

Introducing exaptation theory to social enterprise innovation: case study on the Circular Economy Innovation Communities (CEIC) project

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Abstract

Purpose – With the orientation for sustainability, circular economy (CE) is promoted through “exaptive events” such as educational workshops. Social enterprises (SEs) play an important role in CE transformation but face significant challenges. Whilst exaptation theory is well-studied in commercial context, less is known about its role in driving SE innovation. Thus, this paper aims to answer the following research question: how can exaptive events facilitate circular economy innovation in the context of social enterprise?

Design/methodology/approach – This paper conducted an in-depth case study of a CE-themed project in the UK, engaging with the event organisers and SE participants. Data were collected through interview, observation and secondary documentation. Using a structured inductive approach, this paper identified key themes and generated a grounded theoretical model.

Findings – Four themes are identified as: 1) knowledge sharing, 2) exaptive pools, 3) exaptive relations and 4) challenges to SE sustainability and success. Findings indicate that exaptive events can enhance SE innovation. Also, the connection of exaptive events, tools and relations helps overcome barriers in finance, commercial viability, social value and cross-sector collaboration. Nevertheless, finance and commercial viability inhibit SE’s further effective innovations.

Originality/value – By offering a new perspective – exaptive events – on SE innovation, this study extends the application of exaptive innovation beyond private-sector product commercialisation to tackling challenges faced by SEs. This study indicates that practitioners and policymakers can leverage exaptive events to promote

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sustainable development. For SEs, collaboration with public sectors through these events promotes resource sharing, joint innovation and commercialisation opportunities.

Keywords Social enterprise, Social innovation, Exaptive innovation, Circular economy, Local economy

Paper type Research paper

1. Introduction

In their pursuit of more sustainable development, circular economy (CE) innovation has been promoted by governments and industries (Liu *et al.*, 2022; Walpole *et al.*, 2022). CE is a concept first pioneered in the UK by Dame Ellen MacArthur that promotes a new way of thinking about how to use resources in an efficient and environmentally friendly way (Walpole *et al.*, 2022). In fact, CE has been subject to multiple definitions and has served as an emergent approach to industrial production and consumption (Korhonen *et al.*, 2018). The Ellen MacArthur Foundation (2022) utilises a system diagram, known as the butterfly diagram, to illustrate the continuous flow of materials in a CE, which consists of two cycles: 1) in the technical cycle, products and materials are kept in circulation through processes such as reuse, repair, remanufacture and recycling; and 2) in the biological cycle, the nutrients from biodegradable materials are returned to the Earth to regenerate nature.

Amongst the actors that facilitate CE innovation and transformation are social enterprise (SE), who play important role in the local economy, yet are constrained by various challenges. SEs represent a diversity of organisation types (Doherty *et al.*, 2014) and are connected by a desire to use the vehicles of commercial business to address social/environmental issues. As SE UK state, “Social enterprises are businesses with a social or environmental purpose” (SEUK, 2023). As an organisation they prioritise “people and planet” and reinvest the majority of any profits made to further their social and environmental mission (SEUK, 2023). In the UK, the setting of this research, SEs are becoming an increasingly important component of the national economic and social growth with over 100,000 SEs that contribute £60bn per annum to the economy and employ approximately two million people (SEUK, 2023).

SEs because of their mission driven functions are suggested to manifest significant potential to make a profound contribution to CE practice and thinking (Dezi *et al.*, 2022; Lekan *et al.*, 2021). In part this is suggested given they function in a “complex web of interconnected material and social relations” often related the goals and ambitions of CE (Lekan *et al.*, 2021 p. 257). However, to date very limited consideration of this potential has been researched, considered or presented (Dezi *et al.*, 2022). The majority of what does exist considers CE as a research landscape and subsequently seeks to make no contribution to the connectivity and value of SEs towards CE development and growth (Siegnier *et al.*, 2021; Schadenberg and Folmer, 2022). Samuel *et al.* (2022) suggested that obstacles to SE success often depend on local resources. More specifically, SEUK (2022) found that 22% of small SEs are based in the top 20% most deprived areas, and small to medium size SEs (41%) are more likely to be focused on improving a specific community. SEs struggle with resource capacity combined with their weaknesses when competing for public and private sector tenders suggest a need for participation and access to communities of practice or other forms of social networks (White *et al.*, 2018). These forms of public and private sector connections are argued capable of advancing trust and validity in SEs and ultimately could open various windows of opportunities for new income streams (Samuel *et al.*, 2022).

To promote the CE concept, efforts are made by governments, industries and academia in the form of educational programmes, training workshops and stakeholder engagement activities (Liu *et al.*, 2022; Walpole *et al.*, 2022). These can be regarded as “events” or

“exaptive events”, a concept rooted in the exaptation theory (Garud *et al.*, 2016). Specifically, exaptation innovation is referred to as instances where products, activities, technologies or relations originally created for a specific purpose are later found to serve a different function, often through an unexpected evolutionary process (Andriani and Cattani, 2016; Liu, Beltagui, and Ye, 2021). Accordingly, “exaptive events” means intentional gatherings and activities where individuals from diverse knowledge domains and perspectives come together to interact. These interactions are designed to spark the recognition and development of innovative ideas by leveraging the variety of viewpoints involved (Garud *et al.*, 2016; James *et al.*, 2022). These events, with focus on innovation, can potentially facilitate knowledge sharing and tackle the challenges SEs are facing during CE implementation.

While exaptation theory has been explored in the commercial world, it is unclear whether exaptive events can result in innovation in the context of SEs. Thus, in this paper, we seek to answer the research question: How can exaptive events facilitate circular economy innovation in the context of social enterprise? We conducted an in-depth case study on the Circular Economy Innovation Communities (CEIC), a project associated with a series of CE-themed events, based in the South Wales region, UK to engage SEs and the public sector in circular innovation. Based on empirical evidence from the case study, we apply exaptation as a theoretical lens and examine both the benefits and drawbacks of exaptive events in addressing SE-related challenges. We also investigate how the connection of exaptive events, tools and relations can effectively overcome barriers related to finance, commercial viability, social value and collaboration between SE and other sectors. By offering a new perspective on SE innovation, this study extends the application of exaptive innovation beyond private-sector product commercialisation.

2. Literature review

2.1 Social enterprise innovation

SEs have experienced considerable growth in both number and diversity over the past two decades. This is suggested to be possibly due to societies having to find innovative ways to respond to “market failure” and the reduction and restructuring of public service (White *et al.*, 2018). The systemic consequences of this economic and social restructuring are observed in emerging issues such as economic inequality, social injustice/inequality, post-industrial decline and community deprivation (Samuel *et al.*, 2018), access to employment (Defourny and Nyssens, 2008), consumer goods and services and health and wellbeing (Munoz *et al.*, 2015). Subsequently, we have now become accustomed to SEs socially innovating in areas where traditional public, private and third sector have left vacuums in the delivery of social, economic and environmental support and justice (Engelke *et al.*, 2016). SEs are active in a significant number of sectors across the UK and as a consequence they are recognised as noteworthy contributors to social innovation (Fulgencio and Le Fever, 2016), new enterprise start-ups (Maase, 2010), economic participation (Do, 2022), social justice, community engagement (Satar, 2019), individual and community wellbeing (Munoz *et al.*, 2015), ecological business practices/stewardship and increasing the adoptability and resilience of communities (Berno, 2017; Berkes and Davidson-Hunt, 2007). As such interest in their ability to succeed and grow is of increasing importance to communities, practitioners, governments, policymakers and academics alike (White *et al.*, 2018; Samuel *et al.*, 2022).

Despite the celebrations of SEs, they still face many challenges that are well documented in academic literature. For instance, SEs must deal with the managerial demands of deliver a “dual mission” that seeks to operationalise an organisation that can balance commercial and social values (White *et al.*, 2022; Santos *et al.*, 2015). There is no standard framework to

measure and report social value to show the ‘social’ success and of the SE (Mook *et al.*, 2015). Also, many SEs find it difficult to develop sustainable income streams and suitable investments, especially if SEs are operating in social and economically challenging geographies and markets (Samuel *et al.*, 2022; Samuel *et al.*, 2018; Doherty *et al.*, 2014; Lehner and Nicholls, 2014). When competing for opportunities to work with the public and private sector, SEs are often suggested to be perceived as too small or not professional enough to deliver outsourced public services and other commercial contracts (Peattie and Adrian, 2008). Moreover, many SEs are still viewed as charities, or lifestyle businesses that are not capable of the professional delivery of contractual obligation (White *et al.*, 2022; Liu *et al.*, 2015), and whereby this indicates challenges in attaining stakeholder validity in SEs’ practice.

White *et al.* (2018) presented a comprehensive overview of the challenges SEs must contend with when operating in areas of high social and economic deprivation. Following a three round Delphi study of SEs operating in South Wales, White *et al.* (2018) identified and ranked 14 challenges SE face, the first five being finance, leadership, commercial viability and social value, professionalisation of marketing and perception of validity. This study is further expanded to include a paradox perspective, suggesting that the success of SEs can rely on the alignment of different aspects of their business model and the generation of both profit and social good (White *et al.*, 2022). Yet, as a conceptual study, the paper does not provide detailed approaches to SE innovation and enhancing both social and economic performance. To tackle the challenges in SE innovation, Myers (2017) recommended the engagement with multi stakeholders with a non-top-down innovation approach. Indeed, Newth (2016) argued that because SEs are formed from social, commercial and political expectations, their capacity to innovate is driven by its various stakeholders’ salience, legitimacy, access to resources, social cultural capital. In addition, Kong (2010) argued that intellectual capital draw from stakeholders is also key for SEs to keep innovating. Other studies show the positive service innovation outcome through the partnership between the public and third sectors including SEs (Hellstrom, 2021). Innovation in SE is suggested to be promoted via the interactions between public, market and community resources (Picciotti, 2017), and as such the sharing of resources and inter-dependencies between the public and third sectors is suggested capable of enhance the innovation capabilities of both sectors and SEs alike (Knutsen, 2017).

2.2 Exaptation

The notion of “fortunate” or serendipitous circumstances frequently arises among discussions of research and innovation (Leckel *et al.*, 2020; Sauer and Bonelli, 2020; Kakko and Inkinen, 2009). These are unplanned, random or unexpected events that somehow result in the generation of some valuable or advantageous development (Wareham, *et al.*, 2022; Kakko and Inkinen, 2009). Recent research has begun to uncover the foundations of serendipity and reveal that such occurrences are not necessarily as unpredictable as may have previously been thought (Andriani and Kaminska, 2021; Beltagui *et al.*, 2020; Andriani *et al.*, 2017; Andriani and Cattani, 2016; Andriani and Carignani, 2014).

Within the field of management innovation, the ability to operationalise unforeseen moments of serendipity has been termed “exaptation”. Exaptation originates from the field of biology and originally referred to the unintended utilisation of a physical feature for purposes other than that which it was originally intended (Garud *et al.*, 2016; Gould and Vrba, 1982); examples include bird feathers, which developed for temperature regulation but became the means of attaining flight (Garud, *et al.*, 2018). Technological exaptation differs somewhat from biological exaptation since it possesses a dimension of deliberation. As Garud *et al.*

(2016, p. 150) stated, humans have *the power to induce exaptation*. It is by this means that existing products or technologies may be repurposed or combined in novel ways to bring about innovative solutions (Andriani and Cattani, 2016; Liu, *et al.*, 2021; Liu *et al.*, 2021; Andriani and Carignani, 2014; Gould and Vrba, 1982).). Indeed, exaptation has been identified and studied in a range of contexts including problem-solving (Andriani *et al.*, 2017), product innovation (Andriani and Kaminska, 2021; Ardito *et al.*, 2021), entrepreneurship (Dew and Sarasvathy, 2016; Dew *et al.*, 2004), firm competition (Ching, 2016), international expansion (Santangelo and Stucchi, 2018), digital innovation (Beltagui *et al.*, 2020; Schiavone *et al.*, 2022), banking (Marquis and Huang, 2010) and manufacturing (Adner, 2017; Liu *et al.*, 2021).

Garud *et al.*'s (2018, 2016) work was pivotal in introducing a framework that explained the ways in which "fortunate discoveries" may be encouraged. Comprising "exaptive pools", "exaptive forums" and "exaptive events" each is an environ that fosters the opportunity for innovations to emerge. "Pools" represent codified bodies of knowledge, "forums" are real or virtual spaces where innovators interact and exchange knowledge and "events" are deliberately planned occasions where innovators interact. The coupling of knowledge, between pools or between innovators, within these environs generates uncertain possibilities and the opportunity for innovation to occur. James *et al.* (2022) extend Garud *et al.*'s (2018, 2016) framework with the addition of "exaptive relations" which recognises that innovators possess historical strong- and weak- relationships with other innovators and innovation-enablers, and may deliberately or incidentally forge new relations to address pressing problems. These exaptive relations are important in innovation scenarios and may enable the productive functioning of exaptive events and forums, and may in turn be forged and strengthened by them.

The above literature has addressed exaptive innovation mainly in the private sector in the forms of developing new technology and products for commercialisation (Andriani and Kaminska, 2021), whereas none of the studies have connected exaptation theory to SEs. The exaptation theory has also recently been adopted to interpret how organisations and innovative actors utilise events, forum, pools and relations to develop solutions to tackle emerging problems (James *et al.*, 2022; Ardito *et al.*, 2021). Such problems include disruption in the medical sector (James *et al.*, 2022), technology changes (Beltagui *et al.*, 2020; Schiavone *et al.*, 2022) and can be extended to climate change. Nevertheless, it is unknown whether exaptation, especially exaptive events can facilitate innovation in SEs, who are playing important roles in local economy yet facing on-going challenges related to financial difficulties and aligning profit with social value realisation (White *et al.*, 2022). The current literature provides the basis for empirical research on SE innovation from the perspectives of collaboration, resource sharing and relations, which can be linked to exaptation (James *et al.*, 2022; Garud *et al.*, 2016). Also, the innovation relating to CE transformation can be appropriate research setting to introduce exaptation theory to SE innovation (Dezi *et al.*, 2022; Lekan *et al.*, 2021). Thus, using exaptation as a new theoretical lens, our paper seeks to answer this question: How can exaptive events facilitate circular economy innovation in the context of social enterprise?

3. Methodology

3.1 Case description

Understanding the viewpoints of different actors in organisational practices is most effectively gained through the adoption of an interpretive stance (Langley and Abdallah, 2011). Among the many techniques that are available, a case study affords a means of acquiring rich information about actors and environment, and thereby, enables nuanced and

contextually informed analysis and interpretation (Yin, 2013). Through examining multiple interrelated and interdependent perspectives this approach also facilitates the triangulation of findings (Longoni and Cagliano, 2018; Eisenhardt, 1989).

We have considered the following criteria in case selection: 1) the case is a project containing series of events and activities for the purpose of CE innovation, knowledge creation and sharing; 2) the events engage with SEs and other organisations; 3) SEs conduct innovation projects such as new product development during the events; 4) there are good access to data, including interviewing the event organisers, event participants, especially participants from SEs; 5) the researchers can attend and observe the events and 6) there are also secondary data such as event reports, news release that cover the events. This resulted in our engagement with the CEIC project based in the South Wales region of UK. Whilst the study focuses on this single case (the CEIC project), the “unit of analysis” is “events”, meaning that a series of events organised by CEIC (e.g. workshops, stakeholder engagement activities, conferences) are observed and analysed.

CEIC is an on-going sustainability education project in South Wales started from March 2020, which organises a series of formal teachings, workshops, stakeholder engagement activities, webinars and impact conferences. Funded by the Welsh European Funding Office, CEIC project aims to: 1) create inter-organisation collaborative innovation networks to support regional working and enable public service organisations to solve existing problems; 2) enhance CE knowledge of public service organisations to meet Welsh Government Future Generations Act Goals and address the greatest challenge in the business and society and 3) enhance innovation knowledge and skills to drive productivity and develop organisational capacity. The project is jointly delivered by project managers and university lecturers from Swansea University and Cardiff Metropolitan University. The participants are mainly practitioners from public sector (e.g. local councils, National Health Service) and third sectors in South Wales. These include managers from SEs (e.g. local repair cafes, charities). The CEIC project delivers an average of four cohorts per annum, each cohort spending 10 months attending the CEIC events. So far, there have been 200 event participants from 80 organisations.

The CEIC project incorporates design thinking process, and requires participant to engage with stakeholders to rethink of their product, process and services solution. It consists of a series of events: 1) a foundation workshop and two-day residential experiential learning event; 2) monthly experiential workshops to explore CE principles, design-thinking and new service solutions; 3) action learning sets to explore how to implement new tools and procedures; 4) on-site interventions to assist participants in trialling new tools and procedures; 4) best practice visits to other innovative organisations to explore what works, workplace exchange visits to provide one-to-one peer learning and support and 5) new product development and service solutions mapping and implementation support.

Each cohort has approximately 20 participants. At the beginning of the activities, participants are given a general theme to start with, such as “decarbonisation”. Within each cohort, participants form small groups of 5 to 6 people to work on a problem agreed by consensus among the group members (i.e. “how to develop an insulation solution utilising local farm resources”). They develop and share CE knowledge through engaging with the events, e.g. workshops, workplace exchange visits, guest lectures and webinars. In the end, the participants disseminate the group solutions at an “impact conference” open to practitioners, academia and public service in South Wales. Upon completing the programme, participants can still join CEIC webinars and conferences during which scholars and practitioners share the latest knowledge of CE.

Apart from attending events, participants also create WhatsApp groups to maintain contact outside the CEIC programme. Some jointly apply for funding from local councils and the Welsh Government for CE related new projects. By the end of 2022 (when we completed the data collection), the first four cohorts of CEIC had been completed with a total number of 56 participants completing the programme. Among them there were 22 SE participants from the backgrounds of housing associations, Libraries-of-Things, repair cafes, development trusts, water, education and charities.

As an in-depth single case, the CEIC project meets all the selection criteria. The various events organised by the project provide SEs in South Wales CE knowledge. By investigating this case, the researchers can trace the evolving nature of the events, alongside SE innovation. Thus, the case is typical and theoretically significant, whereas findings of the case study can be generalised to broader scenarios where SEs are engaged with exaptive events for innovation. Thus, the case can effectively address our research question. Moreover, the case not only represents exaptive events, but also shows the characters of exaptive pools, exaptive forum and exaptive relations, which are addressed in the literature (Garud *et al.*, 2016, 2018; James *et al.*, 2022). Specifically, exaptive events refer to the workshops, field trips, guest lectures, webinars and impact conferences. These events are deliberately organised by CEIC to advance existing innovation and potential new innovative projects. Exaptive forums are seen in the form of the CEIC website, email communications and WhatsApp group to inspire potential innovation. Exaptive pools are the patents, products, knowledge and skills brought by the CEIC organisers and the SE participants. Exaptive relations include existing relationships among the SE participants and new collaborative partnership. Accordingly, this case can provide theoretical and practical insights into the interaction between exaptation theory and SE innovation.

3.2 Data collection

Data capture took the form of a period of participant observation of the group activities of CEIC and a series of semi-structured interviews with key CEIC members. Participant observation is a well-established technique that is particularly useful in gaining understanding of new situations (Vinten, 1994) and can “transcend the epistemological gulf between ‘insider’ and ‘outsider’” (Jackson, 2017, p. 44).

Participant observation comprised attendance at three events on 16 February 2022 (CEIC workshop taking place at Bridgend for 3 h), 17 March 2022 (CEIC spring conference at Swansea for 7 h, where participants presented their projects) and 27 September 2022 (CEIC 2022 Autumn Conference at Cardiff for 7 h, where participants presented their projects). This took place to further understand the goals of the programme, the activities that took place, the interaction of participants and to aid in the development of questions for the interviews that followed. Data were recorded using instantaneously sampled fieldnotes (Paolisso and Hames, 2010).

Semi-structured interviews are frequently used to explore the complexities of “organizational life” (Boiral *et al.*, 2019). All participants consented to take part and all subsequent analyses have been anonymised (Duclos, 2017). Specifically, we have interviewed five SEs which are included in CEIC. These SEs are from the sectors of community housing, repair cafes, water supply and services etc. The interviewees are in the positions of director, research and innovation manager, or sustainability and environmental manager, who can provide insights of their engagement with the CEIC events, as well as innovation process in their organisations. The interviews took place from March 2022 to December 2022. An overview of the interviewees is shown in Table 1.

The interview was guided by a protocol, and interview questions were operationalised from the literature and the preceding phase of participant observation, and further questions were developed “in the moment” to explore new and emerging themes (Charmaz, 2014). Firstly, to start with, we asked general questions regarding the interviewees’ organisation and their experience of innovation. Sample questions include: Have you involved in CE innovation projects before? Secondly, the questions were more specifically focus on SEs’ attitudes, activities and experiences of CE innovation while participating in the events. Sample questions include: What happened after you joined CEIC? Do you do things differently now because of CEIC? When was the last time you engaged with CEIC? What do you enjoy the most from CEIC? What do you enjoy the least? Thirdly, we asked the interviewees to explain the innovation outcome and challenges after participating the events. Sample questions include: Are there any new ideas, products or solutions developed from CEIC? Have you formed new collaboration through CEIC? What are the barriers to realising your ideas into practice? Each interview lasted around 45 min, generating a transcript of approximately 4000 words. Finally, we sent followed-up emails to the interviewees to confirm any unclear information.

3.3 Data analysis

Our data analysis spanned from November 2022 to October 2023. We employed a structured, inductive coding approach outlined by Gioia *et al.* (2013) to analyse the qualitative data, which aims to generate a grounded theoretical model. Specifically, in the first stage, each researcher independently conducted open coding to identify significant contexts and activities related to the CEIC events and SE innovation. We then compared and discussed the individual findings to derive a set of initial codes. Examples of the initial codes include “Setting up new connection with a specific industry”, “Engaging with existing stakeholder, e.g. partner, university”, “Learning different organisation’s knowledge and insights” and “Using an existing technology/solution from another participant”.

During the second stage, we collaboratively developed axial codes that revealed recurring patterns and potential relationships among the initial codes (Braun and Clarke, 2006). These axial codes served as a bridge to the final theoretical codes and contributed to the theoretical narratives. For instance, the initial codes “Setting up new connection with a specific industry”, “New to the industry or role and looking for connection”, “Keeping in touch outside the programme”, “Developing a project with new collaboration”, all indicate SEs’ engagement with new partners, and thus are categorised as the axial code “New relations”.

In the third stage, we conducted theoretical coding, synthesising insights from the previous two stages and aligning them with existing literature on exaptation and SE innovation. For example, the codes “Project and experience”, “Process and tools” and “Specific technologies” represent tangible and coded knowledge. Therefore, they are included in the theoretical code “exaptive pools”, which is a key concept in the exaptation theory. Accordingly, this iterative process of coding and data analysis resulted in the development of four theoretical codes: 1) knowledge sharing, 2) exaptive pools, 3) exaptive relations and 4) challenges to SE sustainability and success. Our data structure is shown as Figure 1.

Further, following Gioia *et al.*’s (2013) example, we used the data structure to build a theoretical model (Figure 2). As shown in Figure 2, the building blocks are exaptive events, SE innovation and the four theoretical codes. The arrows between the building blocks represent the interactions, connections and causes and effects. For instance, Exaptive events positively enhance knowledge sharing, exaptive pools and exaptive relations. Challenges to

Table 1. Overview of the interviews

Social enterprise (index)	Industry/service sector	CE implementation	Interviewee position	Interview time	Interview duration
SE1	Community housing	Insulation solution development; reuse, repurpose	Programme manager	29 March 2022	35 min, 3,250-word transcript
SE2	Community housing	CE related training	Sustainability and environmental manager Director	5 April 2022	45 min, 4,732-word transcript
SE3	Local community repair cafes	Local reuse, repair, repurpose projects	Programme manager	1 December 2022	40 min, 3,982-word transcript
SE4	Development trust to support local economy, health and wellbeing	Local reuse, repair, recycle projects		8 December 2022	45 min, 3,903-word transcript
SE5	Water supply and services	Water sensor product development	Research and innovation manager	16 December 2022	50 min, 4,916-word transcript

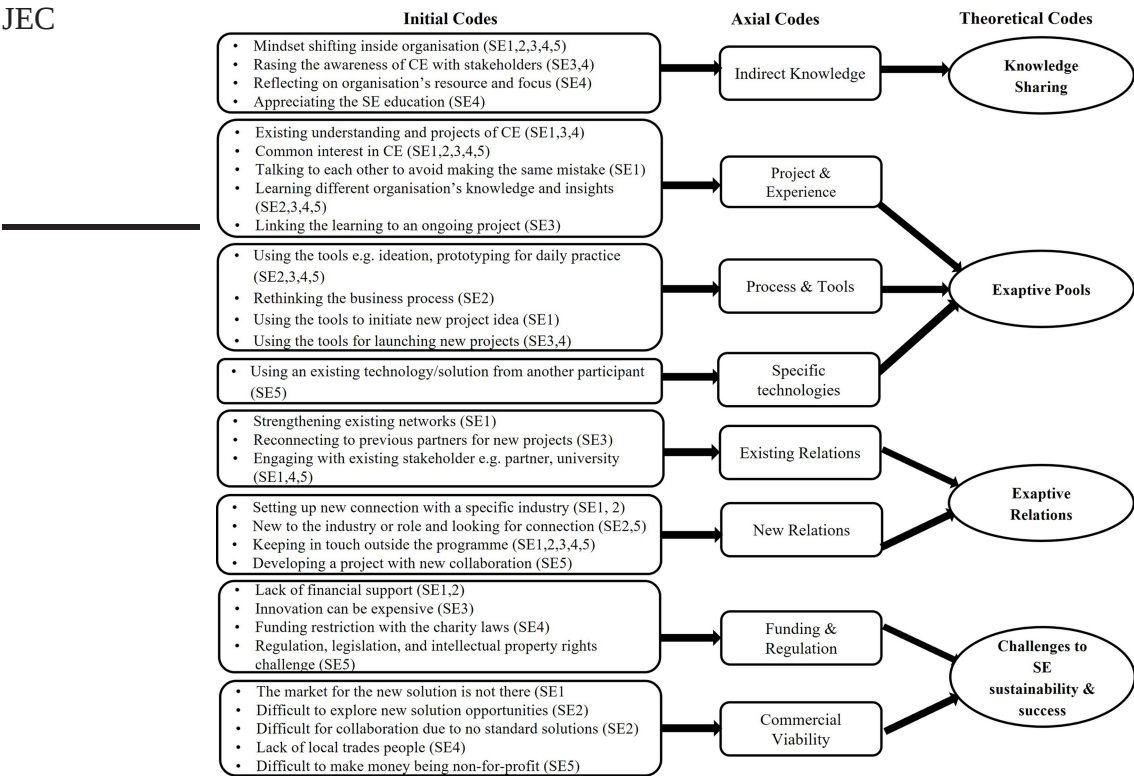


Figure 1. Data structure

SE sustainability and success hinder SE innovation. The following section will elaborate our findings.

4. Findings and discussion

4.1 Findings

4.1.1 Knowledge sharing. As shown in Figure 2 (in purple colour), there are connections between “exaptive events”, “knowledge sharing” and “SE innovation”. Specifically, exaptive events can positively enhance knowledge sharing, which results in the enhancement of SE innovation.

SEs highlight the importance of mindset changing and knowledge development during the knowledge sharing. They enjoy the events and consider recommending the events to others, and SEs regard the CEIC experience as indirect knowledge sharing. After completing the CEIC programme, they bring tools, ways of thinking and reflection back to their organisation for training, training and intra-organisational communication purpose. As evidenced in the interview data:

We’ve used lots of the team building and design thinking and kind of prototyping methods[...] I would say we do thinking around prototyping differently, which has been really helpful,

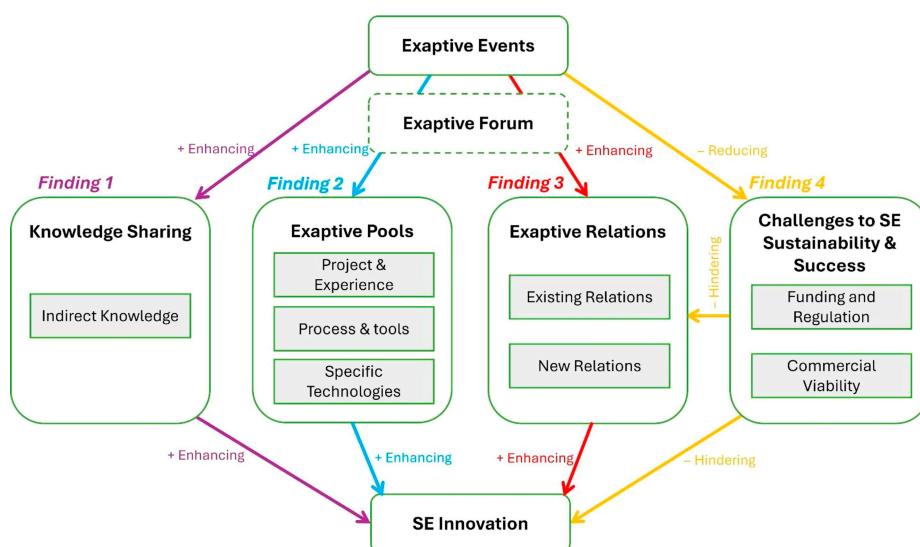


Figure 2. A theoretical model of how exaptive events facilitate SE innovation

particularly because there's been lots of new projects this year[...]so I guess that kind of design phase has been really impacted by[...]by CEIC. – SE3

It is also noted that the sharing and implementation of CE principles based on CEIC events will take time and need broader decisions. SE is in the process of disseminating knowledge across their departments, indicating a potential to adopt CE innovations in the long term:

The program has given me some tools on how I should go about addressing those challenges. Now, as a business we are[...]because I'm the only one who joined the CEIC programme at the moment and I have certain ability to be able to kind of share the learning from the CEIC program with my team and also my PM and also my management. – SE2

4.1.2 Exaptive pools. As shown in Figure 2 (in blue colour), there are connections between “exaptive events”, “exaptive forum”, “exaptive pools” and “SE innovation”. Here, forum is referred to as social media, email list and other online forum, whereas exaptive pools include project and experience, process and tools and specific technologies. Our study reveals that exaptive events alongside exaptive forum can positively facilitate the sharing of exaptive pools, which in return advance SE innovation.

Throughout the CEIC workshops and other events, there is the introduction and sharing of CE knowledge and design tools which are considered as exaptive pools. Working as small groups, SE participants co-develop the concept of CE alongside participants from other sectors, considering various scenarios and requirement from stakeholders:

It's quite interesting to see that not many people can really define it (circular economy). It's quite a broad topic, so yeah, we were learning about that and having a really, really good think about our stakeholders, so who we would want to get involved in the project and who it was important to. – SE5

Meanwhile, the CEIC events also promote the sharing of specific tools and knowledge relating to a certain industry, e.g. decarbonisation in the housing sector. Information relating to industry sector is also shared by participants in WhatsApp. As SE1 highlights:

You know, there's 30 housing associations in Wales and all looking at sustainability so we really need to talk to each other, just because we are going to[...]could all making the same mistakes. I know organizational contexts are different cross-sector but well, we need to [...] if there's knowledge that we can share, that can be used, then share it. – SE1

It is noted that the events also result in unexpected tangible outcomes that are built upon complementary skills and existing technologies, namely, exaptive pools. For example, as one of the largest SEs in the UK, SE5 are specialised in providing drinking water and wastewater services. Joining the CEIC programme, SE5 work with universities, public and third sectors in the same team, whom they have never collaborated with before. Coincidentally, one group member has already developed a sensor that could be used for water quality monitoring. Other group members, including a nationwide body responsible for the management of legacy coal mines and a Welsh Government sponsored organisation that manage natural resources, are also interested in the impact of water on the environment. Eventually the group have proposed a solution based on the core technology, and they are jointly looking for funding opportunities to formally develop the project:

We were very lucky to have somebody on our group and he was already in the process of developing a low-cost passive sensor which can measure heavy metals and also it's in the development stage of being able to measure phosphorus, which is something that [we] very interested in[...] So yeah, we're[...]those are deployed at the moment and there's some validation sampling that's happening alongside that. – SE5

4.1.3 Exaptive relations. As shown in [Figure 2](#) (in red colour), there are connections between “exaptive events”, “exaptive forum”, “exaptive relations” and “SE innovation”. Here, exaptive relations mean both existing and new relations between SEs and other CEIC participants, and between SE and their stakeholders. The data analysis indicates that exaptive events alongside exaptive forum can positively help establish and enhance exaptive relations, which in return advance SE innovation.

The significance and effectiveness of networking and relationship building are appreciated by all SEs interviewed. Evidence shows that the events helped to strengthen existing partnerships even when the other partner was not a participant of CEIC, as the process forced organisations to have structured conversations with their delivery partners and to empathise with their experience of working together. Moreover, the CEIC workshops and events re-enforce existing partnerships, as well as help develop the relations among SEs in the similar industry sector, e.g. community housing. In addition, participants formed WhatsApp groups in a self-organised form – exaptive forum – to maintain the relations outside of the CEIC events.

It is also noted that most SEs join CEIC events because they are conducting CE or sustainability projects or have appointed new people specifically in charge of the CE and sustainability projects. Thus, they deliberately hope to be connected to others through participating the events. These new connections are exaptive relations. According to the data:

I just started a new role, looking at sustainability[...]so it was very timely in that sense, to sort of go out and make some new connections across the local public sector and the housing associations right there[...]the networking was fantastic so that we all came with that understanding from a housing world. – SE1

In addition, the workshops, conferences and WhatsApp communication – exaptive events and forum – also support the building of new networks across different sectors including between SEs and the public sector. Through CEIC events, interactions become relationships, not purely transactional and the partners have a vested interest in overcoming the SE barriers

to public service delivery. For instance, SE4 highlights the engagement with people from different background to advance the understanding of CE concept. This type of relations normally does not lead to a specific innovation project, however, through the events, they were developed:

Um so met lots of different people, different with different perspectives, which was really positive. So people from hospitals, people from the police and we[...]and everyone has been looking at the circular economy from a different perspective. – SE4

4.1.4 Challenges to social enterprise sustainability and success. As shown in Figure 2 (in orange colour), there are interactions between “exaptive events”, “challenges to SE sustainability and success”, “exaptive relations” and “SE innovation”. Specifically, challenges to SE sustainability and success are highlighted as funding and regulation, as well as commercial viability related challenges. The data analysis indicates that exaptive events can reduce the challenges in some degree. Nevertheless, challenges that SE inhibits sustainability and success still negatively affect SE innovations and establishment of exaptive relations.

According to our data, challenges are highlighted as government funding, regulations, commercial viability and lack of practical standard CE framework. Even though the events and relations help to reinforce an existing partnership or initiate a new collaboration, the limitation of government funding is a primary concern according to the SEs, which can also hinder the collaborative innovation. It is also mentioned that due to funding constraints, SEs have no time or resource to innovate and try new ideas. Compared to large companies in the private sectors, SEs are normally of small and medium size. Without resource and funding support, the practice of CE innovation can be expensive. Moreover, investors tend to see quick returns, whereas CE transformation is a long journal process:

So you have very little time to kind of do that test and learn part, I guess, that came up in CEIC quite a lot, you know, that trialling of ideas, prototyping, implementing things, see what works and what doesn't, taking the learnings from umm, you know, failures as well[...]. We don't have time to test and learn because we have to have the successful things in order to get more funding[...] Financial support (is needed) because often those innovations are quite expensive. – SE3

Though there are some tangible CE solutions, it is still far from the implementation. During the CEIC workshops, SE1 developed a solution of using Welsh wool for manufacturing of building insulation. Despite the advantages such as making value out of the surplus of wool in Wales, contributing to foundational economy, biodegradable materials, the market is still at early stage. It is noted though potential investors show interested in this new business, they are not confident that customers will accept the sustainable solutions. Changing of customer attitudes remains challenging to SEs who adopt CE practices:

I think the market at the moment is not there. We need to be able to[...]to[...]look at[...]I don't think anything at the moment just designed[...]uhm, with anything at end of life particularly[...]uh, re-use something at the end of its life maybe just being reconditioned, but straight back on the market, I don't think we're there. – SE1

It is also questionable whether CE solutions can be standardised and applied to all SEs. Hence, rather than actively collaborating cross sectors, SEs may stay in small collaborations depending on the project requirement.

4.2 Discussion

The contextualisation of our findings offers an emergent insight into the link between exaptation theory and SE (White et al, 2018), concerning the role of events in facilitating CE

innovation in the context of SE. Based on the empirical evidence, we find that exaptive events can enrich and renew exaptive pools, referring to the coded knowledge, product, patent and techniques (Garud et al, 2018), which can be disseminated to SEs. For instance, exaptive events support the sharing of CE tools and frameworks, e.g. 3R (Reduce, Reuse and Recycle), ReSOLVE (Regenerate, Share, Optimise, Loop, Virtualise and Exchange) can be directly transferred and adopted by SEs and improve their sustainability and innovation capability. Accordingly, SEs can rely on the innovation tools introduced by the events for training and daily practice to enhance their performance. This effectively solve the SEs' challenge of "human resource", meaning SEs have difficulties dealing with the staff motivation and performance (White et al., 2018). Events can also help SEs to access pre-existing products (e.g. sensor in SE5 of this study), and thus leads to SEs' new product development and market exploration. This further solves SEs' difficulties in "commercial viability and social value", meanings that SEs find it difficult to achieve social goals while remaining a commercially viable organisation (White et al., 2018). Thus, events and pools shared in the events can enhance SEs' product innovation capabilities. Nevertheless, our findings also suggest that the products developed from the events may be at an early stage.

Exaptive events also result in the forming of exaptive relations, including existing relations and new relations (James et al., 2022) which advance SEs' working with partners for knowledge creation and innovation. With the relations developed from events, SEs can jointly apply for government funding to realise CE innovative ideas. This can solve the biggest challenge facing by SEs – finance (White et al, 2018). Moreover, given that CE is a new approach to industrial production and consumption (Korhonen et al., 2018), such innovation can combine economic and environmental benefits. Hence, the events have the potential to balance the dual mission of SEs. This further confirms the paradox view proposed by White et al. (2022) that making align different aspects of SEs' business model so that the generation of profits reinforces the social good pursued is not "impossible". It is also noted that exaptive relations developed from the events may be pre-mature and short-term focusing, and SEs may still rely on existing project experience and relations to seek funding.

Furthermore, our findings indicate that exaptive events can promote the collaboration between participants from SEs, the public and private sectors, and provide SE with more innovation opportunities. Through teamwork, they develop new connections, social capital, intellectual capital and collaborate on product and service innovation projects (Newth, 2016; Kong, 2010). This may tackle the challenges that SE competing with other sectors (Peattie and Adrian, 2008) and SEs often lack the resources, suitable capabilities and administrative know how to work with public sector (White et al., 2018). Our findings support the view that SEs' collaboration with other sectors is like to result in an improved perception of SEs' validity (White et al., 2022) and intellectual capital (Kong, 2010). Our empirical findings enrich the previous studies that partnership between SEs and public sectors can enhance service innovation (Hellstrom, 2021; Knutsen, 2017). In particular, if events focus on CE in a region, they will reinforce the positive effect of local partnership between SEs and public sectors, and thus ignore the negative effects of local politics and community conflict (White et al., 2018).

It is evident that the exaptive events help establish forums e.g. social media group. In addition, our data reveal that SEs' mindset changing is influenced by the events, as participants are incorporating teamwork, knowledge sharing, actively seeking for new solutions during in their organisations. Thus, such events are suggested able to encourage SE innovation given they can encourage stakeholders to share intellectual, cultural and social capital that are the foundation of SE innovation (Newth, 2016; Kong, 2010). This can, in the

long run, enhance leadership and managerial skills, which are currently underdeveloped in many SEs (White *et al.*, 2018). Overall, our study links exaptation theory to SE innovation, indicating that exaptive events has positively affect SEs to develop relations, and absorb key knowledge, skill and physical resources to facilitate their innovation. Findings also show that events can enhance forum, pools and relations. In fact, they are intertwined and reinforcing each other (James *et al.*, 2022), through which SEs become valid organisations capable of playing a pivotal role in the CE transformation.

5. Conclusion

CE is an evolving concept addressing waste management, resource efficiency and the regenerating of natural system. The effort towards CE requires innovation at various levels. Current literature indicates that in the commercial context, exaptive events such as training, workshops and conferences can effectively promote knowledge sharing, as well as establishing relations which are crucial for innovation. However, whether such events can facilitate SE innovation, especially in the context of CE transformation, is relatively unclear. By conducting an in-depth case study of the CEIC project events based in South Wales, UK, our findings reveal how exaptive events facilitate CE innovation in the context of SE.

In terms of theoretical implication, this study advances our insights into the potential contribution SEs can make to CE practice and debate with empirical evidence. Using exaptive innovation as a new theory lens, we discuss the positive and negative effect of exaptive events on tackling SE related challenges. Our findings indicate that exaptive events, tools and relations can positively solve the constraints relating to finance, commercial viability and social value and working with other sector (White *et al.*, 2018). This provides empirical evidence to the views that SEs' collaboration with other sectors can improve perception of SEs' validity (White *et al.*, 2022) and intellectual capital (Kong, 2010), and thus enhance service innovation (Hellstrom, 2021; Knutsen, 2017). Our study provides a new perspective of SE innovation, and expands the scope of exaptation from private sectors or commercialisation of products (Andriani and Kaminska, 2021) to tackling SE challenges. However, events can further impose SE's strong tie with stakeholders, which remains as a challenge. Events can draw both positive and negative impact on SE's innovation. By engaging with five SEs, this paper is an exploratory study on the role of events on SE innovation. Future work such as in-depth case study can follow a collaborative project between SE and public sectors, as formed out of the event, to identify details of how challenges can be tackled due to such collaboration. Comparative studies on other events can be conducted, to identify factors that lead to the success of exaptation. Thus, the paper can lead to research agenda on the interaction between exaptation and SE challenges.

It is also noted that due to the nature of SEs, responses to exaptive events can vary. The idea behind the sociability and collective action (e.g. attending events, sharing knowledge and collaborating with others) under uncertainty is rooted in the argument that economic behaviour can be explained by social capital and network. The concept of social capital as a public good dates back to that addresses how features of SEs, such as networks, norms and trust, facilitate action and cooperation that enhances economic performance. Indeed, in the face of exaptive events, while institutions (e.g. universities, governments) play a significant role in setting rules and norms that guide behaviour, a non-cooperative problem can be overcome or mitigated by several important mechanisms, thus social capital results in innovation. In particular, collective action through voluntary cooperation that is mutually beneficial can be facilitated by the norms of trust and reciprocity (Ostrom, 2000; Bellemare and Kroger, 2007), internalised or externally imposed social norms that restrain opportunistic behaviour (Bowles and Gintis, 2002) and involving individuals acting towards collective goals (Lazarova and Taylor, 2009).

As for the practical implication, we highlight the key issues that future initiatives need to address to achieve effective CE transformation in SEs through findings and discussion. The paper indicates that events can effectively reinforce the positive effect of local partnership between SEs, public sectors and private sectors and drives forward the possibility of sharing social, cultural and intellectual capital to develop the foundation of innovation. Such events can share the CE knowledge and innovation tools widely across the region. Thus, our paper can be useful for practitioners and policy makers who want to initiate or play active role in future events relating to CE and sustainable development. For practitioners, through participating in the events, they not only learn the tangible CE innovation tools, but can also develop managerial and leadership skills, as well as forming important relations with other organisations. As for SEs, our study shows that through the events, they can work with public sectors with a long-term orientation. This can help SEs to change their mindset and actively collaborate with external partners, utilise resources shared by the events, jointly develop new product and service and explore commercialisation opportunities. This can potentially tackle the challenges facing by SEs, and it is possible for SEs to generate profit alongside fulfilling the social and environmental mission.

There are some limitations of this study. It is based on a case study in South Wales, which may not represent a variety of SEs. Also, our studies reveal the important role of exaptive events in shaping SE innovation and their relations with other sectors. Nevertheless, the relations can be short-term focusing, and due to the time frame of the case – lasting for 3 years – the study cannot sufficiently capture the dynamic evolvement of exaptive relations. Accordingly, the limitation provides directions for future research. A longitudinal study may further capture the dynamic features of SE innovation as effected by exaptive events. Additional investigations are needed to include more cases of exaptive events which aim to facilitate SE innovation. For example, the cases can be from a different region or country. Moreover, with the advancement of digital technologies, there are more virtual events. Accordingly, future studies can explore the role of virtual events and forums in SE innovation and reaction to the challenges.

Ethics statement

This research has been approved by the Cardiff School of Management Research Ethics Committee (Ref. 2021DE0011).

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Introducing exaptation theory to social enterprise innovation: case study on the Circular Economy Innovation Communities (CEIC) project

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