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Enhancing Circular Economy Capabilities of Practitioners: An Analysis of Interventions in Wales

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1 EXECUTIVE SUMMARY

Humans face an existential threat from the effects of human-caused climate change (IPCC, 2023). Transitioning promptly to a Circular Economy (CE) will mitigate the climate related impact on people's lives. This research, led by Cardiff Metropolitan University and funded by the Wales Innovation Network, analyses the interventions (programmes, courses, workshops, networks, Communities of Practice, etc.) that are available to practitioners in Wales and reports on their efficacy in terms of developing the CE understanding and implementation capabilities of practitioners. We aim to inform practitioners, academics, and policymakers of the effective pedagogical approaches to enhancing CE implementation capabilities of practitioners.

This report used expert discussions to develop a clear research strategy and to develop a critical and reflective narrative. A literature review was conducted to frame the current academic and grey literature that describes and analyses the pedagogical approaches to implementing CE principles. The review of existing interventions suggests that inter-organisational, challenge-led programmes that support co-production of CE solutions and develops regional CE eco-systems are more effective than traditional programmes and can accelerate the transition to a circular economy. Moreover, learning principles derived from socio-cultural learning theories are most appropriate for workplace learning.

The findings from the quantitative data collected suggests that awareness of CE principles is low across all organisational sizes and sectors. A small minority of organisations have CE principles embedded within their strategy and very few have CE-related key performance indicators. Most organisations do not have a detailed CE implementation plan.

The qualitative data findings suggest that most CE service or product providers have been set up by individuals motivated by social purpose who are passionate about supporting the transition to a CE and making a difference to their region (place). Their social purpose often promoted a workplace culture that encouraged innovation, via a distributed leadership approach (Parry & Bryman, 2006) that encouraged learning. The leadership style was dynamic and strategic, it leveraged social power to engage workers who often felt a strong sense of empowerment and personal engagement. The leaders often encouraged internal and external network engagement to share knowledge.

This report recommends research that further explores the learning processes and pedagogies that develop practitioners CE innovation skills is required. Contextualised CE

interventions should be developed that account for the size and sector of organisations. Moreover, CE awareness-raising initiatives and CE practices development interventions should be prioritised by policymakers to accelerate the transition to a circular economy.

2 INTRODUCTION

The report aims to enhance the knowledge of practitioners, academics and policymakers on the contemporary and effective pedagogical approaches to enhancing circular economy (CE) implementation capabilities of practitioners. The research was led by Cardiff Metropolitan University in collaboration with Swansea University, Aberystwyth University, Cynnal Cymru and Cwmpas and funded by the Wales Innovation Network. The report shall outline interventions (programmes, courses, workshops, networks, CoPs, etc.) that are available to practitioners in Wales and the UK. We conducted a literature review and engaged with relevant organisations across Wales to map, analyse and report on innovative and effective interventions, to inform policymakers and practitioners on 'what works' in terms of implementing CE principles within organisations. We focus on the pedagogy of the interventions identified and outline how the organisations have successfully developed processes to implement CE principles within organisations.

This report shall reduce the resources organisations across Wales expend with their implementation of CE principles, in two ways. Firstly, by publishing a list of available CE interventions, within an accessible framework (capability development matrix). The capability development matrix offers a 'roadmap' for practitioners to quickly access CE content that is appropriate for individuals and groups, depending on their learning needs. Secondly, by analysing interventions which have successfully supported practitioners to implement CE principles to provide efficacy insights. To achieve the second aim, this report focuses on interventions in Wales (programmes, courses, networks, CoPs, etc.), along with their pedagogies and innovative processes, which have been most effective at developing the implementation capabilities of practitioners. The report provides a literature review of the heterogeneous CE interventions and, through engagement with stakeholder organisations across Wales, maps, analyses and outlines innovative and effective interventions. The purpose is to inform practitioners and policy makers on 'what works' in terms of implementing CE principles.

This collaborative research report examines successful CE implementation within organisations and the respective pedagogies employed through the collection and publication of short case studies. The case studies were collected from organisations which have implemented CE principles within their organisations, or from organisations set up to provide CE products or services. The researchers interviewed practitioners to understand the pedagogies (methods) used by them to implement CE. The data collected from the twenty-

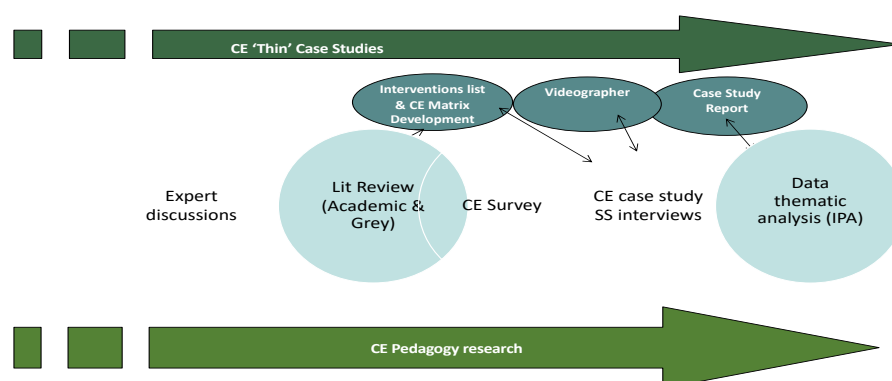
one thematically analysed case studies and the survey data is presented in Chapter 5. The report also presents data obtained from a survey issued to practitioners across Wales. The Conclusions (Chapter 6) and Recommendations (Chapter 7) are presented to help practitioners engage with effective interventions and pedagogies that can support them to implement CE principles within their workplaces. The report aligns with the Welsh Government 'Beyond Recycling' strategy as it provides useful insights on how public and private sector organisations can work towards achieving Net Zero targets.

3 METHODOLOGY

3.1 Introduction

To address the aim of the project, a multi-stage methodology was developed, as outlined in Figure 1, and the data analysed with the theoretical framework of Interpretative Phenomenological Analysis (IPA). Ethical approval was obtained for the study. The survey data was anonymised and is presented as summary data in Chapter 5. The case study organisations were interviewed to compile a short ‘thin’ case study for publication, using the semi-structured questionnaire presented in Appendix 2. The case study organisations also agreed to be video interviewed to briefly describe their implementation. The thematic analysis of the case studies is presented in Chapter 5. The [CE Case Studies in Wales](#) are presented in a separate report, which includes the cases and short [video interviews](#). The research methodology is outlined in Figure 1 and detailed in the rest of Chapter 3.

Figure 1: Research Methodology



3.2 Expert discussions

To develop a clear strategy for the research, interviews were conducted with eight CE experts in HEIs, Welsh Government and support agencies in Wales. The interviews helped develop a

critical and reflective initial ‘project narrative’ that enabled the project team to develop the above research strategy, clear project aims and research questions. The research questions informed the review of the grey and academic literature.

3.3 Literature review and desk research

A literature review was conducted to frame the current academic and grey literature concerning the pedagogical approaches to implementing circular economy. Online databases, including Scopus, Google Scholar, EBSCO and Proquest, were explored using Boolean search terms which resulted in journal articles, books and practitioner reports that were assessed for relevant contributions to the implementation of CE principles. The reports and articles obtained were analysed thematically, resulting in the identification of several key elements relating to implementation of CE principles. These elements will be explored below.

Grey Literature is a term used to describe a wide range of information that is produced outside of traditional academic publishing and distribution channels, which is not often well represented in indexing databases. The CE grey literature reviewed was gathered through searches via Google Scholar and Google. The reports collected from leading UK and global CE agencies, established CE research groups and UK government agencies were obtained and analysed. Aggregated results, with duplicates removed, provided a total of eighty-nine CE grey literature publications. The publications consisted of intervention reports, online documentation source material from newsletters and webinars, accredited formal education programmes and interventions from established reputable organisations and education providers. The primary focus of the review was to examine the pedagogy employed within the interventions discovered and look at the main findings from the publications.

The academic literature contains papers and documents which are peer reviewed and published through academic means, such as journals and books. A semi-structured systematic literature review (Xiao & Watson, 2019) was carried out to identify, select and synthesise the academic literature that reported on the successful implementation of CE principles within organisations and the pedagogy employed. During the review the researchers expanded the focus to include sustainable development as discussed in Section 4.3, the academic literature review section.

3.4 CE Survey to businesses

The literature reviews identified gaps in the CE fields which, along with the expert discussions, informed the next stages of the research, the CE survey, interviews and videography. An on-

line CE project survey questionnaire was constructed and accessed by 98 organisations and agencies. Unfortunately, it was only fully completed by 27 respondents. Whilst the response rate was low there is still real value in these replies that “tell us something about the manner in which specific social and cultural ideas are constructed” (Hookway, 2008 p.78).

3.5 Semi-structured interviews and video interviews

An ‘instrumental’ case study approach was utilised to allow the research team to study and analyse emergent general CE principles and phenomena (Stake, 1995; Barbour, 2014). Twenty organisations from across Wales were investigated. The case studies varied in their organisational sector, size, structure and approach to CE implementation. The researchers used a semi-structured questionnaire (Appendix 2) to compile a three page ‘case study’ and the interviews were transcribed for thematic analysis. The researchers advised the videographer which aspects of the CE implementation to capture in the short video clips.

The written case studies were complemented by short video clips. Visual materials are a powerful tool for stimulating thinking and generating creative approaches to learning (Barbour, 2014). In line with the IPA research approach there was value in capturing evidence of ‘place of work’ video material, which acted as a stimulus for post-project reporting as well as providing material for organisational climate analysis. Ethical approval was obtained for this research method and resulted in an unobtrusive mechanism for capturing a wide range of activities and human interaction in busy workplaces (Luff and Heath, 2012). Mondada (2012) suggests video recording in naturalistic organisational settings affords access to ‘the materiality and complexity of research settings’, going beyond what is represented in verbal discussions and recordings. This research approach echoes the postmodern research of Cunliffe (2001) who innovatively video-recorded interviews with organisational leaders, then subsequently played the recordings back to the leaders and explored their ‘meaning and significance’ to initiate a form of ‘co-inquiry.’

3.6 Data Analysis: Interpretative Phenomenological Analysis

The main theoretical analysis utilised to interpret the CE data was Interpretative Phenomenological Analysis (IPA). IPA is committed to the systematic exploration of personal experience (Tomkins, 2017). Its objective is to understand lived experiences and explore how individuals ‘make sense’ of their personal and organisational worlds. Importantly, the meanings the CE research participants attached to these social contexts and their CE learning experiences are considered the main currency of this IPA research focus (Smith & Osborn, 2003; Noon, 2018). These points of focus were considered vital to analyse the data, enabling

the development of a critical review of the types of pedagogy adult learners were being exposed to in order to build their knowledge, skills and understanding of the CE. Using IPA offers two complementary commitments, notably 'giving voice to' and 'making sense of' the lived experiences of those engaged in CE implementation activity (Noon, 2018). Additionally, this approach closely follows the 'insider-worker perspective' that is inherent in doing work-based research (Costley, Elliott and Gibbs, 2010).

IPA and work-based research are both strongly idiographic as they start with detailed study of one case until clear patterns or an overall 'shape' has been revealed (Smith, 2004; Easterby-Smith et al., 2008). This approach was repeated through all our CE case studies and followed up by cross-case analysis of emergent themes to offer up an overall thematic analytical convergence or divergence. The findings from the analysis are detailed, along with summary data tables, in the findings section of this report.

The interpretive analysis sought to understand respondents' experiences within their particular organisational contexts (Noon, 2017). In this way, IPA and work-based research invariably do not prescribe a single method for working with data, rather they work to a set of common principles like 'moving from the particular to the shared' and from 'the descriptive to the interpretative' (Barbour, 2014). The analysis is therefore predominantly iterative and inductive (Nizza et al, 2021). It utilises reflection against preconceptions and processes (Nizza et al, 2021) and involves close, line by line analysis and coding of the experiential claims and understanding of the participants and key agencies involved (Barbour, 2014). It also sees the identification of emergent patterns of commonality, seen as 'emergent themes', in the experiential matter being analysed (Eatough and Smith, 2008). Dialogue between the project researchers about what this might mean for participants to have these perspectives or overall understanding leads to an interpretative account (Barbour, 2014).

4 LITERATURE REVIEW

4.1 Introduction

This literature review is divided into three distinctive, connected sections. Firstly, an analysis of the CE grey literature, followed by an analysis of the CE academic literature and thirdly, an outline of contemporary executive education (continuing professional development) approaches to pedagogy.

The number of available CE interventions (courses, seminars, programmes, online materials) have proliferated in recent years. They range from on-line ‘free’ sessions that last from five minutes to one day, through to fully accredited CE Masters level programmes. Most CE interventions are offered to practitioners to enhance their knowledge of CE and to support the implementation of CE principles within organisations. However, there is little empirical evidence on which interventions are most effective and few empirical studies that report on implementation processes. The Kirkpatrick and Kirkpatrick (2006) framework is the most popular model for evaluating training effectiveness. However, without evaluation data gathered through a framework like the Kirkpatrick and Kirkpatrick (2006) framework it is difficult to comment on intervention effectiveness. In the absence of intervention evaluation data, which is seldom published, this report looked at two factors: the reported success of *what* an organisation had achieved when implementing CE principles and *what* pedagogical approaches (learning theories) had been employed within the interventions. This report focused entirely on interventions designed to help practitioners understand CE and implement principles within organisations. This report could not access evaluation data from the CE interventions discovered and so we used the successful implementation of CE principles within an organisation as a proxy for effective interventions.

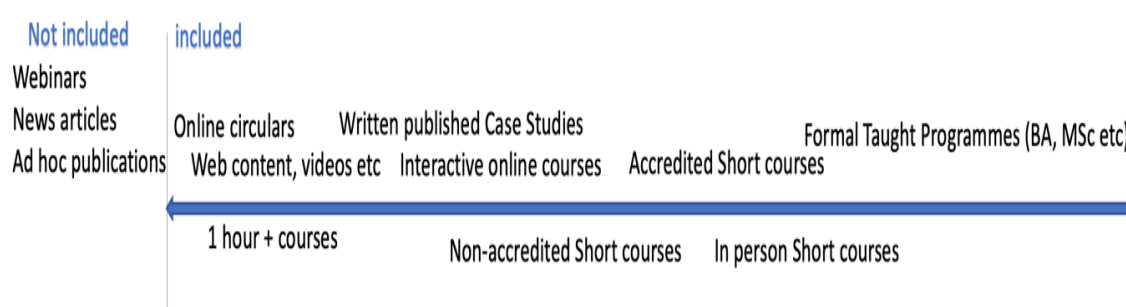
The multiple interventions assessed are placed on a learning scale and a taxonomy is offered for consideration. The analysis of the interventions, informed by the nascent literature on teaching CE implementation, prompted the researchers to develop a [CE Capability Development Matrix](#) enabling practitioners to access appropriate CE content more quickly. The analysis also revealed that CE teaching might merit a new *CE pedagogy framework* to enable a more efficient transition to a CE. This chapter provides context for the approach to evaluating the effectiveness of CE interventions found in the CE case studies and the CE survey.

4.2 Circular Economy Grey Literature Review

4.2.1 Introduction

A review of the grey literature was conducted to outline the CE learning landscape in Wales, from publicly available CE content including case studies and videographic content through to accredited and non-accredited short courses and structured programmes. A short review of the wider UK and global picture of the CE learning landscape is offered, including a critique of ways of implementing CE principles or creating a strategic focus on CE which, over time, can embed CE principles within an organisation's processes and culture. The range of CE interventions assessed is outlined in Figure 2.

Figure 2: Range of interventions assessed



4.2.2 Open 'on-line' webinars and CE information provision in Wales

The report analysed 12 regular CE online open circulars (online occasional, monthly or quarterly information newsletters/briefs/updates) from established agencies, for example [WRAP Cymru](#) and the [Ellen MacArthur Foundation](#) that provide current information relating to CE interventions, projects and activity in the UK. [Swansea University](#) has promoted the learning resources available at the University and through the Ellen MacArthur Foundation. The material published via the circulars provides current CE research, activities, tools and awareness-raising content for practitioner use and implementation examples in private, public

[TSW Training](#) offer an interesting blog on CE 'lead influencers', which highlights good practice approaches, of Welsh businesses implementing sustainability and CE, featuring new product development and innovative CE processes. Similarly, the Chartered Management Institute of Waste Management Cymru ([CIWM](#)) has an informative blog that reports on their webinar series that features [projects implementing CE in Wales](#). Expert commentary, practitioners' polls, informative analysis and supporting data on trends in the CE are presented.

CE learning opportunities for young schoolchildren were discovered. [Dipsy the Eco cat](#) is a story-telling initiative about the work of Emily Hinshelwood, co-founder of the Awel Aman Tawe, and linked to the Egni Cooperative, a community renewable energy charity in South Wales. The story of Dipsy is a captivating example of how young children can engage positively with CE big issues via use of narrative, videography and electronic learning. Many of these CE open web-based circulars and new learning opportunities reflect the gathering pace and desire to extend the knowledge platforms of CE in Wales.

Cardiff University and the PARC Institute have collaborated to develop the new [ReMakerSpace](#) centre, offering an on-line and in person platform for businesses and agencies to address the sustainability challenges of global supply chains. Mike Wilson, Executive Vice President of the PARC Institute, has sought to generate distinctive interdisciplinary solutions through use of on-line circulars, offering systems thinking dialogue and readiness building to enable circular economy transition.

The [Circular Economy Alliance](#) (CEA) accreditation system provides more formal certified learning opportunities via on-line flexible learning, involving case study best practice analysis and the exploration of contemporary CE research. Students are encouraged to become part of the CEA community to enhance their CE knowledge and 'make a difference' within their communities. Toxnot is a software development company in the USA offering a similar global on-line learning platform and self-assessment software for organisations to evaluate their circular economy 'readiness'. [Toxnot's CE implementation guide](#) offers a starting point for assessment of how an organisation can begin to navigate their way effectively into implementing CE principles.

In terms of more structured in-person CE innovation programmes, the [Black Mountains College](#) (BMC), Wales's newest Further Education College, is applying new approaches to teaching CE. Co-Founders of BMC, Ben Rawlence and Professor Owen Sheers, have built an academic partnership with Cardiff Metropolitan University to offer a new BA (Honours) degree in Ecological Futures, to be delivered in the Brecon Beacons (Talgarth campus) via intensive residential learning weekends.

The focus is on emergent and self-directed student learning and a re-shaping of learning via the development of extensive collaborative networks with academia, CE experts and CE agencies. Facilitated and supported by global ecology experts, the BMC pedagogy will apply both experiential learning and appreciative inquiry (AI) approaches. Additionally, the Welsh FE Colleges sector and Welsh Government have combined to present similar on-line and

face-to-face opportunities for prospective CE students with their announcement of Personal Learning Account short courses in preparation for jobs in the green economy.

Programmes like the Black Mountains College initiative and the ReMakerSpace project, are transformational and offer contemporary pedagogical approaches, indicative of diverse and disruptive thinking that promotes 'rebel ideas' that are necessary in an increasingly volatile, uncertain, chaotic and ambiguous (VUCA) organisational environment.

4.2.3 CE short courses and 'master classes' in Wales

The report reviewed twenty-two CE short courses and 'master class' seminars, discovered in Wales. The [Circular Economy Innovations Communities](#) (CEIC) project is an ESF funded in-person programme for public and third sector practitioners. The CEIC project is creating regional collaborative innovation networks (communities of practice) across public service organisations to co-design solutions to challenges around implementing CE principles, within the Swansea Bay and Cardiff Capital regions. Participating organisations enhance their innovation knowledge and skills by applying innovation tools and techniques to enable their organisation to reduce their carbon footprint, reduce costs and improve service levels. The formal, fully-funded 10-month programme is based on a very successful and impactful private sector innovation programme. The CEIC project is supporting public service practitioners to deliver CE innovation benefits for their organisations and the regions. CE knowledge gain and innovation skills development via participation in a wide range of experiential learning activities are the dominant pedagogies throughout the ten workshops.

Similarly, [Infuse](#) is an innovation and research programme designed to build skills and capacity for innovative future public services across the Cardiff Capital Region (CCR). Infuse offers associates the chance to collaboratively tackle some of the biggest issues faced by the region, within two thematic areas of *Accelerating Decarbonisation* and *Supportive Communities*. The programme is delivered over an eighteen-week period through three *Labs* - the Adaption Lab, the Data Lab and the Procurement Lab - that have specific workstreams. As part of their time on the programme, associates have an opportunity to learn about and apply new tools and approaches to help deliver successful public service innovations and test an idea they have designed to help tackle challenges on the two themes. Infuse incorporates contemporary pedagogical methods in action learning sets, peer coaching, site visits, reverse CEO mentoring and case study analysis. The Programme runs until 2023, working with four cohorts of local authority, public and third sector workers from across the Cardiff Capital Region. Infuse is supported by the ESF through Welsh Government and is a collaboration

between Cardiff University, Y Lab, Nesta, CCR and the ten local authorities that make up the region led by Monmouthshire County Council.

The [Circular Economy Research and Innovation Group](#) (CERIG) for Wales, co-ordinated by Swansea University, offers on-going research and collaborative knowledge exchange network meetings. It has created a research forum with direct industry engagement and complementary CE knowledge exchange. Using podcasts and blogs, it includes showcase events which help stimulate new curriculum development and training initiatives. The Ellen MacArthur Foundation recently named Swansea University as an exemplar university for the range of activities it carries out, not only through research and teaching but also in the way it runs its campuses¹. [The WWF Cymru seminar \(2020\)](#) on the 'Environment and Foundational Economy in Wales' engaged key academics, policy experts and practitioners in Wales to agree how the environment (including biodiversity, natural resources and nature restoration) fits with emerging concepts and policy on the Foundational and Circular Economies. Short expert presentations and [Meeting Sphere](#) discussion groups around strategic and critical issues for delivery, focusing on place-based practical solutions and new alliance building for the Foundational and Circular economies in Wales were offered, exemplifying high level creative learning utilising a 'community of practice' engagement process.

[The Institute of Directors Wales](#) (IoD Wales) has run several seminars on sustainability, inviting CEOs of leading companies like AquaPak, who are investing in disruptive technologies to help lead the transition to a CE. [HSSMI](#) has designed and delivered a series of master classes and workshops for the Welsh Government on the provision of practical CE and sustainability processes. The events enhance organisational knowledge on achieving greater value from products, components and materials, often using powerful organisational narratives to debate UK company 'CE best practices'. HSSMI also offer an [on-line boot camp](#) for CE principles knowledge development and best practice in the manufacturing sector. The University of Wales Trinity St David ran an interesting [staff and student led training event](#) in 2019, in partnership with Carmarthenshire Council and EFT Consult, a Swansea-based company specialising in innovative technologies in relation to the design of the built environment. This emergent 'community of practice' event is now having a lasting impact on CE thinking and action in the region and new short course programme development in the university.

¹ See: [University praised for pioneering work championing the importance of a circular economy - Swansea University](#)

The master classes and seminars aim to provide public and private sector organisations with CE information, models and frameworks to meet net zero statutory targets. [Policy Forum for Wales](#) has held several expert led Zoom seminars, bringing notable UK and regional CE experts and Chief Executive Officers (CEO) together with end users to hold [reflective CE discussions](#). The sessions involved individual and group action learning, peer coaching, workplace problem analysis, reflective writing, site visits, collaborative experimentation and prototyping of new products or service solutions. This relatively small number of interventions (short courses, seminars, training events) provides CE content to organisations that have begun developing their CE knowledge and skills. They also represent a desire to build creativity and innovation into CE activities, build systems thinking and new ways of learning into organisational development practices.

4.2.4 Circular Economy development outside Wales

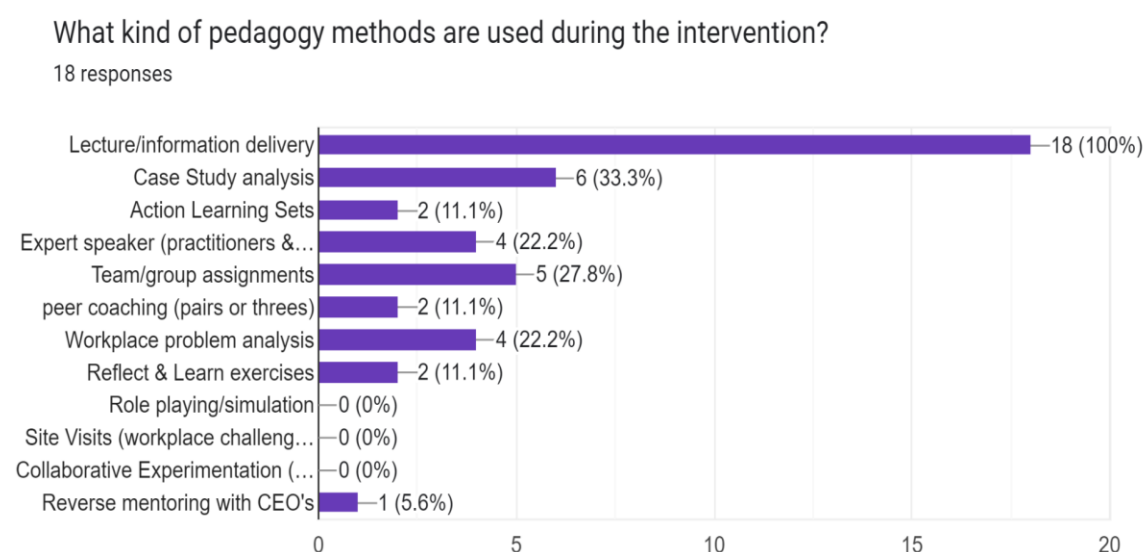
Given that CE content is delivered on-line, there is value in understanding what is available beyond Wales. Like Wales-based CE interventions, a mix of online master classes and webinars predominate. To understand the pedagogical methods used, the search excluded very short engagements such as one-off presentations, seminars, or panel discussions.

This Report reviewed 21 interventions and three were in direct partnerships with Welsh agencies. The majority (18) were aligned to Higher Education institutions (HEIs), followed by umbrella organisations, such as the Ellen McArthur Foundation or the CE Institute. The key components of these interventions, the mode of delivery, cost, accreditation and methods of support were analysed. The review revealed that they were mostly virtual and approximately half of them were free to attend and evenly split between student-paced and tutor-led learning. Most did not require assessment whilst those that did provided assessment via a mix of quizzes and questionnaires. Only one intervention, the MBA in *Innovation, Enterprise and Circular Economy* from the University of Bradford, was formally accredited. The [report](#) *Delivering the Circular Economy – a Toolkit for policymakers* (2015) by the Ellen MacArthur Foundation offers the International Baccalaureate as a transformative example in both curriculum design and teaching practice, where Year 7-13 students are offered programmes of interdisciplinary learning that encourage critical thinking and environmental awareness. At HE level, the report points to Bradford University's circular economy MBA and Cranfield University's interdisciplinary MSc on circular economy. It also notes Stanford University's electives in circular economy in its engineering faculty and comments that "professional training programmes on the circular economy could ensure continued learning throughout a

professional career” (p83). The importance of interdisciplinary teaching of CE is emphasised by this report, which reinforces that CE is a systems-thinking theory.

In terms of *what pedagogy* was employed (see Figure 3) the reviewed material suggests that case study reports were mainly used, largely via on-line interventions. The most common pedagogical method was a lead lecture, or a lecture mixed with group exercises and case study analysis. Given that most of the online training is HEI affiliated, they appear to be aimed at specific group(s) of people and, in some cases, to small groups such as senior executives or managers in organisations. The pedagogical methods include some elements of experiential learning, within traditional HE cognitivist pedagogy. However, they are mainly focused on *transferring knowledge* and *critical reflection* on the content and potential impact of CE content to build deeper personal understanding. None of them included site visits or any CE experimentation, CE implementation projects or workplace challenges.

Figure 3: Pedagogy methods used during the interventions



4.2.5 Circular Economy Case Study reports, Wales

A purposive sample of thirty collaborative CE projects that stimulated new sustainable CE initiatives, or led existing organisations to develop a more substantial CE focus to their work were obtained and analysed. Five of the partnership reports were produced with support from the Welsh Government's Circular Economy Fund (CEF), administered by [WRAP Cymru](#). Most

projects reported on companies successfully increasing their product range, despite an unfavourable economic climate. For example, [Addis](#) found new ways to offset capital costs of new product ventures and initiated supply chain improvements through a re-processing capacity project. [Cardiff Cycle Workshop](#) (micro-company) used WRAP Cymru CE funding to increase workspace capacity and response time due to an increased demand for bikes. Others, like [JC Moulding](#) and [Heathpak](#) developed creative re-use and re-manufacture of products, bringing about both positive commercial and environmental impact. These companies demonstrated real ambition and market vision, utilising a focused development on robotic and high-tech machinery to raise production levels to meet market demand. Similarly, [Techlan](#) utilised the WRAP Cymru funding to develop their equipment capability to manufacture new products and trademark them to increase their capacity to respond to the increasing demand for e-commerce orders.

Three CE Wales case study partnership reports took a more holistic view when reporting developments in their respective sectors. [Built Environment Wales \(BEW\)](#) created a CE 'phased model' using 'open' and 'closed loop' projects. The model highlighted how CE principles can be applied to the built environment, recognising the size of the economic opportunity, material priorities, challenges and recommendations. The model illustrated how CE principles could be implemented across the construction sector to realise CE benefits. The BEW report noted that the key factor to making the transition between linear and circular economy principles is the ability to innovate within a supply chain and across industry sectors to design out waste at all stages of construction. It also emphasised the importance of redefining waste as a resource and integrating circular economy principles into operational practices ([Constructing Excellence in Wales, 2018](#)).

The capacity to self-organise and stimulate organisational morphogenesis (radical reshaping and restructuring) is relevant. The reports suggest key enablers are important to assist in the delivery of a circular approach, including collaboration, rethinking incentives, providing suitable environmental rules, and invariably driving up scale of action and early adoption of new CE products and key processes ([Constructing Excellence in Wales, 2018](#)). The CEW report highlights the importance of understanding and practising systems thinking and seeking out disruptive innovation, developing and utilising powerful feedback loops, building resilience, maximising key 'tipping points', creating self-organisation and constantly exhibiting a growth mind-set, while modelling realistic patterns of human behaviour, as established by the [Ellen MacArthur Foundation \(2017\)](#).

[A Welsh Government report \(2019\)](#) that featured Natural Resources Wales (NRW) CE projects presented a thematic analysis and highlighted a small number of key practical factors

that support CE implementation. The key factors highlighted were: community stewardship of the Welsh landscape, starting and maintaining conversations about Natural Flood Management as a collaborative catchment concept, seeing large scale land management of the Black Mountains as improving the visitor experience, whilst engaging constructively with local communities. Additionally, the report highlights the importance of developing a place-based approach to a sustainable CE.

The report highlights that the CE approach in NRW is not just about ‘what’ they do, but also ‘how’ they do it. This approach emphasises drawing on the experience of people in their workplaces, working with each other to develop new solutions and making sure that communities and people benefit directly from their local natural resources. It requires greater relationship building across different industrial sectors, learning with and from each other, and thinking about the scale of action which needs to be taken to protect and utilise the Welsh landscape.

The [Circular Economy Wales](#) (CEW) on-line brochure ‘Well Being at the Heart of Building the Circular Economy in Wales’ offers similar views by emphasising the importance of CE interventions that develop skills and offer new income generators for people and organisations at the heart of community level change and development. Such a focus is exemplified by three innovative, local CE Welsh projects.

[Repair Café Wales](#) (RCW) supports waste reduction, skill sharing and community cohesion. Staff and volunteers at RCW have repaired over 4,000 items, from electrical equipment to clothing and bikes. Their vision is for a repair cafe to be in every community across Wales, promoting a *repair culture* that invites members of the public to learn a skill from experienced volunteer fixers or through formal training. RCW prevents waste, saves money, reduces carbon footprint, helps tackle social isolation and improves mental well-being by bringing communities together in a supportive and inclusive environment. It uses a powerful storytelling/selling approach via its work and on-line learning CE materials.

[Precious Plastic](#) is a project that champions ‘community ownership over the plastics problem’ through building micro-reprocessing workshops across Wales, where communities are given the tools and resources to [turn waste plastics into useful goods](#).

A similar CE service, [Community Fridge](#) is a pick-up point for surplus food, based in and run by individual local communities. Funded by the Rank Foundation in 2021, Community Fridge is helping communities in Wales by rolling out ten Community Fridge initiatives across Wales, building community food banks to aid individuals and families in food poverty.

The three examples provided of *pop-up* CE projects were borne out of the initial ideas of disruptive values-based innovators who built sustainable development initiatives that thrive off self-organisation and empowerment, co-production and community engagement. Overall, the CE Wales case study partnership reports are evidence of the growing collaboration and innovation emerging across Wales that is facilitated by passionate thought leaders, public service organisations, businesses, third sector organisations and support agencies including higher and further education providers.

4.2.6 Circular Economy intervention reports, UK and global

Twelve published CE intervention reports were analysed, the majority from leading CE agencies like the Ellen MacArthur Foundation (EMF) and the Waste & Resources Action Programme (WRAP). [The WRAP report](#) on 'Employment in the Circular Economy – Job Creation through Resource Efficiency in London' noted that the UK faces substantial economic challenges in its use of labour and scarce natural resources. Whilst the UK economy has significantly increased its resource efficiency in recent years, supply risks in a competitive context means that better use of natural resources is an urgent priority. [A report by WRAP and Green Alliance](#) suggests transitioning to a CE approach on jobs and the labour market in Britain is essential. The [WRAP report](#) on 'Employment in the Circular Economy' suggest a more resource-efficient CE could require more labour and positively impact on areas like London, the Northeast and the West Midlands where unemployment is high. The CE employment analysis for London suggests that, with the right investment and policy interventions, the CE could potentially provide 40,000 jobs in the capital, with up to 12,000 of these being net, additional jobs, potentially reducing unemployment in London by 12.5%. The Green Alliance/WRAP report suggests that the UK CE current development path offers the potential of 200,000 gross new jobs, reducing unemployment by about 54,000 by 2030 with considerable employee re-deployment and training needed for new CE middle managers, sales executives, customer services and administration staff.

The [Stockholm Environment Institute \(SEI\) report](#) on Accelerating the transition to a circular economy through impactful and actionable research (March, 2022) describes a vital 'e-imagining of their CE professional training needs through the delivery of virtual workshops with SEI participants and external partners. Offering a participatory approach, using virtual tools such as Miro and Mentimeter to stimulate the discussion across stakeholder groups, the SEI has built a successful CE mapping exercise of known CE-linked SEI projects. This was followed by internal survey to identify individual CE perceptions and perceived knowledge

gaps in its CE educational portfolio, thus building future directions for SEI research and strategic action.

[The Circularity Gap report 2022](#) follows a similar approach and highlights a broad set of CE pedagogical and knowledge gaps. It suggests a need to expand the use of data driven, digital tools that can bring circularity to everyone and increased utility of metrics to track the circular transition. The report also stresses the need to “apply a social lens to ensure the transition is safe and just” (p45). It recognises that people should drive the circular transition by putting the solutions into practice, recommending that ‘government support is needed to invest in training and upskilling the workforce in preparation’ (p45). The report advocates sharing CE examples and monitoring progress, with an emphasis on storytelling, suggesting that if circularity is to be understood and taken up, it needs to be relatable and contextualised.

The Platform for Accelerating the Circular Economy (PACE) report on [Circular Indicators for Governments \(2021\)](#) asserts it is important to understand the status of critical areas for circular economy action by, “*counting it; supporting new and greater actions - changing it; and enabling the focusing of resources and activation of new partners to maximise impact - scaling it*” (p5). The PACE report also suggests that we need to “*start treading on each other’s toes, cross-fertilize, co-create, inspire and find synergies*” (p47) in order that the resulting insights and outputs can be woven into a compelling narrative of the circular transition to date and to address the major environmental and socio-economic challenges of our time.

[The PACE report \(2021\)](#) points to the development of the Bellagio Process in 2020, which began the monitoring progress of the European circular economy. Led by the Italian Institute for Environmental Protection and Research (ISPRA) and the European Environment Agency, the Bellagio Process has consolidated key principles and identified areas for future work to improve CE monitoring. The process also offers a [set of seven Bellagio Principles](#) for building CE monitoring frameworks for action planning towards a more comprehensive European CE ([PACE Report](#), 2021, pp 22-29). These Bellagio Principles closely align with the earlier work on key CE indicators the Netherlands Environmental Assessment Agency ([NEAA, 2018](#)) put forward to gather quantitative and qualitative information about the CE transition process, particularly as fuelled by innovation processes, and policymaking and implementation. Vitally, both the PACE report (2021) and the NEAA reports (2018; 2021) critically reflect that “there is currently no agreed taxonomy of circular economy actions and interventions to build on for measurement purposes. Having an agreed taxonomy in place is even more important when aiming to translate the outcomes of a circular economy transition into environmental and socio-economic impacts.” (PACE report - Circular Indicators for Governments, 2021 p39).

The World Economic Forum (WEF), in collaboration with ScaleUpNation offers an insightful [White Paper](#) on 'Circular Trailblazers, Scale-Ups Leading the Way Towards a More Circular Economy' (2021). A qualitative analysis of the leadership practices and development of CE 'scale ups' (High Growth Firms) is presented, suggesting that to achieve systemic impact CE innovators must concentrate on four key developmental factors:

1. *building platforms for storytelling* that help them gain credibility
2. *linking with knowledgeable investors* who provide them with patient capital
3. *consulting with policymakers* who enable trailblazers to accelerate the circular transition in an inclusive way;
4. *building a high degree of connectivity throughout value chains* to find the right ambassadors, like-minded customers and innovation partners for circular economy success. (*Circular Trailblazers*, 2021, p3)

The WEF and ScaleUpNation White Paper recognises that becoming a successful *circular trailblazer* is demanding, requiring creative leadership, clear strategy and adequate resources at all levels of the organisation. Invariably, to innovate successfully those leaders are not always appreciated by ecosystem partners as they appear disruptive and are sometimes seen as "upsetting the status quo or distrusted for perceived selfish intent" (WEF/ScaleUpNation, 2021, p8). Notably, circular trailblazers achieve commercial growth and affect systems change by:

- creating a positive cycle of story-telling for impact;
- setting a higher standard;
- sharing insights;
- initiating collaboration and influencing public policy.

Storytelling and story-selling are seen as the most effective tactics for 'scaling up'. Successful storytelling and story-selling leverages humans' intrinsic attraction to learning through narrative in the form of poems, books, myths, viewing films and sharing life events. They are more effective than direct messaging of business needs and appeals to logic because these are easily lost when conveyed to an audience due to lack of trust and connectivity (WEF/ScaleUpNation, 2021). Circular trailblazers use engaging storytelling to attract public attention and raise awareness of new products or services. These include media campaigns, public presentations and opportunities to educate stakeholders, colleagues and customers via blogs, workshops and training.

Circular trailblazers often set new standards of quality for their products and key CE processes and clearly articulate their customers praise, which in turn drives up product desirability and product profitability, sometimes forcing other businesses to launch similar versions of this new standard. Circular trailblazers seek to share and build their technological knowledge and insight with other players in the industry, recognising it is more important to positively impact the environment. Few circular trailblazers can change an industry and shared insights lead to alliances with scale-up peers, multinationals, and supply-chain organisations. This collaboration can extend to academia and non-profit organisations where combined resources for technology advancement and innovation can increase new products, distribution, and market access. This can lead to creating favourable conditions for systems change by building consortia and advocating for policy change linked to regulation, certification, and subsidies for beneficial CE practices (WEF/ScaleUpNation, 2021, p10).

This focus on *systems change* is developed in the [The Circular Economy – Boundaries and Bridges](#) report by The University of Oxford (2019), which argued that successful CE transition requires companies to realise “*wicked problems need systemic approaches*” and a “*take, make, dispose*” linear model requires fundamental changes across multiple systems” (p6). The [WRAP Cymru report](#) Preparing for Re-use – A Roadmap for a Paradigm Shift in Wales (2018) report offers a roadmap to support a national re-use programme to support the transition to a CE in Wales. The report highlights key interventions, including the development of a National re-use brand and delivery of communication and engagement campaigns. Additionally, it calls for research on the role and impact of product-specific, extended-producer responsibility schemes and the establishment of regional re-use hubs and collection points.

This research would link to the support for and facilitation of local initiatives and programmes such as repair cafes, jumble trails and tool libraries (for example [Benthyg Cymru – The Library of Things](#)). It could also see the establishment of an Academic centre of excellence on *Re-use* across Welsh universities, leading research into the implementing of progressive financial incentives and dis-incentives to support reuse ([Wrap Cymru Report](#), 2018, p34). These key interventions would go a long way to stimulating clear systems change in the circular economy of Wales.

4.2.7 R&D collaboration for the Circular Economy

The transition to a circular economy requires products and services that are not designed within a linear paradigm. Therefore, research, development and innovation (RD&I) collaboration are critical to creating and operationalising new products, services and business models. The Government Office for Science report [From Waste to Resource Productivity](#)

[\(2017\)](#) underlines the importance of investment in CE related RD&I. The report draws on evidence from a variety of UK CE case studies, academic seminars, UK business leaders and charities to suggest that increasing resource efficiency requires products to be designed with their end-of-life in mind and, consequently, UK higher education degree programmes in design, architecture and fashion and STE(M) should embed sustainable design and CE principles. The report asserts a greater focus on CE research and innovation, especially with regard to recovery processes for new and emerging materials and technologies, is an educational development priority. Similarly, national and international collaboration is needed to *scale up* and manage new disruptive approaches to CE, new product and service solution development as well as CE business model innovation. The report underlines the importance of highlighting CE best-practice approaches in more mature sectors, especially capturing efficiency gains in heavy industry, manufacturing and waste management.

To facilitate the transition to a CE, the Government Office for Science Report [From waste to resource productivity \(2017\)](#) suggests building CE awareness into the education programmes of future designers and business leaders should embed a long-term view to ensure strategic advantage to maximise businesses benefit and develop organisational cultures that support the transition to a CE. They argued CE-informed leaders can drive businesses of the future through innovative approaches to knowledge gain of CE processes and thereby leverage marketplace opportunities. This, in turn, can foster quicker CE transition and responsible growth.

The [Design for a Circular Economy Primer report \(2020\)](#) emphasises the importance of collaboration and partnership to design and implement innovative circular strategic approaches that facilitate assembly, disassembly and recycling with minimal waste to ensure a transition to a CE. These ‘step by step’ approaches involve all actors, especially educationalists and technologists in creating strategic CE business models that reward longevity of use, disassembly and material reuse.

The Ellen MacArthur Foundation offers an ‘actionable toolkit’ for policymakers for [Delivering the Circular Economy \(2015\)](#). The report suggests that the linear *take, make, dispose economic model* is inappropriate (p19) and offers the circular *ReSolve* framework of six action areas (Regenerate, Share, Optimise, Loop, Virtualise, and Exchange) that offers a circular *rethinking device* and powerful reframing tool for business model and new service solution/product development, capable of sparking creative CE solutions and stimulating innovation (p23). The report highlights several notable opportunities to ‘go circular’, including leveraging the [Internet of things](#), where over 40 billion devices can interconnect ranging from home and office ICT devices (PCs, laptops, mobile smart devices) to connected business and

manufacturing devices. This interconnectedness can enable CE tracking efficiency, predictive maintenance and educational advances that have hitherto been inconceivable. Importantly, this report highlights common barriers to CE progress through several case studies. Most notably, social factors that include poor CE knowledge and skills within organisations and across the workforce in most developed economies. One solution to this problem could be found in the development of collaboration platforms that share knowledge of new CE product/service solutions and support the development of CE knowledge and skills. The platform should also explore opportunities for industrial symbiosis across regions that can be facilitated by formal public-private agreements, creation of R&D clusters, voluntary industry initiatives and partnership training and development programmes within a CE eco-system.

4.2.8 Re-imagining CE curricula with Interdisciplinarity

This report has referenced the importance of interdisciplinary teaching of CE emphasised by the Ellen MacArthur Foundation (2015), which suggested that CE is a systems theory. The reports analysed suggest interdisciplinarity in the CE curricula is important to create new CE thinking and practical innovation. Education has a dual role, to both teach *and* challenge student thinking and action and to contribute to economic development by producing a workforce with CE knowledge and skills. Higher Education Institutions (HEIs) can also support the development of regional CE eco-systems through a triple helix approach (Liu et al., 2022).

The Delivering the Circular Economy report by the Ellen MacArthur Foundation placed huge emphasis on the importance of CE Education and CE implementation skills development. The report notes that, while the CE has broad appeal as a value creation opportunity, knowledge of what a circular model would mean for companies, industries, cities, and countries in the short and medium term is still relatively limited. The development of specific CE knowledge and understanding would be helpful in influencing key organisational values, policy making and business decision-making. This CE knowledge development requires re-imagining curricula at schools, further education and higher education levels and demands new ways of teaching and learning. The report also advocates conducting research across traditional subject silos to develop new CE technologies and business practices that would work at the systems level of organisations (Ellen MacArthur Foundation , 2015 p83).

4.2.9 Themes from the Grey Literature

Analysis of the CE case studies and intervention reports in Wales suggests some organisations and sectors have reacted to funding opportunities and the call from the Welsh Government to move 'Beyond Recycling' and transition to a Circular Economy in Wales. The

UK and global CE reports analysed highlight the complexity of the CE transition and the leadership strategies emerging that are required to transition to a CE. The themes from the CE grey literature review are summarised below:

- The Welsh CE projects analysed were innovative in their focus on new product or new process development and implementation
- A systems-thinking approach and readiness to co-produce solutions is beneficial
- People and relationships make a difference in local communities (place-based approaches), interventions that develop and mobilise more CE lead influencers within regions would accelerate the transition to a CE
- The development of regional CE eco-systems of businesses, third sector, public sector and academia (connected nationally) would accelerate the CE transition
- Informative CE knowledge platforms for CE practitioners, learners, change-makers and innovators would accelerate the development of CE knowledge and skills
- Nascent research suggests inter-organisational challenge-led programmes that support co-production of CE solutions, exchange knowledge and enhance regional capabilities are more effective than traditional programmes
- Existing regional and global supply chains have to be challenged to transition to a CE; an interdisciplinary multi-organisational approach with policymakers, academics and business involved will be required
- The Welsh Government CE Fund, administered by WRAP Cymru, created numerous valueable CE projects and interventions in Wales.

The grey literature review outlines the nascent pedagogies and interventions that are supporting the transition to a CE. This report will now assess the academic literature on CE pedagogy to add to the discussion on what interventions and pedagogy is likely to be effective at developing understanding and implementation of CE principles at the organisational level.

4.3 Circular Economy Academic Literature Review

4.3.1 Introduction

A structured literature review was conducted to identify, select and synthesise academic research relating to CE implementation and adoption within organisations. This section provides context to the CE academic literature, exploring contemporary approaches to CE development and the contemporary learning theories (pedagogies) employed. It then provides an overview of CE education with specific examples. We conclude with suggestions on enhancing CE education and development approaches through a critique of the literature.

4.3.2 Contemporary approaches to CE education and development

Academic research has grown considerably since the Ellen McArthur Foundation popularised the CE concept with seminal publications in 2013 and 2015. The literature highlights a proliferation of CE definitions and subsequent critique of the field (Kirchherr and Piscicelli, 2019; Kirchherr, Reike and Hekkert, 2017). Presently, the most common conceptualisation of CE is the 'how to' logic of combining a reduction of waste, re-use and recycling of materials and products (Ness and Xing, 2017). It is argued there is too much emphasis on generating wealth and jobs, especially in the developed world (Kirchherr, 2021) and too much emphasis on economic growth as measured by GVA (Raworth, 2017). There is less emphasis on slow economy and de-growth, synergistic with sustainable development. A 'conceptual muddle' exists (Kirchherr, Reike and Hekkert, 2017) and therefore ways of either imparting or creating new CE knowledge varies (Kirchherr and van Santen, 2019). As a result, there is a danger that the CE 'concept' may fail to cohere and may remain in a deadlock due to permanent conceptual contention, in research terms and in terms of CE practitioner understanding. This could be addressed by the analysis and description of CE implementation within organisations and across regions to sharpen the understanding of the CE concept amongst both academics and practitioners. This report shall contribute to the literature that aims to reduce the conceptual ambiguity and report on how practitioners have developed CE implementation capability.

Most papers written on the development of CE capabilities begin by placing it within the teaching of sustainable development and are associated with further and higher education, within schools of engineering, management, and urban geography (González-Domínguez et al., 2020; Sumter et al., 2021). Webster (2007) argued that most sustainable development education was teaching ecological modernisation, environmental management or the greening of current forms of production and consumption. However, contemporary commentators (Kirchherr and Piscicelli, 2019; Kirchherr, Reike and Hekkert, 2017; Kirchherr, 2019) argued for a clear conceptualisation of the CE in order to ensure CE policy and curricula are developed with common goals.

The CE literature suggests education leaders should ensure CE principles are taught to all students to encourage changes in consumption behaviours and hopefully lead to a change in thinking from a linear to a circular economy mindset. Nunes et al. (2018) advised *“the difference between the actual learning and the curriculum-based learning in the personal experience within an educational facility is vital”* (p37) for building students understanding of CE and their impact on the planet. Contemporary authors suggest experiential learning design, including interaction and peer-based reflection, should be central to the CE educational experience.

All education programmes and interventions are underpinned by theories of learning (pedagogies) to achieve learning outcomes. Research on the application of contemporary pedagogies in teaching CE suggests systems thinking, critical thinking skills, collaborative problem solving, decision making, and teamwork have all featured in contemporary CE curriculum (Scalabrino et al, 2022). Critical thinking and systems thinking are crucial to transition from unsustainable business models and lifestyles to a functioning circular economy (Kirchherr and Santen, 2019). Scalabrino et al. (2022) highlights the need for critical thinking and disruptive innovation in many global consumer-based and production-focused organisations. Research suggests that ‘tier one producers’ can influence and encourage transition to a circular economy if they can develop more critical and reflective leadership throughout their organisations to support the transition to a circular economy (Huckle 2012; Kopnina, 2018).

The contemporary literature primarily focuses on how to develop the CE through the teaching of sustainable development principles to students and practitioners. However, contemporary authors argue sustainable development teaching is very unlikely to transform mindsets and achieve CE transition; it will require different teaching approaches (Kopnina, 2018). The literature suggests that in addition to moving on from *education as usual* and embedding systems and critical thinking, application of new pedagogies should be explored. Lange et al. (2022) in their article Re-Organise suggest that prevailing educational taxonomies, such as Bloom’s (1956) taxonomy, may not be sufficient to align with CE learning and development because it lacks a high-level focus on system thinking, self-organisation, emergent and self-directed learning. Lange et al. (2022) argued that CE requires working with a diverse group of people, worldviews and technologies, and therefore a different taxonomy of learning is required. Fink’s (2013) six categories of significant learning, which are: foundational knowledge, application, integration, human dimension, caring, and learning how to learn, may well be more appropriate for CE teaching. Fink’s Taxonomy (2013) has been utilised by the University of Buffalo to consider the long-term impact of learning experiences.

Peer to peer interaction, individual feelings, human values, systems perspectives and the need for reflective and critical thinking are crucial parts of contemporary CE pedagogy (Walpole et al., 2022; Scalabrino et al., 2022; Bugallo-Rodríguez and Vega-Marcote, 2020; Kopnina, 2018). Constant re-evaluation and re-assessment of both personal and organisational behaviours are vital for successful CE implementation. It is argued CE pedagogical development should embrace workplace and life contexts and embrace lifelong learning principles (Schumacher, 1997). It should seek to empower a person or organisation to make informed choices and changes that help transform self, organisation and society as a whole. CE pedagogy needs to offer in-depth CE experiences that stimulate transformative, high level learning experiences (Sterling, 2011; Liu et al, 2022). Scalabrino et al. (2022) suggest pedagogies that engage students in applying models and embed reflective learning are often both inspirational and challenging, as they ask learners to question organisational and personal assumptions as well as existing strategic priorities. Walpole et al (2022) suggest interventions that embed Social Learning theory (Bandura, 1977) and reflective practice (Gibbs, 1988) within a programme that formally creates and supports 'networks of change makers' (Hanna et al., 2018), can bridge the gap between national and regional development, in the form of Communities of Practice (Lave & Wenger, 1991). Communities of Practice offer an established foundation for connecting practitioners with a shared interest (domain), hitherto primarily used to facilitate knowledge transfer across expert communities which enables practitioners to improve their reactions to uncertain and complex situations (Agrifoglio et al., 2021). Existing research suggests further exploration of collaborative innovation, using case studies, to substantiate claims and evaluate benefits of collaborative versus bureaucratic innovation (Torring, 2018).

4.3.3 CE Education in practice

This section outlines some examples of experiential learning and contemporary pedagogies that develop CE knowledge and skills. The CEIC programme for public service practitioners (Walpole et al., 2022) develops innovation knowledge and skills and enhances understanding of CE principles to support implementation of CE principles within practitioners' workplaces. Participants engage with ten workshops (11 contact days and 11 workplace days) over a ten-month period to enable them to develop and prototype robust CE new service solutions. The programme was developed from a critical realist epistemology and therefore avoids advocating normative models and encourages participants to adopt an abductive approach to their NSS development. In addition, the CEIC pedagogy is informed by Social Learning theory (Bandura, 1977) and addresses the 'Knowing Doing Gap' (Pfeffer & Sutton, 2000) that practitioners face, by supporting practitioners to apply contemporary innovation tools and

techniques to the challenges taken into the programme. The participants engage in multiple exercises throughout a two-day residential to develop trust and 'critical friend' relationships. The participants are introduced to Community of Practice (Wenger-Trayner and Wenger-Trayner, 2019) elements and roles to cede agency and to provide the participants with self-governing mechanisms. The programme aims to support the development of a regional CE innovation 'ecosystem' by connecting the CoPs across the Swansea Bay and Cardiff Capital regions (Liu et al, 2022).

Summerton et al. (2019) have created a series of CE workshops that foster systems thinking among chemical engineering PhD students. The methods used were a mix of guest speakers, analysis of secondary publications and reports, development of a strategic report and marketing plans for a potential new CE service solution. The assessment also included business case proposals to existing businesses and solving real workplace problems, all within teams. The reported benefits were better communication, greater understanding of a problem from a holistic or '*system*' perspective and shared dialogue between academia and industry through the co-design of the workshops.

Kircherr and Piscicelli (2019) adopted a similar approach and incorporated gamification, site-visits, and experiments to teach CE principles and used leading papers on CE to design the programme. They engaged their students with the '*Drill Game*,' a group exercise that encourages students to reflect on the main promise of the circular economy. They also offered group exercises that encouraged students to relate the circular economy to industrial symbiosis, sustainability, green economy and biomimicry inspired innovation. Feedback from students was positive, yet students asked for more information at the end of each class.

Kircherr (2018) reported on a programme that took students from vocational colleges to work directly with SMEs to support them to develop CE strategies. The students encountered resistance to suggested changes initially, as CE futures planning was not on the agenda of SME leaders. Kircherr (2018) also asked university students to reflect on ways in which four selected companies presented their circular products using reflective essay writing and building student critical evaluation skills on CE delivery.

This small group of innovative CE programmes within higher education show that attempts at applying contemporary pedagogies are being made to foster creativity, critical thinking and apply CE principles. However, the challenge to implement CE principles within organisations and across regions requires leaders within organisations to understand CE principles, and requires tangible support for programmes that engage organisations. The nascent research into effective CE pedagogy suggests CE practitioners should engage with contemporary

pedagogical approaches. Showcasing CE case studies and enhancing student workplace engagement is important. There would be value in CE agencies, such as the Ellen MacArthur Foundation, facilitating CE pedagogical partnerships that support transition. There would also be value in policymakers investing in research into effective CE implementation pedagogy and supporting interventions that apply proven contemporary pedagogies. The literature on CE implementation suggests critical thinking, partnership approaches and co-production enable transformative learning. However, there are also challenges of implementing CE learning.

4.3.4 Challenges of implementing CE learning

Implementing learning into practice is problematic (Pfeffer and Sutton, 2000) and applying CE principles brings the additional challenge of a mindset change. O'Neill (2012) argues the CE transition for business is likely to be achieved more quickly in the context of de-growth and a steady-state economy. Huckle (2012) suggests CE implementation can create tension between individual and organisational motivation, *"[Sustainable development] fosters guilt, focuses primarily on what individuals rather than corporations, governments and social movements should do, and fails to engage learners in critical thinking"*. Sustainable development without transformative models of teaching and critical thinking is akin to *'schooling for a slightly less unsustainable future'* (Webster, 2007, p40). Sustainable development curricula prepare students to work in a *"business-as-usual"* economy even if that economy was meant to be circular or sustainable. Scalabrino et al. (2022) argue *'business as usual'* must be questioned, considering global sustainability challenges, the same applies to *'education as usual'*. The literature suggest that modern eco-systems are not 'joined up'; a CE requires stakeholders to be integrated in a cooperative and collaborative system of knowledge generation and sharing. A recent study on the barriers to CE implementation in the EU suggested *"....cultural barriers, particularly a lack of consumer interest and awareness as well as a hesitant company culture, are considered the main circular economy barriers by businesses and policymakers."* (Kirchherr et al., 2018 p266). The authors also suggest that the considerable effort is required to raise awareness of CE within businesses and across sectors. The below section highlights recommendations from the academic literature.

4.3.5 Enhancing CE education

Marouli (2016) reviewed the different educational approaches to developing CE capability and suggested the transition to a CE requires a significant systemic transformation that requires changes at the social, structural and the individual level. She argues the transition requires a

change in basic assumptions (paradigm shift) with more focus on the big picture (systemic change) and empowerment of people across society.

Table 1: Characteristics of CE education, adapted from Marouli (2016)

What	Why
Broadening the “possible”	To foster creativity and innovation
Promote systemic thinking	To understand of how the environment, economy, society and culture, and power inequalities work and how they interrelate
Cultivate “circular” thinking through exploration of cycles in the environment and life	To develop circular skills to put into practice
Develop service learning	To cultivate social and environmental responsibility
Focus on citizenship responsibility and skills	To prepare “global citizens”, including critical appraisal of rights and obligations, justice and fairness and political literacy
Bring together different bodies of knowledge, different experiences, different viewpoints	To reveal the integral connection between individual issues/action and social problems.
Be an ongoing exploration (action research)	To foster trust and openness, with both individual and group learning opportunities

Marouli (2016) suggests education that supports leading individual and organisational change, innovation processes, social transformation and collaborative working is required, see Table 1. The multi-layered approach by Marouli (2016) should enable education institutions to implement CE into educational programmes successfully.

The innovation diffusion literature discusses the challenges of diffusing and implementing the CE concept. The promotion of knowledge transfer by regional collaboratives for knowledge sharing (Mishra et al., 2021) is associated with successful improved practice and learning (Leising et al., 2018) as well as direct partnering of businesses (Romero-Hernández et al., 2018). The literature on knowledge diffusion and innovation adoption is diverse (Trott, 2017) and yet little has been written on the diffusion of the CE principles (Kirchher et al, 2018).

The published research on the diffusion of innovation suggests that systems thinking methodologies (ISO standards, Lean thinking, Six Sigma), that positions firms within supply

chains and sectors, present similar challenge to CE learning. The sustainability impact of CE practices is typically addressed through the environmental dimension, neglecting the social and economic dimensions. The prevalence of narrow approaches to sustainability in manufacturing leads to a risk that circular economy implementation efforts will fail to provide solutions that are socially, environmentally, and economically beneficial. Therefore, an integrated approach to understanding CE that positions organisations within their region and their supply chains is required to support the transition to a CE effectively. Some authors suggest the diffusion of CE knowledge to organisations can be achieved through greater collaboration with business advisers and supply chain partners so that platforms for collaboration and learning can lead to enhanced inter-organisation collaborations (Ritzén and Sandström, 2017; Dora, 2019). Mishra et al. (2021) suggests this could be through company interaction, within a supply chain, a sector or a region and collaborative working could allow experimentation, creating a structured process to new service solution development that could be augmented with better use of data to enhances learning and the potential of new CE ventures.

4.3.6 Summary of the academic CE literature

The academic literature review has exposed a significant gap in the understanding of how CE innovation is diffused and how organisations effectively develop CE understanding and capability in terms implementing CE principles (Goyal et al, 2021). This report outlined the literature that reports on the efficacy of CE interventions and development of CE implementation capabilities. In summary, the report found:

- There is a paucity of peer reviewed published research on the efficacy of CE interventions and the development of CE implementation capabilities.
- There are numerous CE definitions, the most common conceptualisation of CE is the 'how to' logic of combining a reduction of waste, re-use and recycling with a focus on the manufacturing sector.
- CE education is often placed within the teaching of sustainable development programmes, which is unlikely to be transformative.
- Didactic educational models are the dominant pedagogy and the transition to a CE will require different pedagogical approaches to teaching and development (Liu et al, 2022).

- The literature suggests contemporary pedagogies that develop critical thinking and systems thinking are likely to be more effective at developing appropriate CE knowledge and skills.
- The current narrow approaches to sustainability in manufacturing risks the failure of CE solutions that are socially, environmentally, and economically beneficial.
- There is an inherent tension between the current emphasis on generating wealth and jobs and the transition to a CE, which is synergistic with slow economy and de-growth.

4.4 Contemporary Executive Education and Work-based Learning pedagogy

4.4.1 Introduction

To provide context for the reader and build on the grey and academic literature review sections, an analysis of the contemporary pedagogical approaches to Executive Education (practitioner development) is provided. This section will provide more details on the different pedagogical approaches, models and frameworks for CE practitioners. This section will also provide a critical analysis of high-level learning pedagogies which support practitioners, namely executive education, continuous professional development (CPD) and work-based learning (WBL). It focuses on pedagogies which are participative, underpinned by contemporary learning theory and shown to be effective in support the translation of CE learning into practice.

4.4.2 Social learning and ‘insider-researcher’ pedagogies

Helyer (2015) suggests work-based learning (WBL) offers a deeper, broader and ‘*lived experience*’ focal point to its teaching pedagogy and research structure. Such an approach is underpinned by social learning theories which support participation, reflection, and application of knowledge. This postmodern approach challenges views of learning as a simple, structured activity and recognises work-based learning as something more dynamic and uncertain that happens over time, in any situation, and not just to ‘*self*’ but to, and with, other ‘*key actors*’ (Costley et.al, 2010; Smith and Smith, 2015; Helyer, 2015).

Education in general is dominated by an approach to learning which sees knowledge as something to be acquired. Freire’s (1970) ‘*banking*’ concept of education whereby education is an act of depositing knowledge, in which the students are the depositories, and the teacher

is the depositor. This has been the dominant '*didactic*' approach across UK education sectors until recently, reducing learning to a simple form of transfer, tending to miss the socio-cultural environment the learner operates in, whether that be at school or in the workplace. Social learning approaches underplay the 'sage on the stage' role and recognise that knowledge is socially constructed where learning is hopefully more *self-paced and self-directed* with the tutor, in time acting as a 'guide on the side' (Jones and Steeples, 2002). All learners need knowledge that tends to come from 'experts' and yet too much emphasis is placed on expert knowledge. Exploiting practitioners' workplace experience is seen as valuable for learning within a work-based learning context (Smith and Smith, 2015).

Social learning approaches and social constructivism suggest that knowledge development occurs because of social interaction and that learning is a shared experience, resulting from multiple social processes and interactions (Vygotsky, 1978). Within socio-cultural theory, learning takes place with engagement in everyday activities such as *practice* in the workplace. Rogoff and Lave (1984) propose that workplace activity structures cognition and learning. Rogoff's (1991) research focuses on participation and processes of guided participation, which involves building bridges between learner and facilitator through collaborative working and '*learning their way forward*' (Rogoff and Lave, 1984).

Postmodern learning approaches place greater emphasis on the varieties of constructed experience and beliefs and regard knowledge and learning as far less uniform and pre-determined, but more social, disparate, discursive, and varied (Talbot, 2010; Leontiev, 1978; Engeström, 1987; Helyer, 2015). Social learning theories, therefore, see learning as '*situated*' and embedded within activity. Learning arises from participation in a community and gaining recognised membership within that community (Lave and Wenger, 1991). Therefore, learning designed to impact learner's workplace practices should consider and engage the learner's work practices and work environment.

Contemporary learning interventions with participative pedagogies promote participative approaches to learning (Hodgson and Reynolds, 2005) where learners co-construct the 'curriculum' and learning to enable a greater impact on what they are seeking to achieve in terms of applied learning outcomes. This dialogical approach to the creation of knowledge encourages transformative learning via critical questioning that enables the learner to challenge underlying assumptions and restructure their perspective and the way they act (Hodgson and Watland, 2004). In turn, this extends learner capabilities and aids the development of '*co-created*' solutions for the learners' workplace challenges, providing opportunities for positive impact on their practice, their organisation and in their locality

(Howorth et al. 2012). These approaches offer an applied learning through the development of workplace solutions and new practices.

4.4.3 Work-based research

The contemporary knowledge-driven, technology-based economies require workers to engage in continuing professional development (CPD), accredited and non-accredited professional development related to their workplace roles (Collin et al, 2012). Work-based learning in knowledge 'environments' is an interesting blend of instrumentalism (serving the organisation, economy, and nation state) and a humanistic universalism (serving self and society). Gibbons et al. (1994) described the emergence of a distinctive 'mode 2' knowledge, not centred on any specific academic discipline-based knowledge, but rather on context-driven, problem-solving, and interdisciplinary knowledge development and management. It often involves multidisciplinary teams working together for short periods of time on specific problems in the real world.

Work-based learning and research tends to be process rich, individualised, self-paced and self-directed. It is invariably identified as 'practitioner-led' research (Costley, Elliott and Gibbs, 2010), focusing on developing professional and organisational learning and, particularly, on enhancing worker effectiveness. A small number of UK universities have established research infrastructure for work-based learning, which focuses on 'real time', 'real world' projects that develop practitioner knowledge, skills and understanding that contribute to organisational learning, culture and effectiveness. The research applies situational analysis using reflective practices (Costley and Armsby, 2007), led by practitioners as 'insider-researchers', utilising their unique knowledge of work-based projects to produce 'insider-research' (Costley, Elliott and Gibbs 2010).

Work-based research is carried out inside the researcher's own workplace, thus containing a powerful element of social 'situatedness,' fuelled by behavioural and cultural issues (Vygotsky, 1962; Lave and Wenger, 1991). This situatedness arises from the interplay between researcher (their position/role), the people they interact with, the organisational environment in which they operate (issues of hierarchy, power and influence) and the wider business and 'political' contexts in which their organisation operates. 'Insider-researchers' are in a unique position to study a particular issue in depth and, together with their specialist knowledge, skills and understanding and easy access to key people, they can positively change organisational processes and practices. Work-based research is often small scale, specific, improvement oriented and can offer insights to an existing 'community of practice' (CoP) or community network (Costley, Elliott and Gibbs, 2010).

4.4.4 Executive Education and Work-based Learning summary

Social learning and insider–researcher learning theories are useful for understanding impactful practitioner development and work-based learning in practice. They provide a lens for viewing learning as a social construct involving self and other people, life and work experiences and developmental practice. Effectively, work-based learners see and seek learning opportunities all around them (Smith and Smith, 2015). This review suggests that learning principles derived from socio-cultural learning theories are most appropriate for ‘situated learning’ workplace learning (Reynolds, 2011). Workplace learning can then focus on the critical examination of existing workplace challenges, to develop potential solutions that improve organisational capability and capacity (Reynolds and Vince, 2004; Ulrich and Smallwood, 2013).

Social learning and insider–researcher learning theories have faced the challenge of legitimising the process of making sense of experience and reflecting on practice against the traditional knowledge giving normative education models (Reynolds, 2011). Learning from experience in a collective setting recognises that people learn more effectively with peers and more likely to co-construct ideas with their peers (Reynolds, 2011). Therefore, it is critical that facilitators of such interventions are skilled at enabling practitioner development through social learning models and participative pedagogies.

4.5 Literature review conclusions

Clear themes emerged from the literature review, which shall be discussed further in the findings and conclusion sections of this report. The themes centre on the need to support circular economy transition via the development of targeted, evidence based transformative learning approaches. The below bullet points summarise the literature review findings.

4.5.1 CE Pedagogical development

- Existing traditional, didactic learning approaches are less effective for developing practitioner capabilities to implement CE principles within workplaces
- Most existing CE development is currently at the level of basic knowledge gain or knowledge extension and few interventions develop the skills of practitioners to implement CE principles within their context

- More emphasis should be placed on teaching CE as a systems thinking approach and developing the critical thinking skills of practitioners
- Resources should be devoted to the development of CE 'knowledge platforms', to publicise available CE interventions and implementations case studies for practitioners
- Research that explores the key learning processes and pedagogies that develop practitioners new service solution development skills (process innovation) would be valuable

4.5.2 CE Organisational Development

- Self-organisation and critical reflection are key behavioural elements in the development and sustainability of CE initiatives. Developing these capabilities within organisations is vital
- Effective CPD/work-based learning mechanisms are required to develop organisational dynamic capabilities that facilitate a transition to a business model that implements CE principles
- An appreciation of systems thinking is required and capabilities that seek out CE 'disruptive innovation' are urgently needed across all sectors, which could be developed through inter-organisational programmes and mechanisms like knowledge exchange networks or communities of practice
- An ability to develop regional and community partnerships to support a place-based approach is key, as the transition to a CE will be achieved more quickly and effectively through a CE eco-system that involves public, private and third sector actors

The transition to a CE is dependent on enhancing the quantity and quality of interventions that develop the CE knowledge and skills of practitioners through effective executive education, CPD and WBL. The transition to a CE requires support from local and national government agencies that will encourage 'disruptive innovation' to implement CE principles within their organisational processes and evolve their business models to incorporate CE principles. The transition can be accelerated if regional and sector based CE ecosystems are developed that contain inter-organisational communities of practice and sector innovation networks.

The themes align with the European Commission's European Green Deal that places transformative innovation at the centre of the EU policy agenda. The EU Green Deal promises

to ‘decouple economic growth from resource use’ and ‘no person and no place left behind’, through a regional and community level innovation programme (ibid) that will invest €6 trillion by 2030. The EU ‘Partnerships for Regional Innovation Playbook’ (PRIP, 2022) paves the way for focused *policy dialogue and co-creation* within regions on green and digital transition to develop and test practical policy tools and innovative regional activity. The PRIP suggests regional partnerships should focus on transformative projects with broad stakeholder engagement to improve or enhance ‘regional and local innovation ecosystems’. The EU suggest that innovation is the top priority and should be cultivated through national and regional partnerships to unleash local potential to deliver on both local and EU-wide challenges. Therefore, CE innovation supported by digital innovation is key to our future prosperity. The EU ‘Playbook’ is a seminal publication that can guide practitioners and policymakers in Wales to support the transition to a CE.

5 FINDINGS

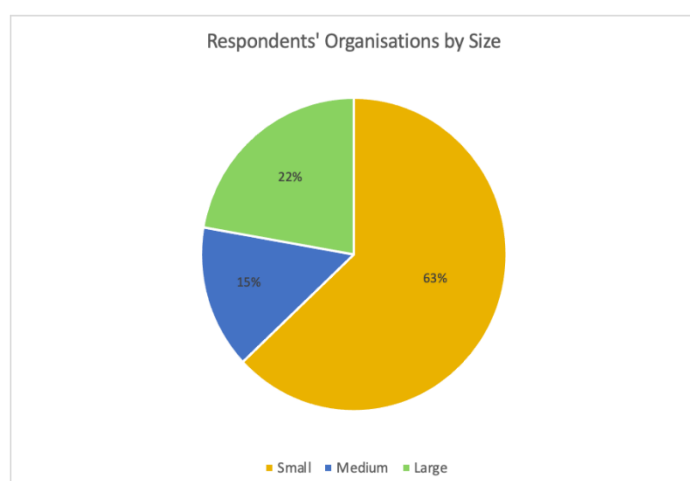
5.1 Introduction

This report gathered both quantitative data through a survey (questionnaire) issued to organisations across Wales and qualitative data through semi-structured interviews. The semi-structured interviews obtained details of how CE principles have been implemented within each organisation and obtained details of the processes and practices introduced. The survey aimed to gather data on how well organisations understood the term ‘circular economy’ and to better understand the CE processes and practices in place within organisations (Appendix 3). The report received 81 surveys, yet only 27 were fully completed and so the data presented below is a summary of the fully completed surveys. The summary data from the survey is presented below and thematic analysis of the interview data is presented in section 5.3.

5.2 Quantitative data (Survey)

The survey was sent to employer representative bodies across Wales for distribution to their members. The breakdown of respondents by size and sector is shown below in Figures 4 and 5 and is presented to provide context to the summary data that will be outlined and commented on below.

Figure 4: Respondents’ Organisations by Size



The data obtained from the surveys is summarised in Figures 6 to 19, below. The results on whether the respondent’s organisation uses environmental management systems (EMS) are summarised below.

Figure 5: Respondents' Organisations by Sector

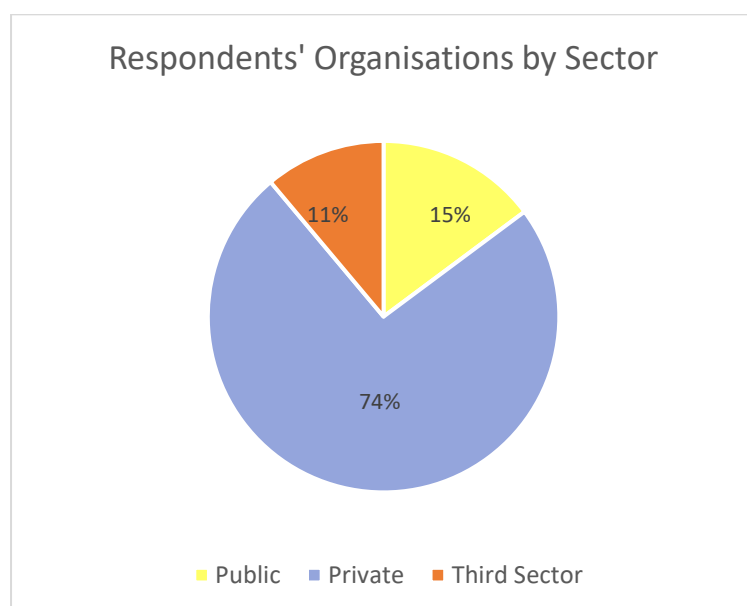
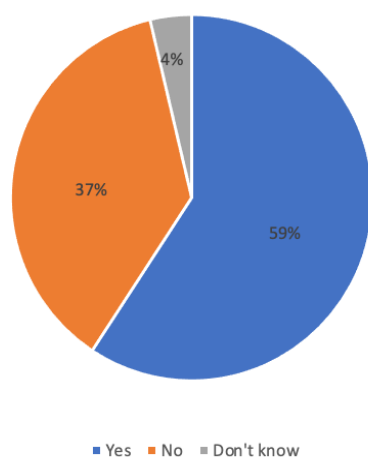
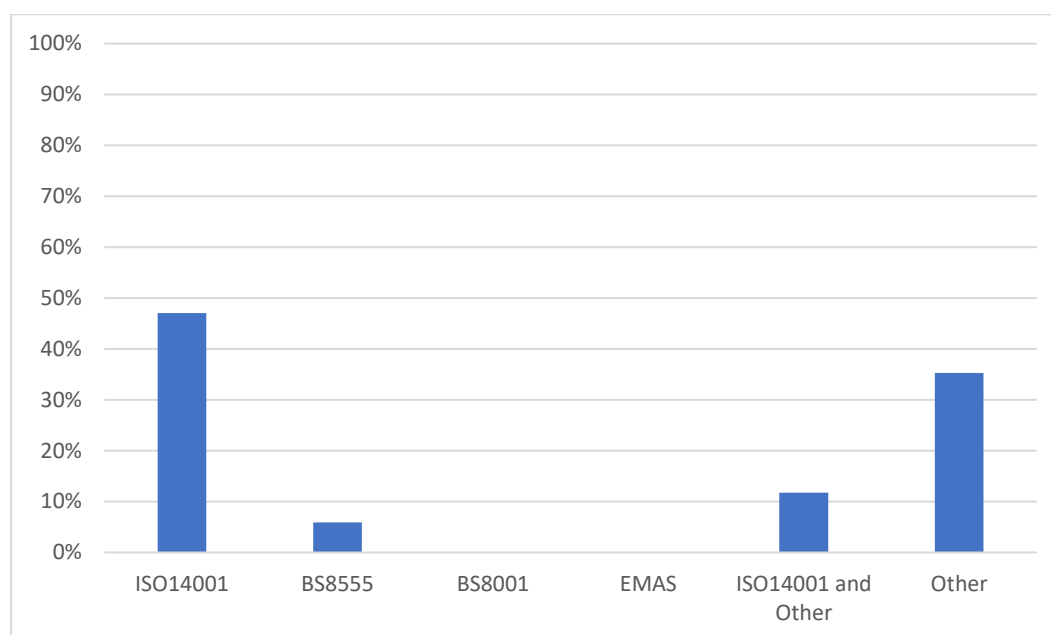


Figure 6 shows that 59% of the respondents have an EMS system in and 37% do not, with 4% unaware. Respondents who did not know are likely to work in large organisations where knowledge of all processes and practices is not always known.

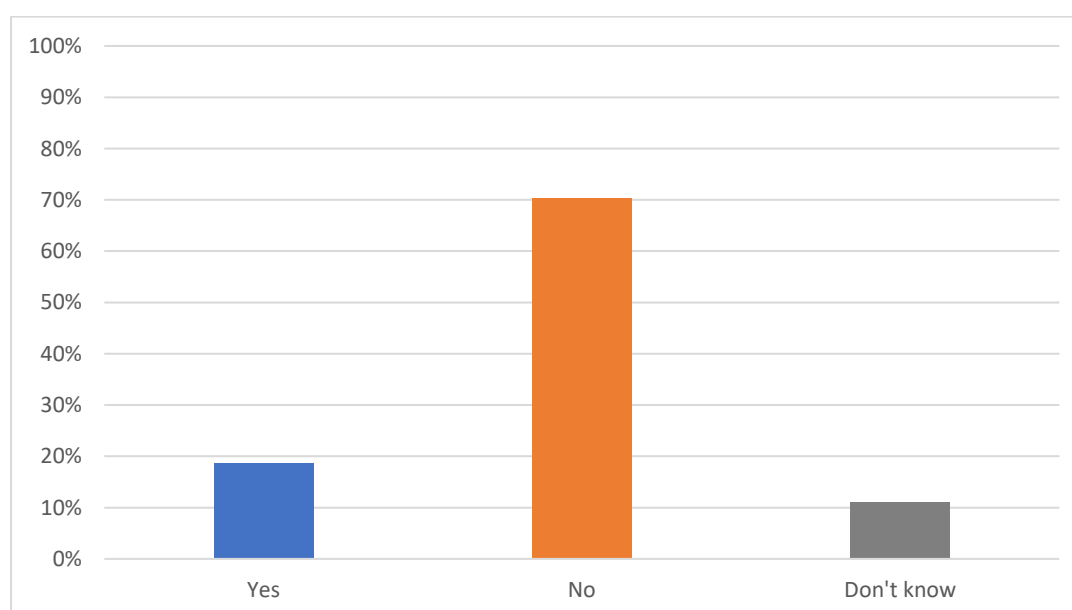
Figure 6: Does your organisation use any Environmental Management Systems



The organisations that employ EMS in their organisations (see Figure 7) are most likely to employ ISO14001 (47%) with 35% employing other systems and a small percentage using BS8555, while none use BS8001 and EMAS.

Figure 7: Which accredited Environmental Management Systems do you use?

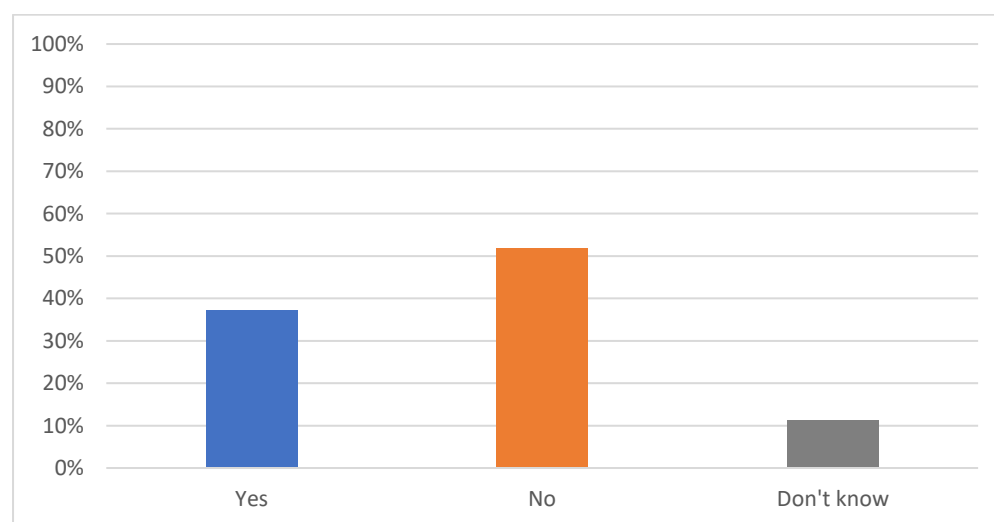
Respondents were asked if their organisation has a formal green procurement policy, 19% advising they do and yet 70% do not, with 11% not sure (see Figure 8). However, in response to a related question as to whether their organisation has a formal sustainable procurement policy, the responses were more positive with a much greater percentage (37%) advising yes and 52% advising no (see Figure 9).

Figure 8: Does your organisation have a formal Green Procurement Policy?

Interestingly, the results suggest that sustainable procurement policies are more likely to be formally established than green procurement policies. This could be a result of different

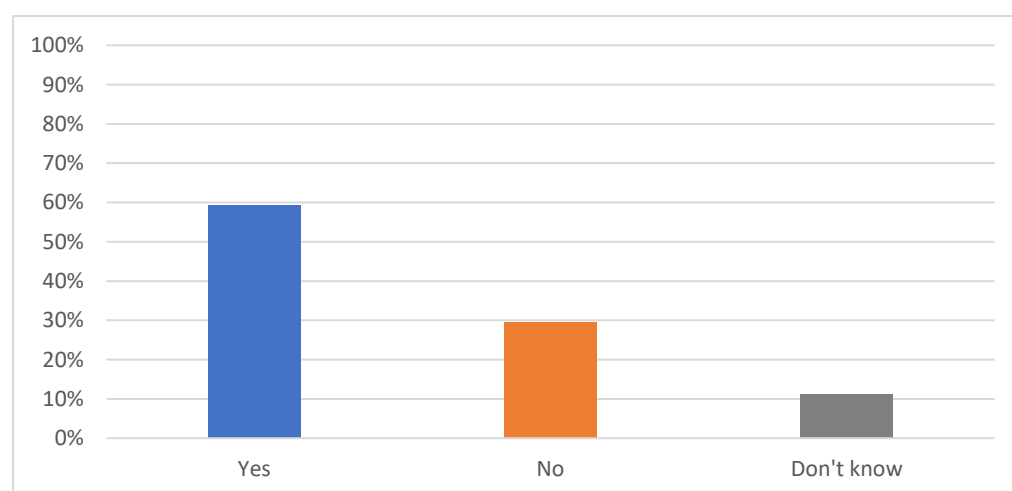
terminology used in organisations or different interpretations of the terms. However, most respondents confirmed an absence of a formal green procurement policy (70%) and slightly fewer (52%) advised they did not have a formal sustainable procurement policy. This suggests that more initiatives to encourage and support organisations to incorporate more sustainable procurement policies that would support the transition to a circular economy are needed.

Figure 9: Does your organisation have a formal Sustainable Procurement Policy?



Encouragingly, Figure 10 provides evidence that almost 60% of the responding organisations have developed processes to comply with the sustainable development (SD) goals. Approximately 40% of the respondents advised they did not have processes that comply with the SD goals or were unsure. This suggests that policymakers should consider how to increase SD goal incorporation by organisations.

Figure 10: Has your organisation developed processes to comply with the Sustainable Development Goals?



This report obtained data on the extent to which the respondents and their colleagues understand the term or concept of circular economy, summarised in Figure 11. The level of understanding is interesting as the respondents appear to have a relatively higher level of understanding than their peers, with a hierarchy of understanding illustrated below. It appears that the survey respondents have a higher interest in CE than their peers, and more senior staff have higher levels of understanding. The data suggests policymakers should consider how a fuller understanding of the term ‘circular economy’ can be developed.

Figure 11: To what extent do you and your colleagues understand the term/concept of ‘Circular Economy’?

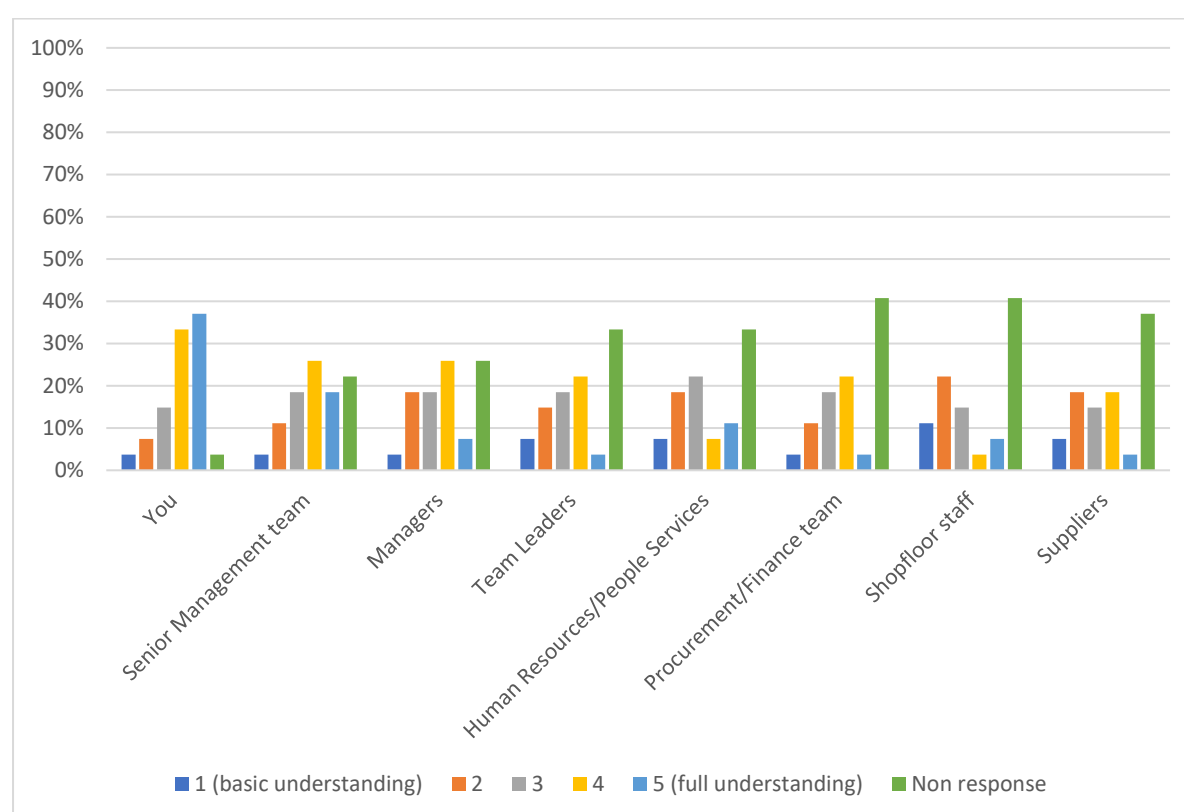
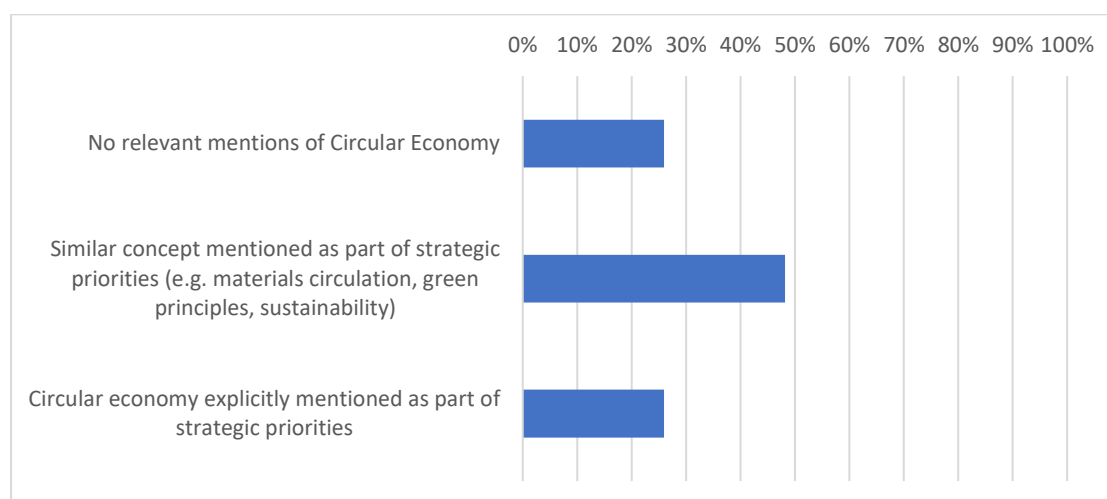


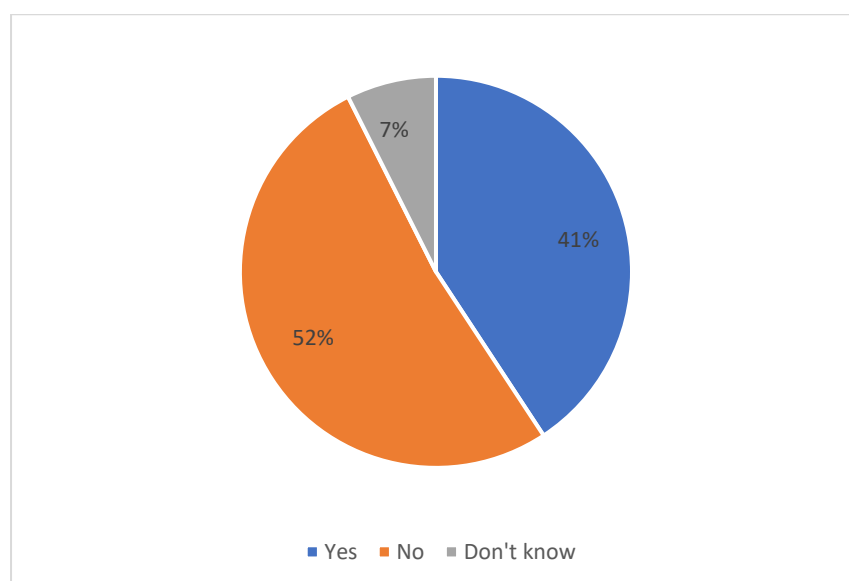
Figure 12 displays the results on the question of organisational strategy alignment with CE principles. The data suggests that 26% of respondents indicated that CE was not mentioned. However, 48% stated that similar a concept was mentioned and 26% confirmed that CE was explicitly mentioned as part of strategic priorities. It is encouraging that the combined 76% have incorporated CE or related concepts into their strategic intent.

Figure 12: Is your organisational strategy aligned with becoming more circular?

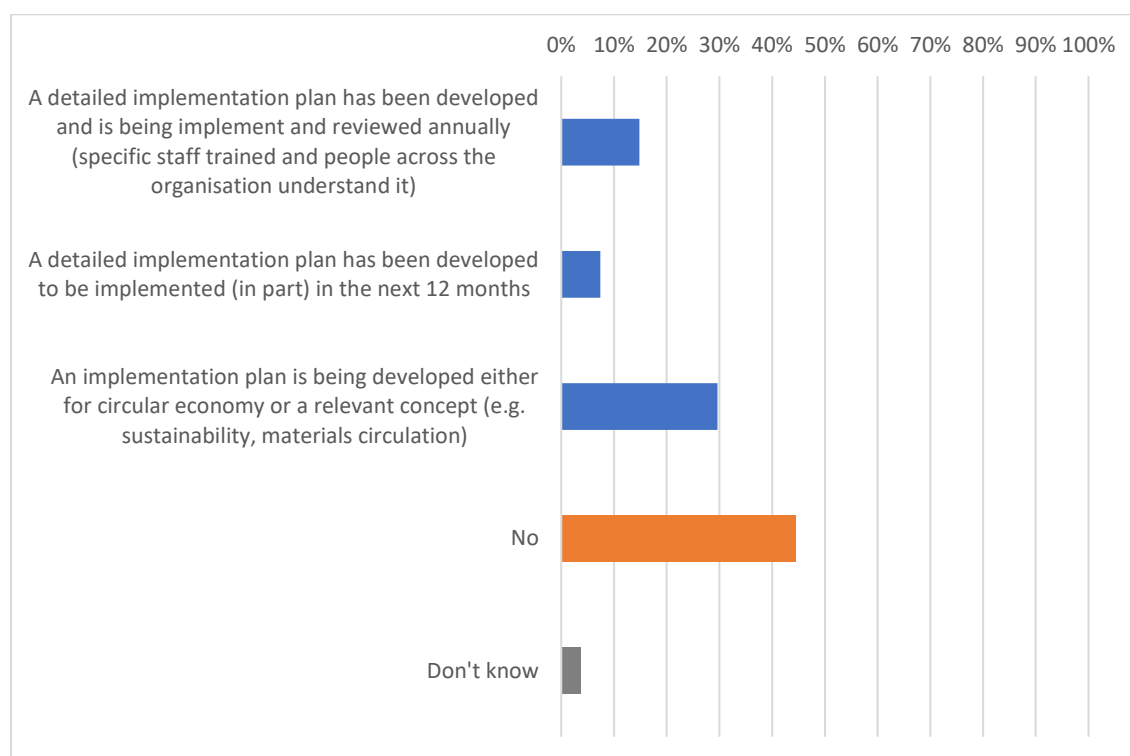


The data on whether respondents have CE targets or measures is displayed in Figure 13 below. The figure shows that 41% do have CE targets or measures in place and 52% do not.

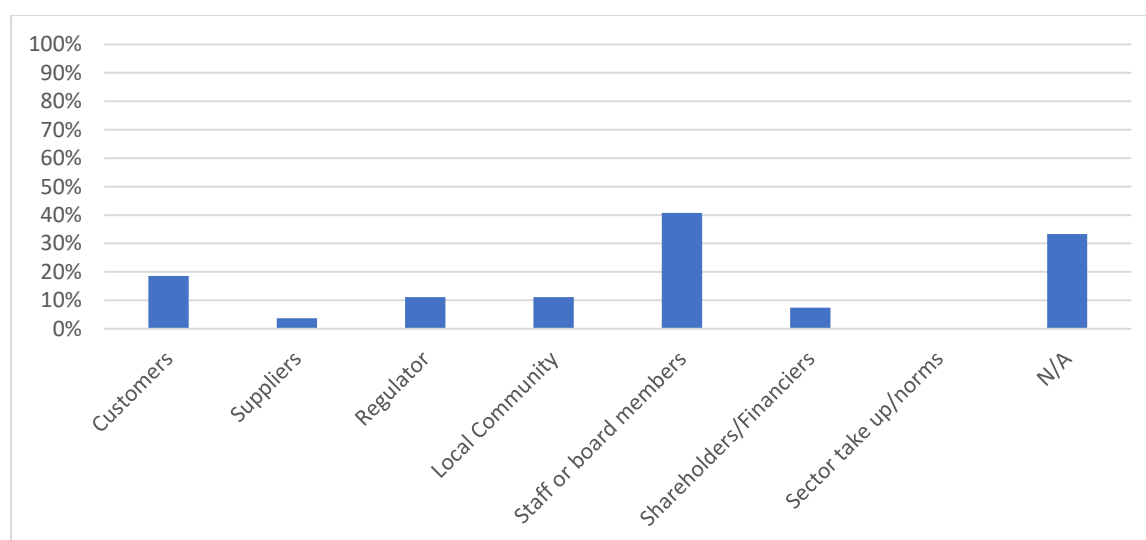
Figure 13: Do you have Circular Economy targets or measures?



This report also asked respondents if they had a CE implementation plan in place (see Figure 14). The infographic shows that 15% have a detailed implementation plan that is reviewed annually with a further 7% having a detailed implementation plan developed to be implemented (in part) in the next 12 months. Moreover, 30% stated that an implementation plan is being developed either for CE or a relevant concept such as sustainability and materials circulation.

Figure 14: Does your organisation have a circular economy implementation plan?

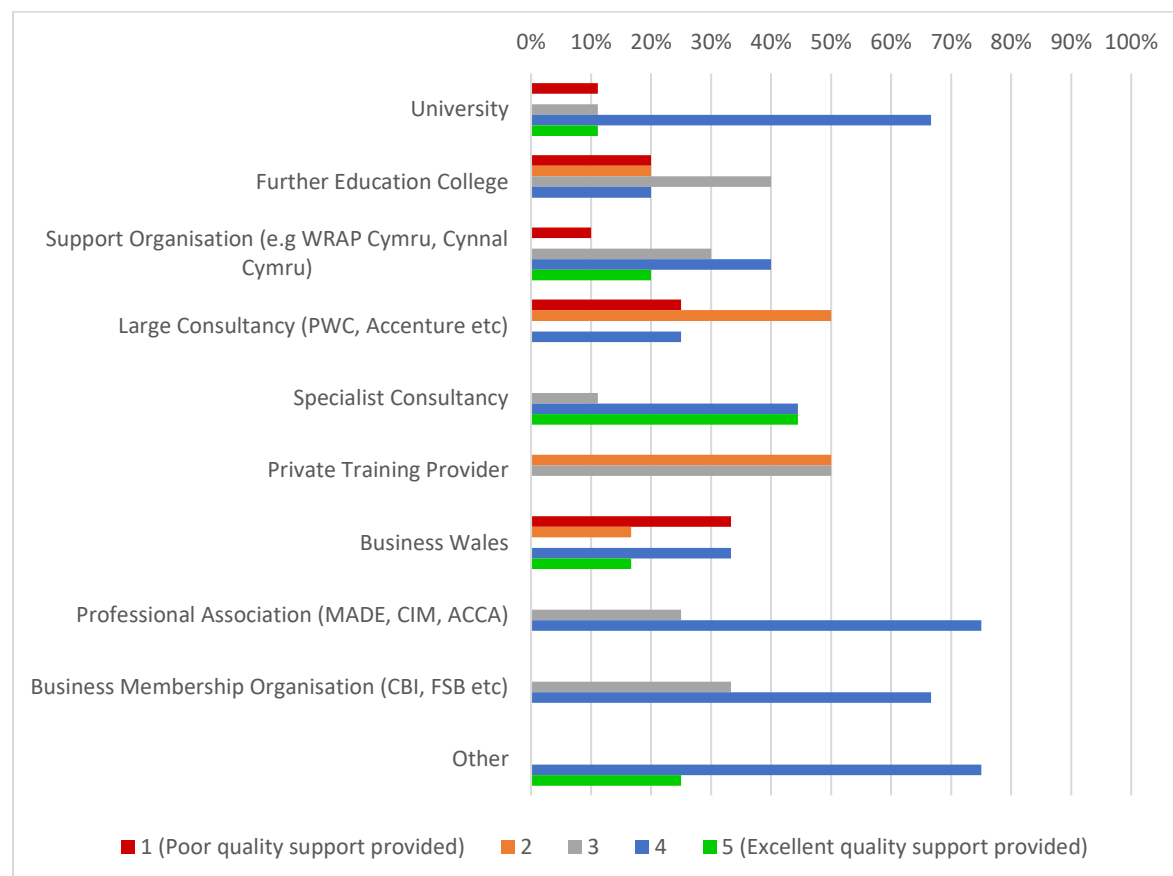
The report obtained data on who might have encouraged organisations to develop a CE plan. We found that staff or board members are the main influencers with 41% and customers at 19% were the second main source of encouragement, as illustrated in Figure 15.

Figure 15: Who encouraged you to develop a Circular Economy plan?

Following the earlier questions regarding a CE implementation plan, we also explored the level of engagement with other organisations for support with CE or sustainability implementation. The data obtained showed that 52% engaged with other organisations for support. The respondents who engaged with other organisations suggested higher quality of support came

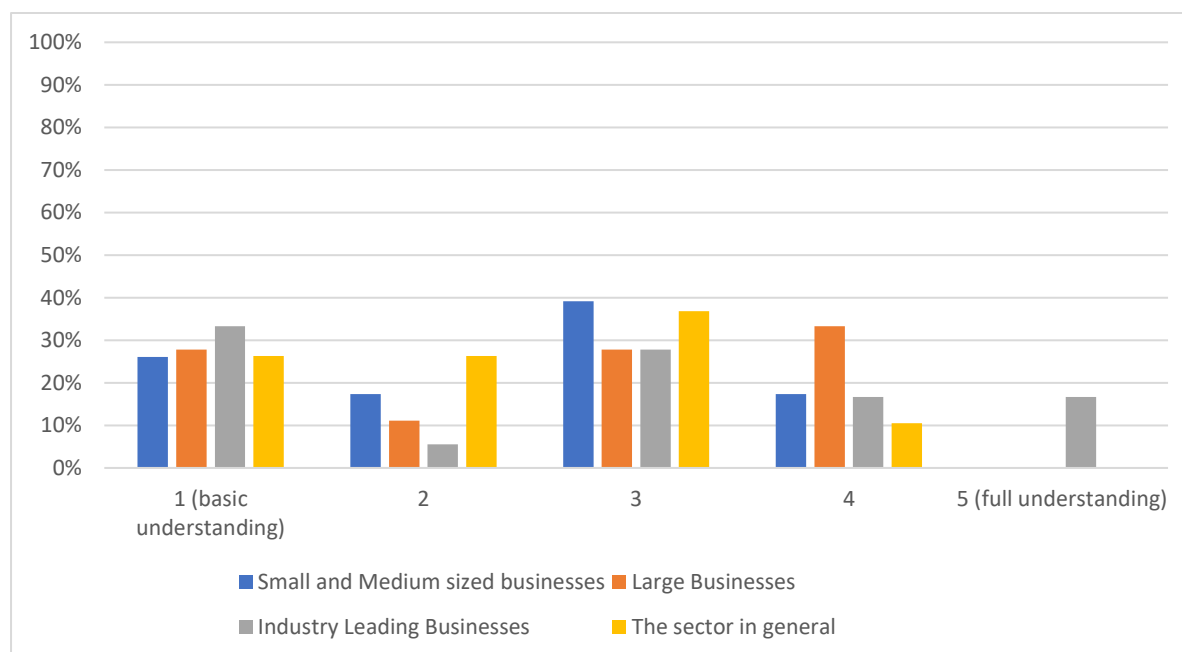
from professional associations, business membership organisations, universities and other support organisations (see Figure 16).

Figure 16: Which organisation supported you with Circular Economy or Sustainability implementation?



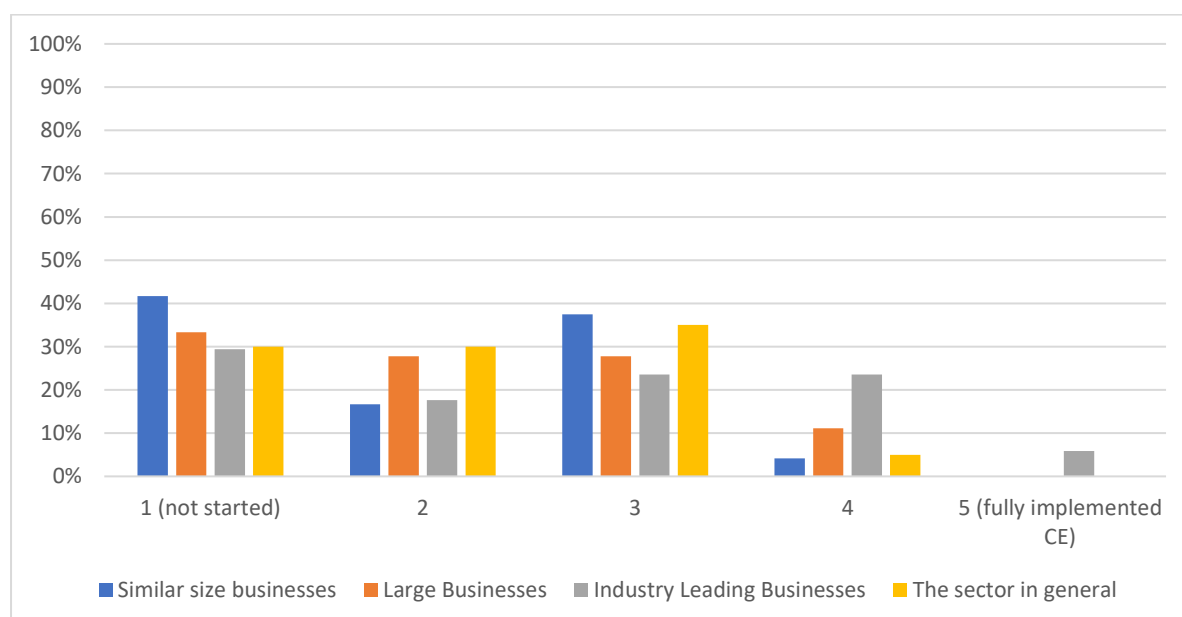
This report aimed to better understand the level of understanding of CE across sectors or industries in which the respondents operate. We found a relatively low level of understanding across the board. It is evident that small and medium businesses have a lower level of understanding of CE. The results are somewhat mixed as small and medium sized businesses and industry leading businesses have a relatively higher proportion of those with full understanding. As expected, industry leading businesses display relatively the highest proportion of full understanding level, as summarised in Figure 17. The data suggests policymakers should consider interventions help raise the level of understanding of circular economy.

Figure 17: In terms of the sector or industry you operate within, what do you think is the level of understanding of Circular Economy?



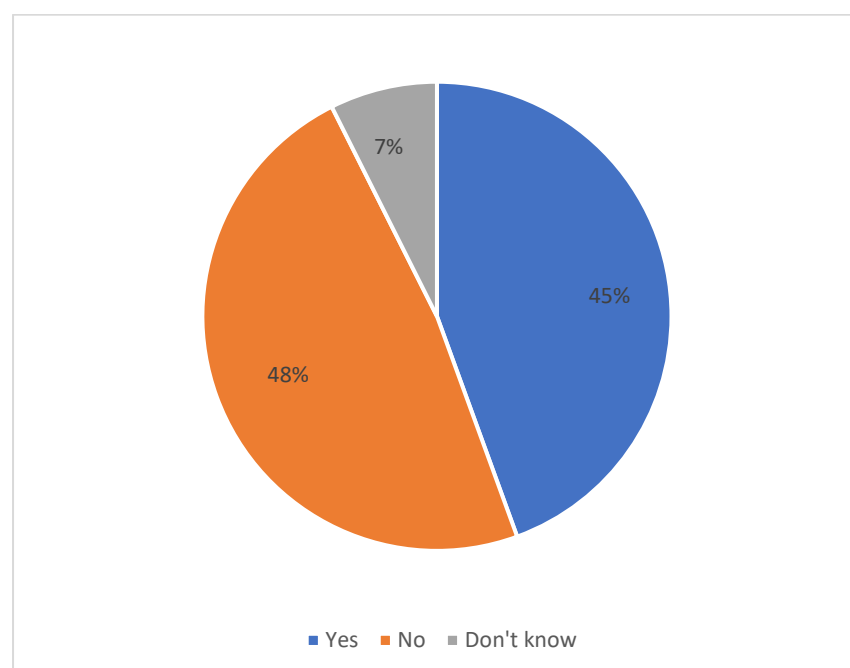
To complement the question on the level of understanding of circular economy, we also examined the level of implementation of CE in terms of the sectors or industries in which the respondents operate. The results, presented in Figure 18, show that industry leading businesses have a relatively high level of implementation and yet there is clear evidence of the need for more initiatives to help achieve higher level of implementation of CE across the board.

Figure 18: In terms of sector or industry you operate within, what do you think is the level of implementation of Circular Economy?



This report gathered data on the respondents' awareness of organisations that provide CE services or products and surprisingly 48% of respondents advised that they are not aware of providers. The report asked the 45% that were aware and had used providers to report on their perceived value of the CE support provided; the data is displayed in Figure 19 below.

Figure 19: Are you aware of businesses or organisations that provide Circular Economy services or products?



These results suggest the development and provision of practitioner-focused CE content and interventions should be prioritised by policymakers. It appears a wide range of interventions (development programmes) is required to raise awareness, interest and educate on circular economy principles and implementation practices.

This report disaggregated the individual responses into public, private and third sector organisations to obtain insight into the practices of the different sectors. The results show that there are more organisations in the public sector which use environmental management systems and have developed processes to comply with the sustainable development goals, than in the private sector. However, there is a noticeable lack of a formal green procurement policy in place across all sectors. In terms of the extent to which the respondents and their colleagues understand the term or concept of CE, we found the results suggest lower levels of understanding in the public sector when compared with the private and third sector. A notable observation is that none of the public service respondents suggested their colleagues had 'full understanding.'

Another interesting finding is that most of the public and private organisations advised that a ‘similar concept’ features as part of strategic priorities, suggesting a proliferation of terms that might not be helping organisations implement CE. It is also interesting to note that no sector had widely adopted CE targets or measures and very few had CE implementation plans. The survey data therefore suggests a requirement for further education and training programmes to enhance awareness, interests, and provide peer networking opportunities on circular economy practices and implementation.

In addition to the sector-based disaggregation, we also examined responses based on organisational size by disaggregating the data into small, medium and large organisations. Interestingly, we found that all the medium sized organisations and most large organisations apply environmental management systems and almost half of small organisations do so.

The results suggest paucity of both ‘formal green procurement policies’ and a ‘formal sustainable procurement policies’ across organisational sizes as well as a lack of circular economy targets or measures, with much lower prevalence in small organisations. However, the survey generates a more positive picture with respect to the development of processes in organisations to comply with the sustainable development goals across all size firms. The data also suggests that small firms have lower levels of understanding of the term CE.

5.2.1 Summary of survey data

The data obtained from the survey suggests that awareness of CE principles is low across all organisational sizes and sectors. A minority of organisations have CE principles embedded within their strategy documents and very few have CE related key performance indicators. Most organisations do not have a detailed CE implementation plan. The survey data therefore suggests that the wide-ranging CE awareness-raising initiatives and CE development interventions should be prioritised by policymakers if Wales is to transition to a circular economy. The survey data also suggests, based on differing responses across public and private sectors, that tailored CE interventions should be developed based on the size and sector of organisations.

5.3 Qualitative Data (semi-structured interviews)

5.3.1 Introduction

The practitioner case studies (thin academic case studies) were drafted to give practitioners insight into existing CE processes and practices and were therefore described as case studies and published in a separate [report](#). This report acknowledges that the academic community

would not consider the case studies presented in the above report as academic case studies, as there was no collection of longitudinal data. Therefore, this report uses the term practitioner case studies. The case studies were developed and written from semi-structured interviews with the organisations that agreed to take part and from a visit to obtain video footage, captured by a professional videographer. Therefore, qualitative data was captured through semi-structured interviews and video footage, as well as ethnographic data from the film footage of the sixteen organisations that agreed to be filmed. The twenty-one practitioner case studies were heterogenous, coming from twenty organisations. The organisations varied in their size, structure, and core purpose. Thirteen of the case studies were businesses, six were social enterprises and one is a public service organisation. Three of the organisations were large (employing more than two hundred and fifty people), four were medium sized organisations and thirteen were small (employing less than 50 FTEs).

5.3.2 Key themes identification methodology

This report adopted thematic analysis (Spradley, 1979; Flick, Kardoff and Steinke, 2004) to analyse the qualitative data obtained from the twenty-one semi-structured interviews and video interviews of practitioners, to develop key themes. Thematic analysis is used to study vocational environments (Fereday and Muir-Cochrane, 2006) and is described as a search for themes important to the description of the phenomenon under consideration (Daly, Kellehear and Gliksman, 1997). The process contains an inductive element involving the identification of themes through “*careful reading and re-reading of the data*” (Rice and Ezzy, 1999, p.258). In terms of the deductive component, this relates to reading the related literature and gaining information that allows inferences from the data. Once these inferences have been collected and mapped against the literature review, key themes can be formulated to develop a storyline (Aronson, 1994). In this way, the deductive component is where the literature is interwoven with the findings and the constructed ‘storytelling’ gains merit. This helps the reader to comprehend the research process, build a theoretical understanding and become aware of the research motivation driving the study (Aronson, 1994).

Aronson (1994) highlights the iterative process of thematic analysis, noting the focus on identifying key themes and patterns of behaviour. This iterative or ‘looped’ process in building data analysis followed a data collection process using audio-taped or video interviewing and recording of dialogue and events from participant observation in our CE case study ‘events.’ Studying and analysing the narrative from these CE research environments, transcribing the conversations and listing ‘*patterns of experiences*’ emerging from direct quotes or paraphrasing common ideas (Taylor, Bogdan and DeVault, 2015) leads to a cataloguing of

related patterns of CE case study experiences into themes. This report analysed the informants' story-telling and dialogue to form a comprehensive picture of their collective experience and was central to developing the key themes presented below.

Aronson (1994) suggested key themes can be developed by cross-referencing the evolving patterns of experiences within the data with the related literature. By constantly referring to the CE and pedagogy literature review with 'emergent themes', inferences have been made from the interviews or participant observation that facilitate the formulation of key thematic statements built around our CE research project 'story line.' The coding process involved recognising important moments and coding them, seeing them as something significant, prior to a second order process of interpretation (Boyatzis, 1998). In addition to this inductive approach, constructing a simple, coded template (Crabtree and Miller, 1999) involved identifying codes from fieldwork notebooks and verbatim transcripts of CE case study interviews, as a means of organising text for subsequent interpretation. In line with thematic analysis methodology, a structure to such coding was developed *a priori*, based on the stated aims of the CE research study and the theoretical framework for the project. This might appear to have evolved as a linear, 'step-by-step' analysis process and yet the second level interpretive understanding was built on a reflexive process during three CE project analysis sessions co-ordinated by the project lead. The figure below outlines the basic stages of the coding and thematic analysis process undertaken and demonstrates a desire for a high degree of conceptual clarity via a distinctive methodological analysis.

Figure 20: Thematic analysis process**CE Project Thematic Analysis Chart**

Stage 1: Development of initial codes and emergent themes from patterns of Circular Economy [CE] experience or direct dialogue [code/theme 'naming;' code focus]

Stage 2: Summarizing data and identifying initial CE behavioural themes [outlining key points from interview transcripts; identifying repetitive behavioural themes]

Stage 3: Applying the codes and building additional coding where appropriate [building induction – i.e. – identifying additional key CE behavioural factors]

Stage 4: Identifying links from key theoretical themes from the CE review of literature

Stage 5: Searching for connectivity – between the CE behavioural and theoretical themes [discovering patterns in the data]

Stage 6: Interpreting and legitimating the key CE themes [searching for familiarity with existing research]

5.3.3 Key themes and findings

The key findings from the thematic analysis of the semi-structured interviews and video recordings are summarised in the summary tables below (Tables 2, 3, 4 and 5). The tables outline themes and a classification as they emerged from an analysis of the data. The themes are separated into organisational and behavioural '*key processes*' and were subsequently analysed against the emergent conceptual themes arising from the literature review. This report analysed the CE intent, the leadership practices, organisational culture, and key behavioural processes inside these organisations and identified common themes in terms of the implementation of CE processes and practices. The report developed data summary tables into identified themes which were organised into the key process of Individual behaviours, Organisational Learning and Development, Organisational Culture, Organisational Pedagogy Methods and Individual Pedagogy methods. This study provides a short narrative of dominant themes identified from the key themes highlighted in the tables.

The individual behaviours identified within the data are outlined in Table 2 below. A strong individual behaviour theme discovered was that of 'passionate, values-based leadership. This theme was identified across all the cases and enabled the leaders to engage others in their

drive to implement CE principles. The other theme, apparent across all the case studies, was the existence of a powerful set of 'lived CE values' which underpinned a social purpose and influenced the organisational identity. These first two behavioural characteristics enabled a respect for others, both inside and outside the organisation, who were leading the push for CE transition and, additionally, helped drive a desire to both challenge and support similar CE agencies. Another common theme, within individual communication styles, was a real desire to continually 'story-tell and story-sell' their CE vision and values to engage colleagues and external stakeholders, which enabled individuals to engage internal and external stakeholders with their CE journey. A facilitative leadership style was discerned across most of the leaders interviewed for the case studies. Most interviewees exhibited strong conviction around CE and social values, which often facilitated a clear strategic vision.

Table 2: Common Themes: Individual Behaviours

Individuals Behaviours	Common Themes
Leadership	Values based, socially focused, passionate conviction. Pluralistic perspective. Emergent approach, clear strategic vision, flexible CE strategy. Facilitative leadership style.
Values	Strong CE and social values; high behavioural standards, powerful sense of social purpose and passion for quality service and standards
Impact measurement	Emphasis on people, place and community development; clear knowledge, skills and understanding of CE
Paradigm/Mindset	Innovative thinking; flexible and organic organisational growth approach; search for 'rebel ideas' that influences a 'fluid' CE development
Working with others	Collaborative; developing external partnerships; co-production; organisational 'agility'; recognising opportunities and 'fast acting'
Communication	Storytelling ability; listening ability; ability to engage colleagues and stakeholders; 'getting people on board'

The organisational learning and development themes identified within the data are outlined in Table 3 below. Many of the case study organisational leaders have built CE awareness into their internal organisational learning to embed an understanding of aims of change initiatives

and for organisational buy-in. This helped realise specific CE business benefits and enhance their overall ability to innovation and embed CE within their organisational culture.

Approximately 70% of the CE case study leaders referred to the importance of building collective CE insight, facilitated by harvesting local, tacit knowledge from colleagues and key project stakeholders which, over time, helped build several local and regional CE networks and sustainable collaboration. The emphasises on the importance of emergent discourses inside CE organisations and the significance of 'place,' often led to the development of a tangible community engagement in CE activity. Most of the CE case study leaders highlighted that they regularly surfed the web for progress reports on the UK or global CE which they could learn from. The Ellen MacArthur Foundation and WRAP UK were repeatedly referred to as helpful CE knowledge platforms. Additionally, the WRAP Cymru website was regarded by CE case study leaders as a vital signpost towards new CE ideas, good practices and funding opportunities.

Another theme identified across most of the cases was a '*Trailblazer*' mindset which aligns with a business change orientation as described in the [From waste to resource productivity report \(2017\)](#). The analysis suggests that over two-thirds of the organisations demonstrated a '*CE Trailblazer*' growth mindset, creating dynamic capabilities in their workplaces and developing quick and effective key CE processes or products in their respective sectors to enjoy competitive advantage as outlined in the [World Economic Forum/ScaleUpNation \(2021\)](#) report.

Table 3: Common Themes: Organisational Learning and Development

Organisational Processes	Organisational learning and development
Management structure	Formal Divisional leads; informal CoPs; Appreciative Inquiry/Task & Finish groups
Organisational culture	Learning culture, CE embedded in daily thoughts and action; intuitive CE 'routines'
Processes and Practices	CE hindsight and foresight in standard workplace processes, internal and external knowledge gathering, collective CE insight
Organisational impact	Robust processes and 'Trailblazer' approach
Networking	Informal learning activity; learning through connecting to peers; CoPs
OD Pedagogy	Internally driven learning approach; organic & holistic CE understanding

The organisational culture themes identified within the data are outlined in Table 4 below. A holistic approach to embedding CE principles across the organisation was identified in 89% of the organisations. This theme was not evident in the large public service organisation. It is more difficult in a large organisation to embed a new concept like CE across an organisation that employs thousands in various roles. Another theme identified, within two-thirds of the organisations, was an internal storytelling culture where workers were made aware of the impact of their CE processes through stories told by managers and repeated by all members of the organisation. The storytelling practice was synergistic with an empowerment of workers and a collective sense-making practice within most organisations interviewed. Workers in 70% of the organisations were encouraged to learn about innovation and CE practices in other organisations, which enabled strong external relationships and networking activities that were used to obtain knowledge of new processes and practices. This organisational culture enabled and supported workers to suggest new processes and practices that would enhance the CE principles through iterative amendments to existing practices.

Table 4: Common Themes: Organisational Culture

Organisational Processes	Organisational Culture Themes
Management structure	Clear & Flexible Management structures; strong internal CE 'storytelling'
Organisational culture	Developmental and holistic embedding of CE into core working practices
Processes and Practices	Worker empowerment and CE 'sense-making'
Organisational impact	Self-directed & Intrinsically-motivated Learning
Networking	Strong external relationships used for knowledge acquisition and collaborative working
OD Pedagogy	Iterative and emergent CE knowledge and skills development

The organisational pedagogy themes identified within the data are outlined in Table 5 below. There were strong synergies between the organisation culture and organisational development pedagogy methods. For example, the culture of encouraging workers to suggest new processes and practices and engage in external knowledge acquisition enabled an iterative approach to obtaining knowledge. Most of the organisations had informal and formal processes that supported a 'test and learn' approach to implementing new practices, relevant to CE. Seventy percent of our case study organisations invested in CE knowledge and skills development through supporting workers to engage with in-person and on-line interventions.

Approximately thirty five percent had cultivated valuable CE education and innovation partnerships with UK universities. Importantly, this varied pedagogical focus informed and constantly reshaped CE strategy and operational plans. The adoption of an iterative pedagogical approach enabled novel and innovative ideas for new CE processes and products. Leaders encouraged and empowered workers to 'self-organise' and 'critically reflect', to identify diverse ways to develop themselves and the organisation. This produced an organisational 'fluidity' and potential for constant CE development and change. Approximately sixty percent of the organisations adopted some form of action learning, where workers were encouraged to discuss challenges and develop solutions within groups. The use of situated action learning mechanisms enabled challenges to be discussed and addressed, supporting the continuous improvement of products or services. Approximately sixty percent of the leaders of the organisations employed coaching or mentoring to support

staff and enhance individual performance, with the interviewees suggesting coaching and mentoring staff enhanced productivity.

Table 5: Organisational Pedagogy methods

Summary of Organisational Pedagogy methods
Advanced CE knowledge & skills development through in person and on-line interventions
Learning support processes – coaching and mentoring
Support for ‘test and learn’ and CE process iteration
Appreciative Inquiry ‘strengths based’ approaches
Support for Situated Learning
Communities of Practice internal and networked developments

The individual pedagogy themes identified from interviews with CE leaders are outlined below, in Table 6. Seventy percent suggested that finding time to reflect with colleagues on progress and challenges facing the organisation was important. This adoption of reflective practice enabled leaders to reflect on individual and organisational performance. Fifty five percent put regular structured time and feedback mechanisms in place to reflect on practice and engage in organisational problem-solving. Many of our CE leaders spoke of developing conditions where learning can thrive and of making incremental and small gains in their movement towards a CE operating model. The leaders encouraged learning that was related to the workplace and encouraged staff to engage in work-based learning where appropriate. The majority of the leaders described discussing CE principles with employees to model behaviour. This behaviour modelling fits with social learning theory, as leaders motivated workers to learn and encouraged observation of CE behaviours. Additionally, they all spoke of a real awareness of thinking and acting with a CE approach in both local and global contexts. This helped develop a mutual responsiveness in their work to support local communities and their sense of place and personal identity.

Table 6: Individual Pedagogy methods

Summary of Individual Pedagogy methods
Reflective practice
Work-based Learning
Social Learning approach
Growth mind-set
Self-directed learning
'Sense-making' and meta cognition

Almost two-thirds of the organisations interviewed suggested more knowledge exchange networks would be helpful to develop their CE processes and practices. Half suggested that universities could be natural facilitators of knowledge exchange networks, which could feature dissemination of CE research and business activity with news of funding opportunities in the CE in Wales. They felt university or government arranged CE networks could share the successes of organisations implementing CE and raise awareness of services and products that incorporate CE principles. The organisations also suggested that hearing about CE 'start-ups' and CE growth organisations would help support growth of CE practices and lead to greater adoption of CE practices within other firms in Wales. They suggested hearing and evaluating how organisations had made a difference in their local communities was vital for supporting their own growth and raising awareness of CE. Half of the interviewees advised university researchers should develop case studies of successful CE implementation and publish regularly. They also suggested this knowledge should be shared through CE short courses, face-to-face seminars, websites, and podcasts, as these mechanisms were described as useful mechanisms for knowledge transfer.

5.4 CE Capability Development Matrix

Interviewees were also asked to comment on the [CE Capability Development Matrix](#) developed by researchers at Cardiff Metropolitan University. The capability development matrix was developed, with funding from [WIN](#), to provide practitioners with a 'road map' to CE

resources and interventions (see Figure 21 below). The lead author was advised by practitioners within the Circular Economy Innovation Communities (CEIC) programme that they found CE content and interventions difficult to find and difficult to assess the value of the interventions available. The practitioners interviewed also advised that it was not always clear what type of CE information and content was appropriate for developing basic knowledge of practitioners and what types of courses or programmes are most appropriate for developing in-depth knowledge and skills of practitioners.

Figure 21: CE Capability Development Matrix

Capability Level Required	Appropriate interventions for each level (indicative)	intervention type (on-demand or live/in-person attendance)	All organisation members	Groups which require knowledge on circular economy (managers and leader)	Groups which require knowledge and skills to implement circular economy principles
1	poster campaign, newsletter article, awareness raising comms	on demand	X	X	X
2	short videos (5-60 minutes), recorded webinars, podcasts	on demand	X	X	X
3	1 - 3 hours interactive courses, Learn & Share webinars, web content, workplace case studies (adapt & adopt)	on demand or live		X	X
4	1/2 and 1-day training events (not accredited)	live		X	X
5	short courses of 1 to 5 days with interactive content (formal assessed and accredited)	on demand and live, blended		X	X
6	a term/semester couple of weeks or years Further Education & Higher Education modules, ILM, CMI Courses	on demand and live, blended			X
7	weeks or months-long programmes. Challenge-led, Programme Community of Practice (PCoP), peer-based interactive learning, action-learning	live and blended			X

Feedback obtained from practitioners to the idea of a matrix as an ‘interventions roadmap’ was positive. Therefore, the above capability development matrix was developed to support practitioners by presenting existing CE content and interventions of various levels and types that are available within a matrix. The matrix organises available resources into levels enabling organisations to develop appropriate knowledge and skills of individuals and groups. The matrix was developed iteratively based on comments from practitioners interviewed during the study and an analysis of the available content and interventions discovered during a one month period in the summer of 2022, from desk research and from interviews with CE practitioners and academics. The matrix was finalised and published to the [CEIC Wales website](#) in November 2022.

The CE content and interventions are organised into seven levels. There are several pieces of content or signposts to programmes and interventions within the matrix. Practitioners click on the levels to reveal interventions within each level. The levels are indicative, not prescriptive, and designed to outline what resources are available to help practitioners develop basic knowledge of CE at level 1 and robust knowledge and implementation skills at level 7. The matrix infers:

- Broad engagement of staff reduces as learning intensity increases
- Learner interventions cumulative (interventions can be combined to enhance knowledge and skills)
- Learners can access content at a level they deem appropriate based on their existing knowledge and skills
- The knowledge & skills of participants increases by level
- Learner time commitment increases by level
- Level of engagement of learners increases by level
- Learner interaction with peers and tutors increases by level

Clicking on a level number (left column) will link to the interventions identified for each level. The interventions were discovered during August 2022.

The CE development matrix has been well received by practitioners. This study has reproduced some of the themes from the responses received from interviewees, who were asked to comment on the matrix. Interviewees suggested it was helpful for practitioners to understand that interactive programmes at the higher levels would develop the knowledge and skills necessary to implement CE principles. The leaders advised that the matrix provided a practical framework that enabled organisations to think about developing all employees' basic knowledge of CE. The interviewees all suggested it encouraged organisations to consider their individual CE implementation stages and their different knowledge and skills. Most advised that the development matrix is useful as something against which to gauge organisational learning and to assess if more CE development could be undertaken. Interviewees also suggested each member of staff could consider their personal CE knowledge-set by looking at the content on the matrix. It was also suggested that some organisations need to be made aware of the range of interventions that are available beyond traditional education, particularly the concept of communities of practice. Almost a third of the

interviewees suggested that MBA courses are not attractive to small and micro-organisations as they do not have the resources and the opportunity cost of releasing staff is too high. One interviewee suggested all children in education at school level should be introduced to CE content from Level 1 and Level 2.

There was some criticism of the matrix. Some thought the matrix could be strengthened further by adding more information about the interventions listed and others questioned the number of levels. Almost one fifth suggested the matrix is based on a traditional structure and makes assumptions about the levels of knowledge that are needed across different job roles and that senior staff need more in-depth development. There were also suggestions that the matrix could be contextualised for different sectors.

5.5 Summary of Findings

The primary data collected suggests that awareness of CE principles is low across all organisational sizes and sectors. A minority of organisations have CE principles embedded within their strategy documents, very few have CE related KPIs and most organisations do not have a detailed CE implementation plan. The survey data therefore suggests that wide-ranging CE awareness-raising initiatives and CE development interventions should be prioritised by policymakers if Wales is to transition to a CE. The survey data also suggests that tailored CE interventions should be developed based on the size and sector of organisations. The findings are consistent with the literature reviewed.

The review of the qualitative data, obtained through semi-structured interviews, to develop 'thin' case studies revealed that the majority of CE service/product providers have been set up by individuals with a social purpose that are passionate about contributing to a CE transition. These individuals and organisations aimed to make a real difference to their locality and region. Their sense of 'identity' and alignment to 'place' were powerful facilitating factors that build a strong social purpose within their organisational cultures, which was recognised and respected by customers and local stakeholders. This clear social purpose featured within a workplace culture that encouraged innovative thinking and action. Invariably, this workplace culture was facilitated by a 'distributed' style that encouraged learning through an 'insider researcher' approach. The leadership style was dynamic and strategic, it leveraged social power, not personal power, to engage workers who often felt a strong sense of empowerment and personal engagement. The leadership also tended to encourage internal and external network engagement to obtain and share knowledge.

The distinguishing organisational features of the CE case studies are:

- the majority were also rooted within the foundational economy
- values based organisations, for example housing associations in Wales,
- organisations set up to provide CE products or services are often led by values-based determined innovators, where a disproportionate number of the founders in our CE case studies were female;
- organisations that have developed and implemented CE principles and processes tend to adopt an internal ‘task and finish’ group approach and engage regularly in ‘as and when’ CE action research
- nearly all CE case study organisations developed CE projects that were iterative and non-linear during the implementation phase
- the CE knowledge and skills acquisition process was often organic, multi-sourced and resulted in heterogenous thinking and action
- there is a dearth of interventions and content that provide CE development opportunities for practitioners. The organisational leaders have implemented CE principles after accessing various sources of CE content, predominantly on-line ‘grey literature.’

The key behavioural and organisational factors outlined resulted in the evolution of innovative CE businesses, regardless of size. These new CE organisations offer practical examples of how CE principles can be applied to develop profitable, sustainable organisations that are often rooted within their region. Importantly, they offer a cornerstone for potential further development of local and regional CE ecosystems. They can also serve as CE ‘good practice’ case studies that provide other organisations with ideas on adopting CE and potential collaboration opportunities.

These CE project findings suggest the emergence of a contemporary CE pedagogy that draws on social learning theory and behavioural approaches to individual and organisational development is more effective in supporting practitioners to develop CE understanding, knowledge and skills.

6 DISCUSSION

The survey results suggest there is a paucity of understanding and implementation of CE principles within organisations in Wales, consistent with recent assertions made by Clifton and Walpole (2023) and Kirchherr and van Santen (2019). This finding was echoed in the interview data, suggesting a wide range of content and interventions are required to raise awareness of on CE principles and develop implementations capabilities. A minority of organisations have CE principles embedded within their strategy documents, very few have CE related KPIs and most organisations do not have a detailed CE implementation plan. The findings echo those of Mishra et al. (2021) who suggest interventions that support inter-organisation interaction, within a supply chain, a sector or a region, are most likely to accelerate the adoption of CE principles.

Interestingly, most of the public and private organisations advised that a ‘similar concept’ features as part of strategic priorities, suggesting a proliferation of terms that might not be helping organisations implement CE, as suggested by Kirchherr and Piscicelli’s (2019). This ‘conceptual muddle’ (Kirchherr, Reike and Hekkert, 2017) could be addressed with concerted and consistent messaging from policy makers, as suggested by Kirchherr and Piscicelli (2019), and through interventions that support inter-organisation interaction that develop CE understanding and collaborative action.

Many of the case study organisational leaders have incorporated CE awareness into organisational learning to ensure understanding of the aims of change initiatives and to obtain organisational buy-in. This helped realise specific CE business benefits and enhance their ability to innovate and embed CE within their organisational culture. Mowles (2011) suggests effective contemporary leadership involves recognising the potential of orchestrating a complex and varied learning environment for stimulating organisational growth. This reflective commentary highlights the importance of an ‘on-going narrative’ in organisations (Brown et al., 2005; Boje, 2008) and it supports reflective practice and social learning, where the individual and the group can better understand themselves and their relationships with work practices.

The interview data suggests that many of the CE case study organisational leaders can be described as a ‘CE Trailblazer’ (WEF, 2021) and have intuitively followed an approach, which placed social learning and an organic CE learning as central in their operations. The organisations often adopted internal ‘task and finish’ groups and often employed ad hoc action learning. The CE knowledge and skills acquisition process was often organic, multi-sourced

and resulted in heterogenous thinking. The CE projects tended to be iterative and non-linear during development and implementation phases.

This emphasis on the importance of leading learning within an organisation develops individuals to support organisational development and growth, as suggested by Parry & Bryman (2006). This builds both self and collective knowledge and helps create a positive 'inter-dependence' (Rosing et al, 2011). The study is not suggesting an ideal CE leadership style was discovered, conversely the study found organisational and behavioural 'key processes' which supported organisational implementation of CE and therefore argues that leadership is not a simple clustering of competences as suggested by Bass and Riggio (2006).

The study findings were consistent with what Griffin (2002) described as processes of organisational improvisation and communicative interaction. Griffin (2002) contends that effective leadership involves influencing the attitudes of others and using work-based learning to enhance worker engagement and interaction. That occurred in our CE Circular Trailblazers, where pedagogical approaches to CE development were often experiential, pragmatic and action-based. The pedagogical approaches of most of the CE case study organisations could be described as social learning biased that built knowledge sharing processes and mechanisms to suggest and discuss new processes and practices across organisations. The dialogical elements within their pedagogical approaches often led to innovative ideas for new CE processes and products, enabled by leadership that empowered workers to self-organise and critically reflect. These processes facilitated organisational innovation capability and the development of new CE products and services, consistent with the processes of highly innovative, successful organisations like Toyota (Spear, 2009).

A consistent theme discovered was the 'insider researcher' (Costley, Elliott and Gibbs 2010) approach taken by organisations who built collective CE knowledge by harvesting local, tacit knowledge from colleagues and project stakeholders which, over time, helped build several local and regional CE networks and sustainable collaboration. This emphasis on the importance of emergent CE discourses inside organisations and the significance of 'place' often led to the development of community engagement in CE activity. Most of the CE case study leaders highlighted that they regularly accessed local, national and international content via the web for CE content which they distributed within the organisation. The organisations described thinking and acting with a CE approach in both local and global contexts, which helped develop a mutual responsiveness in their work to support local communities and their sense of place and personal identity. This emphasis on the power of diverse thinking and action (Stacey, 2010), was evident in most of the small CE case study organisations, particularly in the social enterprises. It aligns with the 'black box' thinking of organisational

interaction (Marion, 2008; Mowles, 2011; Syed, 2015), which suggests that success often hinges on powerful counter-intuitive thinking and action borne out of reactions to initial failure.

Approximately two-thirds of case study interviewees suggested they created conditions for learning, particularly CE related. The mechanisms employed included in-person and on-line communities of practice participation, peer to peer learning, network attendance, coaching and mentoring which all help develop a learning organisational culture (Senge, 1990). These social learning processes enabled 'best practice' understanding and the development of knowledge sharing via mutual account giving (Mowles, 2011). The case study organisations demonstrated a powerful dynamic of interweaving worker CE learning activities and building CE dialogical mechanisms to support incremental changes in processes and product/service offerings, which builds individual and collective knowledge and helps create a positive inter-dependence (Rosing et al, 2011).

A third of the CE leaders built regular structured feedback mechanisms into their schedules to discuss operational progress and challenges, despite stated time pressures. These reflective discussions supported problem-solving and continuous improvement ideas to be implemented (Zaher et al, 2016; Dawson and Andriopoulos, 2014). Syed (2019) emphasised the importance of open dialogue (constructive dissent), described as the power of 'diverse thinking' helps generate organisational success through continuous improvement initiatives. The CE products or services providers were often led by values-based innovators, where a disproportionate number of the founders in our study were female.

An identified theme, articulated in different ways, was an appreciation of CE as a systems-thinking approach. The interviewees talked about the importance of engaging with local and regional supply chains as well as the imperative of embedding CE principles across the organisation. The interviewees described material flows into and out of their organisation and partnerships that enable by-products to be reused or remanufactured. Additionally, they all spoke of thinking and acting with a CE approach in both local and global contexts. This helped develop a mutual responsiveness in their work to support local communities and their sense of place and personal identity. Systems theory (Katz and Khan, 1978) suggests leaders should view their organisations as part of a system which is subject to competitive, regulatory, economic and social forces. It also suggests that leaders should develop organisational strategy to navigate the organization through the external environment they operate within. Kempster and Cope (2010) advised the leadership of SMEs can be idiosyncratic and firm context is an important consideration, suggesting a "*dynamic state between entrepreneur and her or his organisation and the niche market*" (p337) exists. The data gathered supports the

assertion that CE is a systems theory and the context dependant nature of organisations suggestion of Kempster and Cope (2010) is consistent with the findings of this report.

7 CONCLUSIONS

The report obtained information on CE learning content and interventions, and published within a matrix (to the web) to enable practitioners to access CE learning content more easily. The report has commented on the efficacy of CE interventions (programmes, courses, networks, communities of practice etc.) that have been designed to enhance practitioner CE understanding and implementation capability. The report analysed quantitative, data collected through a survey, to comment on availability and efficacy of CE interventions. The report conducted semi structured interviews with organisations that have successfully implemented CE principles. The main findings of the report are summarised below.

An analysis of the CE grey literature highlighted the challenges of implementing CE within organisations and the complexity of the transition to a CE within a region. There is a paucity of CE information and content, therefore informative CE knowledge platforms for practitioners, learners and innovators would accelerate the development of CE implementation knowledge and skills. A systems-thinking approach and readiness to co-produce solutions is more effective. Nascent research suggests inter-organisational challenge-led programmes that support co-production of CE solutions, knowledge exchange and enhanced regional capabilities are more effective than traditional didactic programmes. There is a paucity of peer reviewed published research on the efficacy of CE interventions and the development of CE implementation capabilities.

In terms of local, regional and national level CE transition, the literature suggests that place-based approaches where networked individuals and organisations collaborate are fruitful, therefore supporting CE lead influencers, and impactful projects would accelerate the transition to a CE. The development of regional CE eco-systems of businesses, third and public sector and academia is likely to accelerate the CE transition. Existing regional and global supply chains should be challenged to implement CE principles. Our review suggests an interdisciplinary multi-organisational approach that involves policymakers, academics and business is likely to accelerate the transition to a CE. A regional CE eco-system that involves public, private and third sector organisations will accelerate the transition to a CE. The seminal EU 'Partnerships for Regional Innovation Playbook' ([PRIP, 2022](#)) suggests that innovation capability is imperative and should be cultivated through national and regional partnerships to unleash local potential to deliver on both local and EU-wide CE challenges.

The academic literature reviewed exposed ambiguity in the understanding of how CE innovation is diffused and how organisations effectively develop CE understanding and implementation capability. The report found little peer reviewed published research on the efficacy of CE interventions and the development of CE implementation capabilities. An adoption of an agreed broad definition of CE would help practitioners struggling with a proliferation of terms. The current narrow approaches to sustainability in manufacturing risks the failure of CE solutions that are socially, environmentally and economically beneficial. There is an inherent tension between the current emphasis on generating wealth and jobs and the transition to a CE, which limits growth within planetary boundaries.

CE education is often taught within sustainable development programmes and so a wider adoption of CE teaching across all subject areas is likely to broaden understanding and increase implementation. Most existing CE development is designed to develop basic knowledge or enhance knowledge and yet few interventions develop the skills of practitioners to implement CE principles within their context. Cognitive pedagogies dominate current teaching and yet contemporary literature suggests the transition to a CE will require different pedagogical approaches. The literature suggests contemporary pedagogies, social learning and behaviourist pedagogies, that develop critical thinking and systems thinking are more effective at developing CE implementation skills. Therefore, research that further explores the key learning processes and pedagogies that develop practitioners' new service solution development skills would be valuable. The further development of CE 'knowledge platforms' aligned with publicity to engage practitioners would be beneficial.

The nascent literature on CE organisational development suggests internal innovation capabilities and critical reflection are key elements in the development and sustainability of CE initiatives. Effective CPD/work-based learning mechanisms are required to develop organisational dynamic capabilities that enable implementation of CE principles. An appreciation of systems thinking is required and capabilities that seek out CE disruptive innovation are urgently needed across all sectors, which could be developed through inter-organisational programmes and mechanisms like 'knowledge exchange networks' or 'communities of practice'. Developing organisational capability to engage in regional and community partnerships that support a place-based approach is key for the transition to a CE.

The primary data collected suggests that awareness of CE principles is low across all organisational sizes and sectors. A minority of organisations have CE principles embedded within their strategy documents, very few have CE related KPIs and most organisations do not have a detailed CE implementation plan. The survey data therefore suggests that wide-ranging CE awareness-raising initiatives and CE development interventions should be

prioritised by policymakers if Wales is to transition to a circular economy. The survey data also suggests that tailored circular economy interventions should be developed based on the size and sector of organisations.

The majority of CE service/product providers have been set up by individuals with a strong social purpose. The CE organisation leaders often encouraged network engagement to obtain and share knowledge. Their social purpose, alignment to place and Distributed Leadership style has facilitated the development of innovative organisational cultures. These organisations offer practical examples of how CE principles can be applied to develop profitable, sustainable organisations that are often rooted within their region. Importantly, they offer a cornerstone for further development of local and regional CE ecosystems. They serve as CE ‘promising practice’ case studies that provide other organisations with ideas on adopting CE and potential collaboration opportunities.

The report findings suggest an organic approach to developing CE knowledge and skills that draws on social learning theory and behavioural approaches to individual and organisational development is more effective than traditional pedagogical approaches. Additionally, ‘challenge led’ programmes that support practitioners to develop new processes and practices within communities of practice are more effective than traditional didactic, cognitive-based, approaches.

8 RECOMMENDATIONS

1. The further development of CE knowledge repositories aligned with publicity to engage practitioners would accelerate organisational engagement with CE principles.
2. Research which further explores the key learning processes and pedagogies that develop practitioners CE implementation capabilities is required.
3. Effective CPD/work-based learning mechanisms are required to develop organisational innovation capabilities to facilitate the implementation of CE principles.
4. The transition to a CE requires a systems thinking approach. Regional and sector based inter-organisational programmes or communities of practice are likely to accelerate the transition.
5. The development of regional CE eco-systems of businesses, third sector, public sector and academia is likely to accelerate the transition to a CE. An interdisciplinary multi-organisational approach that supports the development and enhancement of the CE eco-system would add value.

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10 APPENDICES

10.1 Appendix 1: Semi- Structured Interview Questionnaire

Interview Questions

1. What is your understanding of the term circular economy?
2. What elements of the circular economy have you implemented/began to implement?
 - a. Why did you start your circular economy journey?
 - b. What did you do?
 - c. When did you start and what is your progress to date?
 - d. Who was involved? (roles or departments)
 - e. How was it financed?
 - f. How – what process or activities did you develop to implement circular economy principles?
3. What circular economy interventions or programmes (courses, consultancy, web content, industry information etc) or support have you accessed or drawn on?
4. Can you describe the elements of these that were most effective at developing knowledge and skills?
5. Have you done anything further to this internally to develop the circular economy knowledge and skills of the people in your organisation?
6. (*If not already mentioned*) What tools/methods or processes helped your organisation engage with and develop circular economy knowledge and skills?
7. More broadly, what circular economy interventions or programmes do you think would be most effective for developing practitioners/professionals' circular economy knowledge and skills in your sector?
8. What barriers have you faced putting your project into practice?
9. What were the enablers?
10. Looking at the circular economy 'development matrix' do you think it is useful as a framework to develop circular economy organisational capability?
11. What would you add or subtract from the matrix?

10.2 Appendix 2: Survey Questionnaire

Section 1: Personal & Business Information

Name:

Job title:

Email:

Organisation:

Number of Employees (Full Time Equivalent):

SIC code (if known):

Business activity (products or services offered, i.e. Electrical Engineers, Accountants):

Section 2: Circular Economy

2.1 To what extent do you and your colleagues understand the term/concept of 'Circular Economy'

Person or Group	1(basic understanding) understanding) 5 (full				
You	1	2	3	4	5
Senior Management team	1	2	3	4	5
Service /Department Heads	1	2	3	4	5
Managers	1	2	3	4	5
Team Leaders	1	2	3	4	5
Human Resources/People Services	1	2	3	4	5
Procurement/Finance team	1	2	3	4	5
Shopfloor staff	1	2	3	4	5
Suppliers	1	2	3	4	5

2.2 Please tick **one response**.

Is your organisational strategy aligned with becoming more circular?

- ☐ No relevant mentions of circular economy
- ☐ Similar concept mentioned as part of strategic priorities (e.g. materials circulation, new sustainable business models, not just resource efficiency)
- ☐ Circular economy explicitly mentioned as part of strategic priorities
- ☐ I am not aware of whether the organisational strategy mentions the Circular Economy.

2.3 Do you have Circular Economy targets or measures:

- ☐ Yes
- ☐ No
- ☐ Don't know

2.4 Do you have a circular economy implementation plan? (Please select all that apply)

- ☐ An implementation plan is being developed either for circular economy or a relevant concept (e.g. sustainability, materials circulation)
- ☐ An implementation plan, which does not go to an actionable level of detail (i.e. does not describe owner, timeline, resource requirements) has been developed
- ☐ A detailed implementation plan has been developed as a key priority to be (in part) implemented in the next 12 months
- ☐ A circular economy implementation plan has begun implementation and is periodically reviewed
- ☐ No
- ☐ Don't know.

2.5 Does your organisation use any Environmental Management Systems?

- ☐ Yes
- ☐ No
- ☐ Don't know

If yes,

2.5 a Which accredited environmental management systems do you use? Please tick all that apply. [If you answered Yes to 2.5 above]

- ☐ ISO14001
- ☐ BS8555
- ☐ EMAS
- ☐ Other

2.6 Does your organisation have a Green Procurement Policy? *(Green Public Procurement (GPP) is defined in the European Commission Communication (COM (2008) 400) as "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured.")*

- ☐ Yes
- ☐ No
- ☐ Don't know

2.7 Does your organisation have a Sustainable Procurement Policy? *(The HMRC defines Sustainable Procurement as "a process whereby organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organisation, but also to society and the economy, whilst minimising damage to the environment").*

- ☐ Yes
- ☐ No
- ☐ Don't know

2.8 Has your organisation developed processes to comply with the Sustainable Development Goals?

- ☐ Yes
- ☐ No
- ☐ Don't know

2.9 Have you engaged with any organisations for support with CE or Sustainability implementation?

- ☐ Yes
- ☐ No
- ☐ Don't know

2.10 Would you like information about forthcoming Government CE related legislation (e.g. Extended Producer Responsibility, Net Zero etc)

- ☐ Yes
- ☐ No
- ☐ Don't know

2.11 Would you like to receive information about ‘One Planet Cardiff’ and CE implementation support available in the Cardiff?

- ☐ Yes
- ☐ No
- ☐ Don’t know

2.12 Would you like to receive information funding and support available to businesses to move to a more Circular Economy operating model (e.g ‘One Planet Cardiff’, UKRI, Welsh Government) ?

- ☐ Yes
- ☐ No
- ☐ Don’t know

2.13 Would you like to attend a briefing event to understand more about the benefits of a Circular Economy operating model?

- ☐ Yes
- ☐ No
- ☐ Don’t know

2.14 Are you aware of businesses or organisations that provide CE services or products?

- ☐ Yes
- ☐ No
- ☐ Don’t know

If yes, please list below:

.....