

WILL REPAIR SUCCEED? – CITIZEN COMPETENCES IN THE CIRCULAR ECONOMY

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Introduction

An increasing number of circular economy (CE) scholars discuss the importance of embracing the different order value retaining strategies. For example, Reike et al. (2018)'s typology includes 10 levels of strategies for retaining the value of goods and materials in circulation. The typology specifies the hierarchy of different value retention strategies, where lower numbers represent most preferred strategies (e.g. R1 reduce), while higher number strategies correspond to the lower efficiency of value retention processes (e.g., R8 recover energy). At the level of the European Union (EU), waste management hierarchy defined by the Waste Framework Directive emphasizes that focusing on prevention strategies is of highest priority and supports resource efficiency, while recycling and recover options are at the bottom of the hierarchy (EC Waste Framework Directive).



Figure 1. The waste hierarchy of the EU Waste Framework Directive emphasizing waste prevention.

Shroeder et al. (2019) point out that transition to CE requires an active adoption of strategies that are most resource efficient, that is reduce (R1), reuse (R2), repair (R3), but also a targeted improvement of education and training for CE to enable the implementation of these among businesses and citizens.

At the same time, according to the European Academies' Science Advisory Council (2015) there is a lack of CE-oriented programmes at all levels of education and a skills gap, which represent a serious barrier to the implementation of CE in practice. Prior studies found that even professional designers often lack the skills to

develop products that could last longer and accommodate modularity and easy repair (Bakker et al., 2014). Thus, there is a dire need to adapt professional education to the standards that comply with the CE model.

Citizen participation in CE

Overall, the research on citizens' participation to CE is often framed through sorting and recycling activities. However, Finland's updated national roadmap for CE implementation (2019) envisions the transformation of consumers into users as an essential part in the CE transition process. In practice, this means moving towards access-based consumption with intensive use of renting and lending services. According to Hazée et al. (2017), special skills are required to overcome the "complexity barrier" associated with understanding, accessing and using services instead of the traditional ownership-based consumption practices. When it comes to reuse and trading of second-hand goods, often more diverse and complex skills are required than compared to purchasing new in stores. These are related to judging the quality of items, negotiating and bargaining (Crewe & Gregson, 1998). In other words, these modes of accessing goods are less "scripted", and may require effort and energy (Råberg, 2022).

Many of the complex skills mentioned above used to be part of the traditional cultures around the world, like creative use of leftover foods in cooking, bargaining at markets and various swapping traditions. The clothes swapping, for instance, requires flexible judgement of quality, fashionability and sizing, as well as various arrangement and organizational skills (Camacho-Otero et al., 2020). While at present, many consumers find it difficult to identify long lasting products when making purchases (European Commission, 2018).

According to Wieser (2019), participation to CE actually involves a high degree of skill and creativity from citizens, and in addition to acquiring new skills, there is work associated with unlearning the non-circular consumption habits. For example, in a study commissioned by the EC, it was reported that young consumers do not have repair skills, but at the same time are not interested in acquiring them (Cerulli-Harms et al., 2018).

Recent studies related to sewing skills show that despite the wide availability of online tutorials on sewing, the primary driver of engaging in sewing is confidence in own skills (Richards & Perreault, 2021; Hustvedt & Liang, 2022). A study on repair of textiles from the UK settings concluded that citizens lack the necessary skills to do it, compared to previous generations (Fisher et al., 2008). According to the authors, the regress of skills is due to such type of skills no longer being taught in schools, lack of equipment and lack time in everyday life. Based on a study of textile repair in Norway, Laitala & Klepp (2018) suggest that education should facilitate the acquisition of competence in repairing clothing, because it makes the repair experience more pleasant, and the result – more pleasing and encouraging.

Overall, studies on self-repair of different product categories emphasize that lack of confidence (often due to the lack of experience) represents a significant barrier (Terzioglu, 2021). However, when it comes to devices and appliances, it is possible to incentivize attempts of self-repair with modularity of goods and possibility to open them (Amend et al., 2022). As reported by Laitala et al. (2021), according to the Norwegian Consumer Council –

citizens mainly attempt self-repair with clothing and furniture, but use professional services for electrical appliances. Finally, while maintenance activities are key for prolonging the life of goods and minimizing repair, maintenance skills among citizens seem to be lacking (Ackermann et al., 2018).

The overview of the literature above reveals the complexity related to evaluating citizen participation to CE. While many studies focus on the practical skills necessary for CE activities, there are also many related discussions that involve, for instance, the ability for making judgements (on quality and durability), knowledge and actual interest in CE-oriented activities (like repair) or acquiring the CE-oriented skills. Thus, we introduce the concept of ***citizen competency in CE*** to structure the insights related to enabling citizen participation in CE.

Citizen Competences in CE

The Organisation for Economic Co-operation and Development (OECD) defines ***competency*** as “*more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context*” (OECD, 2005). In the context of CE, it translates into a combination of knowledge regarding the different value retention strategies (circular behaviours), practical skills to implement them and citizen attitudes towards these behaviours.

For instance, improving repair competence of citizens is not only about the training of repair skills. It is also about changing citizen attitudes towards repaired items, using approaches like visible mending. In addition, it is about improving the knowledge of citizens regarding different tools, materials and their qualities, or how to combine them for repair.

It is important to distinguish between skills and competences to enable the development of better targeted policies and instruments for encouraging circular behaviours. Before skills can be trained, the foremost priority is tackling the knowledge, which can enable more conducive attitudes for practicing circular skills.

Based on insights obtained during 20 interviews with Finnish eco-influencers, eco-activists and other citizens who are already implementing zero-waste like lifestyles in Finland (Råberg, 2022), below is a summary regarding skills and knowledge that facilitate the forming of circular competences (Table 1).

Table 1. The breakdown of CE-relevant citizen competences.

Color codes:

Yellow = first priority for educational measures/provisions

Orange = attitudes that can benefit from improved knowledge base on CE

Blue = improvement in visibility of existing platforms and solutions needed

Pink = circular business development needed: better digital platforms and services

FORMING THE COMPETENCE ON				
	<i>Circular Behaviour</i>	<i>Skills</i>	<i>Knowledge of</i>	<i>Attitude towards</i>
REFUSE & REDUCE	Buy only what is necessary, refuse single use products	Resisting consumer society norms	Circular economy principles (e.g. the 5Rs, zero waste pyramid, waste management hierarchy)	Sufficiency, frugality Zero Waste
	Choose environmentally friendlier alternative	Searching for information, critical thinking	Carbon footprint of products	Sustainable consumption
	Maintenance of own goods	Taking care of shoes, clothing, furniture and appliances	Care procedures for different goods (e.g. airing clothing after wear to avoid extra wash cycles)	(Time-intensive) household activities
	Purchase of high-quality durable items	Recognizing high quality and durability	Criteria for durability and reparability	“Long term investment” (better quality durable goods often more expensive)
REUSE	Purchase second-hand	Planning skills (e.g. anticipating in advance the seasonal needs, changes in size for childrens’ clothing) Bargaining skills Computer skills	Second-hand marketplaces (specialized, online & kivijalka, by area) Pricing for different categories of second-hand goods	Using second-hand goods (reliability, hygiene, pests and related concerns)
	Rent	Planning skills: anticipating the renting need in advance (e.g. holiday seasons)	Renting/leasing platforms	Access-based consumption/ non-ownership (concerns similar as above)
	Resell unnecessary goods	Photography skills Display skills Computer skills	Second-hand marketplaces (specialized, online & kivijalka, by area) Pricing of second-hand goods from different categories	Time-intensive preparation and sales activities
	Give away no longer needed, but good quality items	Organizing and arranging skills Fixing up skills	Give-away platforms and channels (e.g. FB ryhmät Apua vähävaraisille)	(Time-intensive) preparation and arrangements

REUSE	Repurpose	Creativity and experimentation	Materials, their characteristics and qualities;	Experimentation (openness)
	Reuse for waste-free cooking	Cooking skills Meal planning Creativity	Traditional in season recipes and cooking practices Compatibility of food ingredients	The use of food leftovers Experimentation
REPAIR	Repair	Repair skills Being handy Sewing Wood work Electrical	Tools Different materials, their characteristics Substitution and compatibility of materials	Aesthetics of repaired goods (visibly repaired) Functionality and reliability of repaired goods (guarantees)
RECYCLE	Sorting of waste	Separating waste fractions Storage skills (e.g. organizing storage of biowaste with minimal leakage)	Waste categories /fractions	Waste sorting, possible long distance to sorting bins

Practical implications for enabling CE competences

Understanding the formation of CE competences allows distinguishing between the elements that might benefit from policy interventions, or lead to new business development opportunities. Next, we present a list of recommended interventions for improving circular competences of citizens:

1. Improving CE-relevant knowledge of citizens

Even though “circular economy” is a familiar concept for citizens in Finland, the majority is unaware of EU’s waste management hierarchy and value retention principles of the CE. Certain value retention strategies, like recycling, have been overemphasized, while others, like repair – have received very little attention. It is our recommendation to introduce the following CE-relevant content to primary education and update teacher education in subjects like ympäristöoppi regarding:

- Waste management hierarchy (established by EU) with emphasis on Prevention step.
- Hierarchy of value retention strategies (5Rs: refuse, reduce, reuse, repair and recycle).
- Carbon footprint of products.

During Helsus Youth project, aimed at interaction between sustainability researchers and high school communities, it became apparent that in projects aimed at reducing carbon impacts of school communities, teachers often feel unable to advise their students which school activities would be most carbon intensive, and therefore should be targeted first.

Unambiguous knowledge regarding CE can enable friendlier and more conducive attitudes in society towards sufficiency, frugality, zero waste lifestyles and sustainable consumption.

2. Updating craft education content

In addition, more emphasis in education is needed on improving everyday practices that have a large impact. For example, these include care/maintenance procedures for clothing and footwear to prolong their lives (airing, mending of woolen items, etc.). Also, collecting and utilizing traditional knowledge for waste-free and in-season cooking could help to drastically reduce food waste in households, reducing carbon emissions. Recommendations:

- Multi-stakeholder workshops to update craft education content for promoting CE, including actors like
 - a. Teachers of craft education and home economics
 - b. Martta liitto representatives
 - c. Business actors for enabling more diverse use of tools and materials (e.g. "routakaupat", manufacturers of fabrics).
 - d. Municipality representatives

3. Accelerating the change in societal attitudes towards the "new normal" – circularity

Many circular behaviours are still perceived as strange (renting vs buying), suspicious (purchasing second-hand) or even stigmatized in the society (e.g. children wearing visibly repaired clothing may be perceived as sloppy/poor). The change of attitudes could be facilitated with the following measures:

- Municipally supported public "repair marathons" to showcase the repair entrepreneurs and their competence.
- Exhibitions and public events devoted to repair, drawing attention to "visible mending" (clothing) or "visible repair" (e.g. furniture), that combines different materials and fabrics.
- Establishment of LoTs in municipalities ("library of things") to support more widespread borrowing and renting of seldom used items (e.g. steam-based cleaning devices, hiking equipment, etc.)
- Development of national schemes to guarantee the quality of second-hand repaired items, especially for large household appliances (e.g. fridge, freezer, stove).

4. Circular business development needs: better digital platforms and services

Many competencies related to reuse (for example, reselling own clothing and things) actually include skills that might require professional training. Shop assistants are trained to arrange clothing in display window of shops. So, arranging clothing in attractive sets for selling online and taking good photos is not something that every citizen is automatically capable of doing. Some have a better eye for style and for this reason can sell their things more effectively. In addition, ironing clothing or tuning old things to make them look good are time intensive. Aid organizations that accept clothing donations assign employees to sort through donations to organize them in sets that could be further passed down to families in need.

Because renting services are still extremely limited in range and number, using them requires anticipation skills for reserving the needed items well in advance. The same is true for libraries that typically have only a few items for shared use (e.g. sewing machines) or for lending. The scale is too small for circular economy, where most citizens are expected to be using these services, instead of ownership. In peer-to-peer sharing platforms the challenge is that the sets of needed things (for example, different hiking-related things) might be available from different users, far apart. So, in practice the use of renting services requires citizens to be well-organized, and it is unrealistic to expect this from the wider population, beyond the circular enthusiasts.

While some platforms and services that facilitate citizen involvement in circular economy already exist, they are struggling to compete against powerful players that operate in business-as-usual mode. Many of the small aspiring CE enterprises do not survive the competition. Therefore, we suggest the following support measures:

- Development of clear criteria of what qualifies as CE-oriented enterprise. This includes applying waste management hierarchy to prioritize businesses aimed at waste prevention.
- Access to financing, loans, targeted business development funding for CE-oriented start ups
- Access to central locations in municipalities for CE-oriented start ups
- Improved visibility of CE-oriented consumption patterns (e.g. municipal campaigns for renting vs ownership).

In conclusion, we emphasize that quick transition to a CE requires targeted policy making, and enabling citizens to participate in CE has to address all of these: citizen attitudes, knowledge, skills and ensure easy and diverse supply of circular services and products.

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