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Applying a Systems Thinking Approach to Circular Economy Transitions: Insights From the Use of a Sociotechnical Systems Approach Within the UK Hospitality Sector

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ABSTRACT

Despite more than 20 years of research into sustainable tourism, the environmental impact of the UK hospitality sector remains high. A growing body of research into the concept of a circular economy (CE) demonstrates that transitioning to this way of working has significant benefits both for the environment and business outcomes. However, understanding how a CE, or CE principles, are implemented remains unknown. In this paper, we adopt a sociotechnical systems thinking (STST) approach to propose and test a novel, practical framework for CE implementation, using the hospitality sector as a case study example. Data are gathered via a cross-sectoral, multistakeholder engagement programme to develop evidence-based, sectoral-specific CE implementation plans. We find that the STST offers an effective tool in identifying challenges and barriers to CE transitions and in developing future solutions, providing a mechanism for the implementation of CE principles across a sector. However, we found that the approach lacked clarity and provision of actionable steps, requiring additional insights from road-mapping literature. Theoretical and practical contributions are discussed.

1 | Introduction

Climate change resulting from human activity, including patterns of consumption and production, is changing weather patterns, food and water security, resulting in adverse impacts for human health, non-human health, global and local economies (Calvin et al. 2023). With direct industrial emissions responsible for more than 21% of total emissions (UNIDO 2024), it is imperative that solutions are found that address the planetary impact of industry. The circular economy (CE) model has been proposed as a potential solution, focused on retaining the value of materials and resources that have been previously wasted, to reduce the extraction of primary materials and remain within planetary boundaries (Desing et al. 2020; Whalen and Whalen 2018). Interest in the model has grown in recent years across policy, business and academic spheres (Calisto Friant et al. 2020; Geissdoerfer et al. 2017; Kirchherr and van Santen 2019). Rather than focusing on sustainability activity at the level of an individual business, the CE spans entire ecosystems, or 'networks of production' (Murray et al. 2017), creating a narrative of socially oriented, context-driven, systemic economic change (Webster 2021; Whalen and Whalen 2018).

Recent calls have emphasised the need for research that bridges the gap between theory and practice (Corvellec et al. 2020; Sharpley 2021), providing evidence on *how* the transition from a linear economy to a CE can be made. While existing literature has made some great strides forward in understanding how a CE

can be implemented, many studies have been criticised for being technocentric (Wuyts and Marin 2022) and largely focused on the manufacturing sector (Kirchherr and van Santen 2019; Rodríguez et al. 2020), excluding key sectors and overlooking the societal potential that a CE can truly produce (Geissdoerfer et al. 2017; Murray et al. 2017). Moreover, they have relied on a case study design (Sohal et al. 2022), tackled niche sustainability issues (e.g., Bech et al. 2019; Fedele and Formisano 2023; Jedelhauser et al. 2018; Kirchherr and van Santen 2019) or lacked success, citing issues of broader industrial or supply chain constraints that limit the implementation of a complete CE.

We underline the need to take a systems-based approach to successfully transition to a CE (Homrich et al. 2018; Murray et al. 2017; Webster and Pascucci 2024; Whalen and Whalen 2018). Our study proposes and examines the application of sociotechnical systems theory (STST) as a practical and evidence-based means to overcome CE implementation challenges. Using the hospitality sector as a context in which to test this approach, we explore the following questions: (1) How does STST identify challenges and barriers currently limiting the effectiveness of a CE transition, (2) how does STST identify potential future CE solutions and (3) how can STST support the identification of next steps and enabling factors to support and accelerate the CE transition within the sector?

Our work contributes in several ways. Firstly, by successfully and effectively applying a detailed STST approach to the challenge of CE implementation, we provide theoretical grounding and a practical tool for the use of this approach within future work. Secondly, the success of our application calls for a systems-based approach to be used for complex and dynamic challenges, such as the move to a CE or implementing sustainability initiatives. Our methodological approach to the challenge of CE implementation is novel, bringing together a range of stakeholders who produced innovative solutions, demonstrating the effectiveness of the STST approach. Thirdly, as a result of the successful application of STST to understanding what a CE would look like in the hospitality sector, we provide insights into potential future solutions that can be adopted by businesses, policy, industry leaders and academics.

2 | Theoretical Background

2.1 | A CE as a Sustainability Paradigm

The term 'circular economy' (CE) is defined as a concept which is focused on 'reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes' (Kirchherr et al. 2017, 224). A CE operates at multiple levels of production and society (e.g., product, consumer, company, supply chain, city and region) and aims to achieve economic and environmental sustainability for the benefit of both current and future generations (Kirchherr et al. 2017). For CE models to achieve environmental benefits, a hierarchy of strategies—commonly known as 'R' strategies—is proposed: refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose and recycle, the latter proposed only as a last resort (Kirchherr et al. 2017). As such, a CE differs from generalised definitions of sustainability or net zero to focus on environmental, social and economic regeneration by addressing the extractive, linear input–output model of material flow (Webster 2021).

Evidence has highlighted the benefits of the CE approach across several sustainability goals and domains. For example, a CE approach to construction has been found to significantly reduce CO_2 emissions and ozone depletion (e.g., Minunno et al. 2020), while the reuse of used car batteries in stationary applications would reduce cumulative energy demand and human toxicity (Cusenza et al. 2019). At a business level, the pursuit of CE practices was found to result in increased sustainability-oriented innovation and overall sustainability performance (e.g., Gopalakrishna Pillai et al. 2025), highlighting positive outcomes for organisations. Finally, across society, the CE model has been associated with the creation of new jobs in design, repair and remanufacturing, increasing community engagement and participation, improving health and safety and employee well-being (Korhonen et al. 2018; Padilla-Rivera et al. 2020).

In terms of implementation, the literature on *how* organisations can transition to a CE is nascent (Manniche et al. 2021; Sohal et al. 2022; Sørensen and Bærenholdt 2020). There is a growing body of work outlining the barriers and challenges of a transition to a CE (e.g., Blum et al. 2020; Corvellec et al. 2022; Jones et al. 2016; Kirchherr and van Santen 2019; Korhonen et al. 2018; Sonar et al. 2023), while fewer studies have explored enablers of such a transition, including practical tools and approaches (e.g., Alexander et al., n.d.; Gusmerotti et al. 2024; Kirchherr et al. 2023; Schultz et al. 2024). In particular, studies tend to focus on the organisational level, examining specific products or individual organisations (e.g., Bech et al. 2019; Elshaer et al. 2024; Fedele and Formisano 2023; Gopalakrishna Pillai et al. 2025; Renfors and Wendt 2024; Rodriguez et al. 2023). This focus limits generalisation beyond the organisations examined and fails to recognise that the CE transition is an ecosystem transition, requiring radical change at the individual, organisational, sectoral, supply chain and policy levels (Homrich et al. 2018; Kirchherr et al. 2017; Perramon et al. 2024).

In addition to this critique, the CE approach has received commentary concerning the scope and complexity of a fully circular society. For example, Blum et al. (2020) highlight that circular practices may not always be the most sustainable solution and so should not become the sustainable 'goal' for every system. Moreover, there are questions as to whether a fully circular system would ever be possible, with Corvellec et al. (2022) pointing out that the laws of thermodynamics underlie the need for waste to exist in some form. Concerning the business and societal promises of a CE, it has been emphasised that circular solutions do not increase social justice by default (e.g., Carenzo and Becerra 2024; Neville 2024; O'Hare and Rams 2024) but are context dependent. As a result, there are calls for a more thorough review of issues of social justice and the sociocultural dimension to guard against unintended consequences (Geissdoerfer et al. 2017; Homrich et al. 2018; Jalas and Numminen 2022; Mies and Gold 2021; Murray et al. 2017; Padilla-Rivera et al. 2020).

Despite these criticisms, there is no denying that there is a need to limit the world's use of virgin materials to preserve future generations, and as such, even achieving an imperfect

CE would still reap huge benefits for the climate crisis (O'Hare and Rams 2024, 221). Moreover, the concerns regarding the social impact of a CE are often due to efforts to implement a CE that only focus on the technical or material aspects of the process, neglecting any other factor that needs to interact with such technical or material changes. Therefore, we posit that a CE can still be beneficial for both environmental and social causes when considered and implemented from a systems perspective.

In summary, the CE approach represents a way to encourage the recirculation of materials within society, avoiding the use of virgin materials, which are draining the earth's natural resources, while also avoiding the excessive waste of materials that can still serve a purpose (Desing et al. 2020). The approach holds promises for many areas of life; however, how a CE is implemented within business contexts is not well understood, with existing studies focused on specific case studies of unique organisations, or small challenges where the findings cannot be widely generalised. Therefore, there is a need for greater insights and practical steps into *how* a CE is implemented, considering what the most pressing challenges are and what a CE may look like. We presently posit that a sociotechnical systems approach is required to tackle such a complex and dynamic challenge.

2.2 | STST

STST, first proposed by Trist and Bamforth (1951), is a theoretical approach to understanding dynamic systems. For clarity, we adopt the definition of a system that is offered by Meadows (2008), in which a system is a collection of parts that are interconnected and dependent on each other, but most importantly, has a purpose or a function. Initially developed to understand the relationship between the human workforce and new technological developments (see Pasmore et al. 2019 for a summary), STST has been expanded to examine systems more broadly, such as events (Challenger and Clegg 2011) and supply chains (e.g., Gattorna et al. 2022).

Since its inception, there have been several evolutions of the STST core model. Original models simply sought to identify 'social' and 'technical' parts of systems, exploring the relationships between the two. More recently, in relation to sustainability efforts, several authors have presented STST grounded models with three parts: social, technical and environmental (e.g., Sohal et al. 2022), facilitating a greater 'voice' of the environment. However, these broad 'catch-all' categories have been critiqued for being overly simplistic, overlooking many important aspects of systems that were grouped into these simplified categories (e.g., Coiera 2007). We therefore consider a more granular and specific STST framework, developed by Davis et al. (2014) and based on the work of Leavitt (1965). This STST model identifies six distinct factors constituting a system: goals, people, culture, processes/procedures, buildings/infrastructure and technology (Figure 1). These factors are acknowledged to sit within a broader system of financial and economic considerations, regulatory frameworks and a variety of stakeholders (Davis et al. 2014). Importantly, these factors extend across the different parts of a complex system,

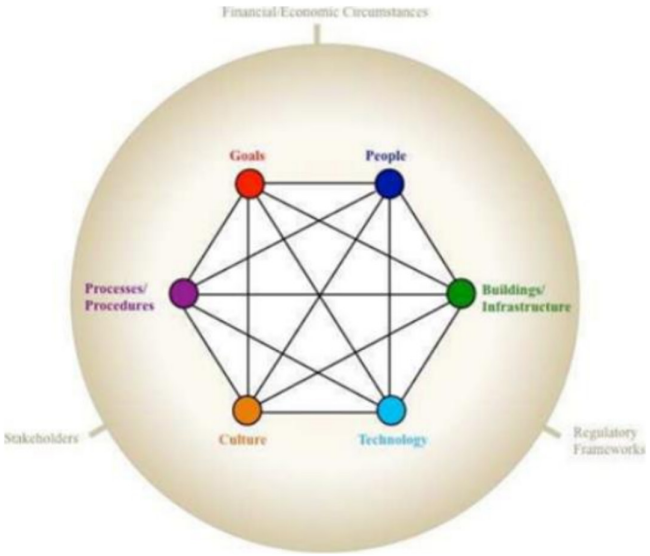

FIGURE 1 | Graphical representation of sociotechnical systems theory (Davis et al. 2014).

highlighting the fundamental, interconnected dimensions that need to be considered when undertaking large-scale changes.

Efforts to apply STST to the challenge of CE implementation thus far have been limited but promising, focusing on the different stages of implementation: to assess the *current* system, evaluate *ongoing* changes and develop *future* solutions. In assessing the current system, Gembali et al. (2024) used the STST structure to analyse grey literature to identify barriers to decarbonisation and CE transitions within the building and construction industry in India. To evaluate ongoing challenges, Sohal et al. (2022) implemented an STST approach to capture perceptions of CE transitions from stakeholders in India and breakdown case study exemplars of successful SMEs who had undergone circular initiatives. Finally, to develop future solutions, Jedelhauser et al. (2018) applied a STST approach to tackle the challenge of circularity of phosphorus in Switzerland, testing and evaluating different options in relation to the broader framework.

Despite these promising results, each investigation has studied only one industry or type of organisation. As highlighted above, the CE transition requires a supply chain approach (Homrich et al. 2018), which is a complex and dynamic system in itself (Gattorna et al. 2022). Additionally, these studies have often focused on a single factor of STST. For example, Sohal et al. (2022) classified research findings into only social or technical, rather than the granular factors as identified by Davis et al. (2014), overlooking key system parts that are vital for a seamless transition to a CE. Gembali et al. (2024) used the model to uncover only barriers to CE implementation, which, while important in design and planning stages, do not offer any actionable solutions—urgently required in the field. In summary, the emergent literature base provides a promising, albeit nascent, foundation for applying the STST approach to a challenge as complex and multifaceted as the transition to, and implementation of, a CE.

We therefore seek to address the challenge of implementation at the practitioner level by proposing a multistakeholder STST

approach that takes specific account of the social dimension. This responds to calls to consider the social embeddedness of organisational activities and to consider *how* institutional change can be achieved (Blomsma and Brennan 2017; Bramwell et al. 2017; Rodríguez et al. 2020). Thus, we recognise that the CE represents a complex business model to implement (Fedele and Formisano 2023), which has yet to translate into practice (Kirchherr and van Santen 2019). Furthermore, the application of a systematic STST approach, encompassing a hierarchy of resource life extension strategies, minimises the risk that the transformational potential of the CE is missed. Moreover, we respond to calls to recognise the importance of a multistakeholder approach to address the complexity of implementing sustainability in this sector (Boluk et al. 2019; González-Sánchez et al. 2023; Gusmerotti et al. 2024; Homrich et al. 2018). We propose the following research questions:

(*RQ*) How does the application of the STST framework support the

1. identification of challenges and barriers currently limiting the effectiveness of a CE transition,
2. identification of potential future CE solutions and
3. development of next steps and enabling factors to support and accelerate the CE transition within the sector?

2.3 | Research Context: Hospitality Sector

To explore our research questions, we focus specifically on the hospitality sector as a research context. This sector is a subset of the wider tourism sector, encompassing a wide range of diverse businesses, spanning pubs, hotels and fast-food restaurants. Within the scope of the present study, we select the hospitality sector over the broader tourism industry as this allows for a more cohesive 'goal' within the sector (e.g., service) which can be closely aligned to the challenge of CE implementation. This is in comparison with tourism, which may also encapsulate themes of travel and logistics, subsequently tapping into very complex challenges of managing these themes alongside CE principles. Additionally, hospitality as a sector faces further challenges, such as high employee turnover, sensitivity to the economy (e.g., Dogru et al. 2023) and guests failing to act in sustainable ways (see Nisa et al. 2017). Therefore, the hospitality sector is selected as our research context for three core reasons: (a) the sector's environmental footprint is significant; (b) the sustainability research landscape for the sector is fragmented, with initiatives focusing on individual eco-savings activities rather than taking a holistic approach; and (c) with its diversity of inputs, the sector is well positioned to signal demand for CE solutions across a wide range of other sectors.

We propose that this sector should be a focus for sustainability initiatives, since it is currently responsible for up to 15% of UK emissions (Clarasys 2023), but is correspondingly vulnerable to the effects of climate change and thrives in periods of stability (e.g., Gössling and Peeters 2015). Additionally, it plays a key role in society, being influential in regional development (Gopalakrishna Pillai et al. 2025), holding significant social capital within local communities (BEIS 2021; Gerke et al. 2024). As a system, the hospitality sector is associated with a supply chain from multiple resource-intensive industries (e.g., food and drink, textiles, packaging, electronics and construction), with any circular initiatives poised to create ripple effects across this network (Clarasys 2023). As such, any changes made in this sector have the potential to impact associated supply chains, organisations and individuals (Manniche et al. 2021), making it an important intervention point within the wider economic system.

Applying Kirchherr et al.'s (2017) hierarchy of strategies in the hospitality sector could lead to the design of built infrastructures, such as hotels and restaurants, which are energy efficient and designed for longevity, minimising the need for refurbishment. Menus might feature local, seasonal, plant-based foods, sourced from regenerative farms. Nutrients from food waste could be cycled back into the soil through composting programmes and links with local communities. Single-use packaging could be replaced with reusable, refillable alternatives in collaboration with local suppliers. See, for example, Manniche et al. (2021) and Gerke et al. (2024) for an analysis of these principles in practice.

Despite the potential influence of changes to this sector concerning wider circularity across supply chains and systems, the literature exploring CE perspectives is nascent within hospitality and service sectors (e.g., De Martino et al. 2025). However, some early studies have demonstrated the effectiveness of taking a CE approach to specific challenges, such as food waste and waste management (Bux and Amicarelli 2023; Renfors and Wendt 2024), food procurement and sourcing (Camilleri 2021; Gerke et al. 2024), stock management practices and waste redistribution programmes (Camilleri 2021; Vo-Thanh et al. 2021). Moreover, several case study papers have been developed demonstrating the efforts of singular organisations regarding how they have moved towards a CE (e.g., Gerke et al. 2024; Manniche et al. 2021). Taken together, these studies demonstrate that CE principles within this sector offer a promising direction for change, with a range of environmental and economic outcomes. However, the challenges of organisations examined are niche and represent small systems; the full extent of a CE within the hospitality system broadly is yet to be explored. Moreover, these findings further highlight that implementing CE practices often requires innovation and changes to supply chains, the development of new partnerships and effective communication of changes with customers (Camilleri 2021; Gerke et al. 2024; Manniche et al. 2021).

In summary, a CE has the potential to represent a form of strong sustainability, radically changing the way business ecosystems function (De Martino et al. 2025; Webster and Pascucci 2024), but only when it is embraced holistically, taking into account technological, social and cultural factors (De Martino et al. 2025). Within the hospitality sector, a sector which is currently utilising many virgin resources but presents an opportunity for vast supply chain change, the literature thus far has been niche and taken a narrow system approach. Therefore, we propose that facilitating a whole, sociotechnical system approach to the challenge of CE implementation will provide a key intervention pathway, answering the call by Bramwell et al. (2017) to break the existing patterns of behaviour within the hospitality and broader tourism sector.

3 | Materials and Method

3.1 | Research Method

As highlighted within the seminal works by Meadows (2008), a system needs to have interconnected parts and serve a function; once defined, we can subsequently change and evaluate it. Therefore, we conceptualise the hospitality sector as a system of interconnected industries, such as leisure, lodging and foodservice (Ottenbacher et al. 2009), while also acknowledging the immediate supply chain industries that are vital for the functioning of the sector. Examples of these supply chain industries include farms, food and drink manufacturers, equipment and furniture manufacturers, education and waste and disposal organisations (Xu and Gursoy 2015). In summary, the hospitality sector is complex, multifaceted and dynamic, justifying its conceptualisation as a system that can be dissected and changed using a STST approach.

To address the research questions and to fully apply STST, the present study utilises the Systems Scenarios Tool (SST) of Hughes et al. (2017). SST is an applied methodology designed specifically for identifying each factor of a sociotechnical system, considering current and future solutions (termed scenarios), strengths and barriers, as well as developing future action plans. SST consists of six stages, an overview of which can be seen in Figure 2 (Hughes et al. 2017).

Within the present study, the system parameters (Stage 2) were predetermined, given the scope of the project: to explore how CE adoption may be accelerated across the sector by identifying challenges and future opportunities. The operationalisation of each stage is described in further detail below.

3.2 | Participants and Procedure

Data were collected through two online half-day workshops, conducted between October and November 2023. To identify and recruit key stakeholders from the hospitality supply chain (SST Stage 1), participants were recruited from an existing business network, following an introductory event which was advertised across various industry group platforms. A total of 41 participants from 38 organisations participated in this study; a summary of demographic details can be found in Table 1. Of note, the majority of the sample held senior leader or technical positions, and the sample was distributed across the United Kingdom. Of the total sample, 43% of participants attended both workshops. Within the workshops, participants were grouped according to industry sector and relationship to the hospitality sector. Workshops consisted of a combination of work in these allocated groups, mixed groups and whole group activities. These groupings were determined after participants registered their attendance at the workshops to allow for even distribution of stakeholders between groups.

Each workshop lasted 3 h, facilitated by the research team and colleagues from the affiliated university. To ensure participants held the required knowledge on CE principles, preworkshop readings were issued, and an introduction to STST was provided.

Within the first workshop, the parameters of the workshops were set out, and measurable success criteria were codeveloped

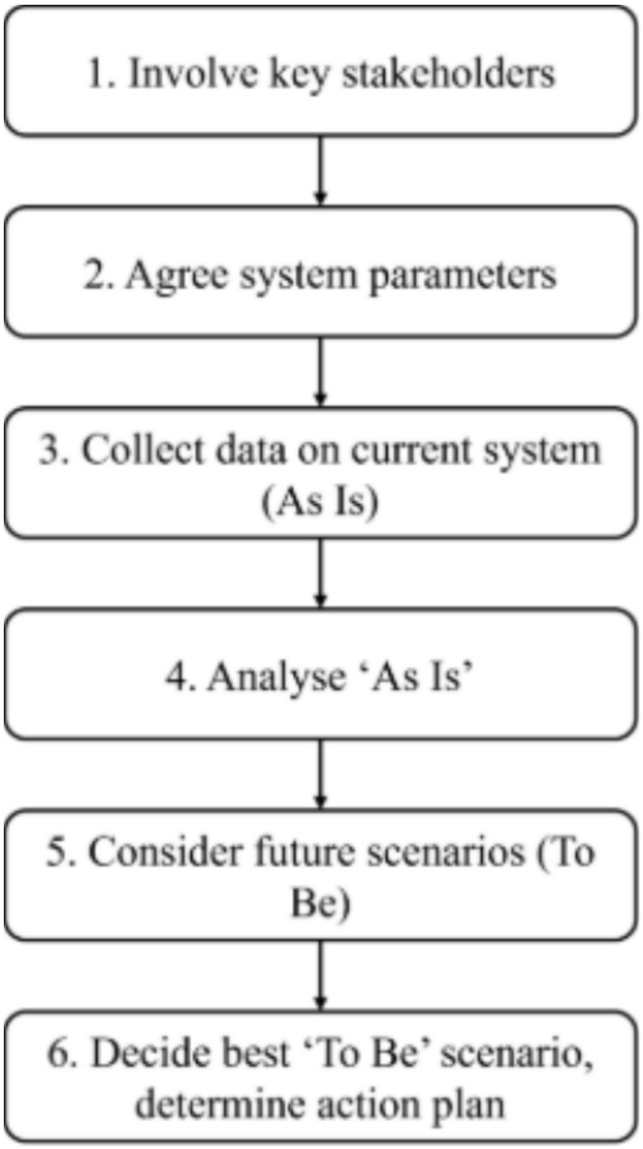

FIGURE 2 | Overview of the sociotechnical tool method, adapted from Hughes et al. (2017).

(SST Stage 2). This process was achieved by presenting initial criteria options, then synthesising discussions to identify key success criteria that are meaningful to the sector and CE principles. Given the focus on CE goals, a weighting system was implemented to boost the three CE criteria by a factor of 1.2, in line with guidance from Hughes et al. (2017).

The 'As Is' overview of the current system, predeveloped based on reviews of academic, government and policy literature (SST Stage 3), was discussed and refined in depth. To evaluate the success of the current 'As Is' system, participants anonymously provided ratings at both the hospitality system level and within their own industry group system (e.g., policy; SST Stage 4) against the agreed criteria. Specifically, participants were asked: 'Based on your experiences, how well do you think the "As Is" (and "To Be"—see below) system is successfully meeting these goals?', with scores of 10 indicating completely meeting the goal and 0 indicating not meeting the goal at all.

TABLE 1 | Demographic data for workshop participants.

	Company description	Attendee role	Industrial sector	Size of business	Location (registered office address)	Workshop group
1	Catering equipment manufacturer	Director	Manufacturing	SME	Suffolk	Group 1: Manufacturing and product design
2	Water treatment solutions	Sales Manager	Food and beverage	SME	Essex	Group 1: Manufacturing and product design
3	Catering equipment manufacturer	Technical Director	Manufacturing	SME	Stirlingshire	Group 1: Manufacturing and product design
4	Trade body	Chief Executive	Third sector	Microenterprise	Greater London	Group 1: Manufacturing and product design
5	Mattress manufacturer	Material Research Manager	Manufacturing	Large enterprise	Lancashire	Group 1: Manufacturing and product design
7	Mattress manufacturer	ESG Director	Manufacturing	Large enterprise	Lancashire	Group 1: Manufacturing and product design
8	Circular design and manufacturer	Director	Manufacturing	Microenterprise	Greater Manchester	Group 1: Manufacturing and product design
9	Governance	Senior Analyst	Public Sector	N/A	Greater London	Group 2: Policy and support
10	Local Council	Stakeholder Manager	Public Sector	Large enterprise	Greater London	Group 2: Policy and support
11	Trade body (hospitality)	Head of Projects and Consultancy	Third sector	SME	Greater London	Group 2: Policy and support
12	Trade body (manufacturing)	Responsible Sourcing	Third sector	SME	Greater London	Group 2: Policy and support
13	Sustainable events consultancy	Climate Strategist	Professional services	SME	Greater London	Group 2: Policy and support
14	NGO	Business Change and Collaboration	Third sector	Large enterprise	Oxfordshire	Group 2: Policy and support
15	Non-profit supporting sustainable hospitality	Project Coordinator	Professional services	Microenterprise	Greater London	Group 2: Policy and support
16	Material tracking services	Chief Technology Officer	Digital and technologies	Microenterprise	Derbyshire	Group 3: Enabling tech
17	Material tracking services	Sales and Operations lead	Digital and technologies	Microenterprise	Derbyshire	Group 3: Enabling tech
18	Sustainability consultancy	Assistant Manager	Professional services	SME	Greater London	Group 3: Enabling tech
19	Engineering services	Director	Professional services	SME	Carmarthenshire	Group 3: Enabling tech

(Continues)

TABLE 1 | (Continued)

	Company description	Attendee role	Industrial sector	Size of business	Location (registered office address)	Workshop group
20	Digital product development for a CE	Founder and Director	Digital and technologies	Microenterprise	Edinburgh	Group 3: Enabling tech
21	Transport logistics	Managing Director	Transportation	Microenterprise	Nottinghamshire	Group 3: Enabling tech
22	Digital solutions for a CE	Commercial Director	Digital and technologies	Microenterprise	Greater London	Group 3: Enabling tech
23	Textile-to-textile recycling service	Textile Planner	Waste management industry	Microenterprise	Devon	Group 3: Enabling tech
24	Digital product development for a CE	CEO	Digital and technologies	Microenterprise	Greater London	Group 3: Enabling tech
25	University	Academic (Lecturer)	Education	Large enterprise	West Yorkshire	Group 4: Consultancy
26	Sustainability consultancy	Consultant	Professional services	Large enterprise	Greater London	Group 4: Design and use of space
27	Sustainable hospitality design	Director	Construction	Microenterprise	Greater London	Group 4: Design and use of space
28	Interior design	Director	Professional services	Microenterprise	West Midlands	Group 4: Design and use of space
29	Holiday resort	Director of Sustainability	Hospitality	Large enterprise	Pembrokeshire	Group 5: Hospitality
30	Sustainable wine solutions	Senior Business Development and Sustainability Manager	Food and beverage	SME	Greater London	Group 5: Hospitality
31	Fast-food business	Head of Responsible Business	Food and beverage	Large enterprise	Greater Manchester	Group 5: Hospitality
32	Catering services	Sustainability Lead	Food and beverage	Large enterprise	Berkshire	Group 5: Hospitality
33	Food services provider	Sustainability Manager	Food and beverage	Large enterprise	Surrey	Group 5: Hospitality
34	Sustainable cleaning solutions	Director	Manufacturing	SME	Greater London	Group 5: Hospitality
35	Restaurant	Chef	Hospitality	SME	Greater London	Group 5: Hospitality
36	Pub support organisation	Sustainability Manager	Professional services	Large enterprise	East Staffordshire	Group 5: Hospitality
37	Brewery	Student placement	Food and beverage	Large enterprise	Greater Manchester	Group 5: Hospitality
38	University	Circular Economy Manager	Education	Large enterprise	Merseyside	Group 5: Hospitality

(Continues)

TABLE 1 | (Continued)

	Company description	Attendee role	Industrial sector	Size of business	Location (registered office address)	Workshop group
39	University	Doctoral student	Education	Large enterprise	Cardiff	Group 6: Food and nutrition
40	Wholesale food services	Head of Sustainability	Food and beverage	Large enterprise	Merseyside	Group 6: Food and nutrition
41	Food waste solutions	Founder and Director	Manufacturing	Microenterprise	Greater London	Group 6: Food and nutrition
42	Sustainable hospitality consultancy and education services	Founder and Director	Education	Microenterprise	Greater London	Group 6: Food and nutrition

To develop 'To Be' future scenarios (SST Stage 5), participants were grouped by industry to first identify ways in which their specific part of the supply chain could become more circular, with considerations for the upstream and downstream consequences, and reflecting across each factor of the STST.

The second workshop facilitated the refinement and consolidation of the 'To Be' scenarios, initially within industry groups and then evaluated within groups of cross-sector stakeholders. Each 'To Be' scenario was anonymously evaluated against the success criteria to determine the best option (SST Stage 6). As a group, an action plan for implementation was then designed. Participants were finally asked to provide feedback, thanked for their time and debriefed fully.

3.3 | Analysis

Data were collected in the form of workshop recordings, including individual breakout rooms, and a shared online document, whereby participants made notes on their proposed scenarios. The audio data were transcribed and anonymised and then used to expand upon the information in the online shared document, for example, by highlighting debates between groups and discussions of challenges or opportunities. Following the SST, the data were analysed using a thematic approach and predetermined themes of the STST parts.

4 | Findings

4.1 | Establishing and Evaluating the Baseline—As Is

A summary of the final 'As Is' themes can be found in Table 2. Overall, the participants confirmed that while the actors within the sector held a general understanding and desire to work towards broader sustainability-related goals, there was a lack of awareness of CE and information on how to achieve this. Additionally, the presence of other competing short-term goals and limited funding to spend on new CE-related technologies or infrastructure amendments impacted current progress towards a CE.

In line with the parameters of the project, the agreed-upon success criteria prioritised key CE goals (e.g., elimination, recirculation and regeneration), with a further eight tapping into key demands in the industry, such as financial viability, short-term or long-term focus, customer service and employee development. Average scores for each evaluation can be found in Table 3, alongside the full list of success criteria. Concerning the 'As Is' scenario, scores across all criteria were very low, with all but two receiving an average of less than 5. In relation to the CE goals, the 'As Is' system was rated 5.5 (weighted) for the elimination of waste and pollution, 4.6 (weighted) for the circulation of materials and 3.8 (weighted) for the regeneration of nature, demonstrating a clear lack of focus in supporting CE within this sector. The highest score for the 'As Is' was in relation to supporting short-term business success (5.8), followed closely by customer experience (5.3). Overall, the 'As Is' current system was awarded a score of 51.5 out of a possible 110 (46.8%).

TABLE 2 | Current 'As Is' of hospitality sector grouped by STS factor, as agreed by stakeholder group.

STS factor	As Is
Goals	• Focus on short-term wins > long-term development • Confusion with Net Zero targets • Focus on other goals, for example, staffing and cashflow
People	• Siloed teams, organisations and groups • Interest at the top, majority focused on service
Infrastructure	• Some specific sites in development, for example, anaerobic digestion • Some good retrofitting examples within the sector • Challenges relating to use of listed buildings and building restrictions
Technology	• New systems under development, for example, automation, modular design, targeting low water consumption and tracking systems • Awareness and accessibility lacking
Culture	• 'Survival mode' culture in many organisations • Split culture: Management makes the decisions, staff 'on the ground' have little voice • General 'sustainability' culture
Processes	• Some emerging sector guidance, lacks evidence • Government policy contradictory, for example, some anti-CE policies rewarding recycling and limiting lifespan of products • Organisational level dependent on leader, optional reporting

4.2 | Identifying Barriers/Challenges (RQ1)

Applying the STST framework, an overview of the barriers and challenges identified in preventing the transition to a CE within the hospitality sector can be found in Figure 3. This relates to the first research question posed within this study (RQ1a): *How does the application of the STST framework support the identification of challenges and barriers currently limiting the effectiveness of a CE transition?* The challenges are subsequently presented in line with STST, but it is acknowledged that many of the challenges identified relate to multiple factors of the STST framework, in line with theoretical positioning.

4.2.1 | Goal/Vision

Participants reported considerable confusion within the hospitality sector and its supply chains around the goals of Net Zero and the CE, with these seen to be separate, and at times conflicting, aims. The achievement of Net Zero was considered to take precedence over the CE, with one claiming,

> it's 99% focussed on carbon and Net Zero [...] because it's a quantifiable tangible thing.

Relatedly, it was found that there was not a coherent CE message: Participants were unsure what the benefits were, how it would help them and their business or how to implement it. Much of this issue was related to a lack of available data on which to base decisions. Finally, the sector is characterised by either a survival mindset, aiming to get through the next season, or a growth mindset, to avoid being in the survival mindset. Summarised well by one participant:

> What's missing is an understanding that you can have a thriving business that isn't obsessed with growing because they want to increase the bottom line and the profit.

Ultimately, the ability to engage in sustainability or CE efforts was seen as a luxury, and goals were found to favour more immediate or measurable challenges, such as performance and lowering emissions.

4.2.2 | People

Two main interrelated challenges were identified within the 'People' factor of the system: the nature of employment contracts and a lack of knowledge of CE and sustainability. As the hospitality sector is highly reliant on seasonal peaks in demand, most of the employment base is highly fragmented, comprised of short-term contracts, temporary workers and the use of multiple teams to cover long shifts. As organisations are unable to invest long-term in employees, the employees are also not invested in business activities, reinforcing the goal of short-term performance over long-term sustainability initiatives. Therefore, this workforce at both employee and leadership levels was found to lack the CE and sustainability-related skills and knowledge to implement any meaningful changes. This manifested in both immediate challenges (e.g., specialist skills such as equipment repair) and system-wide initiatives (e.g., how can CE be implemented across the supply chain). Therefore, even if one industry group tried to implement a change to be more circular, there was no guarantee that it would be extended or used appropriately further down the chain.

4.2.3 | Infrastructure

Infrastructure was typically viewed as one of the fundamental barriers to CE implementation by many of the participants. Some of these revolved around the physical buildings, with complex leases and a lack of freedom to make substantial changes; others were concerned with deliveries, with a lack of support and logistics for the transition to electric transport and reverse logistics. However, where this infrastructure was

TABLE 3 | Success criteria and scores of each discussed scenario.

Criteria	As Is	Product-as-a-Service	Centralisation of resources	Centralisation of logistics	Maximising food value
Elimination of waste and pollution	4.6 (5.5)	7.4 (8.9)	6.8 (8.2)	6.8 (8.2)	8.5 (10.2)
Circulation of materials	3.8 (4.6)	7.6 (9.1)	7.2 (8.6)	5.8 (7)	6.2 (7.4)
Regeneration of nature	3.2 (3.8)	4.3 (5.2)	4 (4.8)	3.4 (4.1)	7.5 (9)
Short-term business success	5.8	5.5	5.9	5.8	6.7
Long-term business planning	4.2	8.1	8.1	7	7.5
Financial viability	4.7	7.2	7.2	7.8	8.2
Reduction of carbon emissions	4.3	6	6.6	7.4	7
Customer experience	5.3	6.4	7	8	8.6
Job retention, creation and staff upskilling	4.7	6	6.2	6.4	7.2
Promotes and supports human health	3.9	6.8	7	6	6.8
Supports existing sustainability and Net Zero goals	4.7	4.8	5.4	5.4	7.2
Total	49.2 (51.5)	70.1 (74)	71.4 (75)	69.8 (73.1)	81.4 (85.8)

Note: $N = 31$ (As Is), $N = 24$ (To Be Scenarios). Scores in parentheses represent weighted scores prioritising CE goals, at a rate of 1.2× original score, in line with Hughes et al. (2017). Scenarios were scored based on 1 = *poor fit* to 10 = *excellent fit*.

in place, it was viewed as fragmented. For example, when discussing an initiative whereby a company collected glass bottles and refilled them rather than recycling the glass, ensuring the materials stayed within the circular system, one participant shared:

> for us in the pubs we were having to store all this glass for then a company to come once a week to pick it up [...]

While the value of this initiative was recognised, the organisation did not have sufficient storage space to hold the bottles for refilling before collection and subsequently considered withdrawing from the scheme, despite a desire to become more circular. As such, the characteristics of existing infrastructure were seen to be the biggest barrier for CE implementation, typically noting that the buildings they occupied neither had the additional space to store materials nor the procedural control or structures to implement new circular systems.

4.2.4 | Technology

The nature of hospitality as a fast-paced sector with low profit margins was identified as a significant barrier for technology innovation for CE, with further ramifications for both the infrastructure and processes dimensions of STST. For example, designing new technologies and educating businesses on how to effectively use them takes time and money, something that this industry does not have the luxury to prioritise. Indeed, one participant stated:

> You can have a product that will beat your competitors [on sustainability-related criteria] but if it's not the cheapest it's unlikely to be bought.

This statement again highlights the consequences for goals focused solely on short-term profit margins. Without the investment from sales, companies attempting to develop technology that supports circular or sustainable initiatives could not advance as quickly as they wanted to, stunting the speed of creating a CE. Yet participants confirmed the need for innovative solutions, both relating to technology and design. A lack of marketing and knowledge of existing CE technologies was also raised as a barrier.

4.2.5 | Culture

Participants reported a culture of risk aversion and a resistance to change:

> I think the cultural problem is, this is the way we do it, this is the way we've always done it.

This reflection relates to both business ways of working and the broader sector, with those across the sector constantly observing and comparing with each other, not wanting to make the first move on any large-scale change in fear of failure or significant negative impact. Yet, there were contradictions found here, with some participants arguing that the culture of enhancing customer experience and increasing profit could not be aligned with a culture of sustainability (e.g., switching to more sustainable

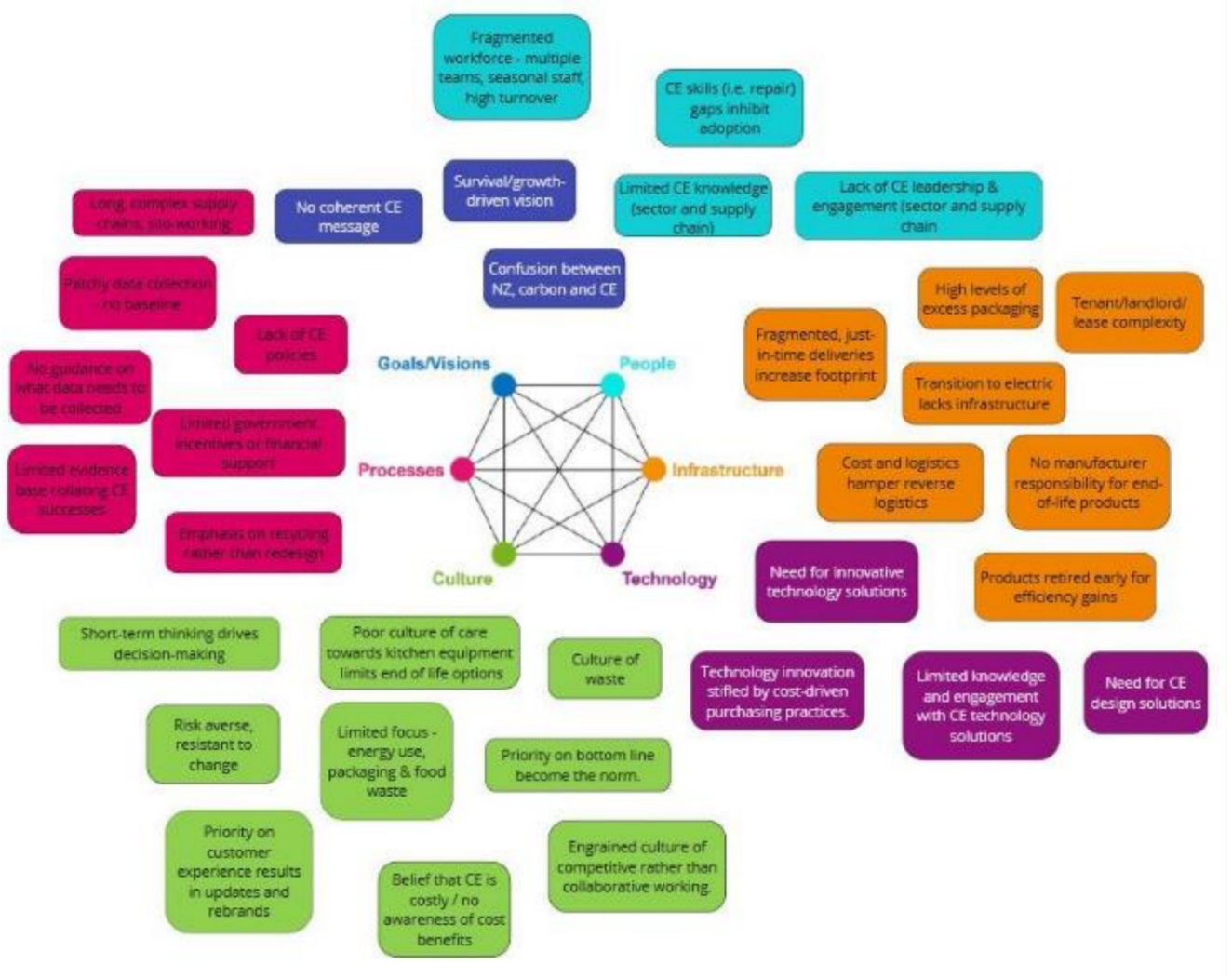

FIGURE 3 | An overview of the key barriers and challenges to the implementation of a CE by the hospitality sector.

products like paper straws), feeding into the lack of knowledge around initiatives. One of the biggest barriers here was the culture of business interactions within the hospitality sector, with participants stating that the sector encouraged independent, siloed working, facilitating competition over collaboration. This culture of independent, risk-averse approaches to sustainability-related issues was found to echo across the stakeholder group, reflecting a common perception of the UK hospitality sector. Therefore, efforts to implement CE-related changes would need a significant mindset shift to work alongside, rather than against, their peers.

4.2.6 | Policy/Processes

A resounding barrier to CE implementation within this aspect of the system was the complete lack of CE-related policies and processes at the business, sector and government level; a lack of evidence for how to implement CE effectively; a lack of financial support; and a lack of guidance on what information businesses need to collect to report efficiently. Many highlighted that businesses across the sector just were not familiar with the concept of a CE and that this needed to come from the country's leaders, with one participant reflecting

> I'm not sure I've heard a lot from leading ministers. I've heard lots about Net Zero. I don't think I've heard a lot about the CE.

This lack of policy and funding ultimately was perceived to be one of the biggest barriers, which underpinned many of the other barriers identified across the system. For example, the lack of policy and guidance hindered changes to business practices and ways of working due to a lack of knowledge, while the lack of funding prevented upgrading infrastructure and technology. Therefore, policy was found to play a significant role across the whole hospitality system, which has been scarcely mentioned within prior literature.

4.2.7 | Summary of RQ1

Overall, the results highlight several barriers and challenges to CE implementation, some of which have yet to be identified by existing scholarship, such as policy and cultural implications.

TABLE 4 | Overview of the identified future scenarios aimed at enhancing a CE.

Proposed scenarios	Summary
Product-as-a-Service	Moving to a lease model, rather than sale model, in which products are returned to the manufacturer at end of life. Products are made with a focus on using recycled or recyclable materials and are continually serviced and repaired throughout life. Places increased responsibility and ownership on the manufacturer, incentivising modular design, ease of repair and design for longevity.
Centralisation of resources	Focused on building redesign and refurbishments, offering holistic strip-out and fit-out services whereby resources are retained to be reused in a central hub, with a zero-waste contractor. Reduces complexity for clients using multiple suppliers and/or contractors and retains items to avoid waiting times for new furniture/resources.
Centralisation of logistics	Develop multiorganisation centralised distribution hubs outside congested areas to collate in-coming and out-going deliveries for organisations within dedicated zones. Eco-vehicles then make end of journey trips to and from individual organisations, consolidating trips and reducing emissions. Enables systematic, cost-saving logistics across multiple sites and resources.
Maximising the value of food	Placing value on previous 'waste' food products such as peels, eggshells and coffee grounds and providing easy, local access to food cycling machines which create nutrient rich powders which can be used for agriculture and are powered by solar power with a by-product of water.
Cohesive CE policy landscape	Strategy to develop policies to support and incentivise CE within business, with three key strands: 1. Measure: Develop holistic measure of CE and cost–benefit analysis process 2. Incentivise: Reward CE actions, for example, through tax cuts and rebates, punish linear economy actions, for example, increase landfill tax 3. Funding: Investment streams for training, CE technology and infrastructure innovation and supporting capital for transitions to CE.

The use of the SST to encourage reflection within each system factor was effective in facilitating discussion and consideration of barriers which had not been previously considered by the stakeholders. This allowed them to piece together how the disconnected workforce impacted culture and how the goal of short-term business survival dominated all other efforts within the sector to become more circular and sustainable overall. As such, taking a STST approach was found to be effective in identifying the barriers and challenges of CE implementation.

4.3 | Envisaging a Circular Future (RQ2)

To identify solutions for how CE principles can be applied across the hospitality sector (RQ2), participants were split into industry groups to identify how their part of the supply chain may trigger changes. Once again, participants were encouraged to reflect on the factors of the STST, incorporating each of them into the proposed solution. Five distinct 'future scenarios' were identified, which addressed the most important challenge for the respective industry system. These are summarised in Table 4.

Following discussions, it was concluded that the final proposed scenario, 'Cohesive CE Policy and Landscape', underpinned the success of all other scenarios from a policy and processes perspective. As such, it was decided that the core principles of this scenario should be embedded in the other four scenarios.

Participant evaluation of each of these future 'To Be' scenarios resulted in the 'maximising the value of food waste' scenario emerging as the greatest fit to the success criteria, scoring the highest on the CE factors of elimination of waste and pollution (10.2) and regeneration of nature (9), as well as many of the criteria related to the hospitality system more broadly. However, two

other scenarios, 'Product-as-a-Service' (9.1) and 'centralisation of resources' (7.2), were ranked the highest in relation to the circulation of materials evaluation criteria, demonstrating that no single scenario was the best fit across all criteria. The full results can be found in Table 3.

4.3.1 | Summary of RQ2

The second dimension of our research question set out to evaluate how effectively a STST approach would enable the identification of potential future CE solutions, as examined here within the context of the hospitality sector ecosystem. By splitting participants into groups aligned with their industry (e.g., a subsection of the hospitality supply chain), we aimed to capitalise on their existing knowledge, tackling the challenges most visible to them and their own businesses. This facilitated the development of highly detailed future solutions, which each group was passionate about. The use of STST again directed groups to think about system factors which were not their speciality (e.g., encouraging engineers to reflect on people factors). Upon reflection with participants, the use of the SST was found to contribute to the novelty of proposed scenarios, as well as perceptions that the scenarios were realistic and feasible, therefore promoting 'blue sky' thinking while recognising the constraints of the existing system.

4.4 | Next Steps and Enabling Factors (RQ3)

To develop a future-focused plan for how the hospitality sector could become more circular, we focused on the 'maximising the value of food waste' scenario as it was the highest rated by the participant group in relation to the predetermined success criteria. Considering all factors of the STST, participants were tasked with outlining the clear steps of how this future scenario could become a reality. The overview of actions identified by the participants can be found in Table 5.

TABLE 5 | Summary of action plan for the implementation of the future scenario: Maximising the value of food waste.

STST factor	Action
Goals/visions	Reduce waste from edible food
	Accelerate trend to grow own food
	Integrate existing technology
	Create food waste reduction roadmap
People	Educate the consumer
	Cross-sector collaboration
	Use of existing tools/programmes to engage stakeholders
Infrastructure	Upscale and increase access to anaerobic digestion and biogas facilities
	Daily food waste collections
	Dedicate cold storage space for surplus food
	Create a shared food waste 'hub' and map solutions to identify local opportunities
Technology	Implement product passports for food tracking
	Improved labelling and packaging materials
	Upscale use of food waste in product design
Culture	Food culture change campaigns
	Develop a culture of valuing food waste
	Communicate metrics to incentivise
Policy/processes	Mandate minimum space for food waste storage, segregate from general waste
	Produce easy access glossary of food waste categorisation and uses
	Collect data on end use for redistributed food
	Continued troubleshooting along the value chain

4.4.1 | Summary of RQ3

This stage of the project examined whether an STST approach could be used to support the development of the next steps and enabling factors. In comparison with the prior two investigations into the barriers and future solutions for a CE within the hospitality sector, we felt the SST was weaker in developing key directions and required additional support. Indeed, we ended up incorporating several premises from road-mapping literature (e.g., Abu-Bakar et al. 2024) to supplement the direction of the discussion, facilitating the development of actionable tasks and measurable outcomes. However, while a strength in facilitating depth of discussion, the multistakeholder workshop format resulted in a challenge regarding how the proposed CE actions would be taken forward and implemented, due to the absence of clear leadership.

Once again, however, the encouragement to reflect across all system factors within the hospitality sector was hugely beneficial to participants and resulted in them considering the impact of proposed changes on different factors without prompts and even considering system factors with which they were not directly linked within their current roles. In conclusion, utilising the STST approach to identify how to reach the future proposed solution did facilitate discussion but lacked clear guidance for what detail was needed within a future-focused plan.

5 | Discussion

The overarching aim of the present study was to apply a STST approach to the challenge of transitioning to a CE, using the

hospitality sector as a research context to represent a complex, dynamic system. Specifically, we set out to assess whether the approach would be effective in facilitating the identification of barriers and challenges to a CE, visions of a CE future within the hospitality sector and the development of key enablers or actions in how to reach this future. The results and reflections show that this approach was highly effective in identifying barriers and future perspectives within the sector; however, it was weaker in supporting the development of specific action plans where more detail was required. Overall, the STST approach allowed us to identify several previously undiscovered barriers to CE implementation and significantly encouraged participants to engage in 'blue sky' thinking and reflect on how possible solutions may impact areas of the system they themselves were not involved in. Therefore, we conclude that the approach is highly effective in this regard, but should be combined with specific road-mapping tools to underpin the steps to transition to a CE. The theoretical and practical implications of these conclusions will now be discussed.

5.1 | Theoretical Contributions

The current study furthers the extent to which STST has been used to address the challenge of CE implementation. As previously discussed, versions of STST have been used to varying degrees within this context (e.g., Gembali et al. 2024), but, to our knowledge, none have thus far applied the six-part version of the framework within the study of CE implementation, or to examine CE more broadly. In taking such an approach, the current work highlights several challenges and opportunities for future investigations into CE implementation.

A critique of the existing body of CE implementation literature is that interventions have failed or been challenged by an unforeseen barrier to change or conflict between differing CE and business goals (e.g., Cantú et al. 2021). By breaking down the barriers and challenges by STST factor, it was possible to identify which factors of a system will demonstrate greater resistance to sustainability-related interventions or require greater attention when designing solutions. For example, our results showed that the policy and procedure factor of STST had been woefully underemphasised within sustainability and CE initiatives currently present within the hospitality sector. As acknowledged by stakeholders, all proposed CE initiatives are therefore embedded with policy into the design, resulting in well-rounded solutions that address existing weaknesses in the system. Yet, this would not have been identified without focusing purely on how policy and procedures support or hinder CE implementation, in line with the SST and broader sociotechnical approach.

Moreover, this granular STST approach (Davis et al. 2014) gave stakeholders the ability to identify how changes to one factor within a system had consequential and interactive effects across the whole system. The process of identifying key factors of the system and continually reflecting on how each one is affected by a proposed intervention resulted in the development of novel and considered future suggestions. Such suggestions were not overly weighted towards solely technical or infrastructure changes and responded to calls to investigate the underresearched sociocultural aspects of CE transitions (e.g., Geissdoerfer et al. 2017; Murray et al. 2017; Padilla-Rivera et al. 2020). Overall, the current study presents a much more nuanced and dynamic approach to exploring how to implement or transition towards a CE in contrast to the existing literature; we encourage future research to test and further evidence the effectiveness of this theoretical grounding.

The successful application of STST to break down the challenge of how to implement a CE within a sector demonstrates the complex, interdisciplinary and dynamic nature of CE transitions. This further substantiates the need to use systems-based approaches to explore the present topic. As previously discussed, efforts focused on technical or behavioural changes alone have had limited success. Nisa et al. (2019) calculated the probability of positive change from behavioural interventions based on information provision campaigns alone to be just 3.4%. We argue this is a result of focusing on only aspects of the system and failing to consider how the challenge impacts different parts of business or supply chain systems in various ways. We call for further investigations grounded in the granular STST to substantiate our findings here.

Finally, the application of the STST to support the CE transition in the hospitality sector represents a novel application of the theory to the macrolevel of an industrial sector, made up of hospitality organisations, nested within multiple supply chains and the wider policy and regulatory environment. Having previously only been applied at business and large-scale event levels (e.g., see Davis et al. 2014), the current work demonstrates how effectively this framework can be applied at such a broad level and further substantiates the conceptualisation of a supply chain as a system. This approach subsequently brought ease to the breakdown of the system into its individual parts, facilitating clear identification of challenges. By using STST, both researchers and participants were able to meaningfully break down a once complex, dynamic system into digestible parts, which could then be analysed, altered and reintegrated through future solution planning. As a result, this study responds to calls for 'bravery' and creativity in the application of STST to support systems change (Davis et al. 2014) and to the need to move from CE theory to practice, establishing just how circular systems can be built at scale (Corvellec et al. 2020).

5.2 | How the Hospitality Sector Could Become More Circular

While the present study aimed to assess whether a STST approach would be effective in understanding and supporting the implementation of a CE, the investigation within the hospitality sector raised several novel solutions, considering both fundamental requirements and specific interventions. Firstly, it was made apparent that the goal of working towards a CE needs to be positioned alongside existing goals and challenges of the industry. Buy-in to this project was achieved through clearly communicating that a CE can not only help businesses develop to meet their own personal needs but also demonstrate how this can help the broader sector and economy within their local communities. Additionally, we found that policy from both local and

national governments to encourage the transition to CE models is vital to underpin interventions at all levels (e.g., business, industry and sector). Without these policies and guidance, there was little incentive or understanding for committing to circular initiatives, especially when they are seen as disruptive to 'business-as-usual' practices. This finding further substantiates the call for urgent policy development in this context (Calisto Friant et al. 2020).

The current work identified four clear potential scenarios for how the hospitality sector could implement a CE: Product-as-a-Service, centralisation of resources, centralisation of logistics and maximising the value of food waste, all underpinned by a cohesive policy landscape. It is interesting to note that none of the scenarios rely on the development of innovative technology or systems but rather the redesign and reapplication of existing technologies, infrastructures and processes. The extent to which these scenarios represent a significant departure from the current system varies, with those focusing on a waste management approach reflecting incremental change, while the Product-as-a-Service scenario suggests a new 'framework for thinking' (Webster and Pascucci 2024). However, taken together as a single alternative scenario, the future vision created by our diverse, interconnected stakeholders reflects a new, resilient and effective system, balancing large-scale infrastructure and policy with locally embedded implementation and fulfilling the transformational potential of a CE (Webster and Pascucci 2024).

5.3 | Practical Implications

CE principles and thinking come from both academic (i.e., Blomsma and Brennan 2017; Homrich et al. 2018; Kirchherr et al. 2017; Korhonen et al. 2018) and grey literature sources (Circle Economy 2023; Circle Economy Foundation 2024; EMF 2013, 2019, 2022). However, in-depth studies and implementation critiques have been conducted from predominantly academic perspectives. The STST and SST approaches are underpinned by the need to incorporate all stakeholders who would be influenced by, or involved in, any CE-related changes to business practices or ways of working (Hughes et al. 2017). Bringing stakeholders together within this study resulted in a host of novel, insightful and, ultimately, rational intervention ideas that stakeholders felt could *actually* be implemented across the sector ecosystem. Moreover, the diversity of practitioner experience is reflected across all findings within this project, from the success criteria, which balance factors affecting profitability and business viability with human and planetary health, to the range of complementary future solutions generated. This level of intrasector collaboration is rarely observed, especially as highlighted by the 'As Is' evaluation of the hospitality sector. Therefore, we encourage practitioners to facilitate these opportunities for collaboration, fostering communication and being open about ways in which stakeholders can work together to solve these complex, dynamic challenges related to sustainability. In summary, this work underpins the shift from incremental to transformative thinking and calls for future work to open the discourse on CE to a wider range of actors (Corvellec et al. 2022; Webster and Pascucci 2024).

The current study provides evidence for the effectiveness of the SST and STST approach in investigating sustainability and CE challenges. It was effective in understanding the barriers that exist in current ways of working, as well as encouraging solution-focused thinking about what can be done. Combined with additional future planning methodologies (e.g., Abu-Bakar et al. 2024), this work provides a clear method for practitioners, businesses and consultants to use when incorporating key performance indicators into roadmaps and action plans for CE implementation.

5.4 | Limitations and Directions for Future Research

While there are many noted strengths associated with the novelty of the present work, the project faced several challenges and limitations, namely, the nature of the workshops and engaging expert stakeholders. While this is a considerable strength and can result in the development of well-reasoned and insightful future solutions, the time constraints and availability of these individuals are limited, and as such, many who wanted to join were unable to make the time. With a more flexible funding and timing structure, future research could endeavour to bring together more stakeholders to develop meaningful and actionable solutions that can be taken further and implemented. Within the present study, we focused on bringing together expert stakeholders who would have deep insights into how the hospitality sector could become more circular. Indirectly, this omitted two key stakeholder groups: lower level employees and customers, both of whom are important particularly within the hospitality sector (Rodríguez et al. 2020; Sørensen and Bærenholdt 2020). We urge future work to include these stakeholders within further studies, particularly in evaluating potential solutions.

Relatedly, STST in practice is designed to be used as part of a cyclical, iterative process (Clegg et al. 2017), in which changes are implemented, reviewed and adjusted, with consistent evaluation against preagreed criteria. As such, we encourage future work to use longitudinal methods to investigate transitions to a CE using this theoretical framing and approach, to accurately examine whether this approach can facilitate system-wide change at this level of observation. Additionally, within the STST framework, we did not specifically account for ecological considerations within future solution planning, despite it acting as an underlying goal. Therefore, to keep the environment at the forefront of the discussion, incorporating an additional 'factor' within the STST framework to map scenarios to is something we encourage future research to consider.

The present study focuses on how a CE can be implemented, and as such, we have predominantly presented CE as being a generally positive direction to take. However, as highlighted within the Introduction, there are criticisms of the CE approach, such as whether it will result in positive societal or even environmental outcomes in every situation or system. Therefore, we encourage practitioners and others working on CE implementation to consider the scope of the changes required and the ecological impact, to ensure whether the CE is the most suitable and beneficial for the environment.

6 | Conclusion

Implementing a CE has the promised potential to transform the current economic system, reducing pressure on the planet and addressing wider systemic challenges. Yet, the process of how we, as a society, implement a CE is not well understood. Our study presents and examines the utility of STST (Davis et al. 2014) as an approach and tool for identifying barriers to, and opportunities for, CE implementation. We found that the tool was extremely effective when tested with stakeholders from the hospitality sector in the United Kingdom, identifying a number of meaningful ways the sector could become more circular. Overall, this work provides leaders, innovators and practitioners with a clear and actionable tool that can be used both to develop a holistic, in-depth understanding of the current state of a sector and for the generation of clear, multistakeholder CE action plans that could be used to facilitate the transition to a CE.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data are available from the corresponding author upon reasonable request.

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