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Facilitating circularity through sharing economy practices in the construction industry: potential shareable resources

Ishara Rathnayake and J. Jorge Ochoa
Sustainable Infrastructure and Resource Management (SIRM) & Australian Research Centre for Interactive and Virtual Environments (IVE), University of South Australia STEM Academic Unit, Mawson Lakes, Australia

Ning Gu
Australian Research Centre for Interactive and Virtual Environments (IVE), University of South Australia Creative Academic Unit, Adelaide, Australia

Raufdeen Rameezdeen and Larissa Statsenko
Sustainable Infrastructure and Resource Management (SIRM), University of South Australia STEM Academic Unit, Mawson Lakes, Australia, and

Sukhbir Sandhu
Centre for Workplace Excellence (CWeX), University of South Australia Business Academic Unit, Adelaide, Australia

Abstract

Purpose – The sharing economy (SE) presents a promising avenue for achieving circular economy (CE) objectives by facilitating the identification of underused resources and supporting resource optimisation. The SE practices are well established in sectors such as transportation and accommodation; however, scholarly literature reveals a notable gap in research related to the construction industry (CI). Therefore, this paper aims to explore construction-related shareable resources while promoting the SE practices in the industry.

Design/methodology/approach – A multimethod qualitative approach was used, including a literature review, qualitative website analysis of construction-related digital platforms and semi-structured interviews. The collected data were subjected to thematic analysis, using MS Excel and NVivo 14 software.

Findings – Out of ten types of shareable resources identified in the literature, the website analysis recognised only seven types of resources (human resources, space/storage, mobility, equipment/ tools/material/ machinery/ devices, data and information, energy and goods) that are currently being shared in the industry. Further, expert interviews recognised three additional resources (robots, financial capital and Wi-Fi) as potential shareable resources in the CI.

Research limitations/implications – The study introduced a novel perspective on the current SE research domain by investigating SE practices in the CI. The study's findings contributed to reframing traditional perspectives within the resource-based view theory.

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Practical implications – The findings provide actionable insights related to the identification and optimisation of underused resources in the CI. Furthermore, the study established a pathway for integrating SE practices into construction, contributing to the realisation of sustainability and CE goals.

Originality/value – This research presents one of the first attempts to investigate the SE concept in the CI.

Keywords Circular economy, Construction industry, Resources, Resource-based view, Resource efficiency, Sharing economy (SE), Sustainability, Sustainable construction practices

Paper type Research paper

1. Introduction

The construction industry (CI) is a driving force within most national economies, contributing significantly to economic and social development (Alaloul *et al.*, 2021). The CI is one of the largest industries in the world, accounting for 13% of global gross domestic product (GDP). The contribution of the CI to the global economy was estimated at around US$11tn in 2020. For example, the CIs in the UK and China contributed 6% and 7% of their national economies, respectively. Further, the Australian context accounts for 9% of the country's GDP by generating approximately 360 billion in revenue and is projected to increase to around 12% of the total GDP by 2025 (Back to Basics, 2022). Accordingly, the CI plays a vital role in the economic and social development of many countries. However, despite the industry's positive contribution, environmental unsustainability is highlighted as a major criticism of the industry (Oke *et al.*, 2021). The CI is recorded as the world's largest resource consumer, accounting for 40% of the world's natural resources (Alsheyab, 2022). Moreover, the industry accounts for 30% of global waste and 33% of emissions (van Stijn and Gruis, 2020). Especially, these impacts will be doubled due to the housing and building needs of the population in the future. These detrimental impacts mainly occur due to the use of a linear economic model in the CI while focusing on the idea of "take, make, dispose of" (Benachio *et al.*, 2020). In contrast to the linear economic model, the circular economy (CE) has emerged as a novel initiative to rethink the decoupling of economic activities based on three aspects, namely, design out waste and pollution, keep products and materials in use and regenerate natural systems (Dhawan, 2021).

Accordingly, the concept of CE has been highlighted as a solution to the negative impacts of current construction practices (Pomponi and Moncaster, 2017). To align with CE practices, Accenture, a global management consulting, technology services and outsourcing company that serves more than 120 countries, introduced five types of CE business models, namely, circular supplies, resource recovery, product life extension, sharing platforms and product as service (Sehnem *et al.*, 2022). The Ellen MacArthur Foundation introduced regenerate, share, optimise, loop, virtualise and exchange framework by evaluating the transition to CE in an extensive manner (Nobre and Tavares, 2020). Among these methods, several studies pointed out the great potential of sharing resources for realising CE by enabling people and organisations to make a profit from underused resources, while eliminating waste (Schwanholz and Leipold, 2020). Accordingly, the concept of sharing economy (SE) has emerged as an innovative solution to optimise the use of the CE by sharing underused assets in ways that enhance efficiency and sustainability (Schwanholz and Leipold, 2020). SE is an economic model based on the activity of acquiring, providing or sharing access to goods and services that is often facilitated by a community-based online platform. The concept of SE is beneficial for industries that are resource-intensive and have negative impacts on the environment (Luthra *et al.*, 2022). The CI, as one of the biggest consumers of resources, is increasingly expected to apply SE practices to better manage the world's finite resources (Hjaltadóttir and Hild, 2021). Among various emerging concepts in

the CI such as design for disassembly, modular construction, building information modelling, Construction 4.0 (Chen *et al.*, 2022; Ostapska *et al.*, 2021), the SE concept was selected for this study considering its direct benefits in resource utilisation (Mont and Palgan, 2025), reducing the need for raw material (Banaszyk and Łupicka, 2020) and minimising waste generation (Nikitina, 2021), which are critical issues in the CI. Unlike other emerging concepts, SE practices enable real-time utilisation of idle or underutilised resources while gaining social, economic and ecological benefits (Puschmann and Alt, 2016; Sadiq *et al.*, 2023). Integrating SE into construction offers more flexibility and access to tools and equipment without making a high expenditure. Further, the SE is ideal for mitigating storage and maintenance issues. Moreover, the growing practice of SE-based business activities, such as construction-related resource sharing through digital platforms, further reinforces the practical significance of adopting SE practices in CI.

Although there is great potential to apply SE practices in the CI, the current SE literature predominantly focuses on the transportation and accommodation sectors. For example, Hossain (2020) conducted a critical study on SE, focusing on the practices of Uber and Airbnb. Hati *et al.* (2021) analysed influential factors and stakeholder involvement in Airbnb. This lack of attention to SE research in the CI was highlighted in a recent study which explored the SE practices in different industries (Rathnayake *et al.*, 2024a). Currently, only a small number of empirical studies on SE practices in the CI can be found in the literature (Kupriyanovsky *et al.*, 2017; Li *et al.*, 2019). However, these studies do not directly examine the SE concept, and their primary focus is not on thoroughly investigating the key aspects of SE. For example, Li *et al.* (2019) studied the impact of SE practices on sustainability in the Chinese CI. The study has identified the impact of digital platforms on the relationships between SE practices and sustainability performance. Further, Kupriyanovsky *et al.* (2017) mentioned that insufficient attention is paid to the concept of SE relevant to technological platforms, construction, transportation and logistics domains. However, these studies are conceptual and have not empirically explored the potential shareable resources related to SE practices in the CI. This research gap leads to the following research question:

RQ1. What are the potential shareable resources related to SE practices in the CI?

Therefore, it is crucial to conduct comprehensive empirical research to identify and evaluate the potential shareable resources pertaining to SE practices in the CI. This research aims to fill this gap by establishing the first empirical knowledge regarding shareable resources related to the SE concept in the CI domain. To achieve this aim, the following objectives are put forward to identify shareable resources across diverse industries and sectors and explore potential shareable resources related to SE practices in the CI.

This research was conducted in Australia, considering its significant efforts to transition the country to more CE initiatives (Australian Government – Department of Climate Change, Energy, the Environment and Water, 2024). The active nature of CE in Australia, supported by government and organisational actions, makes it an ideal context for implementing and researching new aspects of the concept. Australian Government – Department of Climate Change, Energy, the Environment and Water (2024) introduced Australia's Circular Economy Framework as a supporting tool to double the CE rate. This framework is considered as the blueprint for national CE transition, facilitating three main targets, namely, reduce the per capita material footprint by 10%, increase material productivity by 30% and safely recover 80% of resources. A total of four priority sectors have been recognised in this framework such as the packaging industry, built environment, agriculture and food and resources. This framework has highlighted some key insights

related to SE. Mixed-use spaces were recognised as a potential method to mitigate embodied energy and carbon emissions. Further, integrating CE strategies such as adaptive reuse was identified as a potential solution to reduce waste generation and construction times. Moreover, shared infrastructure, equipment, data and resources were highlighted as sectoral enablers in this framework. This shared consumption will reduce the need for multiple individual products and encourage resource efficiency. Further, facility-sharing was highlighted in this framework as Australia's cross-cutting objective, which supports the development and production of innovative technologies by providing access to facilities that are otherwise too expensive for small and medium-sized companies to develop and/or access on their own (Australian Government – Department of Climate Change, Energy, the Environment and Water, 2024). Therefore, the Australian context provides a strong foundation for exploring SE practices as a novel aspect of CE in the CI. Hence, conducting this study within such a relevant context is inspired by yielding rich insights, given the country's experience and advancements in related fields.

The following sections are structured as follows: Sections 2 and 3 present the literature review and research methodology, respectively. Section 4 presents the findings and discussion and Sections 5 and 6 discuss the research implications and conclusions, respectively.

2. Literature review

This literature review aims to provide a clear and comprehensive exploration of current research while highlighting six key aspects, namely, the current state of the SE research, methodological implications, limitations in existing studies, existing research gaps, the need to address these gaps and the necessity of conducting current research to address the existing gaps. Further, this section presents an overview of the SE concept and summarises the ten types of shareable resources across diverse industries identified via the literature review.

2.1 Sharing economy

The SE has been gaining widespread attention as an economic model that introduces shared consumption of underused resources through digital platforms (Atsız and Cifci, 2022). Sharing can be traced back to ancient times, when it was practised as a voluntary act between close community groups (Belk, 2014). However, the novel SE concept enables economic actions facilitated by advanced technologies and is becoming an emerging trend. The SE concept gained wide public momentum with the success of Uber and Airbnb while highlighting the greater opportunities in this practice (Rathnayake *et al.*, 2024a). By exploring diverse applications of SE, key characteristics can be pointed out: economic transactions while increasing resource utilisation rate, temporary access to resources but no transfer of ownership and presence of digital platforms which support the sharing processes (Lehto *et al.*, 2018). From the perspective of resource-based view (RBV) theory, firms can gain competitive benefits by using valuable, rare, inimitable and non-substitutable resources (Na and Kang, 2018). As per Zeng *et al.* (2021), resource orchestration in the RBV theory emphasises that the sustainability of value creation and competitive benefits for companies does not merely depend solely on the ownership of static resources, but the skilful resource utilisation and management are also critically essential. In relation to the SE concept, SE practices facilitate the sharing of resources that are valuable, that are not easily accessible to all and that are difficult to replicate due to technological advancements and geographical benefits. Firms and companies can gain competitive advantages in the market, while sharing underused resources with others. The SE concept is currently being actively practised in

other industries, and their shareable resources vary according to the context of their industry practices.

2.2 Shareable resources across diverse industries

Shareable resources are assets and services that can be offered to another party for their temporary usage, often facilitated through digital platforms. A comprehensive literature review revealed 14 potential categories of shareable resources. While these categories represent a wide range of sharing practices, the specific context of this study required a more focused approach. Therefore, resource categories, namely, drugs, animals, fashion elements and food/ingredients were considered extraneous to the context of this study and were therefore excluded from further analysis.

This section categorised the identified shareable resources across different industries via literature review into ten types. In this study, these identified resources were used to evaluate the applicability of SE practices in the CI.

2.2.1 Human resource. Human resources sharing can be seen in terms of sharing labour, time, skills, knowledge and experiences, emotional companionship, intellectual capabilities and human body parts. Hu *et al.* (2021a, 2021b) discussed the Good Neighbour Sharing Children project, where students provide life care and emotional companionship to elders in China. Rover.com is a popular platform among pet sitters, and they can provide dog walking, visits and daycare services in their free time while earning extra income (Su *et al.*, 2022). Beyond contemporary sharing, Kimura and Nakajima (2020) introduced the sharing of human eyes and ears via wearable media devices under the CollectiveEyes platform.

2.2.2 Robots. Robot-sharing can be considered a viable shareable resource due to its high cost and specialised applications. One of the manufacturing companies of Alpa and Beta company currently practices robot-sharing services in Sweden (Melander and Arvidsson, 2021). Hu *et al.* (2018) investigated applications in exoskeleton and swarm robots as a major improvement in robot-sharing technology. Considering that robots are not a common resource and are often specialised for specific tasks, sharing these resources can enhance resource accessibility and work efficiency.

2.2.3 Space/storage. One of the prominent SE practices is the Airbnb platform which is a space-sharing application (Lho *et al.*, 2022). The authors recognised three main space-sharing practices in the hospitality industry, namely, accommodations, co-working spaces and shared kitchens. The sharing of kitchen spaces for non-dine-in restaurants was observed by Lho *et al.* (2022). Moreover, Suh *et al.* (2022) pointed out garden-sharing practices in Argent Street and Gething Crescent communities.

2.2.4 Mobility/logistics. In mobility-sharing, individuals can share their underused vehicles to provide a service in their free time, as Ušpalytė-Vitkūnienė *et al.* (2022) studied sharing practices conducted through cars, bicycles and electric scooters. Uber, Lyft and DiDi are known as popular mobility-sharing applications worldwide (Liu and Kim, 2022). A shared shipping container transportation method was examined by Huang and Zhao (2019), which facilitates maritime companies to make a transition from linear shipping practice.

2.2.5 Financial capital. Financial capital-sharing is known as the shared use or distribution of financial resources through digital platforms that connect people to invest or lend, and this sharing practice can be seen in various forms, such as crowdfunding, peer-to-peer (P2P) lending and microfinancing. Hu *et al.* (2021a, 2021b) explored capital-sharing schemes such as Shuidichou and Aixinchou in the health-care sector. On the other hand, the energy sector also practices capital-sharing in terms of microcredits and crowd-financing methods (Plewnia, 2019).

2.2.6 Equipment/tools/material/machines/devices. Yang *et al.* (2021) investigated idle three-dimensional printer-sharing as a machine-sharing practice in additive manufacturing applications. The Floow2 is an example in the manufacturing industry which supports collaborative use of idle equipment (Govindan *et al.*, 2020). Conversely, Li *et al.* (2019) observed the SE practices in the CI and recognised machinery and equipment-sharing to enhance resource utilisation. Further, a temporary access-based household laundry facility was examined by Wasserbaur *et al.* (2020) to reduce raw material manufacturing to produce new products while supporting the reduction of GHGs.

2.2.7 Data and information. Data and information have become an increasingly valuable resource in the modern digital world. In the SE, these assets can be shared and monetised in various ways. Plewnia (2019) analysed sharing real-time data on energy generation through ElectriCChain platform. Accordingly, energy-related advanced forecasting and information databases were identified as data and information-related sharing activities. Moreover, Jiang and Lian (2020) also observed data and information-sharing models in shared factory concepts.

2.2.8 Energy. Energy-sharing models can be recognised as an emerging sharing practice. Hu *et al.* (2021a, 2021b) highlighted the practice of sharing underused private charging facilities with individuals via mobile platforms. In the energy sector, platforms such as Beegy, Piclo and Buzz provide various sharing services, namely, energy trading and sharing, photovoltanic battery, virtual power plants (VPP) and electric vehicle charging points-sharing (Plewnia, 2019).

2.2.9 Wi-Fi. Wi-Fi sharing refers to the practice of individuals sharing their internet Wi-Fi facilities with others while optimising existing resources and enhancing internet accessibility. Shirado *et al.* (2019) investigated the sharing of household Wi-Fi, node computing and internet capacities with neighbours. Wi-Fi-sharing facilitates higher internet accessibility and reduces the additional service distribution cost for multiple users.

2.2.10 Goods. In the context of SE, "goods" are physical assets that can be shared, rented or exchanged with others rather than owned outright. Goods in the SE encompass a wide range of items, from books to toys to household appliances. Nastase *et al.* (2021) studied EverToys, a toy-sharing business and elaborated on sharing toys, books and games under goods-sharing practices. Parents can share or exchange these items on this platform rather than owning them outright. In general, children prefer to switch their toys from time to time. Therefore, these concepts of sharing goods are applicable in the toy industry, which caters to the temporary needs of individuals.

Accordingly, this literature review provides an overview of the SE concept and then explores the shareable resources across various industries and sectors. The literature review identified various resources that are being shared and categorised them into ten primary shareable resource categories, such as human resources, robots, space/storage, mobility/logistics, financial capital, equipment/tools/material/machines/devices, data and information, energy, Wi-Fi and goods. Even though these studies examined various SE applications, the majority of SE research focuses on the accommodation and transportation sectors. Other than that, manufacturing, health care, professional services, food and beverage, energy and utilities, logistics and real estate were recognised as other key SE industries and sectors. Notably, the current literature review revealed a paucity of SE research in the context of construction. This indicates a significant disparity in research: while SE practices are extensively studied in other industries, the CI context remains under-researched. Further, available limited SE studies in the construction context have not explored the potential shareable resources yet. Hence, this literature

review highlights the need for more empirical studies to investigate the application of the SE concept in the construction context, while exploring potential shareable resources.

Supplementary_material presents a detailed breakdown of identified shareable resources across diverse industries, as discussed in the literature section. This supplementary information provides an overview of current research related to shareable resources, relevant digital platforms/SE businesses, the industry/sector in which the shareable resource is currently being used and the relevant study data collection and analysis methods.

3. Methodology

This section presents the research philosophy, research approach, data collection and data analysis.

3.1 Research philosophy and approach

Research philosophy refers to a system or nature of the researcher's views and assumptions to conduct the research, including formulation of the research problem, choice of research strategy, data collection and analysis (Žukauskas *et al.*, 2018). A total of four main types of research philosophy can be identified, namely, positivist research philosophy, interpretivist research philosophy, pragmatist research philosophy and realistic research philosophy. Accordingly, this study leans more towards an interpretivist philosophical stance, considering the subjective nature of the study and qualitative methodological flexibility in data gathering (Ngoma, 2019).

The methodological architecture of research encompasses both research design and research approach, which are mutually intertwined aspects. As per Creswell and Creswell (2018), three research approaches can be recognised, namely, qualitative, quantitative and mixed methods. This study was conducted in a qualitative research approach. The qualitative research approach is subjective in nature and often based on innumerable data that are present in the form of opinions, words, sentences, pictures, etc. The qualitative approach focuses on generating theories or developing new knowledge (Saunders *et al.*, 2009), especially for emerging research topics which need an in-depth investigation.

3.2 Research design

The research design refers to the overall plan, strategy and structure of the study while providing information on how data are collected, analysed and interpreted (Kerlinger, 1986). The SE concept in the CI is an emerging research area, and its applicability has not yet been investigated in depth (Rathnayake *et al.*, 2024a, 2024b). Given the nascent nature of this topic, qualitative research design is the most appropriate method to explore the potential shareable resources in the CI. Figure 1 depicts the research process used in this paper. Stage 1 (literature review) has been discussed in the previous section. Stage 2 (qualitative Web-analysis) and Stage 3 (expert interviews) are discussed below.

3.2.1 Data collection and analysis. Recognising the lack of empirical research on potential shareable resources in the CI, this research adopted a three-fold approach incorporating a literature review, qualitative website analysis and expert interviews. As suggested by Yin (2009), this three-fold approach facilitated the development of a converging line of inquiry. The research's initial inquiry was oriented towards exploring shareable resources across diverse industries and sectors. Therefore, a comprehensive literature review was conducted to better understand the extensive spectrum of shareable resources used across various industries. These findings were a foundation for the subsequent data collection stages, which focused on exploring SE practices in the CI.

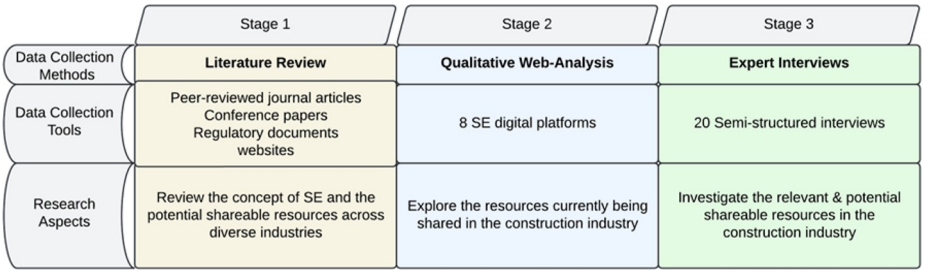

Figure 1. Stages of data collection
Source: Authors' own work

3.2.1.1 Qualitative website analysis. Secondary data from websites have become a vital tool for data collection in research since the widespread adoption of the commercial internet and the World Wide Web in the early 1980s and 1990s (Herring, 2010). Further, website data provide actual and current content related to a product or service; therefore, this digital data facilitates the knowledge and understanding of complex social, technical and economic contexts (Tassi *et al.*, 2018). Moreover, analysing website information as a social research approach is considered an empirical data gathering. The data acquisition through digital platforms is relatively easy and yields worthwhile findings even from small data sets (Martek Marres and Weltevrede, 2013).

Accordingly, qualitative website analysis has been used in many industries and sectors to fulfil their research objectives. For instance, Tassi *et al.* (2018) used website data to investigate service design practices while proposing a service design framework using both qualitative and quantitative website data. Vandelanotte *et al.* (2014) examined social media websites to examine the behavioural changes in physical activity interventions. Further, organisational response strategies were evaluated using website analysis by Mont *et al.* (2021), and Peddie *et al.* (2015) conducted a qualitative website analysis to review health and safety-related information in hospital settings. Due to the inevitable involvement of digital platforms in SE practices, many researchers have adopted qualitative Web analysis techniques to collect data related to SE studies. For instance, Mont *et al.* (2021) used a combination of literature review and qualitative Web analysis techniques to collect data from 30 mobility, space and goods-sharing platforms. Xu *et al.* (2021) collected data from Airbnb: the world's largest accommodation-sharing platform, to evaluate consumer purchase behaviour on SE platforms. Therefore, the qualitative website analysis was conducted as the next step in the data collection process to explore resources currently being shared in the CI. As outlined by Herring (2010) the research first formulated a research objective/a guiding question to conduct the qualitative Web analysis – to understand what resources are currently being shared in the CI. As the second step, construction-related SE digital platforms were selected as the sample.

Accordingly, eight construction-related SE digital platforms were selected based on the purposive sampling technique. Two methods were used to identify the relevant digital platforms, namely, by reviewing existing research and conducting a Google search. The existing research publications related to the research topic were examined and meticulously identified, and relevant platforms that are cited within these publications were listed. Websites cited in previous research have already undergone a rigorous examination and are deemed relevant by expert researchers in the field. Hence, this study built upon the existing

body of knowledge by using digital platforms that were already cited. This method helped identify key websites while ensuring the foundational relevance and academic rigor. Considering the SE concept in the construction context as a novel phenomenon and the limited scholarly studies, the candidate is required to conduct a Google search using a purposive sample technique to expand the scope and capture more relevant and emerging digital platforms. Piasecki *et al.* (2018) recognised Google search as an additional source of data collection. Further, previous studies such as Baker and Fradkin's (2017) research on the impact of unemployment insurance on jobs and Pelters' (2021) study on the interrelation of health and well-being concept used Google search as a data collection source for their studies. Accordingly, this study also used Google search as an additional data collection source to support the identification of relevant and emerging digital platforms. Relevant keywords and search terms related to the research topics were used, and from the search results, the study used purposive sampling to select digital platforms that are deemed most suitable for the study. Accordingly, these eight digital platforms were selected based on purposive sampling, while adhering to the specific selection criteria, such as digital platforms that are relevant to the research topic, digital platforms that facilitate the construction-related resources sharing and digital platforms that are accessible and contain quality and reliable information. According to Peddie *et al.* (2015), thematic analysis was suitable to analyse information on websites. Hence, construction-related SE digital platform data were qualitatively analysed using thematic analysis techniques with the help of MS Excel. Figure 2 presents the construction-related SE digital platforms.

3.2.1.2 Expert interviews. The expert interviews are widely used for exploratory research to understand the opinions and perspectives of individuals with expertise in a particular field. Moreover, expert interviews can be utilised to validate literature findings (Salim *et al.*, 2019). Therefore, to investigate the applicability of identified resources to the CI, validate the literature findings and understand the full potential of the construction-related shareable resources, expert interviews were conducted as the third stage of the research. These expert interviews were held with experts in SE and/or the CI in Australia through face-to-face or online modes. Expert interviews were conducted by following the three steps (identification of experts, interview process and analysis of interview data) outlined by Salim *et al.* (2019).

As the first step, participants for expert interviews were selected based on a combination of purposive and snowball sampling techniques. Since the experts who have an understanding of both SE and construction applications were limited and not easily accessible and responsive, few participants were initially selected from each category using purposive sampling to initiate the chain referral process in the snowball sampling. The research intention was to collect data from experts with more than five years of experience in the CE, SE or CI from geographical locations in Australia and different types of organisational backgrounds. All the interviewees showed their willingness and interest in the research and gave permission to audio-record the interviews. As per Lin *et al.* (2019), the quality of data in qualitative research could be enhanced by involving well-experienced and knowledgeable experts who are willing to participate in the research. Moreover, the authors elaborated that theoretical saturation is the basic criterion for the decision of sample size in a qualitative study. Accordingly, data collection was concluded at theoretical saturation. This decision was based on the observation of diminishing returns of new information. As per Guest *et al.* (2020), theoretical saturation is achieved when the researcher no longer receives new insights, themes or new knowledge from additional interviews. Further, Webster (2025) mentioned that theoretical saturation is reached when enough evidence has been obtained to support each research aspect with multiple examples. According to Nelson (2017), a study

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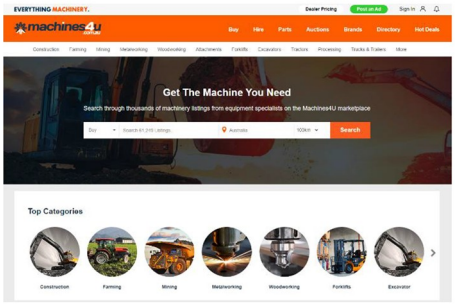

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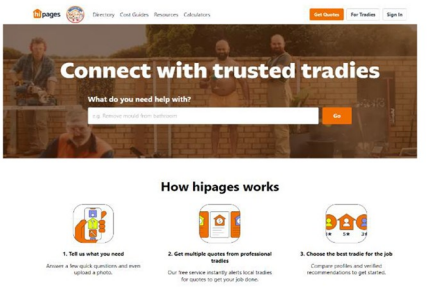

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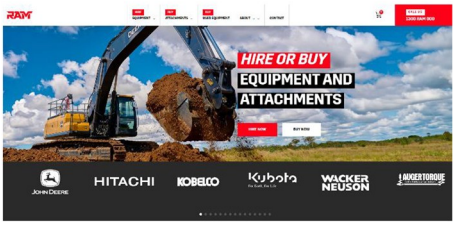

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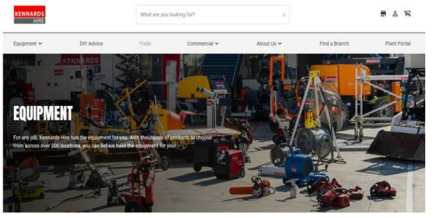

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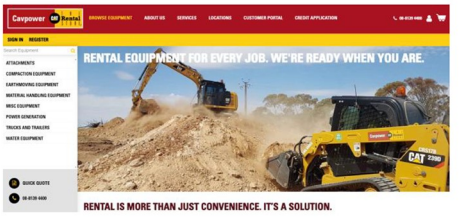

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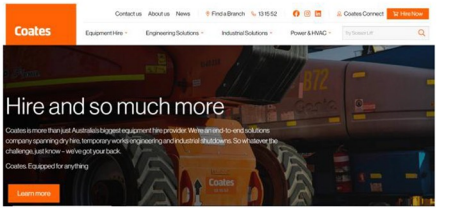

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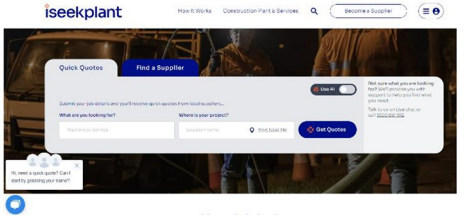

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Figure 2. Construction-related SE digital platforms
Source: Authors' own work

should fulfil four conceptual depths (range, complexity, subtlety and resonance) to reach the theoretical saturation. Accordingly, this study presented conceptual depth aspects such as range (multiple quotes or examples to support each shareable resource), complexity (providing research aspects related to shareable resources that are related and interconnected), subtlety (demonstrating how shareable resources varies across different contexts), resonance (research aspects or in here shareable resources are compatible with past literature) to reflect the data saturation. Therefore, the theoretical saturation of this research was achieved after conducting 20 expert interviews. Table 1 outlines the profile of expert interview participants.

The interview process consisted of face-to-face and online interviews with experts, which usually lasted around 45 min, and in some cases, this varied based on response time. Face-to-face interviews were conducted with experts mainly based in South Australia (SA), and online interviews were facilitated to contact experts who were geographically dispersed throughout different Australian states. In this research, the semi-structured interview guideline consisted of open-ended questions, where the interviewees were able to provide their own perspectives, opinions and experiences on potential shareable resources related to SE practices in the CI in Australia. Expert interview guidelines consisted of three main sections: demographical and background information, SE concept and potential shareable resources related to SE practices in the CI. Interview guideline with the identified shareable resources across diverse industries through literature review was emailed to the experts prior to the interview, allowing them to brainstorm and prepare for the questions. These expert interviews were recorded with the permission of the experts and then transcribed to facilitate the data analysis.

The collected data were analysed using thematic analysis, which is widely used to analyse interview findings related to SE studies (Atsız and Cifci, 2022). Thematic analysis facilitates the researcher's identification and interpretation of recurring patterns, concepts and themes within the information to develop a solid understanding of the research topic. In this research, qualitative analysis software called NVivo 14 was used to identify and analyse the themes of qualitative data. As per Chakravorty *et al.* (2020), thematic analysis can be conducted in three stages, namely, (1) coding of text, (2) developing descriptive themes and (3) generating analytical themes. Prior to the coding, an iterative review of all transcripts was done by reading and re-reading all transcripts to get a broader understanding of the interviewees' opinions. This method, as advocated by Hammersley and Atkinson (2002), underscores the importance of researchers immersing themselves in the data before the coding, and serves as an invaluable aid for eventual coding and presentation of findings.

4. Findings and discussion

The following sections present the research findings and discussion.

4.1 Shareable resources related to sharing economy practices

To identify the potential shareable resources related to SE practices in the CI, the research first explored the shareable resources across diverse industries through the literature review to establish a foundational understanding. Subsequently, an examination of CI-related SE digital platforms was conducted to recognise the currently practised shareable resources specific to the CI. Finally, expert interviews were conducted to further understand the currently available resources and other potential shareable resources in the CI. All identified shareable resources are presented in Figure 3.

4.1.1 Potential shareable resources in the construction industry. The existence of underused resources can be seen as a common situation in the CI, and on average,

Table 1. Profile of the expert interviewees

No	Interviewee code	Expertise area	Designation	Work sector	Work experience (years)
1	CP1	Construction management	Procurement specialist	Non-government	10
2	CP2		Director	Non-government	38
3	CP3		Managing director	Non-government	37
4	CP4		Contracts, commercial specialist and senior quantity surveyor	State/local government	18
5	CP5		Senior quantity surveyor	Non-government	23
6	CP6		Contracts manager	Non-government	7
7	CP7		Project manager	State/local government	25
8	CP8		Sustainability director	Non-government	20
9	CP9		Construction estimator	Non-government	7
10	CP10		Sustainability advisor	Non-government	9
11	SP1	Sharing economy and/or circular economy	Regional health, safety and environment advisor	State/local government	15
12	SP2		Advisory committee member and circular economy coordinator	State/local government	10
13	SP3		Sustainability manager	Non-government	10
14	SP4		Research director	State/local government	15
15	SP5		Senior sustainability consultant	State/local government	10
16	SP6		Senior consultant – circular economy	Non-government	7
17	SP7		Deputy director and senior lecturer	State/local government	30
18	SP8		Principal partner	Non-government	20
19	SP9		Project officer – circular built environment	State/local government	14
20	SP10		Facilities manager	Non-government	10

Source(s): Authors' own work

No.	Type of shareable resource	Resources currently being shared across diverse industries	Resources currently being shared in the CI									Potential shareable resources in the CI	
					Construction-related SE digital platforms								
		Literature review	Qualitative web analysis	Total no. of 'hits' for each resource	Machines4U	RAMEquipment	The Cat Rental - Cavpower	iseekplant	hipages	Kennards Hire	Coates	Meh Plant and Equipment Hire	Expert interviews	Total no. of interviewee 'hits' for each resource
1	Human Resource			5/8			✓	✓	✓		✓	✓		20/20
2	Robots		N/A											13/20
3	Space/ Storage			4/8				✓		✓	✓	✓		16/20
4	Mobility/ Logistics			7/8	✓	✓	✓	✓		✓	✓	✓		8/20
5	Financial Capital		N/A											8/20
6	Tools/ Machines/ Materials/ Devices			7/8	✓	✓	✓	✓		✓	✓	✓		17/20
7	Data and Information			6/8	✓	✓		✓	✓	✓	✓			15/20
8	Energy			6/8	✓		✓	✓		✓	✓	✓		11/20
9	Wi-fi		N/A											2/20
10	Goods			1/8						✓				4/20

Figure 3. Step-by-step identification of potential shareable resources
Source: Authors' own work

construction equipment remains idle 70% of the time (Robins, 2021). However, these underused resources can be integrated into the SE practices and shared among others to maximise the resource utilisation (Lai and Ho, 2020). On the one hand, individuals and companies prefer to fulfil their resource requirements at a lower price compared to the cost of ownership. On the other hand, resource owners with excess or idle resources are willing to offer these resources to others at a lower price (Cheng *et al.*, 2021). Accordingly, SE practices facilitate the needs of these parties while providing a mechanism to share resources through digital platforms (Garud *et al.*, 2022). To identify potential shareable resources in the CI, this study first explored the diverse shareable resources applied in other sectors. Despite the ten types of shareable resources currently being shared across diverse industries, only seven were identified as relevant to the CI through the qualitative Web analysis. However, expert interviews facilitated the exploration of three other potential shareable resources in the CI.

4.1.1.1 Equipment/tools/plant/material and machinery. Equipment/tools/plant/material and machinery sharing is currently listed on seven SE websites, namely, machines4U, RAM Equipment, The Cat Rental – Cavpower, iseekplant, Kennards, Coates and Meh Plant and Equipment. In line with this, 17 construction-related experts in the interviews identified "equipment/tools/plant and machinery" as a potential shareable resource in SE practices in the CI. Even though Robins (2021) highlighted that construction equipment sits idle on average 70% of the time, interviewee SP1 mentioned that some of their equipment and tools reach a 90%–95% utilisation rate. Therefore, it is important to identify idle or underused resources and their utilisation rate to achieve the true benefit of SE.

The qualitative Web analysis recognised that sharing equipment/tools/plant and machinery is listed under the hire/rent equipment category on most websites. The website lists equipment under different categories and filters to facilitate searching for equipment category, quantity, brand, branch, duration, etc. The machine4u, Meh Plant and Equipment and iseekplant list their equipment with actual images and videos to improve user experience and enhance trust and credibility. Supporting information such as detailed specifications, other descriptions such as wet/dry hire conditions and price per hour/day is provided with each listed equipment. After selecting the required equipment, the user can make a hire booking or submit a hire quote. Moreover, an advertisement can be posted if the user wants to list equipment to share on these platforms while earning an extra income. For example, there are four listing options on the machines4u website (standard listing, featured listing, spotlight listing and hot deals). Therefore, this consumer-to-consumer business model can only be seen on machines4u and iseekplant websites, where users can share their resources and rent equipment in need. On iseekplant, the user first needs to select the "seeker/supplier" option, and in the seeker option, the user can search the given directory to find a suitable match and compare suppliers while connecting with them via phone, email or SMS. Then, iseekplant supports the seekers to find the best match when they are in a hurry through their "quick form" option. Moreover, an online chat option is provided to speak with a real Australian user support agent to discuss more information. A previous study indicated that LiveChat function acts as a frontline service technology infusion to support resource sharing (Garrett *et al.*, 2017). On the other hand, if the user wants to become a shareable resource provider, "supplier" option can be selected. Firstly, users must create and fill out the business profile by adding user details, equipment and services that are intended to be provided and other details such as operating areas and rates. Next, a customer service representative from iseekplant contacts the user to verify the profile and to profile necessary details and training. Interviewee SP1 clarified that liabilities and indemnity procedures should be communicated to both parties before being involved in sharing practices. Marzen *et al.* (2016) amplified this by presenting Airbnb's Host Guarantee programme, which provides protection against or compensation for, a loss or liability.

The interviewee CP2 highlighted that construction projects are typically managed by the principal contractors and sub-contractors who oversee all the parts and equipment on the site. Importantly, they are often reluctant to list these equipment or machines online or seek rentals from external sources such as SE digital platforms. However, interviewee CP6 mentioned that the availability of these digital platforms for sharing construction-related equipment is important for some occasions, such as finding specialised equipment and plants. For example, the interviewee described tunnel boring machines, which are hard to find most of the time through a regular network of contacts, can be found if there are active SE platforms. This finding aligns with Ducker Carlisle (2025), who highlighted that construction firms are now widely open to connect digitally with their suppliers; therefore, SE practices offer a unique opportunity to share underused resources in the industry. The author further mentioned that the global successful marketplaces, such as Getable, Kwipped, BigRentz and Klickrent provide sharing facilities to customers to increase the profitability by reducing the idle fleet.

Interviewee CP1 pointed out that scaffolding is a practical example of potential shareable equipment in the CI. Additionally, interviewee CP5 described:

> In the construction, it's useless to buy materials for temporary structures. Therefore, we rent it from a supplier who rents. Ex: scaffolding is refabricated and used accordingly for different structures in different projects.

Interviewee CP1 mentioned that while the scaffolding sharing persists, the emergence of SE practices through digital platforms presents an opportunity for a more efficient method to access and share underused or vacant equipment in the industries. Interviewee CP3 detailed that SE is a possible solution to expensive construction-related equipment. Instead of individual ownership, the CI can integrate the concept of sharing ownership to practice the sharing or renting of equipment. Moreover, the interviewee elaborated that almost all construction-related equipment and machines are expensive; therefore, sharing helps to access equipment at a lower price, specifically related to reduced upfront cost, spreading ownership costs and other storage costs. An important consideration on storage cost of equipment was given by Interviewee CP5, stating:

> Regarding storage and cost related to it, some companies tend to purchase necessary machines and equipment in advance and store them in a facility beforehand. This happens when there are predictions that equipment prices for renting and purchasing will increase in the future. So, they bear the storage cost and keep the equipment with them. On the other hand, if there's no risk related to inflation or price increment, they invest time in procurements and identify dates when each equipment/machinery/tool should be rented in order to eliminate the storage cost.

As per interviewee CP4, the CI is evolving with new technologies to remain competitive in the market therefore, construction projects try to adopt technologically upgraded equipment and machines. Hence the usefulness of sharing platforms to rent these kinds of high-tech and latest machines and equipment without buying is an added advantage to construction projects. Interviewee CP4 further described:

> Sharing practices are helpful in such cases since we can rent or hire the latest technology for our project. If we had purchased equipment for ourselves, it could have become outdated with time, creating the need to buy a new one or hire one while creating the need for additional costs.

However, interviewees CP5 and CP9 indicated that when it comes to tools, many trade workers prefer to own tools that are low in capital expenditure by considering the frequency usage rate and long-term benefits. Otherwise, they prefer to rent in most cases due to the cost of maintenance. Additionally, the requirements for high-risk work licences should be checked when listing high-risk equipment on SE digital platforms. As per SafeWork SA, people who wish to operate high-risk equipment should undertake appropriate training to obtain a licence, especially for forklift operation, scaffolding work, crane and hoist operation, etc (SafeWork SA, 2024). On the other hand, the potential to share materials was highlighted by interviewee CP5, stating that there is a Facebook group where excavators announce that they will excavate this amount of soil at this place and any person who is willing to get those excavated materials can contact and exchange soil sometime even free of charge. Supporting this, interviewee CP10 pointed out the "skip the bin" initiative, which facilitates material-based sharing in the CI. This initiative tries to identify throwaway or leftover materials in sites and make them available to people by enhancing resource utilisation.

Interviewee SP2 described a few hidden reasons that may lead some professionals to hesitate when adopting sharing practices in the industry. The interviewee explained that construction companies tend to dispose of materials and equipment at the end of a project even if the resources could be used or shared in future. People might think the resources bought for a specific project cannot be used again elsewhere, and they also hesitate to use pre-used resources on a new project due to risk aversion nature and unnecessary concerns about compatibility. Supporting this, Chuah *et al.* (2021) recognised perceived risk as one of the barriers to adopting SE practices in B2B firms. However, interviewee SP5 considered the SE practices a great opportunity for the CI to maximise resource utilisation and gain other

benefits. The interviewee elucidated that new business approaches focus on decarbonisation trends, which support eliminating businesses' material and energy intensity. New Zealand, as a similar region to Australia, is now experiencing market transformation due to SE practices (Rahimi *et al.*, 2022). Renting or sharing items such as tools and equipment was highlighted as a noticeable shift in consumer preference in New Zealand (Sharehub, 2025).

Hence, the SE will be a new approach to achieving decarbonisation targets by extending the lifespan of resources and reducing the need to manufacture new equipment, which can solve energy-intensive and pollution-causing business activities.

4.1.1.2 Robots. Even though robot sharing has been identified as a novel industrial innovation in the SE practices across other industries (Melander and Arvidsson, 2021), the qualitative Web analysis revealed that none of the construction-related SE platforms are currently sharing robots or robot technology as a shareable resource. Previous studies have explained possible reasons for this. As Goel and Gupta (2020) explained, industrial robots or robot technology are expensive and not practical for many companies to afford. Furthermore, Ahmed *et al.* (2024) emphasised that robots are frequently designed to customise for specific tasks or jobs, limiting broad adoption. The guidelines developed by New South Wales (NSW) for safe collaborative robot design and implementation showed that skilled operators, ongoing training and education are essential requirements in the lifecycle phases of a collaborative robot (cobot) (NSW Government, 2022). Accordingly, the robot resource type was notably absent from current construction-related SE digital platforms due to its high capital investment, customisation nature and expertise and training requirements.

Surprisingly, 13 interviewees expressed the possibility of considering robots as potential shareable resources in the CI. Interviewee CP1 mentioned that there is great potential to involve robots as a shareable resource in the CI, particularly for welding, bricklaying and material handling to save time, increase efficiency and reduce disputes. This robot-sharing is common in most industries, including manufacturing (Lee *et al.*, 2024) and hospitality industries (Lu *et al.*, 2019). Lee *et al.* (2024) identified the practices such as AI-robot-driven production lines and nighttime assembly in the manufacturing industry, and service robots-based delivery room services identified by Lu *et al.* (2019). Interviewee CP3 explained that the exorbitant capital investment and other expenses of robots create a barrier for a wider audience. Therefore, the adoption of robots or robotic technology through sharing practices offers an economically viable approach compared to individual ownership. Interviewee CP4 mentioned that robots could be used to replace the majority of human tasks while having multi-tasking capabilities. Moreover, having robots as a shareable resource will support small-scale companies that may find this cost prohibitive.

Interviewee CP5 detailed that driverless robotic vehicles have been used and shared in mining projects with extended operational hours beyond traditional work hours, as robots can maintain productivity without fatigue. Importantly, interviewee CP6 highlighted that automating hazardous work tasks with robots can reduce accidents and injuries and facilitate a safer working environment for human workers in the industry. Both, interviewees CP5 and CP6 further mentioned that robots- sharing will be useful in repetitive or high-risk tasks in the industry such as welding, bricklaying, material handling, remote-controlled demolition tasks and asbestos removals. Moreover, interviewee CP1 stated that robot-sharing can be involved in repetitive cycling activities to increase productivity while managing waste precisely in the sites. Kalsaas (2010) studied work-time waste in construction, and the author identified that a considerable amount of time is wasted due to administration and meetings. Accordingly, interviewee CP5 proposed that artificial intellegence (AI) robots can be programmed and integrated into delivering interviews and meetings. The potential use of robotic technology for trench compaction was highlighted by interviewee CP7. Robotic

trench compactor can be recognised as an innovative tool in the CI, which reduces the risk of cave-ins, exhaust fumes and ensures high-quality work. In line with this, Modbotics have revolutionised the CI with its first robots and robotic technology for modular construction in Australia (Built Offsite, 2022). Interviewees SP4 and SP7 described the increasing adoption of intelligent machines within the CI and suggested the future involvement of robots in the industry. Therefore, sharing practices for such resources could be a valuable business approach, allowing for wider accessibility, affordability and productivity in the CI. Expanding on the interviewees' opinions, several experts concurred on the importance of considering robots as shareable resources in the CI. However, interviewees emphasised that robots can be more productive when used synergistically with human expertise.

4.1.1.3 Financial capital. A total of 8 out of the 20 interviewees stated that financial capital can be considered as a potential shareable resource related to SE practices in the CI. Even though the SE trends in intangible assets largely focus on financial capital-sharing (Garrett *et al.*, 2017), none of the construction-related SE digital platforms facilitated the financial capital-sharing practices. The sharing of financial capital was recognised in other industries, yet it remains unrepresented on construction-related SE platforms. Possible reasons for these concerns are the legal framework, risks, trust, insurance policy and governance (Huang, 2018; Lenz, 2016; Sulastri and Janssen, 2023; Uyen and Ha, 2017). Huang (2018) mentioned that SE practices face legal and regulatory risks due to the unavailability of an SE-specific legal framework and sharing platforms dealing with financial capital or P2P lending are severely affected. The barriers were further explained by Uyen and Ha (2017) related to finance in the SE in the Vietnamese context. According to the author, a lack of proper insurance against the lender, awareness of the related law and legal support were highlighted as key barriers to sharing finance resources in Vietnam.

However, Interviewee CP3 described that compared to the traditional economy, one of the most important shareable resources the SE facilitates is financial capital that supports access to resources even with limited funds and risk distribution. Interviewee SP6 pointed out crowdfunding, peer-to-peer lending and microfinance platforms as financial capital-sharing platforms related to SE practices. In the traditional economy, access to capital is often managed by intermediaries, banks and other financial institutions, who connect and manage money lenders and borrowers (Miglietta and Parisi, 2016). Banks charge a fee for their services while evaluating risks and managing other transactions. Therefore, access to capital can be challenging based on credit scores and financial history. However, interviewee CP8 stated that the capital-sharing platforms in SE connect lenders directly with borrowers, offering lower fees and interest rates, bypassing the requirements for banks and other financial institutions. The interviewee further mentioned that capital-sharing enables peer-to-peer finance and democratising access to capital. These capital-sharing practices support borrowers in accessing capital at more competitive rates, even with imperfect credit histories. And also, lenders can earn higher returns through these capital-sharing practices. The interviewee SP6 pointed out capital sharing methods in SE:

> We can access or share these financial resources through digital platforms. There are few forms of capital sharing happening in practice. One is debt capital; in here, digital platforms connect lenders and borrowers who require financial resources. For example, peer-to-peer lending platforms provide services to individuals who need loans from other people. This peer-to-peer lending platform may give potentially lower interest rates than traditional banks for loans.

Moreover, interviewee SP6 indicated that equity capital supports crowdfunding or peer-to-peer investment through SE platforms. This crowdfunding approach empowers individuals to turn to the crowd, raising capital to invest in startups through many small contributions.

Interviewee SP3 highlighted the unique roles that can play as a backer in these crowdfunded projects. A backer is a person who contributes money to the project. Some backers act as financial contributors whose primary role is to provide financial support to the project. Some backers who have higher pledge levels may have potential product testers or early adopters' privileges who can test or use the product before it is publicly available. Backers who have wide fan bases sometimes act as brand advocates to support and promote the project through social media. Madrazo-Lemarroy *et al.* (2019) pointed out how social networks use to achieve funding goals in Fondeadora.mx, one of the largest crowdfunding platforms in Mexico. Further, as pointed out by interviewee SP6, the benefits of capital sharing are its potential to increase access to capital, lower interest rates and support financial inclusion. On the other hand, both interviewee CP8 and SP1 highlighted the challenges of capital sharing, namely, the risk of traditional lenders, lack of regulations and information asymmetry between parties on some platforms. Felländer *et al.* (2015) also highlighted incompatible regulations related to these capital-sharing practices. Additionally, interviewee SP1 stated that capital sharing in the CI can be a double-edged sword. Even though capital sharing offers benefits, some well-established construction parties may have a natural hesitation to be involved in such arrangements because sharing capital with others could foster rival growth and potentially erode their own market share. Moreover, interviewee CP9 clarified that these crowdfunded or capital-shared projects can be risky and not guaranteed a return on investment. The interviewee further mentioned that backers can get refunds before the campaign ends or after the campaign ends. Before the campaign means, in many projects, backers have the flexibility to withdraw their pledges anytime until the campaign successfully reached its funding goal. Another way of refunds happening is some crowdfunding platforms offer full or partial refunds if the project fails to reach its funding goal. However, the common practice of these crowdfunding projects is the creators clearly define their refund policy to help backers understand the risk involved before joining in. The current study's findings corroborate previous research that stressed financial capital sharing as a shareable resource (Miglietta and Parisi, 2016). Therefore, financial capital can be recognised as a potential shareable resource related to SE practices in the CI.

4.1.1.4 Space/storage. The Web-analysis explored four construction-related SE digital platforms offering resources related to space/storage, namely, iseekplant, Kennardshire, Coates, and Meh Plant and Equipment Hire. Mainly, containers in different models were available on the iseekplant platform and information such as model, available quantity, manufactured year, dimensions and images were available. In addition to that, the iseekplant connects different suppliers, for example, Black Diamond Modular Buildings, which provides other space rental resources. Space or storage-related resources available under these external parties of iseekplant were portable buildings, office complexes, site offices, lunchrooms, toilets, self-contained work caravan, shower blocks, waste tanks, dongas, kitchens, gyms, site accommodations, etc. Moreover, KennardsHire offers containers, mobile crib rooms, portable buildings, security storage boxes, site accommodation and toilet blocks. Similar to Kennards, Coates platform also provides mobile crib wagons, amenities toilets, portable accommodation, site storage containers and double stackable buildings related to space/storage-sharing. Additionally, the Meh Plant and Equipment Hire offers four types of facilities related to space/storage-sharing, namely, shipping containers, site huts, portable toilets and bunded fuel storage. Compared to other platforms, the Meh Hire platform tends to offer limited information on resources; however, the option to submit an enquiry allows users to obtain more specific information.

In agreement with 16 interviewees, space or storage can be identified as a highly potential shareable resource in the CI. Interviewee CP1 highlighted the possibility of sharing warehouses in the industry mentioning:

> The proliferation of construction projects in Adelaide has intensified spatial limitations within the city. Despite limited space availability, many project teams tend to deploy dedicated warehouses for their specific uses independently.

The interviewee suggested that shared warehousing facilities, well-planned with site locations and storage requirements, could be a great solution to optimise space utilisation and reduce operational costs. Interviewee CP2 stated that warehousing for storage is one of the biggest issues in construction, consuming a lot of costs and presenting other constraints. The interviewee discussed that warehousing is challenging, particularly for small builders in the industry. In general, builders with multiple projects often need space to store their materials and equipment as well as for space for offices and other related services. Moreover, warehousing might be essential if a builder outsources materials from abroad. Concerns associated with warehousing are costs for building a warehouse or rate for storage space, and transportation costs related to getting materials to and from the warehouse. Therefore, a shared warehousing facility would be an essential solution to the industry, helping to distribute the cost burden among multiple builders and making it affordable for small builders as well. A previous study confirmed this shared warehouse concept related to different business natures (Wang *et al.*, 2021).

Strategically selecting and setting up shared warehouses based on location is essential to minimise unnecessary transportation costs, and delivery service can also be offered from the warehouse to construction sites. Interviewee CP3 expressed that there is a shortage of warehouses in Australia, and this scarcity is further exacerbated by the underutilisation of existing warehouses. This underutilisation is mainly due to a lack of awareness of the sharing concept and its potential benefits, as well as a low level of receptivity of major players towards sharing. However, the interviewee offered a positive outlook, mentioning that other than a few, most construction professionals are willing to use shared warehouse facilities.

Interviewee CP4 mentioned that space is the resource that has been shared least in the CI. The interviewee described how not only construction sites but also office environments could be involved in this space-sharing concept. The interviewee proposed that during office hours, the space can be used for core office activities for their own operations and in off-peak hours, such as evenings, weekends or public holidays, this space can be rented out to others through a platform while optimising the space utilisation and generating an extra income to the company. Similar to this idea, shared spaces such as coworking spaces at WeWork platform (Lho *et al.*, 2022), parking spaces at Parkova (Konecka-Szydlowska and Czupich, 2022), accommodations at Airbnb (Lho *et al.*, 2022) can be considered as ways to optimised spaces when they are not in general use. Also, many companies have their own meeting rooms or conference rooms for their own; however, these places are underused the majority of the time. As a solution for this, interviewee CP4 recommended considering these places as shareable resources. Moreover, the interviewee stated that:

> It would have been nice if, with the new technological advancements, builders could create a space that includes automated partitions which can be placed and removed automatically through technology. Then, different people can arrange their workstations to their preference, which may enhance the sharing practices.

Furthermore, interviewee CP7 presented that the vacant lands in regional construction areas can be considered for sharing. The development of construction projects in regional areas often faces challenges due to limited resource availability. Also, these regional areas possess

a significant advantage: an abundance of vacant lands, which can be a solution for this. By establishing good SE practices and introducing SE digital platforms, landowners could rent these places to construction companies, allowing them to have temporary access to these lands and set up required warehouse facilities.

Both interviewees CP9 and SP1 emphasised that robust security measures are essential for these shared spaces, to mitigate concerns about theft or damage to stored resources. In line with this, Perkumienė *et al.* (2021) highlighted safety and security as one of the key factors of sharing practices. While interviewee SP1 prefers the shared warehouse concept, the interviewee believes that companies should have their own warehouses at sites, especially for frequently used tools and supplies. In line with interviewees CP7 and SP2 also discussed the potential for using underused government lands for storage facilities, with both local and state governments' collaborations. The interviewee further mentioned that lands not currently being used for their intended purposes, temporary grasslands and brownfields could be valuable resources for developing shared storage facilities in Australia. Interviewee SP5 suggested introducing an app similar to Uber but for space or storage-sharing. The interviewee detailed that construction activities always need temporary storage places for short periods, ranging from a few days to months. Traditional storage solutions might not be ideal for short-term needs, and therefore, construction companies face difficulties and delays. Hence, an app can be introduced, or shareable storage or warehouses can be listed on currently available apps to connect people with available spaces. This storage place could be underused basements, garages, parking spaces and warehouses with empty sections, which can easily promote and optimise utilisation using technology and app-based platforms.

4.1.1.5 Wi-Fi. Wi-Fi is a shareable resource type, however, it was not identified on digital platforms. Abdulkader (2023) and McShane *et al.* (2016) emphasised that Wi-Fi sharing is often associated with security risks that could lead to data breaches. The opinions of the interviewees during the expert interviews indicated that a Wi-Fi facility can be considered a potential shareable resource in the CI by considering its current applications. Both interviewees CP1 and CP8 discussed the potential of this resource to be shared, and they mentioned that Wi-Fi is most of the time shared between individuals; however, unused data always remains. A few reasons could be individuals' internet usage habits vary, and internet service providers often provide internet packages with more data than the average user requirement. The interviewee CP8 described public Wi-Fi facilities as shared facilities that provide internet facilities to a number of users without the need for ownership; therefore, a similar practice is currently in place; there is potential to use this shared Wi-Fi concept in a more advanced way to facilitate sharing with more individuals in the CI. Further, major metropolitan cities in Australia, or even any country, always boast extensive internet and mobile facilities. However, connectivity remains a challenge in most of the rural and regional areas. Supporting this argument, Rollinson (2021) mentioned that regional Australia is the economic backbone of the country for example, farms produce around 93% of food requirement, resources related to mining and agriculture are the single-largest source of export revenue and also mining and agriculture sector uses more than 260, 000 and 320,000 people, respectively. However, rural and remote Australian communities have struggled to gain decent mobile and internet facilities for many years.

The interviewee CP8 stated that with governments and municipalities' actions and investments, these key facilities can be made available not only for the general public but also to ensure that construction activities in regional areas do not face additional difficulties. Further to this, the interviewee clarified that shared Wi-Fi facilities would reduce the need for unnecessary extra facilities, provide support to optimise existing infrastructure and provide access to multiple users. Interviewee CP1 claimed that Wi-Fi is a shareable resource related

to SE practices that has great potential but also faces some challenges. Individuals, businesses or companies with unused data capacities could share it with others in exchange for a fee or as a community service through dedicated SE platforms. These SE digital platforms should have the facility to connect Wi-Fi providers and Wi-Fi seekers. Through this, underused office Wi-Fi networks can be optimised and monetised while providing additional income for the company. Construction companies or projects in regional areas can especially share their Wi-Fi with others in the area, which could foster a sense of community and accessibility. However, some existing challenges need to be considered. The interviewee CP1 intensified security concerns, data usage limits, regulations and permission concerns. Sharing internet facilities always raises security concerns, as providers might get unknown users who might connect to unknown networks. Therefore, robust security measures and clear communication on access limitations should be established. Moreover, the interviewee mentioned that construction sites often require internet access for various purposes; therefore, nearby businesses could provide a temporary solution for construction sites, especially in remote locations were setting up a dedicated infrastructure might be expensive. In line with this, Shirado *et al.* (2019) involved this same concept in the telecommunication industry, developing household Wi-Fi sharing services enabling users to share their internet facilities, such as node computing and storage capacities. Further, Lho *et al.* (2022) and Konecka-Szydlowska and Czupich (2022) also studied shared Wi-Fi facilities under different coworking platforms in the real estate industry. The CI is now adopting high-end technologies, such as wearable devices, sensors and trackers, to monitor equipment sharing and provide safe and secure access to operate devices remotely to optimise overall efficiency and evolve as smart construction. Also, if the industry can overcome security concerns, establish clear regulations and foster trust by establishing secure mesh networks and blockchain-based solutions, underused Wi-Fi facilities can be shared related to SE activities in the CI.

4.1.1.6 Human resources. While the importance of "human resource" as a shareable resource is established in other industries (Mitake *et al.*, 2022; Hu *et al.*, 2021a), the qualitative Web analysis revealed that "human resources" was indicated only on five construction-related SE digital platforms, namely, "iseekplant", "hipages", "Meh Plant and Equipment Hire", "Coates" and "The Cat Rental -Cavpower". Human resources as a shareable resource consists of individuals' time, experience, skills, physical, emotional, and intellectual capabilities and human body parts sharing (Rathnayake *et al.*, 2024a). However, sharing time, skills, experiences, physical and intellectual potentials and capabilities can be prominently identified as related to SE practices in the CI. Moreover, all the interview experts highlighted the importance of integrating human resources as a shareable resource in the CI.

The human resource sharing in "iseekplant", can be seen in providing construction-related services such as piling, drilling and blasting and land clearing. In addition to that, some equipment and plants are supplied on a wet-hire basis. Wet hire is renting or sharing equipment or plants with an operator. Therefore, human resource sharing can be recognised in wet hiring as well. Interviewee CP3 mentioned that having the required plant or machinery with an operator under the wet hire is the most beneficial way over dry hire (equipment only) related to complex machinery or tasks requiring specialised knowledge and practice. Despite having a variety of applications of human resources as a shareable resource in other industries, this wet hire approach can be prominently seen in the CI. Moreover, iseekplant indicates an option by allowing the user to become a supplier on their platform. On the other hand, the hipages connect Australian homeowners or businesses with local tradies for various trade jobs. Similar to iseekplant, hipages also provides the opportunity to list a user's

business or individual profile to earn extra income by providing various residential, commercial and construction-related jobs. Meh Plant and Equipment Hire mainly provides well-trained drivers and workers in construction-related operations and plant and equipment handling. Meh Plant and Equipment Hire has implemented a policy to monitor fatigue and fitness for work. Moreover, the digital platform indicates that they conduct random drug and alcohol tests to comply with zero tolerance to drugs and alcohol policy. A number of previous studies highlighted the importance of providing necessary training to the individuals who are registered on their platforms. Glöss *et al.* (2016) highlighted the Uber training programme for their drivers and Farmaki and Kladou (2020) indicated that Airbnb provide training for hosts.

Further, the Coates digital platform offers industrial experts in project management, technical design, installation and monitoring and certification. Similarly, The Cat Rentals – Cavpower offers various services such as field solutions, laboratory services, preventive maintenance, welding and fabrication and operator training. Unlike the iseekplant and hipages, the other three digital platforms do not explicitly provide the option to become a supplier, which indicates these digital platforms operate on a B2C business model. Interviewee CP1 highlighted that if a construction-related SE digital platform allows individuals to register their profile, they can freelance by sharing skills and expertise while offering services with flexible hours and earning extra income. This explanation is common in other industries, for instance, U-nursing and Goldnurse platforms provide opportunity to nurses to take appointments outside the regular 9–5 working hours to earn extra income (Inci *et al.*, 2022). Interviewee CP4 mentioned that the most common practical example of sharing human resources involves consultants who work on several projects within the same period while sharing their intellectual capabilities, time and skills. Interviewee CP1 described how the Australian CI often depends on word-of-mouth suggestions and past experiences when selecting a suitable contractor or service provider. However, these methods can pose limitations in some cases, such as having a limited pool of appropriate service providers or contractors for specialised tasks and finding competent service providers in remote areas. Therefore, interviewee CP1 explained that the availability of construction-related SE digital platforms with the potential to connect with service providers could streamline the selection of relevant service providers. Interviewee CP2 elaborated that human resource sharing is currently being applied in the CI in the form of sub-contracting. CP5 detailed that major contractors apply this practice by sharing their human resources within several projects at the same time in both pre-contract and post-contract stages.

Furthermore, interviewee CP5 stated that:

> I think specialised knowledge and other specialised skills can be shared within the construction industry as well. Such as cutting-edge architectural designs, special project management techniques, and sustainable construction practices.

Accordingly, CP8 explained that human resource sharing involves sub-contractors and consultants, who do not always work for one builder. However, CP9 pointed out that the practice of sharing professional skills and intellectual capabilities between several projects, specially between competitors sometimes poses a threat by potentially exposing project secrets. On a different note, interviewee SP6 described the importance of both human resource sharing in day-to-day business as well as through digital platforms:

> Human resources is the primary operating model. However, I could see a benefit if it were perhaps the secondary operating model. So it's like you've got your core human resources. That is your regular employees, but then perhaps having, like, a secondary pool of human resources through sharing platforms where, if there is a shortage or simply a third access.

Interviewee SP10 highlighted that the sharing of human resources is relatively established within the projects. However, interviewee SP7 indicated that the availability of digital platforms related to the sharing of human resources offers a strategic advantage for businesses or individuals seeking to expand their supplier network and individuals who need to enhance their industry visibility. Mateescu and Ticona (2020) also confirmed the importance of digital platforms in enhancing the visibility of human resource sharing.

4.1.1.7 Energy. The Web analysis discovered six digital platforms support the energy related resource sharing, namely, machines4U, cavpower, iseekplant, Kennards, Coates and Meh Plant and Equipment. Energy sharing can be seen in various resource forms. For example, all platforms had petrol and diesel generators in various capacities, and the majority had silenced generators as well. Apart from that, Meh Plant and Equipment Hire provides Buded Fuel Cells and Coates offers battery energy storage systems. KennardsHires facilitates energy renting through inverters, load banks, power distribution systems and renewable energy systems. As renewable sources hybrid solar and hydrogen generators were available on the platform, six platforms out of eight highlighted the shareable energy-related resources.

The semi-structured interviews reported 11 interviewees' responses regarding energy as a shareable resource in SE practices in the CI. The CI is a major consumer of energy; for instance, energy demand in the Australian CI reached around 180 petajoules in 2022, marking a surge from the previous year (Statista Research Department, 2024). According to interviewee CP1, the energy demand is mainly for powering machinery, on-site facilities and temporary structures. The interviewee mentioned solar power systems can be used for construction activities in remote areas with limited grid access. Considering the space availability in remote areas, solar power is a potential solution for the rural community. Construction projects can fulfil energy independence and achieve cost-effective and sustainable energy solutions by installing an on-site solar system. Moreover, the interviewee mentioned that any excess solar energy could be shared with nearby communities or other industrial projects by being fed back into the grid, creating mutual benefits. In line with this, interviewee CP2 also highlighted the potential of solar power sharing, especially for the outback of Australia. The interviewee mentioned that contractors have to use their own power supplies even in brownfields or greenfield sites, where this energy-related resource sharing is beneficial. The interviewee shared that:

> When I was a construction manager, we did petrol station projects that were way up in the northwest of Australia. There was nothing out there at all, no power, nothing. So I had to truck in 250K VA generators in a semi-trailer type arrangement and that was our mobile power supply.

Similar to this view, interviewee CP5 recognised the renting of generators as a practical example of energy-related resource sharing and suggested that having a common platform will encourage sharing practices. Moreover, interviewee CP6 acknowledged the difficulties in energy supplies in outback projects, including challenges in finding suppliers at reasonable prices. The interviewee emphasised the need for a widely accepted SE platform connecting construction parties with suitable suppliers, even in remote locations. Interviewee CP4 highlighted the concept of the VPP which can be considered under energy-sharing. Kalsaas (2010) corroborated this finding by identifying advanced implications of VPP to electric vehicles under vehicle-to-grid technology. The interviewee stated that construction companies could facilitate energy-producing or storage devices, namely, solar panels, wind farms, electric vehicles' batteries and combined heat and power units to share energy with neighbouring sites. However, interviewee SP1 pointed out that NSW faces some challenges due to certifications and licensing related to shared energy sources. Different levels of

certifications should be obtained when sharing solar power; the cost associated with obtaining all the required licenses and reluctance to share the energy that was expensive to set up were identified as barriers to energy-sharing. The interviewee indicated that sharing energy by-products of existing processes such as methane or leachate from land remediation, could be considered as a potential shareable energy source if there is a capacity and facilities to capture and convert it into usable energy. Further, interviewee SP4 discussed the concept of Sunshift which is a re-deployable hybrid power project. Construction activities in remote areas in Australia rely on diesel generators that are expensive to operate and are subject to uncertainty due to changes in fuel prices. In addition, fuel transportation to remote areas is costly and dangerous. The interviewee mentioned that potential future applications similar to Sunshift will be beneficial for energy production and sharing in construction sites in remote areas.

4.1.1.8 Mobility/logistics. Seven platforms out of eight offer mobility-related resource sharing, and the majority of them provide trucks and trailer renting. Water trucks and trailers are rented on both Machines4U and Cavpower platforms. Apart from this, Machines4U and RAM Equipment rent dump and tipper trucks, and all-terrain vehicles and amphibious vehicles were available on the Machines4U platform. Other than normal mobility-related resources, iseekplant provides tractors, prime movers, floats and crane trucks. Further, both trucks and trailers were displayed on Meh Plant and Equipment Hire and Coates platforms. A wider variety of resources were available on KennardsHire, such as tippers, trailers, tabletop moving packages, crew cabs and vans. Additionally, Coates and the KennardsHire platforms rent utility vehicle under transportation-related resources.

The findings of semi-structured interviews supported the recognition of mobility-related resources as potential shareable resources in SE practices in the CI, and eight interviewees discussed this in detail. Interviewee CP1 mentioned that construction companies can arrange to rent their vehicles when they are not in use. In general, trucks and other transportation vehicles travel empty on their return trips after delivering construction materials. Therefore, the interviewee suggested that these empty miles can be reduced by implementing a system to connect with loads travelling in the opposite direction. Interviewee SP5 mentioned that these arrangements to reduce the empty miles will contribute to eliminating emissions related to unwanted transportation. These findings align with the research of Huang and Zhao (2019), which highlighted the shared container transportation related to the shipping industry. Moreover, having a practice of listing mobility-related resources to share was recognised by interviewee CP9 as a benefit to small and medium-level contractors who do not have a large fleet of vehicles to transport their materials and labour. Interviewee SP1 highlighted a scenario similar to carpooling as mobility-related resource sharing:

> We worked on a project last year which had very limited parking on site. The landowner and the principal owner actually had another completely vacant site and set that up as a parking area for staff and running a shuttle. So they actually paid to run a shuttle between the parking locations. This shuttle service between two locations can be considered mobility-related resource sharing.

A prior study has described the importance of shuttle services related to the mining industry (Shishlyannikov and Vasilyeva, 2016). Interviewee CP6 supported the idea of having a construction-related renting platform by sharing a challenging experience related to a Murray River project in SA. Their urgent requirement for a large and special barge for materials transportation across the river was not fulfilled on time by readily available suppliers or regular contacts. The interviewee suggested that well-developed construction-related SE digital platforms could be incredibly helpful in this kind of situation.

Moreover, the interviewee pointed out that construction-related professionals should be encouraged to list their resources online, especially those in remote areas.

4.1.1.9 Goods. The goods resource category encompasses items that are not directly used in construction sites, such as furniture and other general office supplies. The Web analysis revealed that only one platform rents goods on its website. Accordingly, KennardsHire rent a wide variety of goods such as chairs, tables, food warmers, microwave ovens, ice makers, fridges and water coolers that can be used in the CI specifically for temporary site offices, and other event-based requirements. This finding aligns with the study of Atstaja *et al.* (2022), who examined sharing models as a component of the CE. This authors specifically investigate the sharing of chairs in Ukrainian websites and recognised that the sharing of goods and services promotes the rational use of already produced products and discourages overproduction.

Interviewee CP9 recognised that furniture and other basic items are mostly related to the construction office environment under goods-sharing. The interviewee elaborated that some furniture cannot be shared and has to be in the office all the time to take the maximum benefit out of it, considering its specific applications. However, items such as photocopy machines, scanners and telephones can be shared and commonly used. Further, to optimise resource utilisation, companies can implement multi-user functionality on certain computers. This method allows shared access to the same computer by different employees working different shifts without allocating dedicated computers to each employee. To enhance the data security, passwords can be used and it ensures each user has a secure workstation with access only to their designated work drive. The interviewee CP9 identified this arrangement as a cost-effective arrangement, and it will contribute to maximising the utilisation of existing underused items. Furthermore, interviewee SP6 pointed out the sharing opportunities related to refurbishments and renovations:

> When we are renovating/closing the office spaces, we try to give a second life to that office furniture, and yeah, it's definitely an enormous opportunity, but again the challenge is timing, because often like there's renovations might be happening over like a two to four week period, and the timing to coordinate then getting those goods out of that site, presents like a big challenge. But we have seen it done really successfully. And then particularly, how that can help organisations too with their targets and reporting. Producing embodied carbon and things like that. It's, yeah, quite significant.

4.1.1.10 Data and information. Website analysis revealed that "data and information" are not currently shared as other resources for a fee on the websites. Apart from providing detailed information on other shareable resources six platforms offer valuable data and information for free in line with the concept of sharing, which is a voluntary act (Belk, 2014). Machines4U provides industry news, reviews, releases and testimonials to keep the community updated. Recent industry success stories and updates and a detailed product guide were available on the RAM equipment website. This product guide consisted of clear and pictorial information on health and safety, equipment specifications and operation and relevant technologies. Hipages and Coates provide useful articles to tradies and on case studies, respectively. Interestingly, KennardsHire displays Do-it-yourself instructions for various construction-related activities. A variety of valuable information was available on the iseekplant, namely, the Australian infrastructure guide, machine hire rates, top 100 construction firms and a dedicated iseekplant knowledge centre. Previous studies have identified the reasons for publishing this free information on companies' websites. Online reputation and positive search results can be strengthened by publishing quality industry news and updates, and this published information acts as a digital marketing tool that directly impacts sales (Kompass, 2024).

Sixteen interviewees explored the data and information as potential shareable resources in the CI. Interviewee CP4 expressed that contract templates, construction-related documents or applications on a single platform are shared between several parties; basically, advanced technology facilitates the sharing of common information. However, interviewees CP1 and CP4 declared that the majority of companies are reluctant to share their information, particularly sensitive information, with outsiders considering data security and privacy issues. Interviewee CP5 mentioned the importance of data availability:

> When recruiting new employees for projects, they sometimes maintain a book named "Lessons Learned" consisting of the identification of mistakes they made while working. I think if the company takes some actions to make such information available, then many future and possible mistakes and risks can be avoided. This practice happens in the health and safety divisions, but it would have been better if it could be applied to other work as well.

Interviewee SP1 stated that making information available without personally identifiable details will allow innovation to flourish within the organisation and help to identify trends and opportunities. Interviewee CP9 mentioned that:

> We can share information within the company with different projects; for example, if we have some of the good practices that we have. We have recognised that after completing some of the projects, we can share that with another project within the same company. That's obviously possible. And that's happening.

Further, interviewee SP3 highlighted that some online platforms allow real-time access to project data with all parties, while enhancing collaboration and reducing communication errors. Previous research in SE has recognised the data and information sharing related to shared factory context (Plewnia, 2019). Additionally, interviewee SP8 considered training materials and tutorials as shareable resources related to the construction practices. Interviewee SP1 pointed out general project information such as project timelines, milestones and other best practices with others without sharing sensitive details and non-confidential documents (such as permits, publicly available plans or designs, environment impact reports and material pricing trends), will enhance the overall collaboration and optimise the efficiency and effectiveness. Further, the interviewees highlighted that if established companies could make more information readily available, they could empower smaller and newer construction-related professionals while creating a valuable knowledge base. Supporting this suggestion, Rider Levett Bucknall provides the latest cost information, which is not a common practice of other construction companies (RLB, 2024). Making available valuable information for a fee or free will facilitate the industry professionally overall.

By considering these findings, the study highlighted that the SE concept in the CI is still evolving with limited research publications. However, SE practices in the construction context are rapidly gaining popularity, with real-world applications often preceding formal academic publications. Within the construction context, the application of this concept is often better represented by current SE websites compared to research documentation. In the Australian construction context, eight digital platforms are currently practising this SE concept. The majority of these practices are still focused on the sharing of limited resources, while giving priority to equipment/tools/machines/devices and logistics/mobility-sharing practices. As pointed out in this study, platform facilitators and construction stakeholders can explore the diverse application of the SE concept in the industry while integrating a variety of shareable resources. Moreover, construction professionals and researchers can work together to identify the underutilisation rates of construction resources. Further, to ensure the successful implementation of this new concept in the construction context, it is essential to

promote its benefits using key economy-, research-, product and service- and marketing-related strategies (Rathnayake *et al.*, 2024b).

Additionally, the study's findings contributed to enhancing and reframing the RBV theory by expanding the current understanding of strategic resources, contextualising the theory in the context of CI, suggesting resource fluidity across industries and sectors and promoting access over ownership. Under the traditional definition of RBV theory, strategic resources are considered to be firm-owned resources (Bolzani, 2020). However, strategic advantages can be gained from shared resources, which can be accessed through SE platforms and practices, particularly in resource-intensive industries such as the CI. The RBV theory has been widely discussed in SE practices across manufacturing, services and information technology industries (Gembarski and Kammler, 2021; Isabelle *et al.*, 2020; Putra *et al.*, 2024), but there has been no research exploration related to CI. This study offers initial insights into the implications of RBV theory in SE practices in the CI by identifying ten types of potential shareable resources. Moreover, traditional RBV theory emphasises the firm's internal resources as a means to create value and achieve competitive benefits (Kero and Bogale, 2023). This study has identified shareable resources across diverse industries and sectors, which add a dynamic and networked perspective to RBV theory, highlighting that the useful resources can exist beyond firm boundaries and still be leveraged strategically to enhance the overall performance of the organisation. Furthermore, RBV theory assumes that the firms must have full ownership and be able to manage the resources (Kellermanns *et al.*, 2016). However, under the SE concept, this study suggests a new perspective on this consideration, by suggesting that accessibility and efficient usage of shared resources, rather than internal ownership, can also yield benefits, especially considering the platform-based economic era. Accordingly, the current study offers valuable insights that help to reframe the traditional assumptions within the RBV theory.

4.2 Enhancing circular economy: the contribution of potential shareable resources in the sharing economy

The findings of the study highlighted the potential of SE practices in enhancing CE principles in the CI. The identification of potential shareable resources uncovered the key opportunities to enhance circularity in the CI, namely, improving resource utilisation, minimising resource wastage and extending the life cycle of resources.

4.2.1 Improving resource utilisation. The study identified various shareable resources across diverse industries through a literature review and resources that are currently being shared in the CI through website analysis. Further, semi-structured interviews validated these identified resources and assessed their applicability and future potentials related to the CI. Accenture proposed five CE business models to achieve circularity objectives and among them sharing platform has been highlighted as a vital solution to optimise capacity use of resources (Grow Circular, 2023). Compared to traditional construction practices, the emergence of resource exchange through SE digital platforms highlights a shift towards more efficient resource ordering, allocation and use. Considering the idle or underused resources in the CI (Li *et al.*, 2019), the SE practices and resource-sharing through digital platforms provide a great opportunity to earn monetary benefits, while providing temporary access to resources. The findings of this study paved the way to recognise the importance of identifying underused resources and promoting shared access over ownership to reduce idle time of construction equipment and machines and minimise overproduction of materials.

4.2.2 Minimising resource wastage. Resource wastage is one of the critical challenges in any CI (Lu *et al.*, 2021), and Australian CIs produce around 76 million tonnes of the country's total annual waste generation, highlighting the significant environmental impacts

(Rowcon Recycling, 2023). The findings revealed that using SE platforms and sharing potential shareable resources facilitate the reuse and distribution of additional or underused resources, preventing their transformation into waste. Therefore, this exchanging and sharing of construction resources while repurposing of resource wastage align well with CE principles by ensuring material circulation.

4.2.3 Extending the life cycle of resources. Expert interviews highlighted that the CI could gain long-term environmental and sustainability benefits by integrating SE practices into construction applications. Identifying underused resources and sharing them with others rather than discarding or keeping them idle, the CI can significantly minimise resource waste and directly contribute to reducing the environmental footprint.

5. Research implications

This section presents the theoretical and practical implications.

5.1 Theoretical implications

This research offers a number of unique theoretical contributions to CE, SE and other related fields. Firstly, the research explores a novel approach to achieving circularity through SE practices, which is new in the construction management research area. Since most of the SE studies are focused on other industries, such as the accommodation and transportation industries (Geissinger *et al*., 2022), there is a growing need to investigate SE practices in the CI. In fulfilling this need, the current study provides first insights into potential shareable resources in the CI as a promising base for understanding SE practices. Secondly, the study extends the existing literature on shareable resources by providing empirical data related to CI for the successful implementation of SE practices. Thirdly, this research supports showing how a combined method (qualitative Web-analysis and expert interviews) facilitates the investigation of the implications of shareable resources in the CI. This was achieved by conducting a Web-analysis of 8 digital platforms and semi-structured interviews with 20 experts. There is only one study in the literature currently related to SE practices in the CI (Li *et al*., 2019), which explored a different aspect of SE (sustainability) by conducting a survey. Therefore, this research offers a unique combination of methods to offer a comprehensive understanding of shareable resources through a literature review, 8 digital platforms and 20 expert interviews. Fourthly, this research contributes to the existing literature by evaluating the relevance of various shareable resources across diverse industries to the CI. Finally, the study offers a unique perspective on the RBV theory while highlighting the resource utilisation and competitive advantages through sharing in the construction context. In the CI, potential shareable resources can be considered through the lens of the RBV theory. Construction-related equipment, machinery and specialised labour are valuable, and these resources improve efficiency and productivity. Further, advanced and high-tech construction equipment and specialised human resources are rare and are not owned or easily accessible to every construction firm. Inimitable resources such as robot-technology-based or AI-based construction tools and devices are difficult to replicate. Therefore, construction-related holds resources that have these characteristics that are emphasised in the RBV theory. Accordingly, this study highlights how construction firms can share these potential shareable resources, while achieving sustainable competitive advantages such as cost efficiency, increased flexibility and fulfilling innovations and collaborations.

To the best of the authors' knowledge, this is the first study to investigate potential shareable resources related to SE practices in the CI, providing a unique theoretical contribution to the SE research area.

5.2 Practical implications

Investigating potential shareable resources related to SE practice in the CI has vital practical and policy implications. The Australian Government includes the SE concept and its related services in their business.gov.au website to educate people on SE services, including rights and responsibilities (Australian Government – Business, 2025). As of March 2025, the website highlights three sharing activities, such as ride-sharing services, delivery services and personal services. This is a positive indication that other key services, including SE practices in the construction context, are likely to be included in the future. Further, the Australian Government – Department of Climate Change, Energy, the Environment and Water (2024) introduced Australia's Circular Economy Framework, and this framework highlights the potential in the built environment in achieving CE targets. Therefore, the findings of this study provide valuable insights into policy development in Australia.

Moreover, the study identified six key practical implications. Firstly, the study highlights the underutilisation of construction-related resources in the industry and the potential of practicing shareable resources. Even though there are ten types of shareable resources across different industries, the findings identified that only seven resources are relevant to the CI through the qualitative Web analysis. However, expert interviews facilitated the exploration of another three types of potential shareable resources in the CI. Therefore, digital platform facilitators can consider additional resources identified by experts to share on their platforms to diversify the resource sharing in the CI. Secondly, the findings highlight sharing construction-related resources can lead to cost savings and more efficient construction practices. For example, construction companies can analyse the utilisation rates of different resources and take action to share underused resources through digital platforms, while earning extra income. Thirdly, the study provides knowledge regarding construction-related digital platforms and their capabilities to the construction professionals or small companies, which they can assess advanced resources that would otherwise be unaffordable and inconvenient. Fourthly, the study paves the way for practitioners to incorporate SE practices into the current construction project management practices. The SE facilitates scalability with additional resources and flexibility in project scheduling and helps mitigate delays. Fifthly, resource sharing enhances collaboration in the CI and strengthens relationships between practitioners. Sixthly, the study enables the CI to achieve the sustainability and circularity goals by implementing SE practices. Sharing resources lowers the need for new raw materials, reducing the overall carbon emissions. Moreover, sharing promotes the CE through fundamental reusing and recycling practices. Finally, this study offers a novel perspective on applying the SE practices to achieve Australian and even global circular construction objectives. Currently, human resource consumption exceeds the natural regenerative capacity by around 1.8 times than the earth's natural replenish capacity, alarming an ecological debt in near future (Beshara, 2025). Further, the author explained that CE objectives hold a special place in Australian bipartisan agreements, and the Green Building Council of Australia has mentioned that the property and construction sector can support the nation's aim in achieving around two trillion economic benefits through CE. Therefore, identifying and promoting shareable resources and SE practices is a great choice in moving towards the CE application while safeguarding the ecosystems. The detailed analysis of potential shareable resources related to SE practices in the CI facilitates a holistic, practical contribution, paving the way for the smooth adoption, implementation and upscaling of SE practices in the industry.

In addition to the detailed presentation of the research implications provided above, the overall implications can be summarised as follows: implementing SE practices to achieve circularity, identifying potential shareable resources related to SE practices in the CI, using a

combine method to investigate the SE practices in the CI, reviewing shareable resources across diverse industries and sectors and offering unique perspectives on the RBV theory as theoretical implications. Additionally, future implications in Australian Government websites and Australia's Circular Economy Framework, underutilisation of resources in the CI, benefits of implementing SE practices in the construction context, construction-related SE digital platforms and implementing SE practices to achieve broader CE and sustainability objectives in the Australian CI were discussed as policy and practical implications of this study.

6. Conclusions and future research

According to the review by Rathnayake *et al.* (2024a, 2024b), detailed exploration is needed for SE practices in the CI, which should be achieved by investigating potential shareable resources as the fundamental step of the exploration. However, none of the previous studies explored shareable resources related to SE practices in the CI. Therefore, the aim of this research was to investigate potential shareable resources related to SE practices in the CI. As the first step, the study conducted a comprehensive literature review to understand the existing shareable resources across diverse industries and identified ten types of resources. The practical application of these identified resources was explored through a qualitative Web analysis of eight construction-related SE digital platforms. Accordingly, five types of resources were mainly highlighted, such as human resources, space/storage, mobility, equipment/tools/materials/machinery/devices, energy and goods. The findings identified mobility and equipment/tools/machinery/material/devices as shareable resources with the highest appearance in digital platforms. Moreover, the "data and information" resource type was recognised as a shareable resource that is currently not shared for a fee, which aligns with the concept of sharing. Although the other three resource types, such as robots, financial capital and Wi-Fi, have been identified as potential shareable resources in various industries, the Web analysis revealed that none of the construction-related social media platforms currently share these resources. The current study explained the possible reasons for this, such as the expense and practical issues associated with these resources, default design limitations and extensive training requirements related to the robot resource type. Moreover, legal and regulatory risk, lack of proper insurance and trust issues were recognised as possible reasons for limited sharing practices related to the type of financial capital resource. Further, data and security risk were highlighted as a common barrier to sharing Wi-Fi resource types. However, interviewees expressed their opinion on the possibility of integrating these three resources as shareable resources in the CI while highlighting potential benefits. Overall, this study provided valuable contributions to the knowledge and practice related to the SE in the construction context. In terms of knowledge and theoretical contributions, the findings of this study highlight the unique pathway of achieving sustainability and CE objectives through implementing SE practices. Specially, this study offers early insights into the SE research domain in relation to the SE application in the construction context. This study extends the existing literature on shareable resources by providing empirical data related to construction-related shareable resources. Further, the findings related to shareable resources in the CI offer a novel perspective on the RBV theory. When considering the industrial contribution of this study, the exploration of the SE concept in the construction context is a key contribution. Further, the identification of current and potential shareable resources related to the construction project can be considered a vital contribution that can be used to implement a successful SE business in future. Moreover, the study provides key contributions to the practice by highlighting the competitive advantages and benefits that a firm can gain through implementing SE practices. Overall, the findings of

the study offer novel insights into how SE practices can enhance circularity within the CI by identifying underused resources and enabling them to be shared through digital platforms. Accordingly, SE practices provide access over ownership, while increasing resource utilisation and reducing demand for new resource extraction. The current study promotes the idea of integrating SE practices in the construction context to improve the circularity by facilitating the temporary use, redistribution and shared consumption of resources that would otherwise remain idle.

This paper has some limitations and suggestions for future research. This study is focused on shareable resources related to SE practices, but there are a few other aspects that need to be investigated to achieve the overall implementation of SE practices in the CI, such as investigating factors influencing SE and SE processes related to resource sharing in the CI. In addition, strategies to address SE factors and enhance overall SE practices in the CI can be proposed in future studies. The current findings originated through a qualitative Web-analysis and expert interviews. In the future, studies can use other data collection methods, such as surveys, to explore the views of a large sample, while eliminating subjective opinions. Moreover, empirical data were collected in Australia. Therefore, future studies could be formulated for diverse geographical locations, using diverse data collection methods and building upon the insights gained from this study to increase the implementation of SE practices in the CI. Moreover, future research could review the existing SE strategies and propose suitable strategies to enhance the overall SE practices in the CI.

This study represents a pioneering effort to explore the SE practices in the CI by empirically investigating and categorising ten types of potential shareable resources related to SE practices in the CI, while laying the groundwork for more circular and sustainable construction practices. As the CI continues to grow, the implementation of SE practices can significantly enhance efficiency and overall performance.

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Supplementary material

The supplementary material for this article can be found online.

Corresponding author

Ishara Rathnayake can be contacted at: rathnayake.rathnayake_mudiyanselage@mymail.unisa.edu.au