BARRIERS AND OPPORTUNITIES TO REPAIR IN REPAIR CAFES

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ABSTRACT

For some years now, a part of the population in Europe has been willing to moderate its consumption and to enter into a sustainable waste reduction perspective. Repair is an important lever in the sustainability of products. It requires appropriate approaches depending on the actors involved, whether they are public, private or at the consumer level. Repair cafés are thus born of local citizen initiatives to act on the life cycle of everyday consumer products. We conducted a qualitative study based on a series of semi-structured interviews with the actors of repair cafés in the Grenoble area (France) and carried out an analysis of qualitative data. This analysis, according to three pre-defined fields, technology-competencies-motivations, reveals the perception of the actors on the current obstacles and opportunities for the development of the amateur repair practice. The results obtained support studies already carried out on the subject and show that design is still failing to match amateur reparation requirements. Besides, the social role of these third places takes precedence over the ecological and economic dimension of repair.

Keywords: Sustainability, Circular economy, Design for X (DfX), repair, open community

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1 INTRODUCTION

For a number of years now, European citizens have been increasingly aware of the impact of their consumer behaviour. In regards to manufactured products, the economic and environmental dimensions are no longer neglected when making choice, thus leading to ethical demands from the consumer: less natural resources extracted, less wastes, decent working conditions and extension of the life of products for example. The widespread model of linear production and consumption (extract, produce, consume, throw away), which is at the origin of strong environmental impacts is pushing private bodies and state to propose ways of extending the life span of products, as is one of the levers for reducing environmental impact.

Additionally, frugal approaches have emerged in developing countries where economic constraints are strong, consisting of meeting needs in a simple and efficient way, doing better with less, in an economy of scarce resources. Frugality promotes a flexible and dynamic mindset that aims to respond to immediate problems with the means at hand (Radjou and Roberts, 2012).

As European countries are not subject to the same constraints, frugality in industrialised societies is more of a voluntary ecological approach. In our industrialised societies repair is appearing as one of the solutions to extending the lifespan of consumer goods despite they are easily accessible to the customer and effortlessly manufactured and marketed (Hernandez et al., 2020).

The context of repair in France sees several actors occupying the field with a mitigated success. Companies such as Fnac Darty, historically promoting of the development of the consumer society, now favours local employment and a model that is more respectful of the planet's resources.

In addition to this, there are independent repairers, distributors and retailers selling spare parts and repair services, social solidarity economy players (adapted companies, recycling networks, waste disposal centres), and local individuals or collective initiatives of consumers.

Through the purchasing act consumers can play an important role in extending the life of products by favouring the purchase of robust, repairable and eco-labelled products, facilitating reuse or second-hand products. Also during the use phase, attention to the conditions of use, maintenance of the products and repair if necessary are mandatory; and when they are no longer in use, donation, barter, resale, exchange or disposal can be done in dedicated spaces. However, the will of the consumer alone cannot ensure the effectiveness of such an approach. A recent survey of users of badminton shuttlecocks showed that the vast majority of them promote recycling rather than reuse or repair, the latter coming last in the set of frugality solutions (Vandekerkhove et al., 2021). The technicality of such an operation being the main reason for this lack of enthusiasm.

The research question addressed here concentrates on the emergence of the repair café as a recent actor of the products' life cycle. Our hypothesis is that these structures can act as tier places in the development of repair chains that would foster the emergence of a repair culture in the society. The research question examines the actors, their motivations, and the barriers to repair in repair cafes today.

2 STATE OF THE ART

2.1 The positioning of public and private policies

The obstacles to the good health and development of the repair sector have been identified by ADEME (french agency for environment and energy control), specifying that not all goods are covered by an accessible repair offer, notably because of the lack of availability of spare parts. Good knowledge of products and therefore effective repair actions is made difficult by the diversity of new products. ADEME also pointed out that the cost of repair is not always competitive with the price of a new product, which encourages consumers to buy back rather than repair. The struggle against planned obsolescence, which has been legally penalised since 2015 in France, has led to a proposal to increase the duration of the legal guarantee of conformity from 2 to 5 years. Producers are invited to design more durable products in order to limit the costs incurred by the respect of these guarantees and consumers are informed about their choices in favour of more responsible consumption and guided towards the repair of their goods. France thus precedes European Union, whose "right to repair" law is still in the making.

In parallel, a repairability index has been developed, which manufacturers of electrical and electronic appliances have had to display on their products since January 2021. The objective of this index, which should be turned into a durability index in 2024 (Chasson and Vasseur, 2021) is twofold: to change manufacturers' habits in depth (design and production) and to provide consumers with complete and clear information, encouraging them to adjust their consumption patterns.

Brem and Wolfram (2014) define the frugal engineering approach as a process-oriented approach to adapting existing technologies to local challenges by integrating civil society. Cost and development time reductions are targeted in the case of emerging countries. The aim is different in the case of industrialised countries, but the will to integrate the civil actor in a phase of the life cycle (here repair phase) is based on the same logic.

Repairability can be seen as one of the pillars of the circular economy for extending the life of products (Hernandez et al., 2020). How to design sustainably matters a lot . Methods that focus on a key feature of product development are sometimes called Design for X (DFX). Although the topic of "Design for Repairability" is not explicitly mentioned in the literature, repairability is often associated with Design for Assembly / Disassembly (De Fazio et al., 2021; Bracquené et al., 2021)) Although this criterion of disassembly is essential in the definition of potential repairability, it is nonetheless one factor among many others. Recent work in the field of education has sought to identify design criteria that guarantee reparability (Terzioğlu and Wever, 2021). The authors insist on the complexity of the repair process when the remediation of failures and damages have not been anticipated by the designers. It is then up to the repairers to redesign an alternative to the initial design in order to adapt to the available know-how, resources, etc., and to simplify new repairs if they cannot completely rule them out.

2.2 Citizen initiatives

The choice of repair is essentially up to the consumer. Many factors, formalised through the RMB model (Terzioğlu, 2021), influence the motivation to repair. As far as private individuals are concerned, many initiatives have been carried out individually or in the form of local networks to pool skills and know-how. Indeed, recent years have seen an increase in the number of repair centres and similar forms of open community workshops where people can share tools, space and repair skills (Terzioğlu, 2021). However, Gobert et al. (2021) describe a low enthusiasm for R&R (Repair and Reuse) schemes and the majority model remains the purchase of repaired/reconditioned products by alternative structures. The repair cafés have not been studies yet on the aspect of motivation and opportunities of the participants of these repair cafés. In order to understand the capacity of actors in the field to take up part of this challenge, a survey of repair organisations such as repair cafés is a first significant step.

Repair cafés are, in France, a relatively recent phenomenon, although repair is a centuries-old practice.The first repair café was invented by Martine POSTMA in 2009, it then rapidly gained in popularity and there are now more than 2000 worldwide. They are defined as places where people come together to repair objects on a daily basis, such as household appliances, electrical appliances, electronics, clothes, toys and relatively simple means of transport such as bicycles. Overall, we found the same categories as in Gobert et al. (2021), with the notable exception of furniture.

Repair cafés are characterised above all by their friendly atmosphere and relaxed attitude: there is no financial obligation involved, repairs are carried out mainly free of charge. The main objective of a repair café is to run as a meeting place for repairing together, between volunteers and consumers. These places constitute third places, intermediate spaces between a private space and a work space. These collaborative spaces are based on synergies and informal exchanges between actors. These initiatives allow small communities to build responses to their immediate local problems without waiting for political or market intervention at costs that would be difficult to sustain. This term encompasses a multitude of places, often including, but not limited to, co-working, fablabs (with the latest digital tools, including a 3D printer), hacker spaces (dedicated to computer programming) or maker spaces (with mechanical tools) and other sewing or bicycle repair workshops belonging to the same ontology of third places (Vandenabeele and Decuypere, 2022). What makes repair cafés special is that the act of repairing is not carried out by or delegated to specialised repair centres linked to manufacturers. Instead, repair cafés make the act of repairing public, and these actions are staged as political actions that struggle for a cultural transformation towards product sustainability. The motivations for attending such places are as diverse as the forms they can take (Moalem and Mosgaard, 2021).

The Grenoble conurbation counts ten repair cafés. We conducted our research on these premises with the aim of analysing the relevance of the "repair café" as a new actor in the life cycle of products in response to consumers' desire for frugality.

3 METHODOLOGY

We opted for a qualitative methodological approach, consistent with our objectives of researching the arguments of actors, and compatible with the sample population involved in this study. The approach is based on two stages: data collection through semi-structured interviews with free answers and processing of the collected data using an analysis grid.

3.1 Data collection

The interview survey is one of the data collection methods regularly used in social or management sciences. Semi-structured interviews with users (beneficiaries of the service) - hereafter also referred to as visitors - and volunteers (providers of the service) of repair cafés allow for the collection of thematic discourses with enriched information. We consider them well suited to this multi-factor study context. An established interview guide was drafted in accordance with our research problem. Socio-demographic data characterising the interviewees were collected (age, profession, seniority), the aim being to obtain indicators likely to assess the capacity of these field actors to take on part of the challenge of repair by the user.

The interviews were conducted in all the ten repair cafés in the Grenoble area over a period of one month (mid-April to mid-May 2022) despite COVID19 crisis. 25 people, volunteers and visitors, were interviewed. Data collection was carried out by handwritten note-taking, audio recording, or a hybrid recording, with the oral agreement of each of the interviewees.

3.2 Processing of collected data

Transcripts of the interviews were made of all or part of the audio recordings. Certain elements of discourse were discarded because they were deemed irrelevant to the categories of the analysis grid (for instance discourse linked to impromptu interactions with other visitors or volunteers of the repair café). The addition of these transcripts to the handwritten notes constitutes our corpus of analysis.

The categories of analysis were defined in a dual way. A review of the literature in relation to our research question made it possible to draw up an initial list of categories. This was enriched by a pre-analysis of the corpus in the light of the points raised during the interviews. This resulted in 4 main categories.

- Motivations and values for repairing and having repaired: This category highlights the different motivations of the volunteers in carrying out their repair or support activities, as well as those of the visitors who come with their broken appliances. Finally, the values shared by these people are also collected. We have merged the emotional aspects and values that the RMB model (Terzioğlu, 2021) is distinguishing without obvious reason.
- Technical area: This category refers to all the technical points relating to the practice of the activity itself. It concerns the structure of the products, their design and the characteristics of the parts involved in their repair. This category also includes dismantling techniques and the tools required. Finally, it also deals with spare parts, particularly their availability, cost and supply.
- Knowledge and skills: This category refers to the skills and knowledge necessary for the repair activity from the point of view of the two groups of actors. The sharing of this knowledge and skills is also questioned.
- Internal organisation: this category refers to the organisation of the repair café, the roles and responsibilities of the volunteers.

The transcripts, by individual, were imported as a file into the NVIVO 12 software. Attributes were assigned to each file (age, profession, gender, etc.). Our categories and sub-categories have been identified during the analysis of the corpus. This forms the analysis grid that has been populated with the extracts of the interviewees. We iterated by introducing new categories until the corpus of analysis was completely covered. However, we did not try to reach saturation of the corpus (Hennink et al., 2017).

4   RESULTS AND DISCUSSION

Among this sample of 25 interviewees, 20 people were volunteers in the repair cafés. 6 of these volunteers had an administrative role and 18 a repair role. The remaining 5 people declared themselves to be visitors only. As in other studies Schägg et al. (2022), the population is predominantly male (21 out of 25 respondents). It is also old, since the average age is 60 (counted in 10-year increments) and representative of a high proportion of retired people (from 62 years old in France). The level of qualification is high, often in the technical fields: 14 of the 18 interviewees declared themselves to be engineers, technicians or to have had a scientific career. An initial analysis of all the coded items (cf. Table 1) shows that more than half of the items concern the technical field and that almost all the interviewees (number of individuals who expressed their opinion in each category) addressed this aspect. On the other hand, a quarter of the codes relate to the knowledge and skills aspects, which underlines the importance of this dimension in motivating actors to become involved in this type of structure. Similarly, the values inherent in this activity are often put forward (18% of codes). Almost half of the codes therefore concern non-technical aspects relating to the dimensions of motivation or meaning attached to this activity. The low number of codes concerning organisational aspects can be explained by the fact that this dimension is little known by ordinary visitors of the repairs café and that it is of little interest to the volunteer repairers (3 respondents out of the 4 expressed have a role as administrator).

Table 1. Quantification of coded items

Analysis categories	Respondents	Codes	Percentage
Technical area	23	223	52%
Knowledge and skills	22	104	24%
Motivations and values to repair or have repaired	23	76	18%
Internal organisation of repair cafés	4	17	4%

Table 2 lists all the coded items, by category, and specifies the number of distinct people who mentioned the item at least once. In the "technical field" category, we note the strong preponderance of dismantling problems. These are mostly seen as the consequence of :

- a lack of access to documentation (mainly due to the non-availability of technical diagrams of devices, sometimes compensated by the use of video tutorials on the Internet to understand the structure of the product and the means of disassembly)
- the way in which the parts making up the product are designed, especially in terms of the way in which the parts are fixed and assembled (housing and cover with screws, nuts or clips).

In the area of skills and knowledge, the categories are more balanced, with a slight predominance of skills acquired through experience. Finally, the motivations for repairing or having repairs done are diverse and fairly balanced. However, there is a noticeable representation of the need for status and social ties, which, by combining social contact and activity for the retired, represents almost 1/3 of the coded items. The extension of life expectancy and the appetite for repair only come next.

The interviewees were also asked about the organisational aspects, but they were little mentioned, even though they represent an essential component of the functioning of these third places. The analysis of the verbatims, excerpts of which "*are typed in italics*", provides a more precise view of the actors' perceptions.

4.1 Barriers to repair: a technical issue

The first point raised by the volunteers concerns access to technical documentation. Its essential role is to fill a technical culture gap, which is inevitable given the multitude of systems encountered. The need for documentation may arise at the dismantling stage, when the repairer is faced with products that are unknown to him. In this case, workshop manuals or "*dismantling tutorials*" are sought after. We also note that the absence of instructions can be compensated for by meticulous and rigorous dismantling, provided that the visitor has not "*already dismantled any old how*" or that he "*does not bring all the pieces*". Documentation is also used to "*find references for spare parts*". This is now mainly done on the internet and in this area there is a generation gap: "*the younger people, who are familiar with the smartphone, manage to find references*". Volunteers also look for (electronic) diagrams to identify components or find the principle of a circuit. Generally, documentation is required for "*very specific objects*

Table 2. Quantification of codes by categories

Category	Items	Sub-items	Codes	Individuals
Technical area	Dismountability of products	Access to documentation	45	19
		Part design	46	17
		Tools	31	14
		Other reasons	15	9
	Spare parts	Access & availability	30	12
		Cost	16	8
		Networking	4	4
		Stock at premises	14	10
		Other reasons	1	1
	Broken products encountered		22	18
Knowledge & skills	Types of knowledge	Apprenticeship through internal training	11	6
		Repair with experience	17	11
		Visitor education	8	6
		Innovation	3	3
		Other knowledge/skills	27	14
	Sharing mode	Sharing of experience between volunteers	24	12
		Sharing with visitors	14	10
Motivations and values for repair and have repaired	Love to tinker and fix		15	14
	Social contact		19	12
	Carrying out an activity for retired people		4	4
	Do not throw away		15	12
	Economic reasons		9	8
	Other motivations		14	9

like printers". The oldest volunteers regret the time when electronic products such as "*a television set 50 years ago*" were "*delivered with a diagram [...] of the signals*". Today's manuals only deal with the normal functioning of the product and are "*less and less informative, to help with repairs*". They may provide help in diagnosing symptoms for light maintenance or routine checks before taking the product to the after-sales service. Again, it can be useful in interpreting "*flashing lights*" which are "*a manufacturer's code*". However, it is important that their translation (sometimes automatic from a foreign language) does not turn out to be too "*folkloric*"!

The difficulty in disassembling products raises questions about the design choices made for them. It can be seen that a certain number of devices implemented for disassembly, according to the precepts of DFMA (Design for Manufacturing and Assembling) and eco-design, aim above all at the separability of materials in the recycling phase, rather than at disassembly by amateurs with a view to repair. Taking this to the extreme, it is not a dismantlable system that users need, but a dismantlable AND reassemblable system. This shows that eco-design is still a recent phenomenon and that eco-designed products brought to repair cafés are still few and far between. The design of products is therefore often denounced by the volunteers: "*the companies that design them, it's not really their concern today*" "*So yes, there are objects that are designed to be ready to repair, yes, and others that are not*". This would be a "*purely commercial approach*" whose "*objective is not to repair*".

It is often the assembly techniques that are designed to be permanent assembly that generate problems "*if it's a case that has been soldered or glued, you can't open it*" . The substitution of traditional assembly processes such as screws or bolts has been replaced by ultrasonic welding processes or plastic clips that can break on disassembly. And even when screws have been retained, they sometimes require "*really special keys to dismantle them*" because of specific indentations or unusual access lengths. Volunteers sometimes have to make the necessary tools themselves. Accessibility of functional parts is also mentioned as a parameter that can lengthen operation times. Products are generally designed with standard components (e.g. bearings) but industrial constraints linked to specifications that are not conducive to repair make these components unremovable: "*you can't change the bearings because they are crimped*

in plastic" , "*and they put glue points or whatever, and it's welded!*". Here we see a duality appearing between the profitability of the production phases and the concern to allow manual dismantling, which is "*not easy because everything is miniaturised*" , with standard tools. Miniaturisation is the typical example that illustrates a capacity of industrial production tools that is far from human capacity: "*it's far too small, it's far too compact, it's far too complex for us to have fun opening it*" , and it's just as rampant in the field of electronics as in the field of mechanical casing, where "*small parts (such as clips) break*" . Stakeholders also recognise "*something notable about the purchase price*" of recent products, the "*reliable or not*" brand and the product's positioning in the range, which influence repairability. "*The average device that is not made to last...because it is poorly sized, because it is poorly designed*" is often a source of failure. This is particularly true of hand-held power tools: "*this part which is made of plastic for the private individual is made of metal for the professional*" .

Not all products are repairable. Once we have eliminated all items that are difficult to move (large appliances such as ovens, refrigerators and washing machines), we can see that the success rates vary greatly depending on the category of goods. All of the players who have taken a statistical approach agree that around 60% of products are successfully repaired. This varies from less than 1/4 of the cameras repaired to more than 3/4 of the household appliances. The latter category (often coffee machines, hoovers, etc.) is the most represented, followed by computers and hifi/video. This can be explained by the rate of ownership and their use rate "*the hoover! It doesn't mean that it breaks down the most, it means that everyone has a hoover and that everyone uses it frequently*" . Some products are very repairable: "*The sewing machine goes very well, 75% success rate (150/200)*" , "*out of these 420 hoovers, 250 were repaired*" . However, there is no correlation between the degree of electronics built into the product and the reparability rate. Electrical breakdowns are frequent "*especially in the power supply*" or motors that are "*out of breath*" or whose "*brushes ...are worn out*" . On the other hand, mechanical breakdowns seem to be more easily repairable "*mechanically very often, we will say 90% of the time, the object is repairable*" . A volunteer sums up the situation quite well: "*Mechanical failure: it can be changed/repaired. Program processor card: if it exists ok, if not we can't*". While alternative solutions exist to overcome the lack of availability of mechanical parts (gluing, 3D printing, etc.), electronics represents a real challenge in the face of the widespread use of Surface Mounted Components and integrated components that are often not identified nor identifiable!

More optimistically, some volunteers say that repair "*just depends on the time and money you want to put into it*" . The investment is then proportional to the value of the product: "*An object that is more valuable than a TV, we will spend a little more time on it...*" . The cost of spare parts, which is often prohibitive given the estimated value of the object, seals its fate. The general rate of wear and tear is often cited as an argument for not carrying out the repair. Anecdotally, the repair time may also be a barrier, mainly when the supply time for spare parts is deemed too disproportionate to the urgent need for use.

4.2 An ecological and social issue

Repair cafés develop a social atmosphere between people who are open, dedicated and passionate about DIY and technology. The ambition of repair cafés is to reduce the waste of appliances that could have a second life, to avoid throwing them away, to save money so as not to buy the same product again with the same characteristics. The repair café is therefore seen as an element of the circular economy with an anti-consumerist vision (Bradley and Persson, 2022). The economic argument is secondary: "*We do cheap repairs, but that's not the objective, we don't come because it's cheaper, we come because if it's not there it will go to the dump*". However, there is an egalitarian aspiration to make repairs financially accessible for certain categories of people: "*There are two types of people: 1. the needy, it's financially complicated, but a diagnosis can cost 30 euros at XXXX, only to hear that the device is dead...*". This confirms analysis carried out by Meißner (2021) from which it emerges that repairing means taking care of objects (for their durability and for maintaining a nostalgic attachment to the object) and taking care of the environment by preserving resources, extending the life of products, struggling against waste and against the disposable society. In short, an alternative to after-sales services, whose influence seems to have diminished: "*the days when distributors of various equipment, household appliances and other items had their own repair shop are over*".

Despite the diversity of the audiences, the motivation and values also converge around the search for social contact: "*he has been retired since 2007 (15 years) so there was a need for a social link*". The emphasis on the social aspect beyond the ecological one can be seen in the consideration of each person in a friendly manner and of the community (escape from isolation, feeling of belonging to a community, increase in the quality of life of the neighbourhoods) (Bradley and Persson, 2022). The values of avoiding waste, saving money and creating social links are thus combined and pretty close to the concept of Slow Tech described by Patrignani and Whitehouse (2015). The results obtained for the main item in the category "*Motivations and value of repairing and having repaired*" confirm the hypothesis that social character is a major motivation in Third-Place communities. In this, our results overlap with those of a study conducted in Sweden in 2021 (Bradley and Persson, 2022), which noted the social inclusion character of these initiatives. The economic criterion is not the primary motive, contrary to the results announced in (Vandekerkhove et al., 2021) but this study did not address the social aspect. We can therefore see that the public concerned is more interested in gathering in this type of environment to find a collective friendly atmosphere (Vandenabeele and Decuypere, 2022) rather than for the repair itself "*...motivation of the social link with colleagues and visitors, when you retire, you don't see many people anymore...*". The relationships that develop between volunteers and visitors during a repair can also influence the commitment to the repair: "*the person who is nice is more likely to be given the means than someone who is unpleasant*".

The provision of space and tools for repair for voluntary and free use by visitors can be related to the notion of commons.

4.3 A passion for doing and sharing

The notion of a third place, as a place of exchange, takes on its full meaning here, as it allows the grouping of a multitude of skills and the mutual aid of volunteers when faced with a technical, diagnostic or repair problem. The importance of experience is systematically cited by all the interviewees. It is considered as preponderant in the success of the repair, particularly in the diagnosis. A "6th *sense of the handyman*" is mentioned as well as the regret that there is "*no school for handyman engineers*"! More seriously, practice is recognised as the best school, especially when you "*don't have the science that goes with it*", but "*curiosity*" is a considerable asset.

The mastery of technical gestures is also essential "*... in electronics, to know how to do a correct soldering, to desolder correctly the old component*". It should be noted that there is no universal knowledge management strategy in repair cafés. Some volunteers are specialised (types of appliance, area of technical expertise, etc.) by choice or in response to a division of labour defined within the structure. They cultivate this specialisation by operating only on certain types of appliances, or technical subsystems, related to this speciality. Others mention "*skills that evolve, there is learning and mutual aid*" with a view to "*versatility*" to deal with the diversity of the objects encountered. In all cases, plurality of views "*second opinion*", mutual aid and even working in pairs is the rule, even if it ends sometimes by "*handing over*" in case of overwhelming difficulty.

The passion of doing and sharing skills, knowledge of the field, transmission of values also motivates volunteer repairers. The skills needed for the activities may have been developed over a long period of time (through hobbies or professional experience - item Repairing with experience, Enjoying tinkering and repairing) but there is also a transmission of knowledge between volunteers within the repair café which helps to increase efficiency and save considerable time. The older volunteers are cited as a "*gold mine in terms of experience*" because they have "*lived a time when they had to repair things that today training no longer exists*". The need for "*generational transmission of technical culture*" becomes de facto one of the missions of repair cafés. The reciprocal is also true when it comes to techniques that are difficult for older people to master, such as internet research or 3D printing: "*you have to be good at programming, drawing the part and making it*". Cooperation also takes place between repair cafés, notably in the networking of documentation or the contribution to wider initiatives (Getto and Labriola, 2016).

Knowledge is also transmitted between volunteers and visitors during each repair of appliances with an explanation of the internal workings and the cause of the breakdown. One of the objectives of repair cafés is to involve the visitor in the act of repair. This sometimes requires "*patience*" in order to establish a relationship that differs from traditional commercial service provision. However, as noted by Moalem

and Mosgaard (2021), the unwillingness of visitors to contribute to repair, and the sometimes limited pedagogical skills of volunteers, are often a hindrance to the growth of this activity. This lack of willingness can be explained by the specific nature of the repair activity: "*... people sometimes have a lot of good will, or are a bit handyman-like, but repairing is still something specific! there is a way of working, there is an approach...*". The repair cafés therefore opt for an educational strategy towards users. The success of a repair is often linked to the role of the user in the maintenance and proper use of their appliance. Unfortunately, visitors do not always comply to these principles and this can lead to breakdowns due to "*lack of skills...*" or because of "*insalubrity [which] sometimes leads to other breakdowns (e.g. descaling, cleaning, grease on cooker components, melted cheese in oven where grease gets underneath and causes short circuits)*". The user's responsibility for a breakdown can be engaged when the reading of "*user manual*" is neglected and "*that's not how it should be done*". In this context, the repair café also serves as a place of technology education (unfortunately as a result of a failure) in addition to having the visitor "*participate in this enriching experience of repair*".

5 SYNTHESIS AND OUTLOOK

This study showed the desire for circularity that emerges from the activities of repair cafés and highlighted the social appetite beyond the technical and intellectual aspects of repair. Actors do not recognise any strong structuring at a national scale, but rather some "*golden rules*" such as "*not competing with professional repairers*". This therefore excludes certain objects for which a real network of professional repairers has developed (e.g. smartphones). Although the rule of autonomy is generalised, we noticed that the need for a networking is increasing: sharing of documentation, stock of spare parts, etc.

The trends for positive developments of repair cafés converge overwhelmingly towards better consideration of repairability during the design phase. The barriers to repair are often technical and seen by the repair cafés players as a deliberate action of the manufacturers not to include amateur repair in their specifications by design. The contemporary economic model is reinforcing this trend of not disclosing design knowledge and technical informations (often seen as trade secrets) in the name of industrial competitiveness, at the opposit of the requirements for more circularity and less environmental impact. Another finding is the increasing gap between the industrial process and the means for amateur repair. Products are more and more designed to be manufactured by complex and expensive machines, while repairers can only count on daily life tools to operate. Admittedly, eco-designed products have found their place in certain manufacturers' offer, but the emphasis is mainly put on recyclability and reduce of environmental impact of materials. A strong effort is expected in order to allow the increase of the life time of the products through the release of specifications and technical data along with the product, especially when spare parts are scarce and/or unreasonably expensive. The design of the products should also bring back repair and maintenance operations to a more human scale technology. In parallel with government's initiatives, the consideration of repairability is gradually taking hold in a few companies. The Vice President of Corporate After-Sales Service and Consumer Satisfaction of SEB group, whom we interviewed, announced the initiation in 2010 of a strategy of economically repairable products in the long term. It is based on a guarantee that products can be dismantled (and reassembled), a stock of spare parts whose cost per product is lower than that of a new appliance, and a large network of trained repairers and an internal philosophy deployed throughout the group. Some of these elements are likely to meet the needs expressed by the actors of repair cafés.

On the opportunity side, the coverage of the territory and the notoriety of these third places are still weak but slowly growing. The motivation of the players is strong and very diverse. The ecological argument does not appear to be central in this survey and we perceive it more as an alibi for people who are attracted to DIY anyway. One of the real driving forces today is the social ties that everyone builds. Volunteers express the need for generation renewal in repair cafés and the necessary transmission of experience to young repairers who will in turn bring their skills in recent information and manufacturing technologies.

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