recognised for their technical contribution. BIM managers appeared in 2 articles from England and Australia, signalling growing attention to how digital tools like Building Information Modelling can support CE decision-making. Quantity Surveyors (QS), represented by two studies from Sri Lanka, highlighted the role and competencies of a QS in the 3R concept-infused CE. One unique entry involves MSc candidates in Switzerland, indicating that CE competencies are increasingly being embedded in academic curricula. Over half of the studies do not focus on a specific role, instead addressing the broader spectrum of CE competencies required by professionals across the construction sector.

3.2 CONTENT ANALYSIS

The CE competencies of construction professionals in a common context as well as profession-specific competencies have been discussed in the content analysis.

3.2.1 CE Competencies

The successful implementation of CE practices in construction demands a profession-specific understanding of relevant competencies. Table 1 below provides a synthesised overview of competencies mapped to key construction roles, reflecting the differentiated yet complementary contributions of each profession toward circularity.

Table 1: Circular economy competencies for construction professionals

Competency	Relevant Profession	Sources
Critical & Creative Thinking: Critical thinking, Creative thinking, Creativity, Foresighted/anticipatory thinking, Positive thinking	Common	3,6,7,8
Problem Solving and Structuring: Complex problem-solving, Problem-solving, Problem structuring, Troubleshooting operational errors	Common	3,5,6,7,8
Decision Making and Judgement: Decision making, Judgment and decision making, Originality judgment	Common	5,6,7
Numeracy and Mathematical Reasoning: Numeracy, Mathematics, Mathematical reasoning	Common	6,7
Analytical and Hypothesis Testing: Analytical thinking, Hypothesis testing, Predictive analysis, Quality control analysis	Common	6,8
Communication: Communication, Effective Communication, Speaking, Active listening, Reading comprehension	Common	3,6,7
Negotiation and Persuasion: Negotiation, Persuasion, Relationship competency	Common	5,6,7
Teamwork and Collaboration: Teamwork, Collaboration, Understanding team dynamism, Interpersonal competence	Common	3,5,6,7,8

Competency	Relevant Profession	Sources
Cultural and Social Awareness: Cultural intelligence, Addressing generational differences, Social perceptiveness, Social awareness	Common	1,6,7
Leadership and Direction: Leadership, Leadership competency, Provision of direction to inspire others, Developing teams, Transforming followers into leaders, Empowering others, Resilience	Common	3,4,6,8
Project Coordination and Interface: Effective coordination and integration of stakeholders, Interface management, Coordination, Operations analysis	Common	2,4,6,7
Resource and Process Management: Management of financial/material/personnel resources, Process management, Material Logistic Plan Implementation, connecting reverse logistics with users, Upcycling	Common	3,6,7
Equipment and Site Management: Equipment maintenance, Operation monitoring, Operation and control, Installation, Repairing, Equipment selection	Common	6,7
Onsite Execution and Practical Competencies: Onsite practical skills, Specification writing, Using suitable structural systems/materials, Suitable site characteristics, understanding wear, value perception, and engineering use	Common	1,3,4,8
Self and Stress Management: Stress management, Self-confidence / Self-control, Resilience, Positive thinking;	Common	6
Empathy and Caring: Empathy, Caring, Humanity, Emotional reasoning, Interpersonal sensitivity	Common	6,8
Adaptability and Flexibility: Adaptability, Adaptability competencies, Cognitive flexibility	Common	6
Curiosity and Active Learning: Curiosity, Active Learning, Learning Strategies, Understanding factors affecting user experience.	Common	6,7,8
Ethical and Entrepreneurial Mindset: Ethical competencies, Entrepreneurship competencies, Service orientation, circular business model integration	Common	3,6,8
Design for Circularity: Eco-design, designing for multiple-use cycles, lean design and construction, cradle-to-cradle principles, built environment restoration, water-sensitive and wetland design.	Common	1,9
Impact Assessment: Sustainability assessment and benefits, rating systems and certification, CE social impacts, environmental assessment methods, social life cycle assessment, circular impact assessment, circular scope definition	Common	1,9
Waste Minimisation: Waste efficient procurement knowledge, Ability to manage waste, Ability to create and implement waste management plan, Personnel commitment to pursuing a solution to waste minimisation, Waste avoidance cost accounting	Common	1,3,6,8
Programming and Tech Design: Technology design, Programming, Technology Design and Programming	Common	6,7

Competency	Relevant Profession	Sources
Software and Data Competencies: Software competencies, Competencies for specific tools, Data analytics, Data management competencies	Common	6
Cybersecurity and Digital Identity: Computer security, Digital identity, Digital rights, Digital Security	Common	6
Digital Fluency and Leadership: Digital literacy, Digital communication, Digital use, Digital strategy, Digital leadership, Digital emotional intelligence	Common	6
Systems Thinking and Evaluation: System thinking, Systems analysis, Systems Evaluation	Common	1, 6, 7
Specialised Quantity Surveying Competencies: risk management, procurement advice, resource management, cost control, cost planning, feasibility studies, value engineering, cost estimation, Life cycle cost analysis, cost-benefit analysis, data standardisation and modelling, embodied ecology costing, and sustainability advisory.	Quantity Surveyor	13
Specialised Architecture, Engineering, and Construction Competencies: 3D printing in construction, technical and geographic insight, CE challenges in real estate, urban mining, energy minimisation and monitoring, aquifer storage and water quality issues, Madaster vision for material passports, non-renewable tech and energy trade, functional and physicochemical building blocks.	Engineers, Architects	9
BIM-Integrated Competencies: 3D modeling, Digitalisation, Quantity takeoff and phase planning, Standardisation and flexibility, Asset and component maintenance, Use visual models to reduce rework, BIM interoperability for waste management, Auto-capture design parameters, Extract waste data from design models, BIM for lifecycle waste management, Use BIM for construction waste analysis, Specify materials from models to reduce variation, Extract material quantities from models, Volumetric modular design application, Integrate construction sequencing early, Modular construction techniques,	BIM Managers	10,11

Sources - (1-Quashie et al., 2024; 2- Hendrianto et al., 2024; 3- Botchway, et al.,2023; 4- Wuni & Shen, 2022; 5-Harala et al., 2023; 6- Siriwardhana & Moehler, 2023; 7- Burger et al., 2019; 8-Górecki,2019; 9- Vergani, et al., 2024; 10-Bjerke & Amoudi, 2024; 11-Ganiyu et al., 2020; 12-Wrase et al., 2023; 13-Victar et al., 2024; 14-Jääskä 2021)

Quashie et al. (2024) identified the competencies driving circularity in the construction industry within developing economies, emphasising the unique, context-specific skills needed in low- to middle-income countries. Drawing from such diverse insights, Table 1 was developed through a structured synthesis of original competencies from multiple sources, categorised into 30 thematic groups such as critical and creative thinking, project coordination, BIM-integrated competencies, and software and data proficiency. While some categories are profession-specific, most are broadly applicable across construction roles. These competencies include skills essential for addressing complex sustainability challenges, supporting stakeholder engagement, and integrating circular principles in projects. Additionally, digital literacy, programming, and data proficiency reflect the industry's shift toward technology-driven solutions. Competencies, including design for circularity, impact assessment, and systems thinking are key to embedding circular economy principles in construction practices.

3.2.2 Profession-Specific Competencies

Table 1 presents a diverse range of competencies tailored to key professional roles within the circular construction industry. Górecki (2019) emphasised leadership, emotional reasoning, operational analysis, and interpersonal sensitivity as critical competencies for Project Managers to make sustainable decisions, while Jääskä (2021) highlighted collaboration, decision-making, and problem-solving. Vergani et al. (2024) contributed technical and sustainability-related competencies for Architects and Engineers, including 3D printing as well as technical and geographic insight. Bjerke and Amoudi (2024) identified BIM-related skills such as digital modelling, standardisation, and phase planning that support waste minimisation and adaptability. Ganiyu et al. (2020) further explored BIM's role in waste analysis, modular construction, and logistics optimisation. Wrase et al. (2023) proposed a holistic framework of governance, ethics, and digital transformation to prepare CE-ready graduates. Victar et al. (2024) mapped Quantity Surveyors' roles to the 3R (Reduce, Reuse, Recycle) principles, highlighting competencies like life cycle costing and value engineering.

Accordingly, role-specific competencies vary significantly depending on professional focus. Quantity Surveyors, for instance, are primarily concerned with financial and resource efficiency, possessing advanced capabilities in procurement advice, cost control, life cycle cost analysis, and sustainability-related costing methods (Victar et al., 2024). In addition, certain common competencies such as impact assessment align more closely with Quantity Surveyors, given their involvement in project feasibility evaluations and life cycle cost analysis (Senaratne et al., 2024). Meanwhile, BIM managers demonstrate distinct digital fluency, with competencies in 3D modelling, modular construction, lifecycle waste analysis, and integrating digital tools like BIM for circular design and waste reduction (Bjerke & Amoudi, 2024). These variations demonstrate how each profession supports circular economy goals from different angles, reinforcing the need for role-specific competency frameworks tailored to their functions within the construction ecosystem. However, although these studies present profession-specific competencies, the majority of the identified competencies remain relatively general rather than deeply profession-specific, highlighting a notable gap in the existing literature.

3.2.3 Paving the Way Forward for CE Implementation by Construction Professionals

Despite increased academic attention, existing literature still lacks a holistic understanding of how competencies are distributed across different professions and global contexts. One of the most critical gaps lies in the limited focus on specific construction professions. For instance, PMs were the most frequently examined profession, appearing in only five out of twenty-seven studies despite the availability of a few existing research on professions such as Engineers, Architects, QSs, and BIM managers (Górecki, 2019; Victar et al., 2024; Ganiyu et al., 2020). However, key contributors to on-site performance, including site supervisors, MEP engineers, planning engineers, draftsmen, and construction foremen, remain largely unaddressed. Moreover, most of the studies that attempted to identify competencies remain relatively general, indicating a significant gap in deeply profession-specific competency mapping within the current CE literature. If such detailed mappings were available, the construction industry would be better positioned to maximise the benefits of CE practices by aligning skills development precisely with practical implementation needs. There are also notable geographical imbalances in research coverage. Most contributions originate from European nations such as the United Kingdom, Finland, and Poland (Burger et al., 2019). Most contributions originate from the United Kingdom accounting for three publications focused on engineers, BIM managers, and general CE practices while regions experiencing rapid urban growth, including Southeast Asia, the Middle East, Africa, and Latin America, receive little to no representation. As emphasised by Quashie et al. (2024), these regions encounter unique challenges such as informal labour structures, limited training access, and regulatory fragmentation. Addressing such realities requires context-specific competency frameworks that align with local needs and priorities. Moving forward, there is a need to expand profession-specific studies to include the full range of construction roles involved in circular construction. Additionally, future research should be more geographically inclusive, with a particular emphasis on underrepresented regions where CE adoption can deliver the most transformative impact. Only through such comprehensive efforts can the construction industry be truly equipped to support the global transition to a circular and sustainable built environment.

4. CONCLUSIONS AND RECOMMENDATIONS

This study provided a structured synthesis of the competencies required by construction professionals to implement CE practices, using a systematic literature review approach. It identified common competencies and mapped role-specific competencies across various professions within the sector. Despite the growing academic interest, the current literature remains limited in geographic and professional scope, underscoring the need for a more inclusive understanding of CE competencies in construction. To advance the implementation of CE in the built environment, the following recommendations are proposed. (1) Expand research coverage to include underrepresented regions such as Southeast Asia, the Middle East, and parts of Africa and Latin America, where the built environment is growing rapidly, (2) Conduct profession-specific studies to identify detailed competency frameworks for a broader range of construction roles (3) Promote interdisciplinary education and training programs that align with the identified competency categories, ensuring professionals are prepared for practical CE challenges.

This study contributes to the growing CE literature in construction by identifying both common and profession-specific competencies needed for CE transitions. It presents competencies such as systems thinking, digital fluency, and design for circularity while mapping competencies for key roles, including PMs, QSs, and BIM managers. The research also highlights regional and professional gaps, where most identified skills are general rather than CE specific, with limited representation from countries like China and India, and roles such as site supervisors. These findings guide future, more inclusive CE competency research. However, the analysis was based solely on secondary data, without field-level validation from industry practitioners. Nevertheless, the study systematically synthesises fragmented literature to construct a cohesive and comprehensive understanding of the competencies required by construction professionals to implement CE practices effectively.

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