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Extraordinary supply chain disruptions and the circular economy transition in the construction industry – An opportunity within crisis?

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ABSTRACT

With increasingly frequent supply chain disruptions threatening business continuity, localized material reuse and circulation emerge as resilience strategies in companies. The extraordinary supply chain disruptions initiated by the COVID-19 pandemic therefore presented an insufficiently understood but exceptional opportunity for Circular Economy (CE) transition in businesses. From the theoretical perspective of the institutional pressures shaping corporate behavior, this qualitative study explores the CE adoption in pre-pandemic sourcing practices at 20 Finnish construction companies and the new, CE-relevant practices resulting from COVID-19-initiated supply chain disruptions. The study discovers that while diverse sourcing practices both supporting and hindering CE adoption resulted from the extraordinary supply chain disruptions, a fundamental CE transition was suppressed by the lack of institutional enablement. While experienced regulations and customer priorities in particular were identified as preventing CE adoption, the construction companies expected both regulations and customer priorities to contrarily promote CE adoption in the future. An intriguing contradiction is therefore discovered between anticipated institutional pressures driving CE adoption, and experienced institutional pressures hindering it. To harness the CE transition opportunity embedded in future disruptions, institutional support for CE adoption in construction companies is needed. Accordingly, the study recommends regulatory development in support of construction material reuse, widespread public communication and education to overcome customer aversion towards CE solutions in construction, and support for construction companies in collaborating and establishing CE ecosystems.

1. Introduction

Under the fundamental laws of supply and demand, scarcity of an in-demand resource increases its value (Hicks, 1946; Chermak and Patrick, 1995). Accordingly, in times of scarcity and shortage, the high value of commodities has encouraged their efficient use and circulation through repeated reuse. With economic growth and wealth, commodities have become increasingly disposable—a notion at the heart of our current, linear economic model of “take, make, and dispose” (e.g., Ghisellini et al., 2016; Ranta et al., 2018). While the linear patterns of production and consumption are inherently unsustainable and have resulted in devastating environmental externalities (e.g., Ellen MacArthur Foundation, 2013a; Ghisellini et al., 2016), the regenerative economic model of a circular economy (CE) is envisioned as decoupling economic development from the use of finite resources (Ellen MacArthur Foundation, 2015). The transition from a linear economic model into a CE is heavily reliant on the re-establishment of the value of material and the

widespread adoption of the 3R principles of reduce, reuse, and recycle (e.g., Ranta et al., 2018).

Several sustainability challenges addressed by the CE stem from the corporate sector, highlighting the importance of the CE transition in businesses (e.g., Ellen MacArthur Foundation, 2013b; Doda et al., 2016; Dahlmann et al., 2019). As the bridge between a company’s supply chain and own operations, procurement function is viewed as the gatekeeper of a company’s CE ambitions (Neessen et al., 2021a). The integration of the 3R principles into material sourcing strategies and practices is particularly critical in the construction industry, which is traditionally characterized by intense resource use and the generation of vast quantities of waste (Leising et al., 2018; Benachio et al., 2020), but has seen little progress in CE adoption (Adams et al., 2017; Leising et al., 2018).

Numerous obstacles, including the perceived lack of a business case (Adams et al., 2017; Hossain et al., 2020) and availability and quality issues associated with circular raw materials (Govindan and Hasanagic, 2018; Hart et al., 2019), have discouraged construction companies from

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actively adopting CE practices. Further, CE adoption is often stifled by the lack of necessary support and enablement of the formal and informal rules and expectations by which the society operates (Piila et al., 2022; Ranta et al., 2018) – i.e., of different ‘institutional pressures’, explored by the institutional theory (see Henrysson and Nuur, 2021; Ranta et al., 2018). The COVID-19 pandemic and associated lock-downs initiated extraordinary supply chain disruptions that shook established corporate perceptions, norms, and practices (Craighead et al., 2020; Küffner et al., 2022), confronted the construction industry with unprecedented raw material shortages, and catalyzed radical changes in businesses. As an exogenous shock of a drastic magnitude, COVID-19 may have broken the ‘iron cage’ of institutional pressures determining corporate behavior (Craighead et al., 2020) and often hindering CE adoption in companies. Further, the supply chain disruptions associated with COVID-19 provided an incentive for re-imagining traditionally linear construction material supply chains—after all, as suggested by the CE conception of buildings as material banks (BAMB), each building at the end of its usage phase could serve as a local raw material source for future construction (e.g., Leising et al., 2018). A distinct opportunity for a construction industry CE transition was therefore embedded in the crisis of COVID-19-initiated supply chain disruptions.

The frequency and impact of supply chain disruptions is growing (Katsaliaki et al., 2022), while the need for corporate CE transitions becomes increasingly urgent (Piila et al., 2022). Accordingly, the prospect of seizing the CE transition opportunity embedded in supply chain disruptions (see e.g. Ibn-Mohammed et al., 2021) holds tremendous promise, but is compromised by a lack of knowledge and understanding, associated with two significant gaps in existing research: first, despite the potential for significant sustainability transitions (Ibn-Mohammed et al., 2021), the effects of COVID-19 on sustainable practices in supply chains are poorly understood, and must therefore be empirically explored (see Chowdhury et al., 2021). Second, as CE adoption in the face of supply chain disruptions is realized through material sourcing and supply chain management, empirical research is sorely needed on the success or failure of real-life circular procurement examples (Qazi and Appolloni, 2022). Addressing these research gaps will mark a significant contribution to the fields of CE and supply chain management: the much-needed understanding about circular procurement and the sustainable practices that emerged from COVID-19-initiated supply chain disruptions support both the enablement of corporate CE transitions in the context of future disruptions, and the prevention of supply disruptions through localized, circular materials.

To address the research gaps in the context of the CE-critical construction industry (Leising et al., 2018; Benachio et al., 2020), this study adopts an institutional theory approach. It explores the CE-relevant sourcing practices that emerged from the COVID-19-initiated supply chain disruptions in construction companies, and the role of the institutional pressures, such as societal norms and rules, in driving and hindering CE adoption in sourcing. Due to the criticality of the institutional pressures in shaping corporate CE activities (see Henrysson and Nuur, 2021; Ranta et al., 2018), and the hypothesized institutional upheaval resulting from COVID-19, institutional theory offers an intriguing and valuable access point to the changes in sourcing and supply chain management practices as a result of COVID-19-initiated supply chain disruptions (Craighead et al., 2020). The empirical research data of the study were collected in 20 semi-structured interviews with representatives of large- and medium-sized Finnish construction companies. Based on the retrospective recollections of the interviewees, the study first explores the CE adoption in the companies’ pre-disruption sourcing practices in the context of the institutional pressures shaping them. The study then proceeds to investigate the CE-relevant changes in the construction companies’ sourcing practices following the extraordinary supply chain disruptions and potential COVID-19-induced transformation in the institutional pressures (Craighead et al., 2020). Two research questions are addressed:

1. How did institutional pressures shape the CE adoption in sourcing practices in Finnish construction companies prior to COVID-19-induced supply chain disruptions?
2. How did COVID-19-induced supply chain disruptions and potential changes in institutional pressures shape the CE adoption in sourcing practices in Finnish construction companies?

CE adoption in sourcing practices is understood broadly in the present study as sourcing that promotes, enables or necessitates material reduction, reuse or recycling (3R) within the construction sector, considering the entire building life cycle from design to construction material manufacturing, building construction, operating, and finally the end of life of a building (see Benachio et al., 2020). While circular procurement lacks specific and universal definitions (Qazi and Appolloni, 2022), this interpretation is an industry-specific adaptation and expansion of the concept of circular purchasing, which applies the 3R principles in closing the material and energy loops of supply chains, and eliminating waste (European Commission, 2017; Neessen et al., 2021b).

The present study identifies an intriguing contradiction between anticipated and experienced institutional pressures, with the former promoting and the latter hindering CE adoption in the pre-disruption material sourcing and usage practices of the construction companies. The study also reveals that while numerous CE-relevant changes occurred in material sourcing and usage practices as a result of COVID-19-induced supply chain disruptions, a comprehensive CE transition was not enabled by the institutional environment. Based on these findings, recommendations for policymakers, construction industry associations and corporate practitioners are discussed to help facilitate CE adoption in relation to transition opportunities presented by the future disruptions that are sure to come.

The rest of the article is structured as follows. Section 2 introduces the conceptual framework by discussing COVID-19-related supply chain disruptions and the relevant aspects of institutional theory in a CE context. Section 3 explains the study methodology, while Section 4 reviews the findings. Section 5 answers the research questions by exploring the findings in the context of previous research efforts, discusses policy and practical recommendations, and suggests directions for future research; Section 6 concludes the article.

2. Conceptual framework

2.1. COVID-19-induced supply chain disruptions and circular economy

The trend towards globalization and the resulting complexity have amplified supply chain vulnerability to disruptions (Ibn-Mohammed et al., 2021; Küffner et al., 2022). Accordingly, recent years have seen an increase in both the frequency and impact of supply chain disruption (Zsidsisin et al., 2016; Katsaliaki et al., 2022), along with companies’ growing dependency on the business continuity of their supply chains (Chongvilaivan, 2012). As a sudden event with far-reaching consequences, COVID-19 constituted an exogenous shock of an uncommon magnitude (Verbeke, 2020), introduced drastic implications for businesses (Kuckertz et al., 2020) and dramatically exposed the fragility of supply chains (Mollenkopf et al., 2021; Sarkis, 2021). Rather than a typical and short-lived event-driven disruption, COVID-19 presented industries with a long-term supply crisis that created profound uncertainty in both the short and long terms (Choi, 2020; Ivanov, 2021). Due to their unforeseen scale and intensity, the supply chain disruptions that emerged from COVID-19 have been described as extraordinary (e.g., Ivanov, 2020; Chowdhury et al., 2021).

Resilience in the face of typical supply chain disruptions has been considered as encompassing the elements of proactive resistance and reactive recovery (Katsaliaki et al., 2022). It has also been described through the notions of a system’s absorptive, adaptive, and restorative capacities, enabling systems to withstand impacts and return efficiently to normal operations (Hosseini et al., 2019). In practice, these

approaches entail, for example, building redundancy in the form of safety stocks, fostering flexibility through alternative suppliers and transport options (e.g., Hosseini et al., 2019; Katsaliaki et al., 2022), and building resilience through diverse response measures (Küffner et al., 2022). As such, resilience building has been identified as causing negative sustainability trade-offs, because maintaining smaller inventories, relying on single sourcing, and using a single channel of transport are typically preferable from a sustainability perspective (Hosseini et al., 2019). In contrast to traditional resilience measures, a pandemic-induced supply chain disruption has been viewed as requiring extended resilience approaches (Ivanov, 2020). Craighead et al. (2020) describe such approaches through the concept of transiliency, which encompasses simultaneous processes of restoration and often radical change, whereas Ivanov (2020) proposes the notion of a viable supply chain designed to be structurally changeable, dynamically adaptable, and able to survive a long-term, global disruption.

As the dramatic disruptions and uncertainties associated with COVID-19 called into question the merit and viability of the mainstream practices of offshoring and global sourcing (Craighead et al., 2020; Sarkis, 2021), the shortening of supply chains emerged as a relevant resilience strategy (Mollenkopf et al., 2021). Beyond resilience, increasingly local sourcing presents opportunities for CE transition, as lesser energy and resource consumption is typically required (Sarkis, 2021). Further, the poor supply chain visibility and coordination often associated with international raw material imports can compromise the reuse and recycling potential of products at their end of life (Feldman et al., 2024). CE strategies have been found to have great potential in building resilience and reducing vulnerability to future supply disruptions, as domestic material sources and industrial symbiosis are created through material reuse and recycling (Gaustad et al., 2018; Smart et al., 2017). It has even been speculated that CE adoption might be the silver bullet enabling joint resilience, efficiency, and sustainability in supply chains (e.g., Münch et al., 2022; Sarkis, 2021). A two-way dynamic exists between supply chain disruptions and the CE transition, with the former presenting an opportunity for the latter, and the latter mitigating the risk associated with the former.

While devastating, COVID-19 was credited with triggering the need for circularity in supply chains, and with presenting a unique opportunity for the creation of a more resilient economy through CE transition (Ibn-Mohammed et al., 2021). This notion is relevant in the construction sector, as construction companies were identified as highly vulnerable to the exogenous shock of COVID-19 (Costa et al., 2022), and experienced a particularly dramatic COVID-19 -induces drop in the number of suppliers (see Veselovská, 2020), suggesting that they likely suffered from exceptionally severe disruptions in material availability. The resulting inability to source sufficient quantities of virgin raw materials may have

increased the appeal of circular approaches in sourcing, which are seen as a crucial instrument in corporate CE transitions (e.g., Ghisellini et al., 2016; Qazi and Appolloni, 2022). The potential of avoiding supply chain disruptions through CE adoption has also been previously recognized in the construction industry (Akhimien et al., 2021; Hossain et al., 2020). In the context of the construction industry, some key sourcing approaches promoting the 3R principles in different phases of the life cycle of a building (see Benachio et al., 2020) are presented in Fig. 1.

Despite the rich and growing body of research surrounding COVID-19-initiated supply chain disruptions, there is a pressing need for further empirical research that is expected to provide valuable insights but has so far been sparse (Chowdhury et al., 2021; Glas et al., 2021; van Hoek, 2021). The longevity of any sustainability benefits emerging from the pandemic is uncertain (Sarkis, 2021; van Hoek, 2021), and there is a risk of negative environmental trade-offs generated by post-pandemic socioeconomic recovery activities (Sarkis, 2021). Thus, studies dedicated to the effects of COVID-19 on sustainable practices in various supply chains are called for (Chowdhury et al., 2021). The present study helps address this research gap and the research gap associated with real-life circular procurement examples through an empirical study of the CE-relevant sourcing implications of COVID-19-induced supply chain disruptions in the Finnish construction industry. By examining CE adoption through sourcing activities, the study also contributes towards sorely needed understanding of procurement approaches in CE implementation (Qazi and Appolloni, 2022).

2.2. Institutional theory in a circular economy context

Economic activity is inseparably embedded in society (Moreau et al., 2017; Schulz et al., 2019), making companies subject to the formal and informal rules and expectations by which the society operates. These ‘rules of the game’, encompassing the regulatory frameworks, economic and industrial systems, as well as societal values, norms, conventions and habits, are referred to as institutional conditions (see e.g. Henrysson and Nuur, 2021; Schmidt and Radaelli, 2004; Schulz et al., 2019). Critical in determining the pace and nature of any fundamental transformation (Henrysson and Nuur, 2021; Ranta et al., 2018), institutional conditions can effectively bring about or hinder CE adoption in companies (see Piila et al., 2022). Accordingly, institutional theory, which explores the organizational pursuit to secure and maintain its license to operate (i.e. legitimacy) within the context of its institutional conditions (Scott, 2008; Williams et al., 2009), presents an indispensable approach to researching corporate CE transitions (see e.g. Cavalcanti Sá de Abreu and Ceglia, 2018; Henrysson and Nuur, 2021; Schulz et al., 2019). As institutional theory encompasses an extensive and diverse field of theoretical contributions, this section seeks to solely introduce the

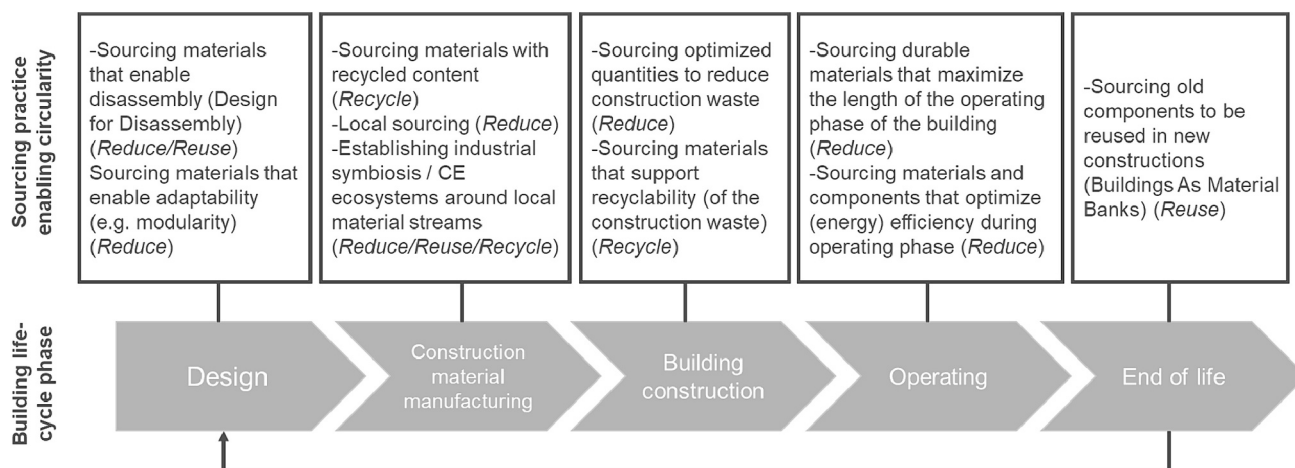


Fig. 1. CE adoption in sourcing, i.e. practices promoting 3R principles of Reduce, Reuse and Recycle throughout the life cycle of a building.

theoretical context relevant for the present study: the role of different types of institutional influences, or ‘pressures’, in driving and hindering CE adoption in companies.

Institutional pressures are the influences emerging from a company’s institutional conditions, driving it to adopt certain norms, values, and behaviors (DiMaggio and Powell, 1983; Zucker, 1987). Institutional pressures determine not only the objectives an organization should pursue, but also the ways in which to do so (Edvardsson et al., 2014). Failure to adhere to these pressures induces perceptions of an organization’s irrationality, negligence, and even irrelevance (Maier, 2005; Williams et al., 2009). In a CE context, institutional pressures have been identified as a significant driver promoting circularity throughout supply chains (Hussain et al., 2023). Institutional theory identifies three distinct pressures influencing the operations of an organization: normative, coercive, and mimetic (DiMaggio and Powell, 1983).

Societal expectations and subjective norms, meaning the support and approval of key stakeholders, have a pivotal role in influencing CE related behavior (Adabre et al., 2023; Piila et al., 2022). Normative pressures refer to the norms and standards of the operating environment, guiding organizational decision making (Teo et al., 2003; Williams et al., 2009). An organization’s conformity to normative pressures is therefore based on its sense of moral and ethical obligations and its perception of the expectations of the environment (Scott, 1995). Such pressures can originate from a multitude of sources, including interest groups, public opinion (DiMaggio and Powell, 1983), professional networks, and a company’s customers and suppliers (Teo et al., 2003). Prior to COVID-19, the influence of societal expectations in corporate CE adoption was identified among Finnish companies, who reported brand benefits and the prospect of attracting environmentally conscious workers as drivers for CE adoption (see Marjamaa et al., 2021). As a key stakeholder, pressure exerted by customers and consumers has significant impact on corporate CE adoption activities: while customer demand for circular solutions (Piila et al., 2022) and growing consumer distaste towards excess and wastefulness (Schulz et al., 2019) can be important drivers of corporate CE transition, customer aversion towards reused products may constitute an institutional barrier to CE transition (Feldman et al., 2024; Ranta et al., 2018). COVID-19 pandemic may have reinforced this barrier, as some customers and consumers perceive recycled and re-used materials as contaminated (Sarkis, 2021). Shaping consumer mindsets and behavior through education is a critical measure needed to promote corporate CE transition and to enable CE activities that are currently economically unviable (Feldman et al., 2024).

Coercive pressure emerges from vertical connections (Scott, 2008): it is exerted on an organization by parties in a position of power, such as government authorities and legislators (Williams et al., 2009; Zhu and Sarkis, 2007). Also, parties controlling a resource on which a company depends, such as a parent company or a critical trading partner, have the opportunity to apply coercive pressure on the company (Teo et al., 2003). In the context of corporate CE transition, coercive pressure is frequently discussed in terms of regulatory enablers of (Alonso-Almeida and Rodríguez-Antón, 2020; Qazi and Appolloni, 2022), but also obstacles to CE activities, with the latter encompassing both the lack of necessary regulatory and policy support (Adams et al., 2017; Alonso-Almeida and Rodríguez-Antón, 2020; Hossain et al., 2020), as well as regulations actively preventing material reuse (Piila et al., 2022; Ranta et al., 2018). Accordingly, the role of coercive pressures in CE adoption in the construction industry is complex, with certain regulatory initiatives, such as landfill bans and carbon taxes promoting CE adoption (Guerra and Leite, 2021), while diverse regulatory barriers and inconsistencies are also reported as stifling a construction sector CE transition (Adams et al., 2017; Feldman et al., 2024; Hossain et al., 2020). In the Nordic countries, studies conducted both before and after COVID-19 found national and local policies to encourage CE adoption in construction companies (see zu Castell-Rüdenhausen et al., 2021).

Mimetic pressures drive organizations to mimic the activities of their competitors in pursuit of perceived success and legitimacy (DiMaggio

and Powell, 1983; Zhu and Sarkis, 2007). In institutional theory, this imitation has been closely associated with organizational uncertainty and attempts to alleviate it (DiMaggio and Powell, 1983). Accordingly, mimetic pressures are heightened by new and challenging circumstances, as organizations rush to follow the lead of competitors regarded as best equipped to survive (Williams et al., 2009). In contrast to the vertical orientation of coercive pressures, mimetic pressures emerge from horizontal connections between organizations within an industry. As underscored by Scott (2008), these connections can be competitive, but they can also be cooperative. While competition has been identified as a significant pressure motivating corporate sustainability transitions (Masi et al., 2017), CE implementation calls particularly for cooperative connections, as circular networks and ecosystems crucial in CE implementation require active sharing of information, skills and resources (Sehnm et al., 2022). The former may, however, prevent the latter, as competition has been identified as a significant barrier to CE collaboration between companies. Indeed, corporate CE transitions are hindered by both the lack of collaboration, and the lack of corporate success stories companies could mimic and relate to (Feldman et al., 2024). In the construction industry, lack of collaboration in preventing CE adoption has also been previously identified (see Hossain et al., 2020).

Although institutional pressures influence organizations to differing and evolving extents with contextually changing priorities (Scott, 2008), a significant change such as corporate CE adoption requires support from all institutional pressures (see Ranta et al., 2018). While organizational responses can vary, institutional pressures typically promote and maintain stable behavior among organizations (Scott, 2008). This stability does not, however, mean the complete absence of change (Goodrick and Salancik, 1996; Scott, 2008), and drastic shifts in accepted norms—the breaking of a proverbial iron cage—can occur as a result of dramatic events (DiMaggio and Powell, 1983; Goodrick and Salancik, 1996). Such drastic events hold great potential for CE transition, which requires the enablement of a radical institutional transformation (see Henrysson and Nuur, 2021). The extraordinary supply chain disruptions emerging during the COVID-19 pandemic constituted a dramatic event, with organizations driven to discard old conceptions of legitimacy in favor of new operating models more suited for a post-pandemic institutional environment (Craighead et al., 2020). For example, the economic policy makers, who had historically supported global production networks, were suddenly pushing companies to reshoring and resilience-building (Linsi, 2021). To better understand these processes, Craighead et al. (2020) called for research using an institutional theory approach to explore the COVID-19-initiated (τ) evolution in supply chain processes and strategies. Indeed, institutional theory offers a unique access point to exploring corporate CE transitions in the context of COVID-19 -initiated supply chain disruptions, as it provides insights into the changes in the institutional pressures that can enable or prevent CE adoption (see e.g. Piila et al., 2022; Ranta et al., 2018), and into the potential institutionalization of new, CE-relevant practices emerging from the disruptions (see Craighead et al., 2020). Accordingly, the present study applies institutional theory to examine how the supply chain disruptions resulting from COVID-19 have changed CE adoption in sourcing practices at Finnish construction companies.

2.3. The theoretical and analytical framework

The relevant contributions on institutional theory and COVID-19-related supply chain disruptions, reviewed in the previous chapters of this section, form the framework for exploring the present study’s research questions. The first research question is necessarily retrospective; it examines the pre-disruption material sourcing practices at Finnish construction companies and the role of normative, coercive, and mimetic institutional pressures in shaping their CE alignment. The second research question focuses on the post-pandemic era, seeking to understand how the extraordinary supply chain disruptions connected

with COVID-19 influenced the CE alignment of sourcing practices in the context of the post-pandemic institutional environment. The theoretical and analytical framework of the present study, combining relevant elements of existing theory-building and research efforts with the focus of the two research questions, is presented in Fig. 2. By providing a structured approach to exploring the pre- and post-disruption institutional conditions in relation to CE adoption in sourcing practices, the framework supports the present study in addressing the research gaps and questions described in Section 1. It also provides a contextual guideline for reviewing the empirical research findings presented in Section 4.

3. Methods

3.1. Research sample

As Chowdhury et al. (2021) suggest, a country-specific approach is required when examining coping with COVID-19, since both the impacts experienced and the strategies adopted by different countries vary significantly. Finland was selected as the focus country of the case study due to its ambitious CE agenda (Piila et al., 2022), and the Finnish construction industry’s interesting relationship with CE: while a strong tradition of circularity through disassembly and reuse characterized Finnish building practices until the early years of industrialization (Lakkala et al., 2020), Finnish construction companies now struggle to meet the European Union’s CE-related regulatory expectations (Lehtonen, 2019). Construction companies were also selected as the focus of the present study due to that sector’s pivotal role in the CE transition (e.g., Leising et al., 2018; Benachio et al., 2020).

Considering the research gaps and questions described in Section 1, a qualitative research approach was chosen for the study in order to obtain rich and nuanced empirical data about the experiences of Finnish

construction companies with regard to CE adoption in sourcing practices in the context of the institutional influences and COVID-19 -initiated supply chain disruptions. The research data were collected through semi-structured interviews with representatives of Finnish construction companies. In order to obtain in-depth data regarding the cases where the disruption of global construction material supply chains most likely constituted a dramatic event necessitating significant changes in sourcing practices, purposive sampling was utilized (see e.g. Campbell et al., 2020; Palinkas et al., 2015). Specifically, medium-sized and large companies concentrating on new on-site constructions, rather than demolitions or renovations, were selected due to their dependence on a more extensive and global raw material supply—and accordingly a greater susceptibility for COVID-19 -induced supply chain disruptions. Further, due to the position of the companies in the construction phase in the building lifecycle (see Fig. 1), the interviewees were able to share experiences relating to design and material sourcing, which are critical functions in CE adoption in the construction industry (see Benachio et al., 2020; Feldman et al., 2024; Neessen et al., 2021a).

Within the relatively homogenous group of target companies, 20 interviews were conducted. Data saturation, where no new information relevant to the research questions was obtained in 3 consecutive interviews (see Hennink and Kaiser, 2022; Morse et al., 2014), and further data collection was deemed unnecessary (see Hennink and Kaiser, 2022; Morse et al., 2014; Saunders et al., 2018), was achieved in this sample size. In qualitative research, 9 to 17 in-depth interviews has been identified as the sample size typically reaching saturation, where the data collected captures the nuance and diversity of the studied issue, thus confirming content validity and promoting the rigor of the research (Hennink and Kaiser, 2022). In this study, the sufficiency of the 20 companies as sample size and a credible representation of the targeted group was further supported by the companies providing a comprehensive geographic representation of Finland, and constituting the

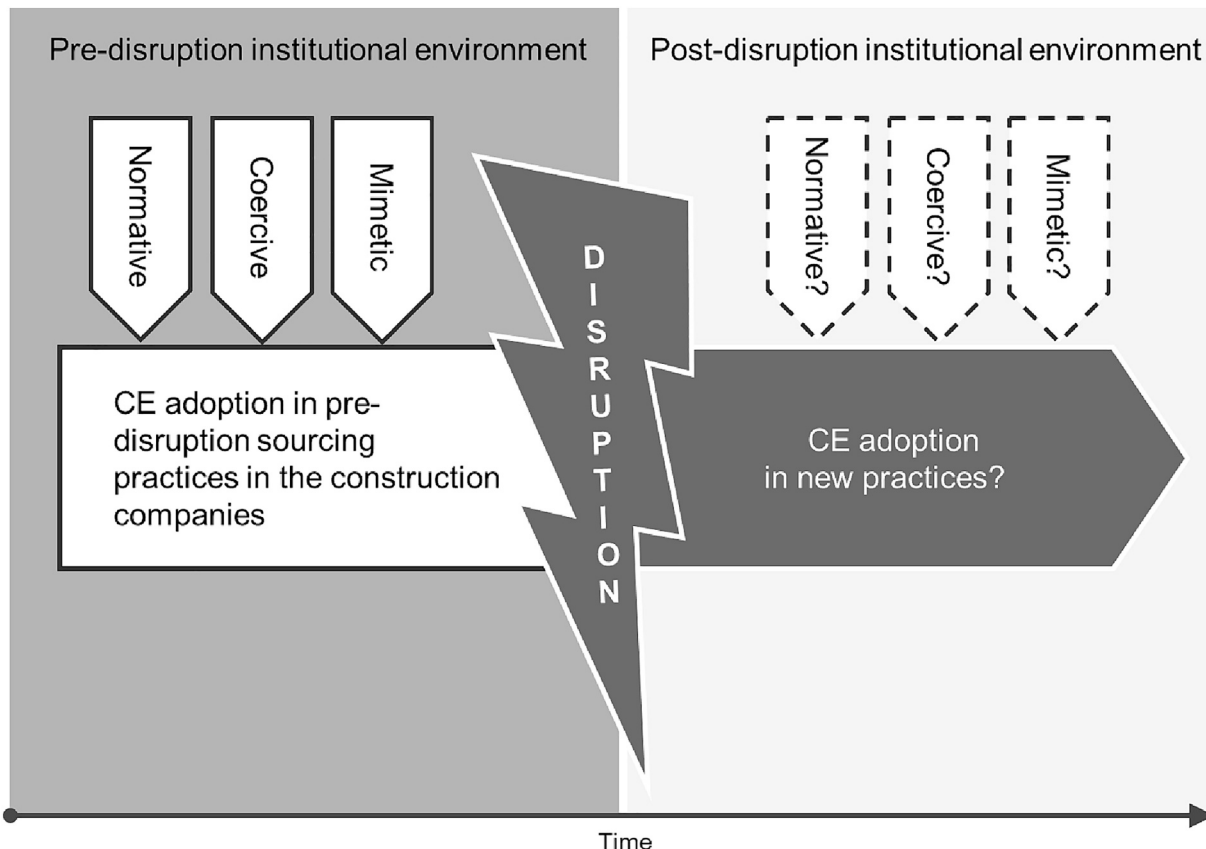


Fig. 2. The theoretical and analytical framework of the Study

majority of the relatively small Finnish new building construction sector by turnover. When the construction companies were first contacted, they were asked to select a representative best suited to address questions related to the CE in the context of the company’s stakeholder relations and material sourcing and usage practices. The resulting group of 21 interviewees (with one company represented by two interviewees) comprised 12 sustainability experts, 4 development experts, 3 procurement experts, and 2 corporate executives. The prevalence of sustainability professionals in the sample likely suggests that within the selected companies, CE as a topic was more closely associated with the responsibilities of the sustainability function than those of, for example, the procurement function. An anonymized sample composition table with the interview details is presented as [Appendix 1](#).

3.2. Research interviews and analysis

The semi-structured interviews were conducted online between May 2022 and February 2023 and lasted from 21 to 71 min. The interviewees were first asked background questions regarding the operations of their

companies, their roles within those companies, and their roles’ potential connections to CE matters. The second part of the interview focused on the CE alignment of the pre-pandemic sourcing practices at the companies and on the significance of normative, coercive, and mimetic institutional pressures in shaping them. As the interviews were conducted after the pandemic and an understanding of pre-pandemic practices had to be formed retrospectively, the interviewees were asked to consider when the CE concept was first raised on their firm’s corporate agenda and what types of CE practices the company had engaged in since. To gauge the significance of normative, coercive, and mimetic pressures in shaping the CE alignment of sourcing strategies and raw material choices, the interviewees were asked to describe the stakeholders and factors influencing CE alignment at their company and whether said influences were regarded as promoting or hindering CE adoption. The third part of the interviews focused on identifying CE-relevant changes in sourcing and material usage practices and priorities that emerged from the supply chain disruptions related to COVID-19. The interviewees were asked generally about those disruptions and their impact on sourcing and material usage and more specifically about

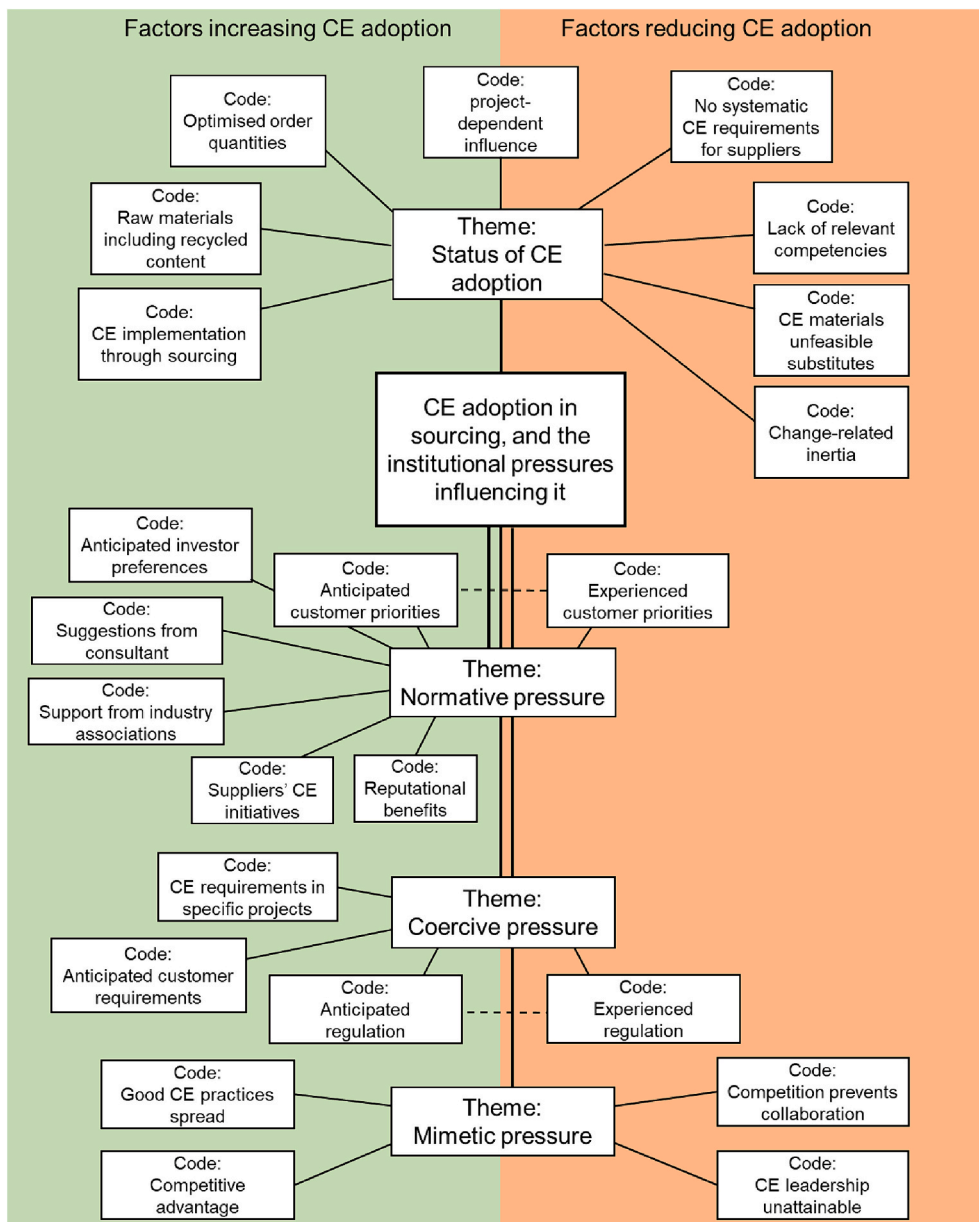


Fig. 3. Thematic network analysis of influences on and the status of the pre-disruption CE adoption in sourcing.

whether they considered the impacts as having any CE relevance. The interviewees were also asked to describe any CE-related expectations and requirements that their company had of their suppliers. The post-disruption institutional environment, while still largely unestablished, was discussed as the context of the post-pandemic corporate realities. The detailed interview guide is presented in the Supplementary Information.

To promote the trustworthiness of the study, all interviews were conducted in Finnish (the native language of the interviewees), recorded, and transcribed verbatim by a professional transcription service provider. The transcripts were analyzed using an abductive thematic approach (Thompson, 2022), at which point the relevant content was translated into English. In the initial stage of the abductive data analysis, the transcripts were coded to identify all points of significance in the context of the research questions and the theoretical and analytical framework of the present study (Fig. 2). In the next stage, the codes were categorized into themes, with all codes portraying a distinct phenomenon constituting one theme (Braun and Clarke, 2006; Thompson, 2022). The development of themes from codes is displayed qualitatively through a thematic network analysis, which through its explicitness is viewed as increasing the transparency of research findings (Attride-Stirling, 2001). Due to the differing focus and theoretical context of the two research questions in the present study, a separate thematic network for each question is shown in Section 4 (Figs. 3 and 4). The sub-codes from which the codes emerged are presented for each network in Appendix 2 and Appendix 3 respectively. These sub-codes are the unit of analysis in the present study. Codes encompassing only one sub-code were excluded from the analysis.

As is uniquely characteristic of abductive qualitative analysis (e.g., Atkinson et al., 2003; Thompson, 2022), the exploration and theorizing based on the identified themes in the remainder of the article are guided but not determined by the existing theoretical and conceptual understanding introduced in Section 2. Accordingly, the theoretical and analytical framework synthesizing relevant prior contributions for the purposes of the present study (Fig. 2) is intended to provide structure and focus, rather than constrain the empirical findings of the study to an existing theoretical context. Indeed, the present study investigates the extent to which the prior theoretical understanding explains its

empirical findings and seeks to help refine theory where it does not (e.g., Makadok et al., 2018). The following section introduces the research findings through the thematic network analysis.

4. Findings

4.1. Pre-disruption CE adoption and the institutional pressures influencing it

The interviewees reflected on the pre-pandemic CE adoption in material sourcing and usage practices in their companies and discussed the diverse institutional pressures influencing adoption. Fig. 3 introduces the relevant notions raised by the interviewees and categorizes them based on whether they were described as increasing or reducing CE adoption.

4.1.1. Status of CE adoption

In recalling the status of CE adoption in raw material sourcing prior to the extraordinary supply chain disruption, *optimized order quantities* were widely discussed by the interviewees. Although seven interviewees described this optimization as largely financially motivated, it also increased CE alignment through reduced material use, as one interviewee put it: “Money guides us, so we order as little material as possible.” Another factor increasing CE alignment, the notion of certain *raw materials including recycled content*, was raised by three interviewees, two of whom cited the example of gypsum board. One explained that “it’s not really something we think about much; it just happens that the gypsum board has a certain percentage of recycled content.” On a related note, referring to the pivotal role of sourcing decisions in enabling CE adoption, the vast potential for *CE implementation through sourcing* was discussed by four interviewees. However, the construction company’s ability to realize this potential was described as inconsistent due to the highly *project-dependent influence* that companies had over sourcing decisions: eight interviewees noted that while construction companies could consider CE adoption in sourcing decisions for their own projects, in projects commissioned by external customers, material and design choices were determined by the customer specifications and requirements. As one interviewee put it, “Of course we can make more of

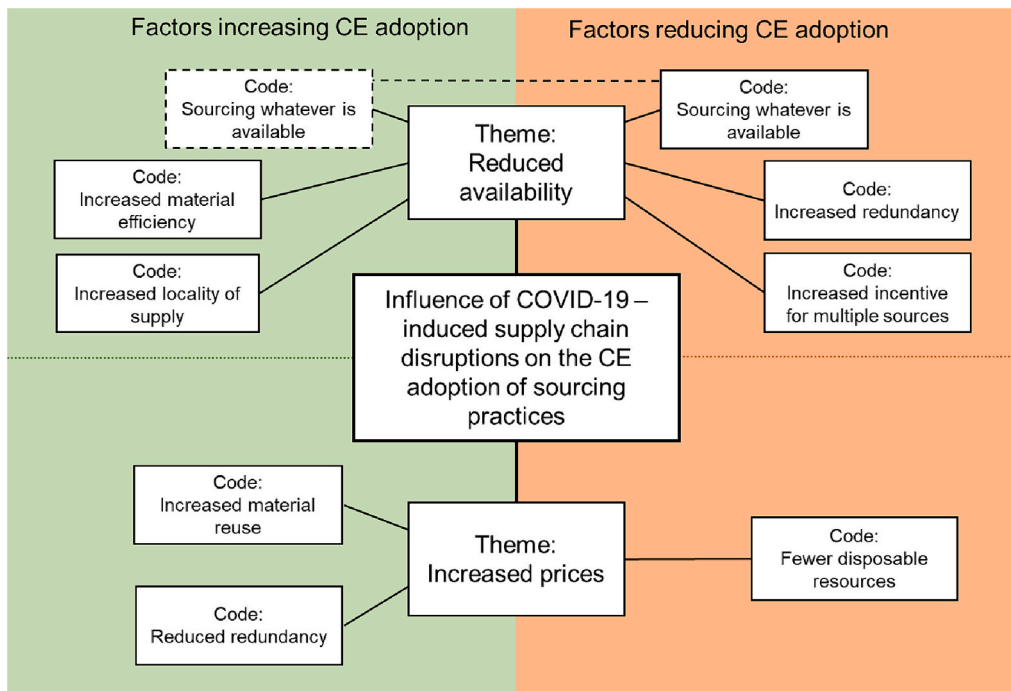


Fig. 4. Thematic network analysis of influences of COVID-19-induced supply chain disruptions on CE adoption in material sourcing and usage.

a difference when it's our own project.... With an external customer, we can offer them these solutions—but at the end of the day it's their choice.”

Perhaps in part due to this inconsistency in influence, according to the interviewees, their companies had *no systematic CE requirements for suppliers*. However, out of the nineteen interviewees discussing the topic, five described introducing CE-related material requirements for specific projects, with one of them explaining: “Some projects might have targets and the achieving of those targets is then considered in sourcing.... But this is not something that would be integrated into our processes in general.” Two interviewees also mentioned non-mandatory expectations towards suppliers, namely environmental impact data relating to sourced materials, and supplier adherence to a determined code of conduct.

Among the pre-disruption material sourcing and usage practices reducing CE alignment, a *lack of relevant competencies* needed for systematically pursuing CE adoption within a company was discussed by three interviewees. CE adoption was also reduced by perception of *CE materials as unfeasible substitutes* for their virgin alternatives due to limited availability, high costs, and expected quality deficiencies. These issues were described by three interviewees as detrimental in the context of their companies' key sourcing priorities, summarized by one interviewee as “availability, price, and supply security; these are the things that we must bear in mind, always.” As another factor slowing the transition towards CE alignment, *change-related inertia* within the construction industry was identified by two interviewees, one of whom described the industry as “so slow to change that everything comes to us slowly and late.”

4.1.2. Normative pressure

The interviewees described diverse normative pressures as incentives increasing the pre-disruption CE adoption in their companies. The pressure of societal demand for corporate CE transition had led the interviewees to perceive CE adoption as a measure for seeking visibility and *reputational benefits* in the eyes of the public. Of the seven interviewees discussing the topic, two specifically cited the pressure their companies associated with trying to attract young professionals, who were perceived as being highly environmentally conscious. The promotion of CE solutions by the companies' supplier base was portrayed in terms of *suppliers' CE initiatives*, efforts, and competencies driving CE adoption in sourcing. As one of the six interviewees describing this explained, “You can get far as long as sourcing knows to look for CE things. We have some suppliers who offer them, and we just need to recognize that ‘Hey, that's great; that's CE.’” Four interviewees noted *support from industry associations* in the form of information-sharing and encouragement towards CE alignment: “We get information and status updates without even asking.... The organization is there to support and represent us,” said one interviewee. Meanwhile, receiving ambitious *CE suggestions from consultants* engaged by their company was mentioned by two interviewees.

The interviewees considered CE in the construction industry as largely an emerging trend. Accordingly, anticipated stakeholder expectations were portrayed by the interviewees as a significant source of normative pressure increasing CE adoption. The pressure of *anticipated investor preferences* was discussed by two interviewees, who predicted CE adoption becoming increasingly important in securing funding and attracting investors in the future. CE adoption was also expected to evolve into a significant consideration among customers: the pressure of *anticipated customer priorities* was discussed by seven interviewees, one of whom stated, “this will become more important, so that these things will matter when making big decisions, like buying an apartment, or choosing to whom to commission a construction project.”

In contrast to the normative pressure associated with the anticipated customer priorities, the normative pressure emerging from *experienced customer priorities* decreased CE adoption in pre-disruption sourcing at the surveyed companies. Eleven interviewees described their customers

as not willing to pay for CE or not wanting reused or recycled elements in their new homes or on their premises. One interviewee suggested that “frankly, today, money is still the only thing they look at,” while another explained that “there's still an issue with the attitude.... Like, would a company that's commissioning the construction of their new headquarters or something want there to be used parts?” The normative pressure of experienced customer priorities emerged as particularly influential in shaping the CE adoption in pre-disruption material sourcing and usage practices, with the interviewees underscoring that the customer played the most important role in terms of steering their CE efforts.

4.1.3. Coercive pressure

The coercive pressures shaping CE adoption in pre-disruption sourcing in the construction companies emerged from experienced and anticipated regulation and customer requirements. Among the factors increasing CE adoption, *CE requirements in specific projects* commissioned by customers were discussed by nine interviewees, one of whom said, “sometimes customer have specific requirements, like a certain percentage of materials have to be CE products.” Two interviewees recalled a case where the requirements related specifically to an eco-label or certification the customer wanted their building to qualify for. *Anticipated customer requirements* were also noted by three interviewees, with one predicting that CE adoption “will be customer-driven; customers will start requiring this, and we must be onboard with the change. We can't get stuck in old ideologies from, like, the '80s.” As another significant consideration promoting CE alignment, *anticipated regulation* was actively discussed. Of the twelve interviewees mentioning pressure from anticipated regulation, six discussed regulations in general, while the other six referred specifically to the EU taxonomy for sustainable activities. According to one of the latter; “the taxonomy is going to influence our CE prospects. The requirements will be passed down to us because of our customers' reporting needs.”

As a factor reducing CE alignment, *experienced regulation* was seen as stifling opportunities for CE adoption in sourcing. More specifically, nine interviewees discussed perceived regulatory inconsistencies and contradictions and restrictive material eligibility and quality standards as hindering the use of CE materials. One said, “if we talk about using materials with recycled content, or demolition sites and what materials could be salvaged from there for new construction, the material eligibility standards really make things challenging,” while another noted that “it's a very narrow frame, what can be done with reused materials, as the regulation is really strict.” The interviewees underscored the importance of regulation as a factor steering CE adoption in their companies.

4.1.4. Mimetic pressures

In comparison to normative and coercive pressures, there were few references to mimetic pressures shaping pre-disruption CE adoption in the interviewees' companies. The role of mimicry in increasing CE adoption was portrayed by the notion that *good CE practices spread* throughout the construction sector once they have been shown to be successful by industry frontrunners. This phenomenon was described by two interviewees. CE adoption was also discussed as a source of *competitive advantage*, underscoring the importance of monitoring competitors' CE-related activities. As described by one of the two interviewees identifying CE as a source of competitive advantage, “if another company comes out with a CE topic, we need to stay alert and keep up with the times. So in that way, competitors do have influence on us.”

While competition was portrayed as driving CE efforts, it was also noted that *competition prevents collaboration* on CE topics within the industry, which hinders CE adoption. One of the two interviewees raising this issue explained that the “construction industry has always been very competitive, so if we innovate something, we're not going to tell anyone; we'll keep it to ourselves so it's our ace to play, and maybe we're

awarded the project because of it.” As a factor decreasing CE adoption by discouraging the efforts of smaller companies, two interviewees described how their firms considered *CE leadership to be unattainable* due to the superior resources of large construction companies: “I know that the big companies are doing a lot, and that’s great—but at the same time, I just wish we also had a team for this,” one of them explained. The interviewees underscored the importance of developing shared, standardized industry practices around CE, with industry associations suggested as the best vehicle for promoting and coordinating such efforts.

4.2. Post-disruption CE adoption in sourcing

While all the interviewees acknowledged the dramatic impact of the supply chain disruptions related to COVID-19 on their companies, four did not perceive those disruptions as having any CE-related influence on sourcing or material usage in their company. The rest, meanwhile, discussed a wide variety of new practices and priorities resulting from those disruptions, with both positive and negative influences on CE adoption. From the perspective of these interviewees, the COVID-19-induced supply chain disruptions encompassed two aspects motivating the adoption of new practices: the reduced availability of construction materials and extremely long lead times in obtaining them, and increased material prices as a result of the availability challenges. As one put it, “lead times are long, not everything is available, and prices have absolutely skyrocketed.” Reduced availability and increased prices constitute the two themes encompassing the codes of individual CE-relevant effects that can either increase or decrease CE adoption (Fig. 4).

4.2.1. Reduced availability

Several interviewees reported availability challenges influencing material sourcing or usage in a CE-relevant way and identified factors that increased or decreased CE adoption. As one of the factors promoting CE adoption, *increased material efficiency* was discussed as a strategy for making the most of available material, thus reducing the quantity of raw material the company had to source. As described by one of the by two interviewees whose companies had applied the strategy, “I would say it [lack of availability] evokes that mentality of times of scarcity and shortage, so you want to ensure that the use of materials is as efficient as possible.” *Increased locality of supply* emerged as a sourcing strategy in the face of the disruptions, as the wide geographic scope of supply chains was perceived as increasingly risky. The motivation for using more localized supplies promoted CE adoption through the reduced need for energy and resource consumption. Increased locality in sourcing practices was described by four interviewees, with one recalling that “we had massive challenges, and it has definitely increased our interest to favor more local production.... I have personally justified that it makes sense to pay a little bit more than to run the risk that material ordered from Central Europe never makes it here.”

Often the efforts to ensure business continuity during availability challenges drove construction companies to compromise on established material specifications and standards, resulting in an approach of essentially *sourcing whatever is available*. While such an approach, depending on the CE-relevant features of the available material, could either increase or decrease CE adoption, only one of the seven interviewees describing this sourcing practice suggested it could yield CE benefits, with remaining six discussing exclusively the negative connotations. One of the six explained, “we have been forced to take what we can get. So, there’s no way we’ve been able to draw comparisons based on environmental factors or anything; we’ve just had to make sure we can get *something*”, while another recalled an example case: “We’ve had a project where we strived to purchase material with as much recycled content as possible, but now it’s no longer clear what is even available, so we have to buy whatever we can get. We can’t practice proper sourcing.” The appeal of using standard materials due to their more secure availability and interchangeability, rather than niche materials with CE attributes, was also emphasized in association with sourcing

whatever is available.

Among the practices decreasing CE adoption, *increased redundancy* and safety stocking was described as a response to availability challenges. While one of the two interviewees raising this topic referred to long lead times as the reason for ordering a safety buffer, the other discussed their company’s panic buying of excessive quantities of material, which resulted in greater waste at construction sites. As another factor reducing CE adoption, *increased incentive for multiple sources* of raw material as a result of the extraordinary supply chain disruption was discussed. This practice, seen as hindering CE adoption through efficiency losses and increased transportation needs in the supply chain, was described by two interviewees.

4.2.2. Increased prices

From the new practices and priorities resulting from price increases, the ones promoting CE adoption related to minimizing the sourcing and use of virgin raw materials. One such practice was *increased material reuse*, which was discussed by four interviewees. Two referred to the specific example of timber used at construction sites. They suggested that the price increases had triggered the re-emergence of the discarded operating model of circulating timber, which had initially ended when the increasing cost of labor and the decreasing cost of timber rendered it unprofitable. As described by one interviewee, “on the positive side, with the higher costs of the materials, suddenly in some cases it’s once again profitable to have someone pull nails out of old timber and reuse it at another site—all of a sudden, that material has value.” Of the other two interviewees citing increased material reuse, one raised the example of improved circulation of metal as a result of price increases, while the other considered the monetary incentive for increased material reuse in general. As another factor promoting CE adoption, *reduced redundancy*—the opposite reaction to increased redundancy as a result of reduced availability—in order quantities due to price increases was reported by two interviewees.

Regardless of positive CE effects, CE adoption was also reduced by price increases, as the struggles to secure materials at a viable price resulted in *fewer disposable resources* to dedicate to CE efforts. Of the four interviewees raising this challenge, two discussed the topic in relation to shrinking profit margins and monetary resourcing, with one suggesting that “the price increase and the cost pressure mean we have less and less leeway to put money into CE experiments and projects.” The other two interviewees considered reduced disposable resources in terms of company focus and interests. One of them said, “we’ve had to prioritize, and so the focus has not been so much on these, let’s say, non-essential things, as it otherwise would be.”

The interviewees discussed no changes in the institutional environment as a result of COVID-19 triggered disruption, beyond the notions of the financial struggles among customers having increased their cost consciousness. The nature of the disruption to business and supply was framed as all-consuming for the companies, with the implication that considerations non-vital for short-term business continuity—such as normative and mimetic pressures—became secondary. Accordingly, the motivations behind new sourcing practices increasing CE adoption were strictly related to business survival, not to institutional pressures or CE ambitions. Despite this exclusive focus on business continuity, and the contradictory effect the extraordinary supply chain disruption had on CE adoption in sourcing, two interviewees saw the disruptions as an opportunity to discard the old, linear ways and adopt CE approaches instead. As one said, “this is getting a bit philosophical, but maybe it’s really that we need this [disruption]. Like, it’s been too easy, we’ve gotten too used to doing things the same way, so we need a big change.” Another interviewee also underscored the CE opportunities within the extraordinary supply chain disruptions: “Now we see we are in an acute situation where there is no material, so this would be the point to develop [CE]”. This notion of circularity born from necessity was also raised by four interviewees who reflected on the historic circularity of building construction in Finland, and—particularly in reference to times

of war and subsequent periods of intense scarcity—discussed the role of material shortages in necessitating efficient material circulation.

As a distinct opportunity for CE transition, the disruption was perceived as motivating the emergence of CE ecosystems around localized material reuse, with one of the interviewees noting, “this probably also supports the founding of new circular economy operators, building a business around the available material streams... The market is there for the taking.” The CE transition was also considered a strategy for mitigating risks related to supply chain disruptions by one interviewee, who hypothesized that developing close CE collaboration and relationships with partners could help sustain construction companies during supply chain disruptions. However, none of the companies represented by the interviewees had engaged in CE partnerships as a result of COVID-19-related supply chain disruptions.

5. Discussion

5.1. Contributions to theory and fields of literature

This study applies institutional theory to explore the influence of COVID-19-induced supply chain disruption on CE adoption in sourcing practices at Finnish construction companies. By examining retrospectively the pre-pandemic institutional influences and the resulting CE-relevant sourcing practices, as well as the new, CE-relevant sourcing practices that emerged from the extraordinary supply chain disruptions in the context of the institutional influences, the study addresses two significant gaps in existing research – namely the insufficient understanding regarding sustainable supply chain practices emerging from COVID-19, and the lack of empirical examples relating to circular procurement. This section discusses the present study’s empirical findings in light of the previous research, highlighting novel contributions to

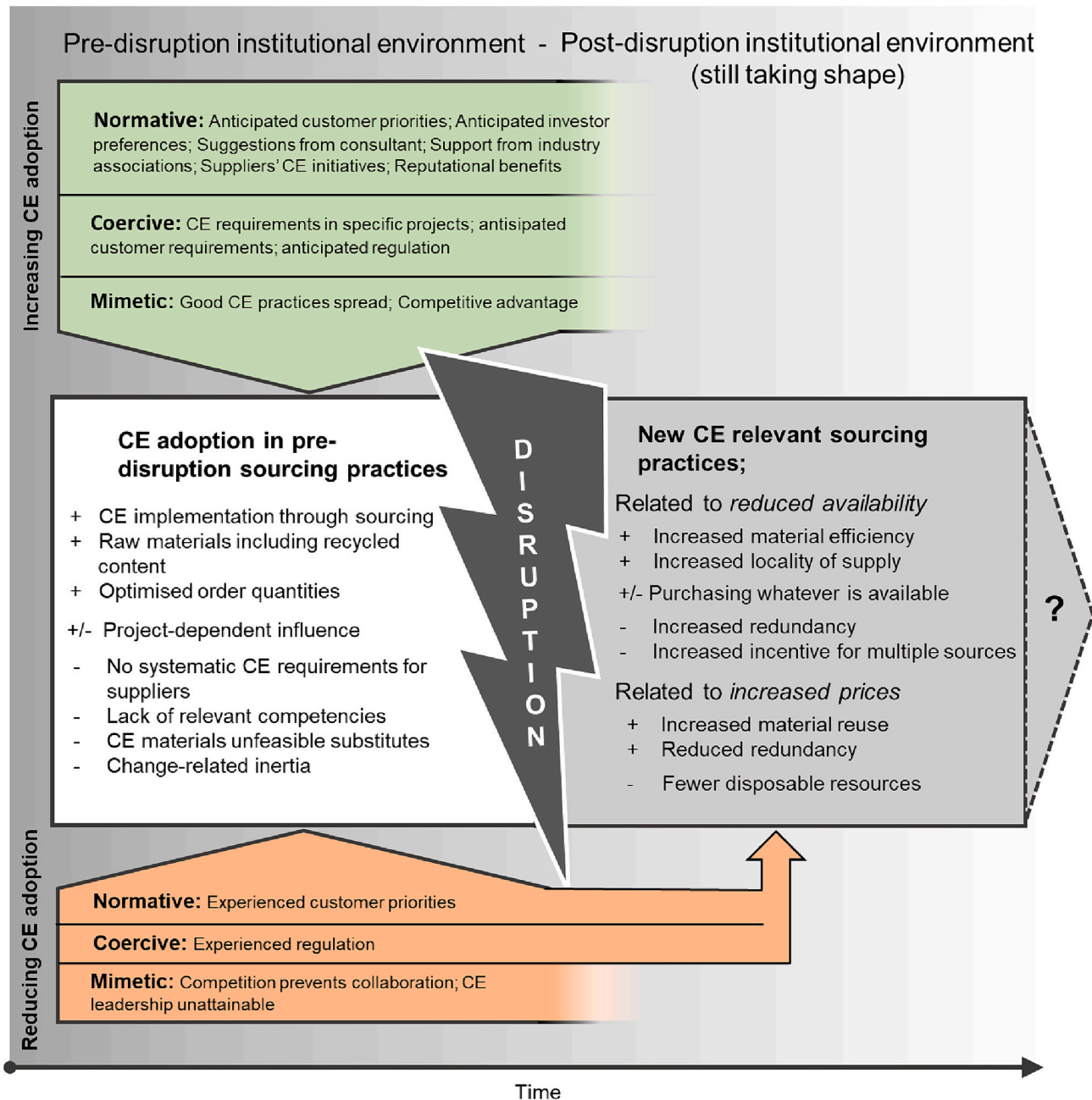


Fig. 5. CE adoption in sourcing and relevant institutional influences pre- and post-disruption.

different fields of CE research. The theoretical and analytical framework of the study (Fig. 2), further developed to reflect and summarize the empirical findings discussed in Section 4, is presented in Fig. 5.

Prior to COVID-19-initiated supply chain disruption, CE adoption in sourcing in Finnish construction companies was characterized by the prevalence of CE aspects that were economically beneficial, such as optimized order quantities, or organic and effortless, such as certain materials including recycled content. While the significant role of sourcing in promoting CE transition was underscored—a notion reported also in prior research (Ghisellini et al., 2016; Neessen et al., 2021b; Qazi and Appolloni, 2022)—no CE considerations were systematically integrated into sourcing practices, beyond isolated projects with more ambitious CE targets. As factors reducing CE adoption in sourcing, the lack of CE-related supplier requirements and relevant competencies were identified, with the latter recognized also in prior research as a significant barrier to circular purchasing (Neessen et al., 2021b; Qazi and Appolloni, 2022). In line with existing research (Feldman et al., 2024; Govindan and Hasanagic, 2018; Hart et al., 2019), the undesirable features of CE materials making them an unsuitable substitute for virgin alternatives was also raised as a factor reducing CE adoption. Finally, the change-related inertia associated with the construction industry was identified as a hinderance to CE adoption. In the context of other industries, a similar challenge of industry norms and culture favoring the sourcing of virgin materials has been previously identified (see Qazi and Appolloni, 2022).

Pre-pandemic, normative influences promoting CE adoption in the construction companies were associated with reputational benefits, supplier initiatives, industry association support, suggestions from consultants, anticipated investor preferences and anticipated customer priorities. The influence of anticipated customer priorities in driving CE adoption was contradicted by the stronger, opposing effect of experienced customer priorities in hindering CE adoption. This finding presents an interesting dynamic with the anticipated and experienced aspect of the same normative pressure driving companies in opposite directions in terms of CE adoption. The same contradiction was also prevalent in coercive pressures: regulations were viewed as reducing CE adoption, even as anticipated regulation promoted it to a lesser extent. These institutional ‘present versus future’ contradictions provide a valuable contribution to the field of research exploring drivers and barriers in corporate CE transitions (see e.g. Feldman et al., 2024; Piila et al., 2022), and an intriguing elaboration to prior research on institutional pressures in CE transitions (see e.g. Henrysson and Nuur, 2021; Ranta et al., 2018). Other coercive pressures increasing CE adoption were project-specific CE requirements and anticipated customer requirements. As mimetic pressures promoting CE adoption, the competitive advantage emerging from the CE, and good CE practices spreading within the industry were identified. Meanwhile, the mimetic pressures reducing CE adoption related to competition preventing CE collaboration, as documented also in prior research (Feldman et al., 2024), and the demoralizing view of CE leadership being unattainable.

While the COVID-19-initiated supply chain disruption was unanimously acknowledged as dramatic, and even its embedded potential for CE transition was discussed, no fundamental progress in CE adoption through systematic integration of the 3R principles into the sourcing practices took place. Rather, several more modest changes in sourcing practices had emerged from the lack of availability of materials and resulting increases in material prices; some of these changes increased CE adoption, but others reduced it. The factors promoting CE adoption relating to reduced availability were increased material efficiency and increased locality of supply, with the latter also described in existing literature as a supply chain resilience measure emerging from the COVID-19-initiated supply chain disruption (Mollenkopf et al., 2021). The most commonly adopted new practice of purchasing whatever is available was predominantly associated with reducing CE adoption, constituting an interesting insight to the field of CE related procurement and supply chain disruption research.

Other factors associated with reduced availability hindering CE adoption were increased redundancy in order quantities and greater incentives to use multiple material sources, both of which are typical strategies for building resilience against supply chain disruptions (e.g., Hosseini et al., 2019; Katsaliaki et al., 2022), and are known to generate negative sustainability tradeoffs (Hosseini et al., 2019). Relating to increased prices, factors promoting CE adoption were increased material reuse and reduced redundancy in order quantities, with the latter demonstrating how reduced availability and increased prices produced contradicting priorities in sourcing practices. This contradiction emerging from two inseparably interlinked impacts of a supply chain disruption constitutes an interesting contribution to CE-related procurement and supply chain resilience research. However, increased prices had also a negative effect on CE adoption due to the fewer resources available for CE considerations.

While an exceptional opportunity for a CE transition in the construction industry was clearly presented by the extraordinary supply chain disruptions surrounding COVID-19, a transition was not enabled by the institutional environment. Although many aspects of the post-disruption institutional environment are still taking shape, experienced regulation, which was described as a potent coercive pressure hindering CE adoption before the disruption, remained unchanged throughout the pandemic, therefore undercutting the opportunity for a transition. Experienced customer priorities that reduced CE adoption pre-pandemic also remained unchanged by the pandemic and related supply chain disruptions, leaving the institutional barrier to CE adoption intact. Mimetic pressures, which had the least influence on CE adoption in purchasing and supply chain practices before the pandemic, were arguably even less significant during the COVID-19-initiated supply chain disruption, as CE considerations were trumped by the sole objective of securing sufficient quantities of material at a viable price. Accordingly, the increase in mimetic pressure that previous research has associated with challenging circumstances (Williams et al., 2009) appears not to apply to topics perceived by companies as non-essential, such as the CE transition. This finding is significant in the context of institutional influences in corporate CE transitions, and accordingly an important contribution to the related field of research.

5.2. Recommendations for policy and practice

In relation to the prospect of a CE transition in Finnish construction companies, the iron cage of institutional pressures that Craighead et al. (2020) predicted could be shattered by the COVID-19-induced supply chain disruption instead remains intact. This is perhaps not surprising, given the nature of the institutional foundations of said cage; that is, experienced regulation and customer priorities, which no company hoping to remain in business can overlook, no matter the circumstances. Evidently, a radical change in corporate practices requires the enablement of a complementary change in the institutional environment, as any significant transition must be supported by coercive, normative and mimetic pressures (Ranta et al., 2018). It is therefore crucial to systematically develop the institutional environment to promote rather than suppress the CE transition when the next crisis, whatever form it might take, presents an opportunity for transition. Based on the findings of this study, the following recommendations, supporting institutional enablement of CE transition in the construction industry, while also increasing the industry’s resilience against future supply chain disruptions, are made for the policymakers and construction industry associations.

1. Coercive enablement: Reduce the bureaucracy and regulatory barriers associated with reuse of construction materials as far as possible without significantly compromising on material quality and safety, and design regulatory incentives for reuse. This is crucial in establishing a reliable secondary market for construction materials and enabling the use of localized, circular supply, such as Buildings As

Material Banks (BAMB), which also reduces the industry's reliance on complex and vulnerable global supply chains.

2. Normative enablement: Advocate for material reuse and other CE practices in building construction both within and outside the construction industry. Shaping customer and consumer attitudes towards material reuse from the current state of widespread aversion into acceptance and ideally preference is particularly crucial in enabling the CE transition in the construction industry.
3. Mimetic enablement: Help establish CE ecosystems and build collaboration. Different-level government entities and construction industry associations have an important role in acting as intermediaries between members of the CE ecosystem and in helping to establish CE operators that are currently lacking. Close collaboration among construction companies, and between the companies and their key stakeholders is crucial in realizing the CE transition in the construction industry and in sustaining the companies in times of crisis.

While such enablement of the institutional influences is indispensable, CE adoption in sourcing and supply chain practices is inevitably carried out by the companies. Construction companies should approach circular procurement not only as a corporate responsibility initiative, but also as a resilience strategy in supply chain management, helping them mitigate risks associated with supply chain disruptions that keep growing in both frequency and impact (Katsaliaki et al., 2022). Out of the CE-relevant sourcing and supply chain practices that resulted from COVID-19-induced supply chain disruptions, construction companies should strive to maintain and further develop those that increased CE adoption, and leave behind those that reduced it. Proactive CE adoption in sourcing strategies and processes, as well as internal competence development related to CE and circular procurement, are crucial in CE transition and futureproofing of material supply.

5.3. Further research and limitations of the study

In order to promote a CE transition, further empirical research on the success and failure of corporate CE transition actions associated with extraordinary supply chain disruptions in different industries is still needed. In particular, understanding regarding the institutional enablement of corporate CE transitions in terms of harnessing institutional drivers and addressing the barriers is critical in helping companies seize the CE transition opportunities embedded in inevitable future crises. As a pivotal activity in both construction industry CE transition and supply chain resilience, material reuse, such as the use of Buildings As Material Banks (BAMB), should be further explored in terms of institutional enablement. We also believe that the identified contradiction between anticipated and experienced institutional pressures driving different CE outcomes is significant in understanding corporate motivations for CE transition, and therefore merits further examination.

Finally, while COVID-19 did not disrupt the fundamental institutional barriers preventing a corporate CE transition, many aspects of the institutional environment are still taking their post-pandemic shape. Accordingly, research efforts examining, for example, emergent customer requirements and priorities and corporate approaches to collaboration on CE in the post-pandemic era would generate valuable insights. Such efforts, along with the policy and practical recommendations of the present study, could support corporate CE adoption in general, and more specifically, once a transition opportunity emerges from a future crisis.

Like all research, this study has certain limitations. Reflections on the pre-disruption purchasing and supply chain practices are retrospective, as all the interviews were conducted after the pandemic. While the study explored the CE transition opportunities associated with the COVID-19-induced supply chain disruption specifically in the context of the Finnish construction industry, the key institutional barriers undermining those

opportunities, such as the lack of regulatory and normative support for reuse and customer preferences for new products, are also applicable in other institutional, regional, and industry contexts (see Ranta et al., 2018). The implications of the present study are therefore not limited to the Finnish institutional environment or the construction sector.

6. Conclusions

Through empirical insights into CE-relevant changes that occurred in Finnish construction companies' sourcing practices as a result of the supply chain disruptions triggered by COVID-19, this study addressed critical research gaps associated with COVID-19-initiated corporate sustainability transitions, and the success and failure of circular procurement. The study discovered that while an opportunity for CE adoption in Finnish construction companies was presented by the extraordinary supply chain disruption, a fundamental transition was not enabled by their institutional environment – in particular, by the restrictive regulations and customer aversion towards CE solutions, which prevailed throughout the pandemic. However, the study also found regulation and customer priorities to be characterized by an intriguing temporal contradiction between experienced and anticipated institutional pressures, with the prior hindering CE adoption, and the latter, to a lesser extent, promoting it. Within the bounds of the institutional influences, diverse new sourcing practices motivated by the lack of availability and increased material prices did emerge from the supply chain disruptions, but while some of them increased circularity, others reduced it.

The findings of the study contribute to the research areas relating to institutional influence in CE transitions, circular procurement and supply chain management, supply chain disruptions, and CE in the construction industry. Based on the findings, recommendations are made for policymakers and construction industry associations to engage in coercive, normative and mimetic enablement in order to support CE adoption in the construction industry both before and during future crisis that present opportunities for CE transition. Further, recommendations are made for construction industry practitioners to adopt CE in sourcing strategies and practices in order to drive the urgently needed CE transition in the industry, and to safeguard their raw material supply against future supply chain disruptions, that keep growing in both frequency and impact. Finally, the study suggests future research directions supporting the realization of the CE transition opportunities embedded in future crises. Specifically, research on the institutional enablement of joint CE and supply chain resilience solutions is called for.

Declarations of competing interest

None.

CRediT authorship contribution statement

Noora Piila: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Milla Sarja:** Conceptualization, Data curation, Methodology, Validation, Writing – original draft.

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Appendix 1. Sample composition table

No.	Company (alias)	Interviewee role	Interview date	Duration (minutes)
1	Company A	Procurement professional	December 9, 2022	53
2	Company B	Procurement professional	December 27, 2022	24
3	Company C	Procurement professional	February 2, 2023	37
4	Company D	Sustainability professional	May 25, 2022	64
5	Company E	Sustainability professional	June 9, 2022	64
6	Company F	Sustainability professional	June 13, 2022	66
7	Company G	Sustainability professional	June 22, 2022	50
8	Company H	Sustainability professional	June 23, 2022	47
9	Company I	Sustainability professional	June 23, 2022	59
10	Company J	Sustainability professional	July 1, 2022	51
11	Company K	Sustainability professional	August 12, 2022	26
12	Company L	Sustainability professional	August 31, 2022	29
13	Company M	Sustainability professional	September 19, 2022	47
14	Company N	Sustainability professional	October 10, 2022	48
15	Company O	Sustainability professional	December 19, 2022	27
16	Company P	Development professional	June 21, 2022	71
17	Company Q	Development professional	June 3, 2022	49
18	Company R	Development professional	August 16, 2022	44
19	Company S	Development professional; Deputy CEO	September 20, 2022	53
20	Company T	CEO	September 12, 2022	21

Appendix 2. Themes, codes and sub-codes associated with pre-disruption CE alignment in sourcing, and the institutional pressures shaping it. (The numbers indicate the number of interviewees citing a specific sub-code → code → theme.)

Theme: status of CE alignment		
	8	Code: Project-dependent influence
	8	The ability to have CE influence depends on the project type (own versus customer’s)
	7	Code: Optimized order quantities
	3	Minimizing costs through optimized order quantity
	2	Material efficiency has been a priority for a long time
	2	Careful planning in sourcing helps avoid waste
Factors increasing CE alignment	3	Code: Raw materials including recycled content
	2	Gypsum board has recycled content
	1	Sourcing re-used tiles
	4	Code: CE implementation through sourcing
	3	Sourcing has an influential position in CE adoption
	1	Material choices are crucial, sourcing makes inquiries about CE raw materials
	19	Code: No systematic CE requirements for suppliers
	12	No CE requirements for suppliers
	5	Only specific projects may entail CE requirements for suppliers
	2	There are CE expectations, but no requirements for suppliers
Factors reducing CE alignment	3	Code: Lack of relevant competencies
	3	The company is lacking in relevant CE competencies
	3	Code: CE materials unfeasible substitutes
	2	High cost, poor availability and inferior quality of CE materials
	1	New types of materials are a big risk no-one wants to take
	2	Code: Change-related inertia
	1	Construction industry is slow to change
	1	Construction industry is conservative, big changes are difficult
Theme: normative pressure		
	7	Code: Reputational benefits
	5	CE is important for positive visibility and reputation
	2	CE is important in talent attraction
	6	Code: Suppliers’ CE initiatives
	4	Suppliers may initiate/suggest CE solutions
	2	CE collaboration with suppliers
	4	Code: Support from industry associations
	3	Confederation of Finnish Construction Industries RT supports in CE transition
Factors increasing CE alignment	1	Green Building Council Finland builds CE network within the industry
	2	Code: Suggestions from consultants
	1	Consultant suggested re-use of water fixtures
	1	Consultants promote CE solutions
	2	Code: Anticipated investor preferences
	1	CE needed to secure funding in the future
	1	Anticipated pressure from investors
	7	Code: Anticipated customer priorities
	5	CE anticipated to be a growing customer priority

(continued on next page)

(continued)

Theme: normative pressure		
	1	Big customers such as cities expected to increasingly demand CE
	1	Younger consumers expected to increasingly demand CE
	11	Code: Experienced customer priorities
	5	Customers are not willing to pay extra for CE
Factors reducing CE alignment	4	Customers are not demanding /interested in CE
	4	Customers do not want CE materials in their buildings
	2	Customers' CE demands are not matched by their budget
Theme: coercive pressure		
Factors increasing CE alignment	9	Code: CE requirements in specific projects
	5	Customers have CE requirements for specific projects
	2	Customers may have requirements relating to eco-label or certification
	2	Public sector customers may have CE related contract clauses
	3	Code: Anticipated customer requirements
	3	Customers are expected to increasingly require CE in the future
	12	Code: Anticipated regulation
	6	Regulation is expected to push CE - anticipatory compliance secures business continuity
	6	EU taxonomy expected to push CE in construction industry
	9	Code: Experienced regulation
Factors reducing CE alignment	4	Excessively strict regulation and bureaucracy prevent CE transition
	5	Material eligibility requirements and being classified 'waste' prevent material reuse
Theme: mimetic pressure		
Factors increasing CE alignment	2	Code: Good CE practices spread
	2	Snowball effect, CE practices that are proven good spread within industry
	2	Code: Competitive advantage
	2	CE source of competitive advantage within the industry
	2	Code: Competition prevents collaboration
	1	CE collaboration in competitive situations is rare and difficult
Factors reducing CE alignment	1	CE information is not shared within the industry for competitive reasons
	2	Code: CE leadership unattainable
	1	CE leadership is exclusive to big companies with plentiful resourcing
	1	CE performance in comparison to peers seen as inferior

Appendix 3. Themes, codes and sub-codes associated with influence of COVID-19–induced supply chain disruptions on the CE alignment of sourcing practices. (The numbers indicate the number of interviewees citing a specific sub-code → code → theme.)

Theme: reduced availability		
Factors increasing CE alignment	2	Code: Increased material efficiency
	2	Efficient and sparing use of material in the face of reduced availability
	4	Code: Increased locality of supply
	2	Mitigating risk by localizing supply
	1	Newly found interest in locally available materials
	1	Suppliers re-shoring factories and production
	7	Code: Sourcing whatever is available
	7	Having to take whatever raw material you can get
	2	Code: Increased redundancy
	1	Safety stocking in order to survive long lead times
Factors reducing CE alignment	1	Panic buying in the face of reduced and unpredictable availability
	2	Code: Increased incentive for multiple sources
	2	Mitigating supply risk by using multiple, rather than just one source of supply
Theme: increased prices		
Factors increasing CE alignment	4	Code: Increased material reuse
	2	Increased circulation of timber within and between construction sites
	1	Improved circulation of metal in construction projects
	1	Increased cost of material motivates material reuse
	2	Code: Reduced redundancy
	2	Ordering less excess or buffer due to increased prices
Factors reducing CE alignment	4	Code: Fewer disposable resources
	2	Less money available for CE initiatives due to price increases
	2	Reduced bandwidth for any non-business-critical topics

Appendix 4. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.spc.2024.03.032>.

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