

Supplementary file A

A SUMMARY PRESENTATION OF THE FINAL FOURTY-ONE PAPERS INCLUDED IN THE STUDY

s/ n	Author and (year of publication)	Country context	Target participant	Research design	Data instrument	Domains of knowledge	Presentation of proficiency	Key findings
1.	Gonella et al. (2024)	Brazil	General populace	Quantitative	7-point Likert scale	5 distinct dimensions: (i) Rational Use of Resources (RUR); (ii) Waste Management (WM); (iii) Sustainable Products and Packaging (SPP); (iv) Dematerialization and Collaborative Consumption (DCC); and (v) Technical Cycles (TC)	4 levels: A certain level of ignorance (never heard about it, having heard of it but not knowing what it is about), basic understanding, average understanding and a full mastery	34% showed a certain level of ignorance, 24% had an average understanding, 7% had a complete mastery
2.	Koralage et al. (2024)			Qualitative	Literature review using Web of Science, Scopus, "Engineering Village and	General familiarity with the CE concept and Understanding of the principles		The results indicate that a larger proportion of the respondents are aware of circular economy at an

					"Google Scholar			averagely high level, and an average of seven out of every 10 enterprises are familiar with the 3R concept of the circular economy. The result also indicates that an average of three out of every 10 sampled enterprises have implemented a circular economy in their operation at both strategic and operational levels and 12R CE principles can be considered as the critical reinforcing
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								knowledge to contemporise initiating solutions to current limitations of CE transition in the construction industry
3.	Alotaibi et al. (2024)	Saudi Arabia	Multiple including Clients, consultants, and contractors and also top management and expert engineers	Qualitative	Interviews	3 themes: 1. Knowledge and Familiarity with CE, 2. Principles of Circular Economy, 3. Materials Efficiency and Sustainability Link	3 level: lack of awareness (basic or lower level of understanding), good recognition of principles, a moderate level of awareness	The study demonstrates a lack of awareness of the term circular economy amongst participants, with more than half of them demonstrating a basic or lower level of understanding . Despite the unfamiliarity with ‘circularity’, the participants demonstrated

								good recognition of some of its principles and defined it as the vehicle to cover the 4Rs: redesign, reduce, reuse, recycle, in the construction lifecycle. The general understanding of CE is mostly made up of knowledge of sustainability and waste management, which makes it evident that the circular economy has not been fully grasped yet
4.	Bayraktaroğlu & Soylu (2024)	Turkey	Furniture manufacturers	Qualitative	Open ended questionnaire	3 aspects: Thoughts about what the concept of the circular economy is about,	5 level: No idea, some staff have heard about some	21 companies out of 36 indicated prior awareness of the circular

						ability to explain with some few words to come to mind and explanation on the three pillars of a circular economy	benefits, adequate awareness, limited, benefits are known by all	economy concept while 15 had not encountered it. Moreover, approximately one-third (13/36) of the surveyed firms claimed involvement in circular economy-related activities
5.	Wardani et al. (2025)	Indonesia	Undergraduate students in economics/cooperative education programs, office administration education, and accounting education	Quantitative	5-point Likert scale	The reuse, reduce, refuse, repair, and recycle principles (5R's) of the CE concept based on Knowledge, Attitude and Behaviour indicators	5 level very high, high, sufficient, low and extremely low	The level of circular awareness of the student economy (KAB) is generally high. in general, there is no difference in the average value of circular economic awareness between men and women

								and the overall variables are positively correlated
6.	Akinwale (2024)	Saudi Arabia	micro, small, and medium enterprises (MSMEs)	Quantitative	5-point Likert scale	Awareness of the CE and 3R Principles of reuse, recycle and reduce	5 levels: very high, high, medium, low, very low	The results indicate that a larger proportion of the respondents are aware of circular economy at an averagely high level, and an average of seven out of every 10 enterprises are familiar with the 3R concept of the circular economy. The result also indicates that an average of three out of every 10 sampled enterprises

								have implemented a circular economy in their operation at both strategic and operational levels
7.	Adams et al. (2017)	United Kingdom	construction industry associations, representing industry activities, consultants and researchers, building owners, manufacturers, designers and contractors	Quantitative	4-point Likert scale	awareness of the circular economy	2 level: unaware and fully aware	while there is a good level of awareness, there is a clear need to articulate the benefits of the circular economy in a transparent and measurable manner; this was supported by the views from the breakout sessions particularly in regard to the business case. But clients, designers and subcontractors

								are the least informed and this is a key challenge for greater adoption
8.	Zwiers et al. (2020)	N/A	Organisations publications	Qualitative	Literature review	A combination of understanding of all the domains	N/A	Provided dimensions of the circular literacy framework i.e. systems, target and transformation knowledge
9.	Palafox-Alcantar et al. (2021)	United Kingdom	Companies involved with the Alternative Raw materials with Low Impact (ARLI) project and master's level students from university of Birmingham and Oxford	Quantitative	5-point Likert scale	How well do you understand the concept of the 'circular economy'? 2. Do you agree with the following statement? The 'circular economy' is just another word for reducing, reusing and recycling materials. 3. Which of the following concepts are	5 levels: very well, well, neither, not well, never heard of it	Most of the participants (both students and companies) were aware, to some degree, of the CE concept.

						important to the 'circular economy'?		
10 .	Putra et al. (2024)	Indonesia	Consumers at multiple Starbucks outlets	Quantitative	5-point Likert scale	I realize that some product packaging can pollute the planet- I realize that some products produce waste that is harmful to nature (plantation, fabrication)- I was taught about the 3Rs (Reduce, Reuse, and Recycle)	Not presented	Indicators such as access to information, labelling and peer pressure, sense of retribution, and circular economic perception can be used as reliable and valid measures to describe individual

								feelings towards environmental issues
11	Erdiaw-Kwasie (2022)	Ghana	top management employees	Quantitative	5-point Likert scale	access to circular economy knowledge, understanding, alignment of office practices with CE	Not presented	provides evidence of a direct association between CE adoption and sustainable service, including the moderating effect of circular economy knowledge
12	Nikolic' et al. (2022)	Bosnia and Herzegovina & Republic of Serbia	primary, high school and university students	Quantitative	Binary scale	Have you heard of some companies taking back their used products for recycling and reinserting the min to the production process? W2: Do you know what a circular economy is?	Not presented	Present results demonstrate that there is a significant relation between attitudes and behaviour, while there is no significant relation between awareness and attitudes nor between

								awareness and behaviour.
13	Ceptureanu et al. (2018)	Romania	SMEs in PVC joinery industry	Quantitative	5-point Likert scale	Circular knowledge in terms of 6 business actions of ReSOLVE framework (Regenerate, Share, Optimize, Loop, Virtualize, and Exchange)	Not presented	Mixed results. Of the 6 business actions of ReSOLVE framework, only for half of them (Regenerate, Optimize and Exchange) can be concluded that they are correlated with Circular Economy,
14	Ho et al. (2023)	Australia	Key stakeholders in Victorian CE transition from government departments, businesses, NGOs, industry association, local council	Qualitative	Semi-structured interviews	knowledge of various terms, their knowledge on European and British legislation on CE and their views on the remaining value of their firm's products	Overall, there is an increase in awareness levels	70 per cent of the responders had heard of the term before. 63 per cent of them declared that they were familiar with the term, instead of having just heard of it. awareness

								levels in the West are still far off to those in Asia and especially in China, where research suggests 90 per cent of respondents being aware of the term. The basic concepts of CE, such as a CLSC, the 3Rs, etc., are, admittedly, strongly associated with the term
15	Liakos et al. (2019)	Global	manufacturing firms mainly managers	Quantitative	Questionnaire	knowledge of various terms, their knowledge on European and British legislation on CE and their views on the remaining value of their firm's products	never heard of it, familiar, strong awareness	70 per cent of the responders had heard of the term before. 63 per cent of them declared that they were familiar with the term, instead of

								having just heard of it. awareness levels in the West are still far off to those in Asia and especially in China, where research suggests 90 per cent of respondents being aware of the term . the basic concepts of CE, such as a CLSC, the 3Rs, etc., are, admittedly, strongly associated with the term. To understand the degree to which firms are aware of the regulations regarding CE, more than 55
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								per cent of responded showed they were aware, while 45 per cent appeared to have no idea on what those are. This shows that although awareness on CE and its potential opportunities have increased over the years, there is still a lot of work that needs to be done in the area. An attempt was also made to verify the knowledge of respondents on the concept of the 3Rs (reduce, reuse, recycle). The results proved
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								to be encouraging, since the vast majority of the people had heard of this concept before (85 per cent). 71 per cent of responders believed that the disposal of products at the end of their lifecycle is unnatural. This is very encouraging, since it means that employees of manufacturing firms are becoming more and more aware of the importance behind taking advantage of the remaining value of their
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								products, until those are rendered useless
16	Li et al. (2024)	Australia	Master Builders SA(MBS), the Australian Institute of Building (AIB), and the Institute of Civil Infrastructure	Quantitative	5-point Likert scale	General awareness of highest consuming industries and recycling capabilities,	Not presented	The study indicated that on-site plastic waste recycling behaviour, intention, and their exogenous constructs are not moderated by acknowledging the current high consumption and low recycling rate of plastics in the construction industry and the commercial construction application of recycled plastics.

17	Dewi et al. (2022)	Indonesia	economics related undergraduate students at two Indonesian universities	Quantitative		analysed awareness from knowledge, attitude and behaviour aspects	3 levels: high, middle to low	Students' scores on three variables: knowledge, attitude, and behaviour toward CE are categorized as high
18	Loste et al. (2020)	Spain and Latin America	University students	Quantitative	5-point Likert scale and dichotomic variables (yes/no)	Indicate your knowledge about the following sustainability tools and strategies: circular economy; Have you used any of the following tools	Not presented	The rating of this item about the degree of knowledge of these sustainability tools shows that EE is the best-known strategy (2.79 points out of 5), followed by EMS (2.77), LCA (2.57), CE (2.37), ED (2.31) and finally GC (1.81). After training, Analysing the

								results for tools, LCA was valued as the most useful tool (4.3 points out of 5), followed by EE (4.3), CE (4.2), EMS (4.2), ED (4.1) and finally GC (4.0)
19	Henao-Hincapi' et al. (2024)	Columbia	individuals 18+ years	Quantitative	Single-selection questions with two response options (yes and no)	assessing consumers' knowledge of CE, analysing their understanding of the concept, government actions supporting CE, and the progress of CE implementation in Colombia	Had heard about the term and are familiar with it	The assessment of consumer knowledge about CE unveiled that 58 % of respondents had heard of CE, among whom 45 % were familiar with the term. In terms of awareness of national government initiatives

								related to CE, only 11 % identified the ENEC, and a mere 7 % were informed about the progress of CE implementation in the country. Furthermore, a mere 16 % of consumers were cognizant of government interventions at the departmental or municipal level, while 17 % knew about private companies promoting CE. Overall, approximately 26 % of the responses indicated knowledge of
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								various facets of CE
20	Filho et al. (2024)	Brazil	Individual 18+	Quantitative	7-point Likert scale	five distinct dimensions: (i) Rational Use of Resources (RUR); (ii) Waste Management (WM); (iii) Sustainable Products and Packaging (SPP); (iv) Dematerialization and Collaborative Consumption (DCC); and (v) Technical Cycles (TC)	5 level: A certain level of ignorance (never heard about it, having heard of it but not knowing what it is about), basic understanding, average understanding and a full mastery	34% showed a certain level of ignorance, 24% had an average understanding, 7% had a complete mastery. high personal cost in terms of time and money (psychological barriers), are considered dragons to CE awareness. Also, actions taken by family, friends, celebrities, influence people's awareness of CE. lastly, there is a positive effect between the

								influence of friends, family and celebrities on people's formation of opinions concerning the importance of CE principles thus social influence positively moderates the relationship between psychological barriers and people's awareness of CE
21	Salgin et al. (2025)	Türkiye	professionals in the Turkish construction sector	Quantitative		Knowledge of the 11R model (refuse, rethink, redesign, reduce, replace, reuse, repair/remanufacture, refurbish, repurpose, recycle, and recover)	2 level: high and low	it is evident that the awareness and perceived importance of all key principles are higher than their practical implementation

								n. Although awareness and importance ratings are high, the low scores observed in actual implementation indicate a significant area that requires further investigation but low implementation
22	Cozzolino et al. (2025)	Italy	aquaculture producers of Italian Aquaculture Association (API - Associazione Piscicoltori Italiani)	Quantitative	5-point Likert scale	Familiarity with circular economy in aquaculture 2. Adequacy of statements describing CE 3. Consideration of CE as an Opportunity. 4 CE in the national aquaculture sector is limited by	Limited awareness	93 % reported familiarity with CE. Overall, the environmental and integrated strategies are viewed as the most promising, while social aspects may need further

								attention, The study revealed that while most producers are familiar with CE concepts, their understanding is primarily focused on environmental aspects such as waste reduction and resource efficiency. However, the economic and social dimensions of CE, such as job creation and improving social acceptance, are often overlooked.
23 .	Bigliardia et al. (2022)	Italy	Engineering students	Quantitative	Likert scale	Perceived value and knowledge		It emerges that the constructs

						about environment		with the greatest discriminating power are those of a cognitive type, that is, Green perceived value and Environmental knowledge.
24	Gu et al. (2024)			Meta-analysis		Understanding of the benefits of the CE		The research suggests that there is a strong positive correlation between the public's reuse knowledge and their reuse behaviour. individual attitudes towards reuse, expected outcome efficacy, relevant knowledge and

								environmental concern are the most critical factors driving individual reuse behaviour
25	Voukkali et al. (2023)			Literature review		Understanding of the principles of the CE		social barriers encompass challenges related to consumer behaviour and awareness, as well as the need to instigate a shift in existing business culture to embrace circular practices are some factors affecting social attitude and behavior for the transition towards a

								circular economy
26	Abro et al. (2025)			Literature review		A combination of domains		Findings reveal that studies predominantly focus on Europe and insect-based foods, with limited research on insect-based feeds and derived products. Consumers in Africa, Asia, and Latin America show higher acceptance of insect-based food compared to those in Western nations, where psychological barriers such as neophobia, disgust, and limited

								awareness hinder adoption
27 .	Uhunamure and Shale (2025)	South Africa	Household heads	Mixed method	Semi-structured questionnaire	asking generally their familiarity with the circular economy	extremely aware, very aware, moderately aware, slightly aware, not-to basic knowledge	When asked specifically about the term “Circular Economy”, only 30% of the survey respondents indicated that they were familiar with it, while a significant 70% stated that they had never heard of the terminology. However, after an in-depth explanation provided by the research assistants, which included breaking down the term into more

								conversational keywords such as reduce, reuse, recycle, repair, remanufacturing, renewable energy, second-hand products, and repurpose among others, some respondents gained a clearer understanding of the concept. 18% of households believe there have been insufficient awareness campaigns to educate the public about the CE in the province
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28	Papamichail et al. (2024)	Cyprus	different stakeholders (i.e., retailers, policy makers, academia, engineers etc.)	Quantitative	5-point Likert scale	what is your level of knowledge (awareness of benefits plus CE principles)	Not presented	Higher level education of individuals seems to have a positive impact on the level of knowledge regarding matters of circular fashion, regardless of the area of expertise of everyone. However, educational initiatives to raise awareness need to be developed to highlight the importance of circular fashion and provide consumers with the knowledge and tools to participate in
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								sustainable practices such as clothing repair, recycling, and responsible consumption
29 .	Ferronato et al. (2022)	Bolivia	Citizens 18+ years old	Quantitative	Questionnaire	Awareness of the benefits of the CE		Most of the participants consider very useful (87.6%) or useful (8.0%) to recycle the waste. Less than 5% of the participants think recycling is of little use. indicate that the most recycled materials are plastics (73.1%), paper and cardboard (71%), while organic is the less recovered (36.4%). the

								factor that most affects the implementation of recycling is not knowing to whom the waste can be delivered once classified
30 .	Chrispim et al. (2024)	Sweden	Company employees	Mixed method	Semi-structured interview and questionnaire	Thoughts on key principles or main targets of CE, Knowledge and considerations about the R-imperatives	2 level: aware and did not know	Regarding the understanding of CE, all the interviewees have already heard about the CE approach. However, some expressed that they were not very confident about the meaning of CE. most of our participants answered that they knew,

								except for one interviewee who answered he did not know about the R's, and another participant who mentioned his company works with the R's but he did not know more about it. The size of the companies does not seem to have affected their understanding of CE or perception of benefits and barriers. Educational background and previous work experience of the interviewee
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								do not seem to influence the knowledge about CE.
31.	Ruggeri et al. (2024)	Italy	Garden shop customers	Quantitative	Questionnaire	Awareness of environmental impact of linear economy and deeper understanding of principles		The results indicate strong preferences for reusable and recyclable pots, followed by biodegradable options and products made with recycled materials. Additionally, providing consumers with educational information about the environmental impacts of plastic pots significantly influenced their preferences

								and willingness to pay
32 .	Kevin van Langen et al. (2021)	Italy	80 Participants of a European project studying the CE, 114 Academics in different branch of Economics of Parthenope University of Naples 10, Italy, 141 Administrators of the Metropolitan City of Naples, Italy	Quantitative	Questionnaire	what CE means to the respondents, what the more important aspects in a CE are, investigate the expectations that are most important to the respondents of CE	Not presented	For Administrators, the CE mainly means: “Reduce, Reuse and Recycle” and a “zero waste economy”. The other two groups are more oriented towards a concept of CE that routes between “an economy able to regenerate itself” and “Reduce, Reuse and Recycle
33 .	Smol et al. (2018)	Poland	Residents between 18 and 64	Quantitative	Questionnaire	Recognition of the term “circular economy”, Identification of CE, CE- related behaviour	Not presented	Protecting natural resources by keeping materials in circulation and

						(present CE practices)		minimising their losses in the form of waste were indicated as a core CE characteristic by the majority (78%) of participants. CE means closing production loops in industry for almost 11% of respondents. For the same proportion of the sample, CE is related to the segregation of waste in households. it should also be noted that the understanding of the term “circular economy” could confirm
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								that people's CE awareness has a positive correlation with their level of education
34 .	Rogers et al. (2021)	United Kingdom	Residents in the City of Hull	Quantitative	Questionnaire	Respondents were asked to place a variety of actions into the categories of either the linear, shared, or circular economy	Not presented	The vast majority of respondents (82%) identified repair activities as being a part of the circular economy, which may indicate a level of association between repair and environmental impact or eco-friendly behaviour. Furthermore, 79% indicated that they have used PRS in the past, and 76% had

								repaired items themselves. This study found no significant difference in age relating to likelihood of undertaking repair either as DIY or professional services.
35	Koshta et al. (2022)			Quantitative	Questionnaire	Awareness of consequences referring to the person's knowledge about the adverse effects of a linear economy	Not presented	The results suggest that perceived behavioural control (PBC), awareness of consequences, and intentions to recycle e-waste are positive predictors of WTP (willingness to pay)
36	Carbonell-Alcocer et al. (2025)	Spain	Public administration and private enterprises representatives,	Qualitative	Semi-structured interview	Principles of the CE beyond the 3Rs and benefits		The research results show that while communicatio

			university professors and scientific personnel			of the transition to a CE		n plays a crucial role in promoting the transition to a circular economy, traditional communication models have far-reaching limitations. The findings suggest that communication strategies should go beyond general awareness-raising campaigns and instead adopt a social marketing-based approach that is tailored to specific population groups and considers factors such as
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								geographical region, age and awareness. The results of this study make it clear that the role of stakeholders in the transition to a circular economy often does not match their perceived responsibility
37 .	Fu et al. (2024)			Mixed method	Literature review and survey	Awareness of consequences and need for a transition		In addition, attitude, subjective norms, perceived behavioural control, personal norms, perceived value, emotional value, social value, and functional value (quality

								and price) were all positively associated with WTP. Personal norms and awareness of responsibility played a mediating role in NAT
38 .	Ramos et al. (2024)	Portugal	architects and engineers and other technicians	Quantitative	5-point Likert scale on a Structured questionnaire	a self-assessment of their degree of knowledge about it		it was verified that the general self-evaluation of respondents is moderate (average value of 3.25)
39 .	Soares et al. (2023)	31 European countries	Health workers	Quantitative	Questionnaire	familiar with CE and Green skills, national and department environmentally friendly policies, personal and individual CE attitudes, perception of the importance of the circular economy,	Not presented	31%-42% of participants are aware of national and departmental policies in CE and green skills concepts. Even though half of the participants considered

								that they advocate and practice CE, the open questions indicated that participants only focus on waste management, ignoring all the other dimensions of CE in healthcare. Personal attitudes and lifestyles also did not reflect CE
40.	Nadeetharu et al. (2024)			Qualitative	Literature review from Scopus, Web of science and Engineering village	4 elements: information, values, skills and experience	5 levels: KP1-KP 5 Fundamental awareness, novice, intermediate, advanced and expert	Developed a conceptual framework to propose how knowledge proficiency can be applied to designers to overcome the Dunning-Kruger effect in the implementation

								n of CE in the construction industry
41 .	Robertson et al. (2024)	Rwanda	Slum inhabitants	Mixed Method	Interviews, Focus group discussion 5-point Likert scale	5 Principles of CE, What the CE is about, what are the benefits, 5 principles of the CE, name CE practices from everyday activities	2 level: Well-known and not well known	Repurposing emerged as the most prominent circular practice. The FGDs revealed that the term CE is not very well known in Kigali's slum areas but The KIs are strongly aware of general concepts connected to CE like economy, environment, as well as health and nutrition.