Mapping circular economy projects: a case study of a major company in the sports & outdoor industry

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MAPPING CIRCULAR ECONOMY PROJECTS: A CASE STUDY OF A MAJOR COMPANY IN THE SPORTS & OUTDOOR INDUSTRY

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ABSTRACT

The sports industry is both a victim of climate change's impact, but also a contributor: adult active sports participants have an average annual carbon footprint of 844 kg of carbon dioxide-equivalent emissions. Thus, it is crucial to find solutions that reduce the sports industry's environmental impact. In this context, the circular economy emerges as a possible alternative. This paper analyses a sports production and retail company transitioning to the circular economy. First, we identified 154 internal circular projects concerning 89 product categories and classified them into different circular strategies and approaches. Then, we conducted interviews with 33 project representatives. Our results show that repair & maintenance is the most employed loop, but sharing economy and recycling also have an essential role. Each circularity loop presents specific challenges, but personal conviction is the common motivator. However, there is a need for greater allocation of resources such as time and budget. Additionally, strong governance is essential to structure these initiatives.

Keywords: Circular economy, Sustainability, Sports and Outdoor Industry, Case study, Innovation

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1 INTRODUCTION

The French sports industry comprises 112,000 companies that achieved 77.7 billion euros in revenues in 2020 (BPCE L'Observatoire, 2020). The population is mainly responsible for funding it, spending 17.3 billion euros on buying products – shoes, clothes, and equipment- and paying for services – memberships and course fees- (Amsalem and Mechmache, 2019). Yet, there is a new challenge in the sports field: climate change. Natural disasters and severe weather affect competitive and recreational athletes' ability to participate in many sports (Viola, 2021). Climate change presents direct and indirect sport-specific risks, such as heat stress, respiratory stress caused by wildfires, and skin cancer (Schneider and Mücke, 2021). Also, winter sports deal with their endangered playground once there is less snow and ice (Taylor, 2019). While the sports sector is a victim of global warming's impact, it is also a contributor: adult active sports participants have an average annual carbon footprint of 844 kg of carbon dioxide-equivalent emissions, with individual sports producing more emissions than team/racket sports (Wicker, 2019). Thus, finding solutions that reduce the sports industry's environmental impact is crucial.

Today, our economy is under a linear logic of extracting, producing, consuming and throwing away. Opposing it, circular economy (CE) proposes a restorative system that relies on renewable energy, minimises tracks and eliminates the use of toxic chemicals; and eradicates waste by careful design (Ellen MacArthur Foundation, 2013). In this context, the research question is: how a sports company can engage in CE? This study focuses on a case study of a significant sports retail company in France. (Braungart *et al.*, 2007) say that organisations usually adopt an approach that aims to reduce the ecological footprint, for example, diminishing carbon emissions or optimising energy use. However, this company strives to take an additional step by developing circular business models (CBM). This paper explores how they are approaching the transition from linearity to circularity. The objective is to map the main circular loops they use, understanding the challenges encountered in this field and the motivations behind these projects.

2 CONTEXT

We investigate different circular loops considering the European Directive on Waste Hierarchy, the concentric loops of the Ellen MacArthur Foundation (2013) double-diagram, and the framework of analysis by the level of shape degradation (Menu *et al.*, 2019). This analysis resonates with the evolutionary framework proposed by Ceschin and Gaziulusoy (2016) that defends that "Design for Sustainability has expanded from a technical product-centric focus towards large scale system levels changes in which sustainability is understood as a sociotechnical challenge". Thus, in this article, we will approach solutions at the product and the business level.

Below, we explain the technical loops (Ellen MacArthur Foundation, 2013) and their related CBMs:

- Repair & maintenance: prolonging a product's lifespan for as long as possible through maintenance and repair ("The Circular Economy In Detail", n.d.) to provide longer usability and functionality (Ludeke-Freund *et al.*, 2018). They require companies to have business models that focus on offering superior product experience and engaging customers in value co-creation rather than selling products (Ludeke-Freund *et al.*, 2018).
- Sharing: Longer-lasting products can be shared amongst users who enjoy access to their service, avoiding the production of new products ("The Circular Economy In Detail", n.d.). Sharing economy (SE) privileges access rather than ownership, with environmental promises of better resource utilisation (Ritter and Schanz, 2019). Scholars who study both CE and SE conjointly unanimously agree that SE is a subset of CE, i.e., SE is one of several circularity approaches (Henry *et al.*, 2021).
- Reuse and redistribute: products that can be reused multiple times and be redistributed to new users with only little intervention ("The Circular Economy In Detail", n.d.), such as cleaning and repairing minor defects (Ludeke-Freund *et al.*, 2018). This kind of CBM focuses on giving access to used products and evaluating their market value, resulting in lower product prices. In addition, they can be C2C or C2B2C, i.e., they have a company as an intermediary, which calls for a product flow back to the service provider.

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- Refurbishment and remanufacturing: these processes combine capabilities from the previous strategies: repair/maintenance with reuse/redistribution (Ludeke-Freund *et al.*, 2018; "The Circular Economy In Detail", n.d.). Although refurbishment and remanufacturing may be similar, the difference is the level of intervention. While refurbishment is mostly a cosmetic process, remanufacturing is more profound, involving "dismantling, cleaning, checking, testing for compliance, and replacing worn-out parts" (Ludeke-Freund *et al.*, 2018). The value creation is based on "access to goods that can be resold, enhanced reputation as a manufacturer, products with as-new quality (...), a reduction of waste handling costs, and less social externalities" (Ludeke-Freund *et al.*, 2018).
- Upcycling: It is a process in which products and materials that are no longer in use are reprocessed in a way that increases their value, contrasting with recycling, where value is often at least partially lost (Singh *et al.*, 2019). According to (Menu *et al.*, 2019), there are two upcycling loops: (i) repurpose, in which there is a change of function but not shape, *e.g.*, a surfboard turned into a bench: (ii) refunction, in which there is a partial modification of the shape to fulfil a new function.
- Recycling: the process of going back to the raw material level to produce new products ("The Circular Economy In Detail", n.d.), maintaining the material's core characteristics despite the partial loss of quality.
- Downcycling: Converting products into materials of lower value, usually in an open loop logic. In this case, there is a significant loss of material value.

3 METHODOLOGY

The studied company, composed of 20 brands, combines two main activities: designing sports products and selling them physically and online. It has more than 1700 stores worldwide and more than 100,000 employees. The first step was finding the circular projects in the company's media, resulting in the finding of 40 projects. Then, we reached out to the Sustainable Development team to learn about other circular projects that were in development, finding 17 projects. We got in touch with the leaders of each project and asked them to tell us if they also knew about other circular projects, resulting in the finding of 59 projects. Finally, we reached the Retail leaders to collect projects involving sharing economy (38 projects). In total, we found 154 circular projects. It is important to note that to count the number of projects, we followed the rule: one project accounts for one solution to a single kind of product, *i.e*, repair solutions for a bicycle and a roller skate count as two different projects.

We created a framework representing CE loops (Figure 1) to help us categorize each project. In the framework, we incorporate the concepts of shape degradation (Menu *et al.*, 2019) into (Ellen MacArthur Foundation, 2013) cycles. We state that ecodesign can be present both in linear and CE: some companies will look for carbon footprint reduction in a product's manufacturing through ecodesign, but CE calls for a deeper change in the system logic. For example, design for repair and design for recyclability aim to facilitate future circular loops. We also classified the projects according to which sector was leading the project: sports brands (product development), industrial processes (component, accessory, and assembly development), or retail (stores and online management, and logistics).

Then, we conducted interviews with 33 circular project representatives. We asked them questions regarding their job responsibilities, followed by questions regarding the circular projects: objectives, main challenges, the motivation behind working with circularity, and the perception of CE in their sector (positive, or negative). We chose the interviewees based on their connection to the circular projects. There were fourteen interviewees from the sports brands, eight from the retail, seven from the industrial processes and four from support teams (innovation labs and sustainable development division). We analysed the responses, searching for challenges and motivations behind circular projects.

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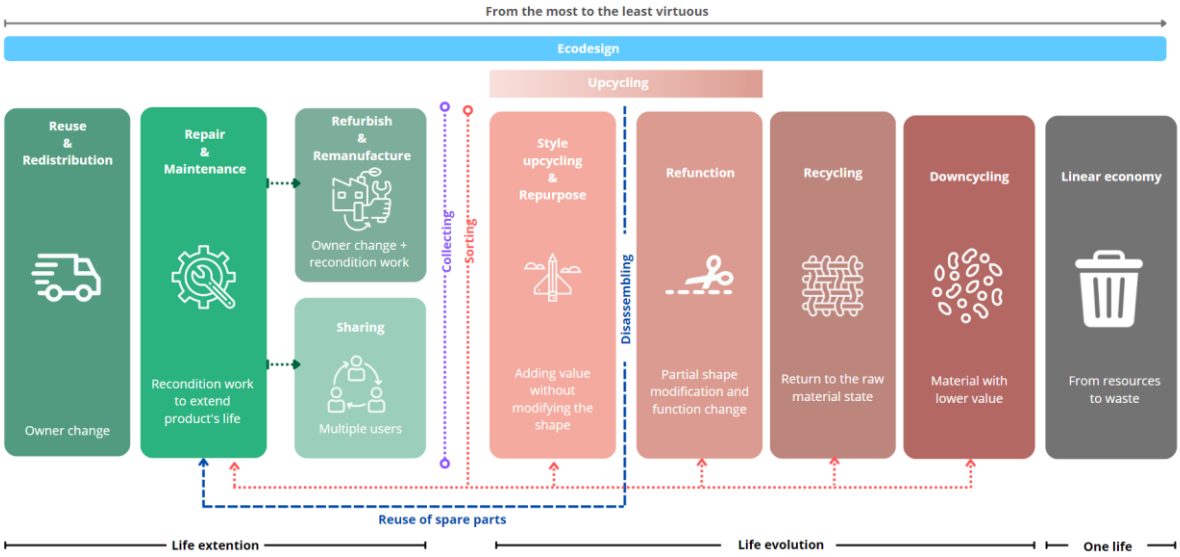

Figure 1. Circular economy framework

4 RESULTS AND DISCUSSION

In this section, we present the research findings following the methodology steps. We discuss the results as we confront our findings with the information gathered in the literature review.

4.1 Mapping circular projects

We noted that inside the circular loops, some specific approaches seem recurring. So, we decided to provide another level of granularity to them, creating subcategories that we called "approaches". For example, for the repair & maintenance strategies, we have the following approaches: professional workshops, Do It Yourself (DIY) repair kits, tutorial videos, spare parts, and ecodesign for repair. In Table 1, we present the approaches that compose each circular loop.

We got in contact with 154 circular projects focusing on 89 product types. With their description, we classified them according to the circular loops and their approaches. It is essential to observe that one project can simultaneously include more than one approach, usually on the same circular loop. For example, bike repair solutions count with professional workshops, DIY tutorial videos, repair kits, and spare parts. Yet, other projects are able to combine different circular projects, *e.g.*, there is an end-of-life project for tents in which some components are upcycled while other parts are recycled. In Figure 2, we analyse the project's circular loops. We note that repair & maintenance was the most used loop, representing 34.9% of the projects. Then, in second place there is SE (27.0%), followed by repair & maintenance (19.0%). There is a balance between them, showing that this company is exploring different circular loops concomitantly. Repair & maintenance is the loop with the biggest representation: most of the projects are already in the implementation phase, paving the way to new repair & maintenance projects with clear guidance and methodology.

Table 1. Approaches to circular strategies in the sports & outdoors industry

Circular loop	Approach	Description and examples in the sports industry
Reuse and redistribution	In-store recovery	In-store transaction of reuse, resulting in owner change without the repair step. Example: "Trocathlon"
	Online recovery	Online transaction for reuse, resulting in owner change without the repair step. The user sends their product from their home by post. Example: "Trocvélo"

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Repair and maintenance	Workshop	Workshop professional service to recondition products. Example: “Patagonia repair (Wear Again)”
	Tutorial DIY video	Videos that teach customers how to repair their own products. Example: Decathlon after-sales videos for products such as the “easybreath” diving masks
	DIY kit	Kits that provide tools so that customers can repair their own products. Example: “Aquaseal FD Repair Kit” for wetsuit
	Spares parts	Selling the spare parts so that customers can repair the products themselves. Example: “Form”, swimming goggles.
	Ecodesign for repair	Designing products that are easier to repair in the future. Example: “First Fair” repairable sneaker
Refurbish and remanufacture	Second-hand product with reconditioning and in-store recovery	In-store transaction of reuse, resulting in owner change, with an intermediary repair step. Example: “Reprise Decathlon” for surfboards
	Second-hand product with reconditioning and online recovery	Online transaction for reuse, resulting in owner change with an intermediary repair step. The user sends their product from their home by post. Example: “Reprise Decathlon” for backpacks
	Remanufacture	Buying back products that need major repairs to resell them. Example: “Steel Vintage Bikes”
Sharing economy	Short-term rental – single product	Rental of a single product for a short period of time in a punctual situation. Ex.: “Redbull” self-service rental of surfboards
	Short-term rental – pack	Rental of a combination of products that are usually used together, for a short period of time, in a punctual situation. Example: “Decathlon” camping pack rental
	Single product subscription	Access to a single product with basic services such as maintenance. Minimum commitment of 1-3 months with recurring payment. Example: “Véligo” long-term bicycle rental
	Scalable subscription	Access to the use of a product that can be changed as the child grows, or the person evolves in the level of practice. Example: “Callaway Junior” clubs.
	Multi-sport subscription	Subscription that gives access to different products, not necessarily of the same nature. The customer may have several products in their possession simultaneously, up to a certain value limit. Example: “We Play Circular”
Upcycling	Repurpose	Upcycling strategy in which there is a change of function but not shape. Example: using a surfboard as a bench.
	Style upcycling	Upcycling strategy in which we add style value to a used product. Example: “4040 Mahapatchco Upcycled Crew Sweater” by Maharishi

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	Refunction	Upcycling strategy in which there is a change of function and shape to fulfil a new function without total shape loss. Example: “La Virgule” – backpacks from inflatable kayaks.
	Reuse of spare parts	Dismantling a product at its end-of-life and recovering the pieces that are still in good condition to be reused in other products. Example: spare parts recovery from used tents in “Decathlon” workshops
Recycling	Recycling for existing products	Process of returning to the material level to produce new products, still preserving the material’s intrinsic quality. Recycling business models are diverse, but their value proposition relies on offering recycled raw materials. Example: closed-loop cotton recycling (from clothing waste to recycled clothing)
	Ecodesign for recycling	Developing products that will be easier to recycle at the end of life, through easier disassembly or mono-material products. Example: recyclable sneaker by “Hodei”
Downcycling	Downcycling of existing products	Processes in which the created new materials make no use of the original material's intrinsic qualities. Example: using post-consumer neoprene wetsuits to produce shock-absorbing coverings for playgrounds – a project by Rip Curl.

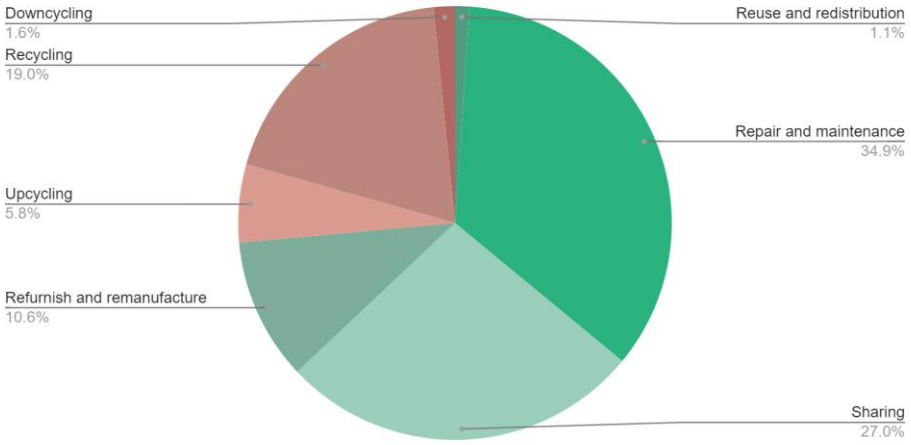

Figure 2. Circular loops configuration in a sports company

Then, on a more detailed level of analysis, focusing on the circular approaches that compose each circular loop, short-term rental of a single product was the most common approach: 34 projects with this approach represent 17.46% of all circular approaches. We observe that it is typically an initiative of the stores independently, rather than a unified action of the company. Thus, they have a bigger representation when compared to other projects, being related to the number of stores (more than 1050 in Europe). Yet, they have less impact due to their local nature and their capacity. Short-term rental is generally employed in stores near practice sites (e.g. skis near mountain stations) in specific seasons related to the sport (e.g. winter for skiing). Compared to other approaches, short-term rental is already common in the sports industry, and it has a rapid implementation. On the other hand, product and

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multi-sport subscriptions require a more significant change concerning the user experience, information technology and logistics. Thus, they are done through centralised company efforts.

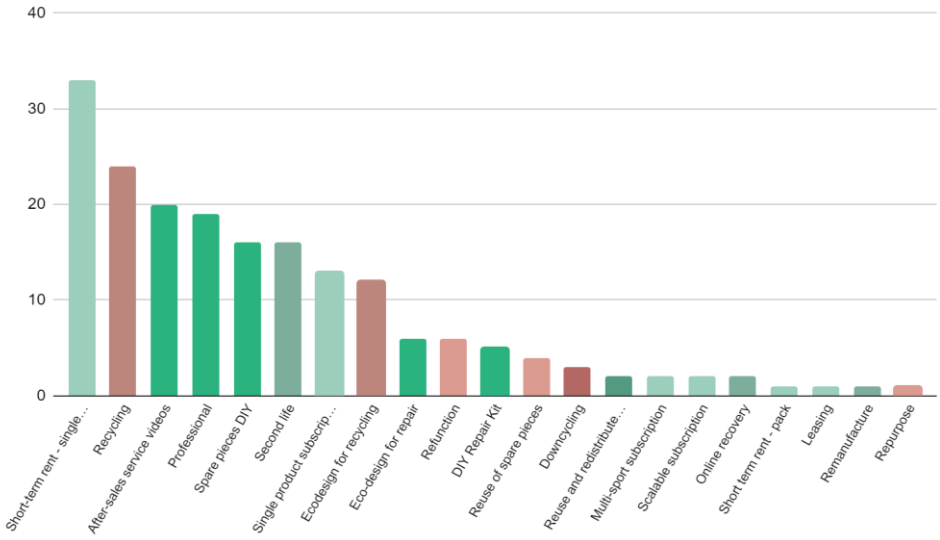

Figure 3. Circular approaches in a sports company

Regarding the repair & maintenance approaches, DIY after-sales videos were the most used solution. We found twenty projects that propose it. Meanwhile, professional workshops have slightly less representation, with nineteen projects. DIY repair solutions are cheaper for customers, and they require fewer resources (*e.g.* trained technicians). In addition, DIY has been mostly implemented for individual protection equipment, once the professional repair requires product re-homologation that may demand destructive tests. Nevertheless, professional repair is still needed in the case of complex services or very demanding repairs that customers do not feel capable of doing on their own.

Parallelly, recycling existing products is the second most employed approach. It is related to the consumer demand for greener production (Hole and Hole, 2019). However, we note that only 62.5% of the company's recycling projects involve a specific collection activity of end-of-life products. This could be a future obstacle, considering the risk of not having a stable input of waste material. Moreover, recycling business models require specific knowledge from product design and material sciences to deal with many composite materials' physical and chemical properties (Ludeke-Freund *et al.*, 2018). Although the technical teams are experts in creating new products, finding a way to dismantle and recycle them is not evident, requiring R&D activities. This is the reason ecodesign for recyling was the most employed approach among all the ecodesign practices (66.6%). Its goal is to facilitate the recycling process from the conception phase when developing new products.

The upcycling approach of refunction, another end-of-life solution, has a smaller representation because of the difficulty of scaling it up. Upcycling designers and makers face obstacles that involve a lack of affordable resources, such as working space, equipment, time, skilled labour and raw materials (Singh *et al.*, 2019). These operations are mainly manual and require high skills due to waste variability. This way, they are costly. In this context, there are two currents: (1) industrializing and automating upcycling; and (2) replicating artisanal upcycling businesses on a local scale. The second proposition could be complementary to traditional recycling businesses focusing on mass production and high volume. Meanwhile, upcycling businesses would emphasize creating unique products on a smaller scale but with higher value creation. Translocal communities, such as Repair Cafés and Precious Plastic (handmade recycling), can develop a transformative potential to challenge dominant institutions, striving toward CE (Spekkink *et al.*, 2022). (Rohsig Lopez and Faucheu, 2021) highlight the importance of local actors' work regarding environmental and business impact in the region.

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4.2 Circular project interviews

We interviewed thirty-three people representing the different circular projects. The projects' objectives are aligned with the CE principles: They aim to extend the lifespan of products through sharing, reusing and repairing and then, at the end of life, they reintroduce waste as raw material through upcycling and recycling.

Regarding repairability solutions, the main challenges are the high repair costs that prevent clients from using this service instead of buying a new product. Also, it is crucial to have mutualised pieces among different products to facilitate repair operations. Therefore, they invest in cheaper solutions that engage the customer, such as tutorial videos, spare parts supply, and DIY repair kits. Creating more durable and repairable products is essential for refurbishment and sharing loops.

Concerning second life, the company will recondition the product before reselling it. It has a new guarantee equivalent to the one of a new product. Yet, they only work with refurbishment and not with remanufacture: they take back only products that need minor repairs. However, clients usually overrate their product's condition. Another challenge is logistics: when working with the second-hand market, it is difficult to have a stable offer of products once it depends on what customers bring back. Thus, they are exploring solutions to take back products through an online procedure in which the customer does not have to go physically to the store. Finally, in the case of the SE projects, the challenge is the strong impact on IT, supply, and finance activities. Today they are mainly local projects of short-term rental led by the stores or certain regions. It must become a common company strategy to gain economic and technical viability. The company aims to focus on the subscription model, which requires fewer contact points with the client when compared to short-term rental. Yet, it is necessary to train employees on tasks related to the sharing economy, which are different from the ones of a salesperson.

In the case of end-of-life strategies, we perceive that the main challenges are related to the recycling/upcycling value chain rather than the technical aspects. Thus, the collection, sorting and disassembling represent a bottleneck to the industrial processes of transforming the product waste. Collecting is an essential step that affects all the reverse logistics, but it depends on the client's engagement. The return of waste electric and electronic equipment is already in place in the European Union since 2009 (Directive 2012/19/EU). However, the collection rates are still low, 48.5%, compared to the 2019 target of 65% (Eurostat, 2022). In addition, the collection constitutes a new activity for store employees who are not used to it, and sometimes they see it as out of their work scope. Also, disassembly is an obstacle, especially for multi-material products. Nevertheless, this problem can be addressed in future products through ecodesign for disassembly or ecodesign for recycling, creating mono-material products or products whose materials we can easily separate. .

Despite the differences in the project characteristics, the primary motivation to start working with circularity is personal conviction: circular projects' representatives believe it is vital to take responsibility for the environmental impact generated by the company's activities. Besides, the company's transition plan towards circularity played a fundamental role in supporting them. Yet, they also report having difficulties with a lack of resources (budget and time) to implement their projects. Governance for circularity is in a structuring phase, so circular projects' representatives may have difficulties regarding their perimeter of action. Getting in contact with other circular project representatives might be complex, considering the company's size. Furthermore, it is also difficult to start a new circular project once the company has no previous experience in this field. Finally, some people also said they face obstacles due to the project's economic feasibility: despite the use of Key Performance Indicators (KPI) in terms of life cycle analysis, the company is still attached to a linear logic. In the private sector, profit is essential for business (B), while customers & users (U) want to limit costs when buying products, and society aims sustainability, resulting in the collision of these actors' (B-U-S) needs (Ottosson, 2019). It is still difficult for researchers to determine a methodology regarding the overall evaluation of CE benefits once we consider a large number of variables along a system lifecycle (Sassanelli *et al.*, 2019).

The collected information is aligned with (Pal and Gander, 2018). They say that CE faces challenges in its implementation phase due to technological limitations, institutional inertia, and dynamic

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customer preferences that restrain business scalability. In addition, external factors (e.g., regulatory, market, supply & partner network, socio-cultural, technology & infrastructure, knowledge & information, and environment) impact on CBMs, demanding companies to customise their product and service offerings depending on the country they are in (Han *et al.*, 2022). For example, the implementation of the extended producer responsibility for leisure and sports articles in France in 2023 is a facilitator for CE, aiming to engage sports industry actors in waste management, repair, and reuse activities (Ecologic, 2021).

5 FINAL CONSIDERATIONS

This paper explored the transition from linearity to circularity in a sports company. The objective was to map circular loops that are being implemented in the company, discover the challenges encountered in this field, and understand the motivations behind the circular projects. In this study, we created our framework to explain the existing circular strategies: reuse & redistribution, repair & maintenance, sharing economy, refurbishment & remanufacture, style upcycling & repurpose, refunction, recycling, and downcycling. Then, we classified 154 circular projects related to 89 product types according to this framework. Also, we conducted interviews with 33 circular project representatives.

Through the analysis of the results, we conclude that repair & maintenance was the most employed loop, followed by SE and recycling. Repair & maintenance aims to increase a product's lifespan through DIY solutions (videos, repair kits, spare parts) and professional services in workshops. DIY services provide cheaper solutions at the same time that they require higher engagement from customers. Repair & maintenance solutions are fundamental for enabling other circular loops such as refurbishment & remanufacture and sharing. Inside the SE loop, short-term rental was the most common approach. That is because short-term rental is already well established in the sports industry, and it is easy to implement when compared to other loops that require deeper modifications in IT, finance, and supply. Regarding recycling, the main difficulty is structuring a reverse value chain, specifically in collecting post-consumer waste, dismantling, and sorting the waste. On the other hand, upcycling is less employed due to the complexity of industrialising this solution to scale it up, but it can be a complementary alternative at a local level.

The project representatives are often motivated by personal convictions, but they encounter difficulties regarding resource allocation (time and budget). In addition, circular project representatives feel that economic viability is still the priority, while environmental gain rests in second place. Having strong governance regarding circularity and a structured circular network is essential to pave the advance of circular projects.

The research of circular projects inside the sports company was non-exhaustive, we discovered new projects every time we conducted an interview. Yet, this study provides a picture of the company's current situation in performing the transition towards circularity. We believe that for the next studies, it would be important to collect data regarding the economic and social impact of each project so that we can weigh them instead of just considering the absolute number of circular projects. Also, we noted that despite the great interest in CBMs, some people have difficulties in choosing what circular loop is the most adapted to their product. Thus, we propose creating a multi-criteria decision-making tool, considering environmental, economic and social factors.

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