A Work Project, presented as part of the requirements for the Award of a Master's degree in Impact Entrepreneurship and Innovation from the Nova School of Business and Economics.

"Eco-Innovation within the surf industry – circle project"

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Our venture, "Circle," introduces an innovative surf product — a traction pad crafted from recycled rubber obtained from old tires, addressing the pressing issue of tire waste. This essay traces our project's beginnings and explores our future goals, providing an account of our entrepreneurial adventure. While navigating the difficulties of developing sustainable products and breaking into the surfing industry's market, we highlight our dedication to environmental responsibility.

Circle aspires to redefine the surfing landscape by offering eco-conscious solutions, leveraging recycled materials to create high-performance, sustainable products while fostering a positive impact on both the surfing community and the environment.

In terms of my own contribution, I was mostly concerned about the prototyping process. Put another way, the progression from manual prototypes to actual, concrete goods.

Innovation – Sustainability – Surf industry – Traction pad – Prototyping - Entrepreneurship

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I. Introduction

1. The spark of inspiration

Every creative project begins with an inspiration. It all started with Victor, a fervent supporter of environmental preservation. One day, walking through the downtown streets, he was unable to ignore the concerning number of used tires that were strewn by the side of the road. Alice, Benjamin, and Livina then decided to research this issue further. Our preliminary inquiry uncovered a startling fact. The quantity of waste generated by tires that were thrown away was nothing short of staggering: nearly half of the 2.5 billion tires produced each year throughout the world end up in landfills, necessitating immediate action *(Saseanu, 2019)*. This realization highlighted how important it is to provide a long-term solution. The idea came to us as our group's commitment to making a difference grew: making something practical and eco-friendly out of the rubber from old tires. Rubber is a polymeric material consisting of long chains of hydrocarbons. This material consists of elastomers, large chain-like molecules that can be stretched to great lengths and recover their original shape. It is characterized by elasticity, resilience and toughness *(Paolo Spinelli, 2022)*. Reusing the tires to create surf pads would both solve this pressing environmental problem and extend their life cycle.

So, the seeds of Circle, the eco-friendly business that craft surf pads made of rubber recycled from old tires' waste were planted, rooted in our shared passion for sustainability and commitment to innovation. The name "Circle" was chosen to emphasise the life cycle of the product, aligning with the spirit of the circular economy. It is also closely related to the tire's shape. This deliberate relationship highlights our commitment to reusing recycled materials and creating a visual connection. In addition to providing inspiration, we are filling a market void. The majority of surf pads available on the market are made of plastic, mostly EVA (Ethylene-Vinyl Acetate), a substance that is frequently found in classic surfboard traction

pads. Despite its good grip and lightweight, it is not the greatest choice for individuals who are concerned about the environment. In fact, the manufacture of EVA can produce hazardous pollutants, and recycling the substance is difficult *(Carrera, 2023).* Many eco-friendly brands frequently use cork (Jam Traction) or recycled EVA (FCS), but they lack the performance and flexibility that we found in rubber. Rubber is an unused resource in surf pads despite being a highly durable and effective material used extensively in shoe soles. Through the use of recycled rubber, we not only bring a superior product to the market but also promote the principles of circular economy by prolonging the life cycle of discarded tires. Even though there would be challenges along the way, this first inspiration would keep us committed to achieve our goals.

At the heart of our journey with Circle is our passion for surfing, a sport that creates a spiritual connection with nature and has shaped our lives and inspired us to start our own business. For us, surfing is more than simply a sport—it is a way of life *(Chouinard, 2005).* Benjamin and Victor, our first team members, are both experienced surfers whose lives have been inextricably linked to the waves for as long as they can remember. The oceans are our playground and a responsibility and, as surfers, we are acutely conscious of the possible damage our sport could cause to the environment. Our deep affinity with the natural world and our passion for surfing motivated us to act. We realized that instead of observing the environmental problems our seas confront, we had a role to play in safeguarding the ecosystem that has brought us so much joy.

Each member was motivated by a strong understanding of the serious issue of managing discarded tires and the urgent need for long-term solutions. Our shared desire for fostering a more environmentally conscious future served as the cornerstone for the Circle team. Our entrepreneurial journey is fuelled by the unique roles and talents of each team member, which

work in harmony to create a dynamic synergy. Together, the practical surf knowledge of Victor and Benjamin, the organisational savviness of Livina, and the analytical and marketing prowess of Alice create a team that is not just enthusiastic about our idea but also well-equipped to bring it to life *(For more information, please refer to Appendix A and B).* It was not by coincidence that our team came together; it was a conscious decision motivated by our shared ideals and a dedication to sustainability.

2. Purpose and Scope

The entrepreneurial journey involves more than just putting together a team and defining individual tasks; it also entails creating a shared vision that unites all efforts and directs the business towards success. Our purpose is two-fold. Firstly, we would want to outline the entrepreneurial journey that motivated us to start Circle, as well as the challenges we encountered and the knowledge we acquired along that journey. Secondly, our goal is to present the Circle business model in detail, covering everything from concept development to product validation and market impact. This thesis covers the operational components of our eco-friendly surf pad business idea in addition to our internal and external environmental motives. We analyze the environmental problems surrounding tire garbage, the surf industry, the opportunity in the market and our commitment to making a difference.

Circle's vision is based on the company's commitment to tackling the urgent problem of waste tire management through the creation of environmentally friendly surf pads from recycled rubber. Our shared passion for environmental sustainability informs every decision we make. At the heart of our shared vision is our commitment to providing surfers with high-quality, sustainable products while minimising environmental effect. We have established specific, quantifiable goals to turn our vision become reality. In fact, our objective is to establish

ourselves as a reputable and well-known eco-friendly brand in the surf business, distinguished by the excellence and sustainability of the material of our surf pads, providing a product that not only improves surfing but also helps to make the world greener and cleaner.

Circle is dedicated to crafting a product that significantly reduces carbon emissions compared to existing market offerings. The core of our business ethos is the concept of prolonging a product's life cycle, transforming it from being relegated to waste to being repurposed for alternate functionalities. Indeed, Circle's primary objective is precisely to reclaim product waste, particularly rubber sourced from discarded tires - a product challenging to dispose of conventionally. The 4R principle of the circular economy (reduce, reuse, recycle and recover), which include a set of strategies aimed at promoting sustainability and resource efficiency, has allowed us to explain the process we are going through *(Chrispim, 2023)*. This framework represents an approach to manage resources and waste in a way that minimizes environmental impact and maximizes the value derived from materials. In fact, our business model involves reducing the consumption of resources and minimizing waste generation at the source, reusing materials by giving products a second life, and recycling products that have reached the end of their conventional life cycle, fostering a sustainable approach to resource utilization. Furthermore, a significant aspect of our business involves its localization within Portugal. Our strategic choice to collaborate with suppliers situated within the same country underscores our commitment to minimizing carbon emissions, not only in production but also throughout the entire supply chain. These attributes position Circle as a business attuned to contemporary challenges, striving to develop a product that addresses relevant environmental challenges.

Innovation is a key component of our shared goal. We think it is crucial to stay on the cutting edge of sustainability and technology. We are committed to continued research and

development, constantly looking for innovative methods to enhance our product and decrease its impact on the environment. Achieving our shared vision demands team alignment and every team member's input is valued and considered in the context of the group's overall goal thanks to our open and collaborative work environment. Circle's goals go beyond short-term success: in the surf industry, we want to leave a legacy of sustainability and environmental stewardship. Our long-term goal is to establish new benchmarks for environmentally aware surfing gear and encourage other companies to follow suit.

3. Identifying the problem

Waste reduction has emerged as one of the urgent global concerns requiring immediate attention in our effort to start a sustainable path *(Saseanu, 2019)*. Particularly, the ever-growing mound of abandoned tires, which is becoming a significant source of pollution, is the focus of growing concern. Tires present complex problems with regard to the environment, economics, and technological advances due to their high flammability and composition (Mmereki et al., 2019). Surprisingly, Pieter Jan Kole's research from 2017 found that tires are among the most prevalent plastic pollutants on Earth, making up up to 10% of the micro plastics trash found in oceans worldwide *(Tik Root, 2019).* This estimate was even increased to a stunning 27% in later research by the International Union for Conservation of Nature *(Tik Root, 2019).*

a. Causes

We have learned that there is a complicated web of factors that contribute to the developing concern behind the tire waste issue. According to Seaseanu et al. *(2019)*, one of the main causes contributing to the problem is the general lack of education and awareness surrounding responsible waste management. Many people and communities continue to practise negligent waste management since they are unaware of the negative environmental effects of

inappropriate tire disposal. As the world becomes more interconnected, more tires are produced and used, which generates more garbage *(Saseanu, 2019).* The global tire industry is estimated at 19.25 million tonnes of production in 2019 and is anticipated to grow at 3.4% compound annual growth to 22.75 million tonnes in 2024 *(Barnhart and Gibson, 2019)*. The need for tires increases in direct proportion to the growth of the tire waste issue in the automobile industry. Moreover, both individuals and corporations may find the cost of proper tire disposal to be unaffordable. Tire recycling and proper tire disposal typically come with costs, which may make consumers choose inappropriate options *(Saseanu, 2019).* Additionally, there are frequently significant absences of strict repercussions for inappropriate tire disposal practises. Since there are no fines or punishments, using careless tire disposal practises have no real ramifications for people or enterprises *(Saseanu, 2019)*. In some places, inadequate recycling infrastructure and waste management practises make the issue worse. These systems frequently have trouble handling the enormous amounts of discarded tires, which results in incorrect disposal and landfilling *(Mmereki et al., 2019).* This can make it difficult to dispose of tires responsibly. People or organisations may use incorrect disposal techniques when they have limited access to these facilities *(Mmereki et al., 2019)*. According to Mmereki et al. *(2019),* the lack of recycling or repurposing incentives may deter people and businesses from taking part in sustainable tire disposal programmes. The market for tire-derived products, such as crumb rubber, has not always kept up with the supply of discarded tires. This mismatch may result in an overabundance of tires without a defined recycling destination *(Saseanu, 2019)*.

b. Consequences

The effects of the tire waste issue are extensive, having an impact on various facets of our planet, including social, environmental, and health-related issues. Non-biodegradable tires that have been discarded cause dangerous chemical releases into the air, soil, and water, disrupting

ecosystems *(Ecogreen, 2021).* The equilibrium of our natural habitats may change as a result of the extensive effects that these substances may have on plant and animal life. The chemical emissions from tires directly endanger human health. Tires release pollutants when they break down, which can have an impact on the water we drink and the air we breathe. In areas close to tire disposal facilities, these pollutants have the potential to cause respiratory disorders as well as other health problems *(Ecogreen, 2021)*. Our carbon footprint increases as a result of the methane gas emissions from discarded tires *(Ecogreen, 2021)*. Methane is a strong greenhouse gas, and its release exacerbates environmental problems related to global warming. Tire fires, which are frequent as a result of tires' high flammability, may cause deforestation *(Ecogreen, 2021)*. In addition to destroying trees, these fires also release acidic smoke that is hazardous to both people and the environment. Ecosystems may suffer additional harm from the oily waste left behind. Inappropriately disposed tires provide as a breeding ground for mosquitoes that transfer diseases including the West Nile Virus *(Ecogreen, 2021).* As a result, populations close to tire disposal sites face increased health concerns. Illegal dumping occurs when tires occupy important landfill space, especially in low-income communities *(Ecogreen, 2021)*. This not only makes less land available for other uses, but it also causes property prices to decline, resulting in socio-economic inequities. Moreover, tire trash influences the oceans as much as on land. Incredibly, tire abrasion produces 500,000 tonnes of plastic debris per year just in Europe *(Sieber-Gasser & Sanchez, 2022)*. These tiny plastic particles endanger human health and disturb marine ecosystems. Tire wear particles (TWP) have been found in even the most remote parts of the world's oceans, contributing significantly to the problem of microplastic pollution *(Sieber-Gasser & Sanchez, 2022).* TWPs are responsible for almost one-fourth of the microplastics in seas, endangering the conservation of land and marine ecosystems, clean water, and human health SDGs *(Sieber-Gasser & Sanchez, 2022)*.

4. Connecting with sustainability

Sustainability as a concept is closely linked to the Circle journey. We believe that in order to make a meaningful and enduring impact, any business - especially one that was founded out of environmental concern—must follow the principles of sustainability. Sustainability, in our opinion, starts with the environment. By turning tires into practical surf pads, we are promoting the circular economy, which reduces the demand on natural resources by repurposing materials rather than wasting them.

Our commitment to sustainability extends beyond the creation of eco-friendly surf pads. We are dedicated to ensuring the sustainable operation of every facet of our business. We are dedicated to lessening our environmental effect and promoting environmentally conscious company practices, such as energy-efficient production methods and ethical material procurement. Our mission is centered on raising awareness of environmental issues and encouraging positive change. We believe that by sharing our mission and our experiences with others, we could inspire them to reflect on their own actions and make more sustainable decisions. Together, we can make a greater impact and accelerate progress.

II. Crafting the opportunity

1. From concept to eco-friendly surf pads

Although developed countries have made progress in this area by implementing more efficient innovative recovery and recycling methods and strict regulations regarding the management of used tires, waste tires' management has not received enough attention in many developing countries, and the processing, treatment, and disposal of waste tires are still in their infancy. There is therefore room for improvement in this area. We made the decision to start Circle to lessen the negative effects that used tires have on people's health, the environment, and socioeconomic issues.

Circle is an eco-friendly brand creating surf pads, also known as traction pads, using the rubber from these old and not managed tires thrown away. A traction pad is a piece of foam attached to the tail of a surfboard to prevent the back foot from slipping off. The traction pad's primary purpose is to increase the rear foot of the surfer's grip and to reduce wax usage. Learning how to position their back foot correctly on the board can be an excellent alternative for beginning surfers. Moreover, the surf pad is self-adhesive, adheres to the surfboard, and cannot be removed after application *(For more information, see Appendix C).* Therefore, Circle's goal is to increase customer satisfaction with sustainability and brand image while giving used tires a second chance by transforming them into surf pads.

2. Value proposition

As we embarked on our journey to create Circle, we conducted thorough investigations into the market landscape and identified existing commendable alternatives. However, the gap waiting to be filled is significant since surf pads made of rubber, one of the most performant materials when it comes to flexibility and robustness are not existing yet. By supporting a

sustainable material and prolonging the tire life cycle, this strategic choice strengthens the value proposition and supports the circular economy. It presents a strong, high-performing material that draws inspiration from the longevity of rubber, which is used in many different applications, including shoe soles.

This unique technique serves as the foundation for our value offering. Circle stands as the pioneering brand in the eco-friendly surf pad industry, not solely because we were the first to adopt this ground-breaking idea, but also because we are dedicated to having a significant positive environmental impact. Our goal is to address the urgent issues surrounding the disposal of used tires, which goes beyond simply differentiating our products. We are aggressively lowering the health, environmental, and socioeconomic problems related to tire trash by reusing these waste products. Customers who are concerned about the environment are seeking goods that share their beliefs and are drawn to our strategy. We are not just offering surf pads; we are providing a solution to a global problem.

The core principles of Circle are innovation, sustainability, and positive environmental impact. This is demonstrated in our value proposition. It propels us to the top of the market, distinguishes us as forerunners in the eco-friendly surf pad sector, and positions us to have a significant impact on the world.

VI. Customer Acquisition & Marketing Plan

1. Identifying our target audience

The process of identifying a target audience is a pivotal action within any business strategy. It serves as the linchpin for aligning marketing strategies and product development with the specific demographics, needs, and preferences of the individuals and groups most likely to engage with our environmentally conscious surf pads. Through a comprehensive analysis of consumer behavior, rigorous market research, and precise audience segmentation, we have endeavored to increase the likelihood of our product's success while optimizing our marketing and sales endeavors. This analysis forms a critical component of Circle's business plan, strategically aligning our company's mission with the individuals who are most integral to our venture's success.

Circle's primary target market is the surfing industry, offering eco-friendly surf pads crafted from recycled materials, with a significant emphasis on tire-derived rubber. To better understand our customers and prospects, we have meticulously defined a semi-fictional representation of our ideal customer. By creating these exemplary consumer profiles, we can gain profound insights into the needs and expectations of our audience, allowing us to tailor our marketing strategy and customer journey accordingly.

Our eco-friendly surf pads, derived from tire materials, cater to a wide spectrum of customers within the surfing industry. However, we have categorized our market into two main segments: business-to-business (B2B) and business-to-consumer (B2C). Whether our interactions are with other businesses or individual consumers, our overarching goal remains the same. Through this analysis, we aim to delve deep into our customers' needs, the rationale behind

their purchase decisions, and the most effective ways to present our offerings to them. To gain a comprehensive understanding of our target audience, we have created two user personas, distinct for the B2B and B2C markets *(See Appendix E: Persona B2C & persona B2B).* Recognizing the pivotal role customer profiling plays in customer acquisition and retention, we intend to develop a robust, customer-centric inbound marketing strategy. This strategy will enable us to craft a user experience grounded in genuine insights, attracting more customers and prospects. Ultimately, this process will lead to the establishment of an intuitive purchasing journey, driving sales growth and enhancing customer retention. Our improved marketing strategy will not only target loyal customers but also bolster the return on investment (ROI) of our campaigns through precision targeting and relevance.

In conclusion, through a rigorous examination of market data and customer behavior, we have acquired essential knowledge about the specific individuals or groups that are most likely to interact with our recycled surf pads. This thorough knowledge empowers us to develop a targeted and impactful marketing strategy that appeals to our audience and eventually drives the success of our product. To further improve the relevance and attractiveness of our service, thorough segmentation enables us to adapt to the particular requirements and preferences of our potential customers. In fact, both our B2B and B2C customers will be interested in surfing and committed to sustainability, domains where Circle is engaged. Serving this well-defined target market gives us a competitive advantage and reaffirms our mission to give surfers a high-performing, environmentally responsible surf pad that complements their beliefs and sustainability objectives. Hence, the foundation of our business approach in the ever-changing surf accessory industry is the identification of our target audience, which opens the door to deep relationships and sustained success.

2. Crafting a compelling brand story

Crafting a compelling brand narrative for Circle is essential, as it underlines the profound connection with our customers. At the heart of Circle's brand narrative is a diverse team united by a dream and a multitude of common interests, which include a shared passion for surfing, a deep connection with nature, and a strong commitment to addressing environmental issues. This engaged team forms the bedrock of Circle's story, reflecting a unique blend of backgrounds and shared values that drive the brand's mission forward. The story of a dedicated team assembled out of the shared environmental concern and the commitment to sustainability is, therefore, pivotal. This brand story serves a dual purpose: telling the story of our entrepreneurial journey and providing a comprehensive introduction to Circle's innovative surf pad business concept, which utilizes recycled tire rubber to create surf pads.

Hence, Circle's mission transcends mere product creation; it aims to address global environmental challenges by providing eco-conscious alternatives. Moreover, the unique value proposition as a pioneering brand in the eco-friendly surf pad industry highlights the commitment to urgently needed environmental solutions.

Therefore, through its rich history, driven founders, and their advocacy for sustainability, our brand aspires to evoke emotions and forge stronger connections with like-minded customers. In fact, our primary aim is to effectively communicate a message that aligns with our core principles and ideals, allowing our unwavering passion and dedication to shine through to our community. This message will serve as the cornerstone of our unified brand identity, adept at addressing the unique concerns and high-performance expectations of our target audience. As a result, our brand will not only witness increased customer engagement and higher conversion rates but also garner greater recognition and visibility.

In the end, Circle's brand narrative serves as a driving force for positive change, impacting not only the surfing community but also the broader context of environmental sustainability. This narrative forges a profound connection with customers, uniting them through shared values and a collective commitment to making a difference.

3. Digital marketing strategies

a. Social media marketing

Harnessing the influence of social media stands as a vital pillar in our digital marketing strategy. Our commitment involves maintaining an active and engaging presence across platforms such as Instagram, Facebook, and LinkedIn *(Please see Appendix L: Instagram Account).* Through these channels, we aspire to connect with our target audience, share our brand's message, and showcase our innovative products. Consistent, high-quality content, inclusive of user-generated contributions and strategic hashtag usage, will be pivotal in augmenting our online visibility and drawing in surf enthusiasts who align with our core mission.

Our Instagram profile, dedicated to Circle, has proven to be a dynamic platform for connecting with our audience. We have observed significant engagement with our Instagram stories, garnering substantial likes. Reposts of our content and usage of precise hashtags have amplified our reach, eliciting even more engagement and comments, indicating a growing interest in our product. In fact, in the initial phase, our Instagram stories experienced moderate viewership, but with the steady increase in our follower count, we have witnessed a notable surge in story views. Leveraging strategic tagging of individuals and locations has been instrumental in expanding our reach and attracting a broader audience.

Additionally, we have established a presence on LinkedIn as well to further extend our outreach. However, we have observed that our Instagram profile has yielded greater success compared to our LinkedIn presence. While our LinkedIn profile remains an integral part of our digital presence, our immediate focus and success lie in harnessing the potential of Instagram due to its visual and interconnected nature. However, we aim to continue refining our strategy on both platforms, leveraging the strengths of each to effectively communicate our brand message and engage with our diverse audience.

To maintain this momentum and enhance engagement, we are strategically planning our content distribution on Instagram. We have devised a precise schedule to post both regular posts and stories consistently every week. This strategic approach aims to establish a more constant presence, increase likes, viewership, and foster engagement with a broader audience. We believe that the synergy between high-quality content, user-generated contributions and a strategic hashtag usage, will augment our online visibility, furthering our goal to connect with surf enthusiasts who resonate with our brand's mission and innovative ethos.

b. Content marketing

Beyond serving as a means to captivate potential customers, our content marketing strategy also revolves around nurturing an informed and empowered community. By curating informative and educational content on sustainability practices, technological innovations in eco-friendly products, and the impact of our initiatives on ocean conservation, we aim to inspire action and advocacy among our audience.

Moreover, our content initiatives are designed not just to showcase our brand's expertise but also to actively contribute to the ongoing conversation surrounding environmental

responsibility. Through thought-provoking articles, expert insights, and impactful visual storytelling, we endeavor to initiate meaningful discussions, drive awareness, and prompt positive behavioral changes toward more sustainable lifestyles and consumption patterns within the surfing community. Furthermore, our commitment to transparency and authenticity remains at the core of our content strategy. We aim to share success stories and real-life experiences that underscore our dedication to sustainability. This transparent approach fosters deeper connections, resonating with our audience on a personal level and reinforcing their trust in our brand.

We aim to leverage non-governmental organizations' network and experience to drive impactful campaigns, educational initiatives, and community-driven actions. Together, we seek to empower individuals, communities, and industry stakeholders to actively participate in preserving our oceans' health and promoting sustainable practices.

c. Email marketing

Central to our email marketing strategy is the establishment of a comprehensive database of interested customers and fervent surf enthusiasts who opt to subscribe to our newsletters and updates. Our periodic email campaigns will encompass a spectrum of content, ranging from product launches, exclusive promotions, and sustainability initiatives to narratives and experiences shared by the vibrant Circle community.

Indeed, our foray into email marketing has proven to be a strategic and impactful solution in nurturing connections with our audience. Our past endeavors in email marketing have demonstrated its effectiveness as a direct channel for communication. We have witnessed firsthand its ability to establish and fortify relationships with customers, providing them with

valuable insights into our product launches, exclusive promotions, and our commitment to sustainability. The positive response and engagement from our vibrant Circle community have underscored the significance of this medium in fostering brand loyalty and driving engagement.

As we move forward, we are dedicated to elevating this approach by implementing tailored newsletters specifically designed for individuals who subscribe to our website. Hence the email, created to foster customer relationships, stimulate repeat business, and keep our audience consistently informed and engaged, serve as a vital channel for maintaining a meaningful connection.

d. Offline marketing and community engagement

While digital marketing is pivotal, we recognize the enduring value of personal interactions and community involvement. Active participation in local surf schools, attendance at events, and support for surf-related activities will be integral to our offline marketing strategy. This approach allows us to cultivate trust and credibility within the surfing community, establishing authentic connections with customers on a more individual level. Collaborating with surf instructors and enthusiasts, our objective is to forge a network of ambassadors who not only champion our brand but also contribute significantly to our offline presence.

These strategies, combined with our commitment to delivering eco-friendly surf pads, will help us effectively reach our target audience, foster brand loyalty, and gauging the success of our marketing endeavours.

Building brand loyalty and customer relationships

Building long-lasting relationships with customers and cultivating brand loyalty are two of the core pillars of Circle's customer acquisition and marketing strategy. Fostering a feeling of community, common values, and a sincere connection are more important to us than merely selling surf pads when it comes to building lasting connections with our customers. At Circle, we recognize that the core of loyalty is the customer experience. At every point of interaction, from the moment a consumer encounters us online or in-store (if we choose to launch stores in the future), to the time they leave with a purchase, we aim to exceed their expectations. Each member of our team provides courteous, efficient customer service so that each and every one of our clients feels heard and valued.

We are aware that our clients share our enthusiasm for sustainability. We share our quest to use recycled rubber from old tires and are sincere and forthright about our environmental efforts and accomplishments. Our transparency fosters trust and appeals to customers who care about the environment and are eager to support a company with a compelling goal. We offer interesting and educational content to assist our clients in making wise decisions. Our blog, social media updates, and email newsletters provide insightful information on sustainable surfing techniques, product care, and other topics. By continuously educating our audience, we establish ourselves as a knowledge hub in the surfing community.

Circle's customers are not only buyers; they are also involved members of our environmentally responsible surfing community. To provide our devoted customers with a feeling of exclusivity and a deeper connection to our company, we host special events, competitions, and promotions. Since every client is different, we utilize data-driven insights to personalize our marketing messages and make sure that consumers see offers, content, and product suggestions that are

relevant to their interests and past Circle experiences. We aggressively seek out and appreciate client input. It is not enough to just listen; we also need to act on the advice we receive. We can better satisfy the requirements and expectations of our clients by enhancing our products and services through this cycle of continuous development. Circle has a strong commitment to the local and international surfing community. We actively participate in sponsorships, community activities, and initiatives. Our participation demonstrates our commitment to supporting the surfing community and giving back.

Our goal in putting these tactics into practice is to develop a committed group of surfers who are delighted to be associated with the Circle community. Building relationships with customers and retaining brand loyalty, in our opinion, is not simply a business objective but also a demonstration of our dedication to developing a flourishing and sustainable surfing ecosystem.

4. Measuring and analysing marketing effectiveness

One of the most important components of our customer acquisition and marketing strategy is tracking and evaluating marketing effectiveness. Data-driven decision-making is crucial for any marketing strategy to succeed in the modern digital era. We have put in place an extensive system for monitoring and evaluating the success of our marketing campaigns in order to make sure that our efforts are paying off and to continuously improve our strategy.

Our online presence and interaction are among the primary criteria we pay close attention to. We regularly track data like the quantity of followers, likes, comments, and shares on our social media sites, which include Facebook, LinkedIn, and Instagram. These metrics give us important information about the effect and reach of our content and help us understand which

posts resonate most with our audience. In addition, we monitor website traffic, conversion rates, and click-through rates to evaluate the effectiveness of our digital marketing initiatives. Another important component of our approach is email marketing, and we track the effectiveness of our campaigns with email tracking software. We may assess the efficacy of our communications using email campaigns' open, click, and conversion rates.

We measure our efficacy in offline marketing and community engagement by keeping tabs on the quantity of people who attend the events and seminars we organize or take part in. We examine the degree of interest sparked, the conversations we have with prospective clients, and the input we get from them. We are able to better shape our offline marketing strategy and fortify our ties to the community thanks to this input. A crucial step of our analytical approach includes gathering and analyzing client feedback. We regularly solicit feedback from our customers, administer surveys, and promote candid dialogue with our audience to learn more about their Circle experiences. Based on client preferences and demands, this data assists us in improving our offerings in terms of goods, services, and marketing tactics.

In order to calculate the return on investment (ROI) of our marketing initiatives, we also use a variety of analytical methods. Through a cost-revenue comparison, we may evaluate the efficacy of various marketing strategies and make informed judgements about resource allocation to achieve optimal outcomes.

5. Timeline and Milestones

We have created a detailed timetable with predetermined checkpoints to direct our efforts as we evaluate the effectiveness of our marketing tactics. During the first two months, we set baseline metrics on several platforms, understanding our starting point. We track these

numbers for the next three months and adjust as needed to improve our effectiveness on social media, email marketing, and website conversions. The seventh through ninth months are dedicated to broadening our marketing reach via influencer alliances, collaborations, and joint efforts with stores and surf schools. Active customer engagement, surveys, and feedback gathering take place in months ten through twelve, influencing our marketing messaging and future product and service enhancements. All year long, our quarterly ROI analysis offers a constant evaluation of costs and revenues. Lastly, we perform an annual assessment at the end of the first year, utilizing data-driven insights to improve our tactics and establish precise objectives for the subsequent year. By using a methodical strategy, we may effectively respond to shifting market conditions, enhancing our reputation, and forging closer bonds with our customers.

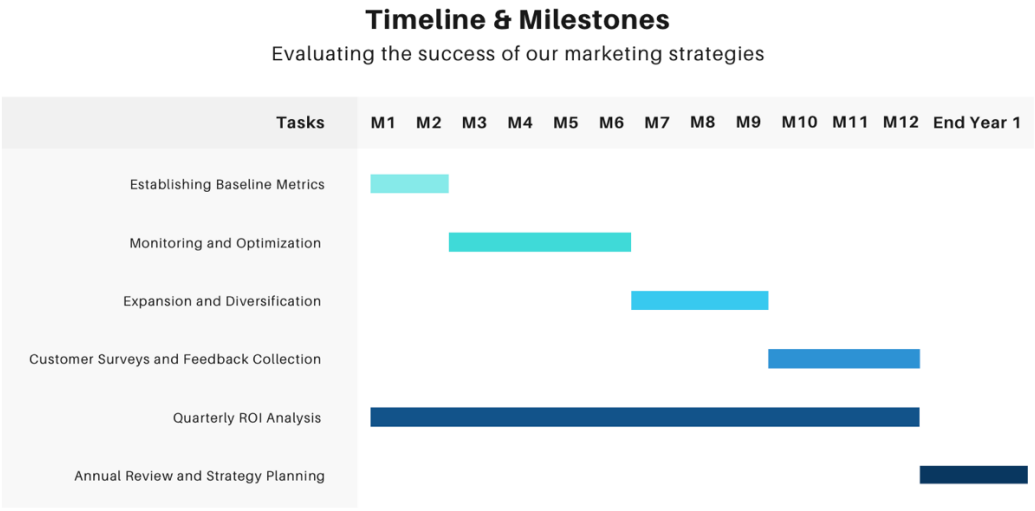


Figure 11: Timeline & Milestones for Evaluating the Success of Marketing Strategies

VII. How will our customers acquire our product?

1. Customer’s decision-making unit DMU

The Customer’s Decision-Making Unit (DMU) has several different characteristics when it comes to surfers and environmentalists. Enthusiastic surfers who are looking for high-performance surf pads and who are becoming more aware of the environmental impact of their equipment constitute the first circle. These people are frequently early adopters and perceptive to developments that fit with their sustainable beliefs. Simultaneously, environmentalists comprise yet another noteworthy aspect of the DMU. This subgroup actively seeks for alternatives that recycle resources and prioritises items with the least negative impact on the environment, supporting the concepts of the circular economy. Their impact goes beyond their individual purchases since they frequently participate in environmentally conscious groups, which broadens the brand's appeal. Furthermore, owners of surf shops and buying managers are an integral component of the DMU in the B2B sector. These decision-makers assess goods according to their marketability, compatibility with the store's values, and customer attractiveness. Gaining shelf space and establishing long-lasting relationships require an understanding of their viewpoints and standards.

Through an extensive mapping of the DMU's various components, Circle can customise its engagement tactics and advertisements. Our strategy guarantees resonance with all stakeholders, from highlighting the positive environmental impact to stressing the surf pads' durability and performance. With the help of this sophisticated knowledge, Circle can successfully negotiate the complex web of decision-making, promoting brand advocacy and loyalty among a variety of influencers and consumers. The Customer's Decision-Making Unit investigation is the basis for focused strategy development, guaranteeing that Circle's value proposition satisfies the wide range of audience preferences and motivations.

2. The process of acquiring a paying customer

A tactical strategy that is in line with Circle's dedication to sustainability, innovation, and customer happiness is included in the process of turning a client's interest into a concrete transaction. The first awareness phase is at the forefront, during which the brand uses focused promotional methods to expose itself to potential clients. In order to convey Circle's distinct value proposition, this phase primarily makes use of digital channels, including email advertising, social media, and content marketing.

As clients move from awareness to curiosity, the focus should be on giving them detailed information on the environmentally friendly surf pads. Providing comprehensive information about product parameters, manufacturing procedures, and the advantages of selecting Circle's surf pads for the planet, the website is an essential point of contact. Prioritising transparency is in line with the modern client's desire to make ethical and well-informed purchases.

Essential components of the evaluation phase include interactive elements, product reviews, and instructional content that engages customers. The brand becomes more appealing when interesting stories about the upcycling of tires into efficient surf pads are circulated. The conversion funnel helps potential buyers make a deliberate decision to buy as they learn more about the brand.

During the conversion phase, the goal is to ensure that the buying procedure is simple and safe. To satisfy a wide range of consumer preferences, it entails streamlining the online store, creating user-friendly interfaces, and offering several payment choices. Successful conversions are further increased by trust-building components like straightforward return policies and safe payment channels.

After the purchase, the focus switches to client retention and satisfaction. Circle uses tailored communication techniques, greets the client for their purchase, and asks for input to keep improving the quality of the good and the customer experience. A long-lasting relationship with the customer can be maintained through loyalty programmes, special offers, and continual interaction via social media and newsletters.

Customer feedback and data analytics are important components of this approach. In order to monitor the customer journey, pinpoint trouble points, and enhance the user experience, Circle uses analytical tools. This method is iterative, which guarantees constant improvement and keeps Circle's plans in line with changing consumer demands and market conditions. In conclusion, digital marketing, brand transparency, strategic engagement, and an unwavering dedication to customer happiness operate together harmoniously to acquire a paying customer for Circle. Through the alignment of every stage with the brand's fundamental principles, Circle creates a community of surfers who care about the planet and builds a meaningful relationship with its audience.

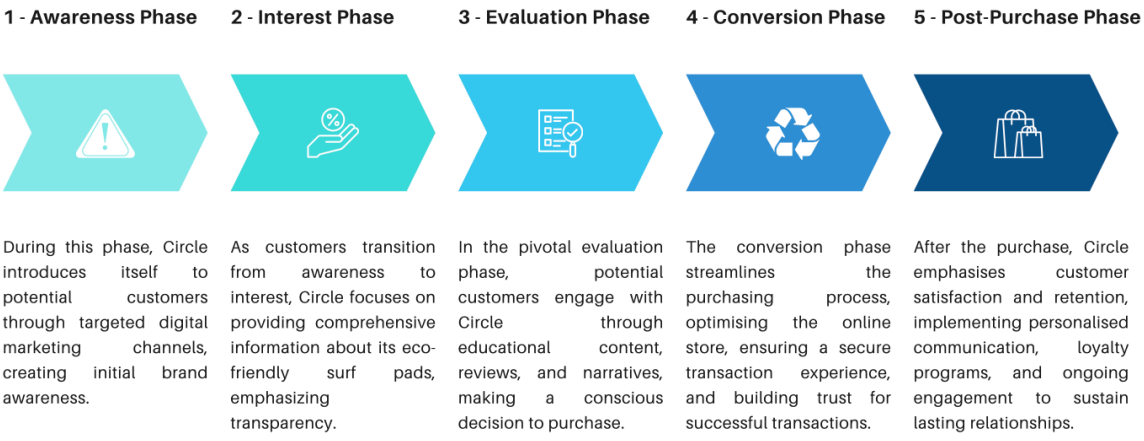


Figure 12: The 5 Phases in the Process of Acquiring a Paying Customer for Circle

3. Sales process to acquire a customer

Circle's environmentally friendly surf pads are sold through a carefully designed sales process that upholds the brand's core principles of sustainability, openness, and client happiness. From the first point of contact with a consumer until the closing of a deal, there is a deliberate flow that gives priority to engagement, education, and ethical business practises. Establishing a strong online presence on major social media sites like Facebook, Instagram, and LinkedIn is the first step in the sales process. These platforms act as dynamic demonstrations of Circle's dedication to turning used tires into premium surf pads. To pique interest and start conversations among the target audience, the business uses visually appealing material, educational postings, and user-generated content in its social media approach. The foundation of the sales process is educational content. To spread knowledge about the environmental effects of waste tire upcycling, the creative design of the surf pads, and the brand's overall philosophy, Circle uses content marketing techniques. Content such as blog entries, articles, and videos are carefully chosen to answer customer questions and establish trustworthiness.

As prospects advance through the sales funnel, the website turns becomes a crucial tool. It functions as a thorough resource, including thorough product specifications, user reviews, and a flawless online shopping experience. The website is designed with ease of use in mind, with features like simple navigation, safe payment channels, and clear shipping and return guidelines. Furthermore, one of the main components of Circle's sales strategy is personalised interaction. The company works with surf schools, attends surf-related events, and interacts with the surfing community in person. This hands-on approach builds a relationship between the company and its audience by improving brand awareness and giving potential customers a tangible experience. The sales team is essential to the process since they are passionate about sustainability and have in-depth product expertise. Inquiries from clients are immediately and

informatively answered, fostering a climate that encourages potential customers to make knowledgeable judgements. The crew has received training on how to highlight the special qualities of Circle's surf pads, highlighting their effectiveness, robustness, and favourable effects on the environment.

The final step in the sales process is a smooth transaction that gives clients confidence in their choice to buy surf pads from Circle. Post-purchase communications should emphasise thanking customers, offering more resources for product maintenance, and encouraging them to share their stories. This after-sale interaction promotes repeat business and helps to develop brand loyalty. Circle's sales approach essentially combines personalised connection, educational material, digital engagement, and ethical commerce. The sales process turns into a journey of mutual values between Circle and its ecologically aware consumer base when each step is in line with the brand's concept.

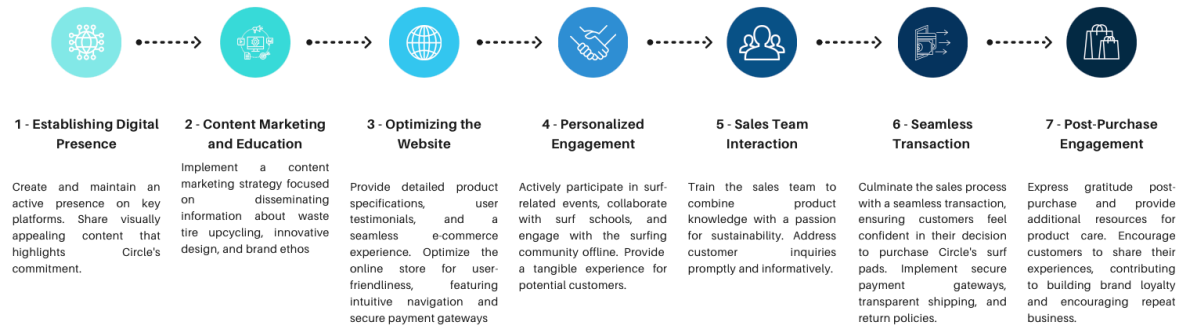


Figure 13: The Sales Process of Circle's Eco-Friendly Surfpads

VIII. Financial projection

1. Projected Revenues

Assumption: For startup companies, the growth rate of sales can be relatively high in the initial years. We estimate the growth rate for sales volume is 15% per year for year 1 to 2, and 30%for years 2–3, 40% for years 3–5. The expected number of pads sold in the first year is 600. The ratio of B2B &B2C distribution is 4:6. The price are €14.9 and €35 respectively.

Considering the CPI and PPI in Portugal, we estimate the price growth for our products is 1.5% per year.

So the sales prediction for a 5-year span is as follows: (The total volume is round-off number)

	Y1	Y2	Y3	Y4	Y5
B2B Volume	360.00	414.00	538.20	753.48	1054.87
B2C Volume	240.00	276.00	358.80	502.32	703.25
Total Volume	600	690	897	1256	1758
Price for B2B	14.90	15.12	15.35	15.58	15.81
Price for B2C	35.00	35.53	36.06	36.60	37.15
Sales	13’764	16’066.03	21’199.13	30’123.96	42’806.14

Figure 14: Projected Revenues

2. COGS Prediction

Materials' Costs					
Name	Cost	Quantity	Quantity needed in one pad	Number of pad we can created with that quantity	Cost per pad in euros
Rubber Genan Fine Powder 20221122_01 (SMALL)	500€ including shipping costs and taxes	1000 kilos	34gr	29411.76 pads	0.017
EVA n5	2.5€	1kg	400gr/pad (with 50gr surplus for the press)	2.5 pads	1
Talcum Powder - Diacleanshop (prevents heats for rubber)	34.99€	5kg	4.5gr	1110 pads	0.032
Fita Dupla Face 3M ref: 9448A	676.63€	Roll - 1200mmx50mts	29cm x 29cm	664 pads	1.01

Figure 15: Costs of production

According to the table above, material costs per pad is €2.06. Considering the PPI in Portugal, we estimate the material cost grows at 1% every year.

The fixed costs (capital) include 9 aluminium mould costs about 756€ in total; 750€for ovens; 104€ for granite board. --1610€ in total. As we aim to lower our cost, we would use the granite board a natural press on top of the several mold due to its natural heavy property. We would let it, on top of every ranged baked mold and with the weight of the granite board and it's perfectly flat side let it the necessary time, until the pads reach their atmosphere temperature. The granite board would not need to be changed at any time, so it is not depreciated.

- We assume aluminum molds are depreciated over 4 years and residual value is zero. Depreciation each year is €189.
- Ovens are depreciated over 6 years and residual value is zero. Depreciation per year is €125.

Thus total depreciation for each year is €314(capital expenditures).

Additional costs (including the tools we use for creating them, such as brushes, oven gloves, vacuum cleaners, etc.) are about €80/year.

The table below summarizes the total costs:

Year	Y1	Y2	Y3	Y4	Y5
Material costs per pad	2.059	2.080	2.100	2.121	2.143
Quantity	600	690	897	1256	1758
Total Material costs	1235.40	1434.92	1884.05	2664.04	3766.95
Depreciation	314	314	314	314	314
Additional costs	80	80	80	80	80
Total costs	**1629.40**	**1828.92**	**2278.05**	**3058.04**	**4160.95**

Figure 16 : Projected costs

3. SG&A

Assumption: The marketing expenses (mainly social media marketing) consist approximately 20% of the total revenue.

Rent: €6000 per year.

Website package: €120 for the first year and €348 afterwards.

We estimate General& Administration expenses including office equipment and utilities etc. consist approximately 10% of the total revenue.

SEO: About €1000, €2000, €2500, €3000 for year 2-5 respectively. As SEO are online worldwide, we would start focusing on that later as our aim is to start mainly in Lisbon area.

Other expenses: Package, storage or other unexpected expenses that may occur. On average, we estimate other expenses consist 10% of the total revenue.

	Y1	Y2	Y3	Y4	Y5
Sales	13764	16066.03	21199.13	30123.96	42806.14
Marketing expenses(20% of sales)	2752.8	3213.21	4239.83	6024.79	8561.23
Rent	6000	6000	6000	6000	6000
Website package	120	348.00	348.00	348.00	348.00
General& Administration expenses(10% of sales)	1376.4	1606.60	2119.91	3012.40	4280.61
SEO	0	1000.00	2000.00	2500.00	3000.00
Other expenses(10% of sales)	1376.4	1606.60	2119.91	3012.40	4280.61
Total operating expenses	11625.6	13774.412	16827.65	20897.583	26470.457

Figure 17: Projected Expenses

4. Profitability Analysis

YEAR	**Total**	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**
1.Sales(VAT Excluded)	**1'23'959.25**	**13'764.00**	**16'066.03**	**21'199.13**	**30'123.96**	**42'806.14**
Total volume	**5201**	600	690	897	1'256	1'758
Price for B2B		14.90	15.12	15.35	15.58	15.81
Price for B2C		35.00	35.53	36.06	36.60	37.15
2.COGS	**12'955.36**	**1'629.40**	**1'828.92**	**2'278.05**	**3'058.04**	**4'160.95**
Materal costs	**10'985.36**	1'235.40	1'434.92	1'884.05	2'664.04	3'766.95
Depreciation	**1'570.00**	314.000	314.000	314.000	314.000	314.000
Additional costs	**400.00**	80.000	80.000	80.000	80.000	80.000

3.Operating Expenses	**8'9595.70**	**11'625.60**	**13'774.41**	**16'827.65**	**20'897.58**	**2'6470.46**
Rent	**30'000.00**	6'000.00	6'000.00	6'000.00	6'000.00	6'000.00
Marketing expenses(20%)	**24'791.85**	2'752.80	3'213.21	4'239.83	6'024.79	8'561.23
Website package	**1'512.00**	120.00	348.00	348.00	348.00	348.00
General& Administration expenses(10%)	**12'395.93**	1'376.40	1'606.60	2'119.91	3'012.40	4'280.61
SEO	**8'500.00**	0.00	1'000.00	2'000.00	2'500.00	3'000.00
Other expenses(10%)	**1'2395.93**	1'376.40	1'606.60	2'119.91	3'012.40	4'280.61
Operating Income	**21'408.19**	**509.00**	**462.70**	**2'093.43**	**6'168.33**	**12'174.73**
Taxes(17%)	**3'639.39**	86.53	78.66	355.88	1'048.62	2'069.70
Net Income	**17'768.80**	**422.47**	**384.04**	**1'737.55**	**5'119.72**	**10'105.03**
Net Profit Margin	**14.33%**	3.07%	2.39%	8.20%	17.00%	23.61%

Figure 18: Profitability

Note: Qualifying small or medium enterprises (SMEs) may benefit from a reduced tax rate of 17% on the taxable income. Thus tax rate of 17% is applied.

The profit margin is relatively low for the first two years, but it rises fast with the increasing sales volume. The overall net profit margin for the first five years is 14.33%. We consider profit margin is high enough to make the project worth pursuing.

The chart below shows the changes of revenue and net income:

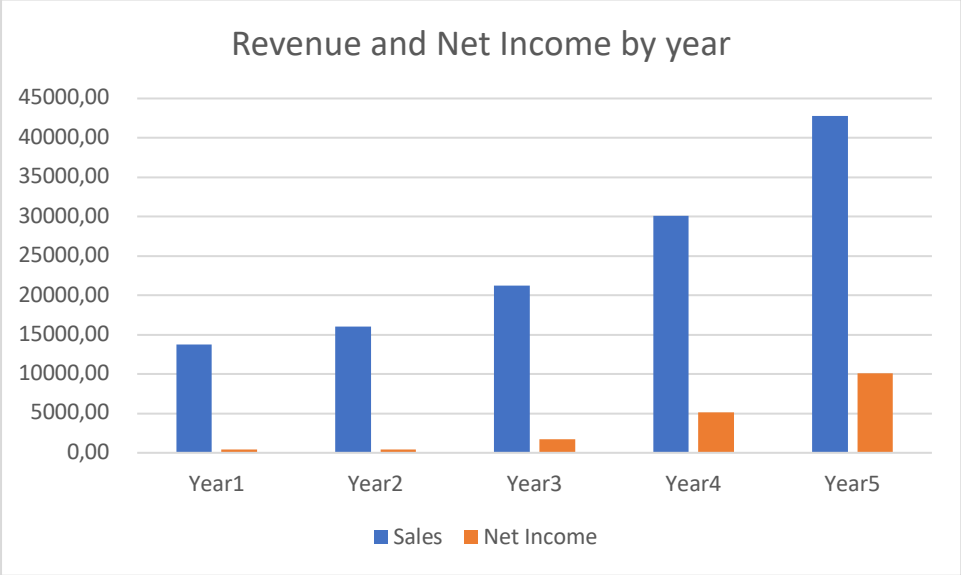


Figure 19: Projected revenue and net income per year

5. Financial Risk Analysis

a. Sensitivity analysis

	Total Sales	COGS &Opereating Expenses	Operating Income	Operating Margin
Basic Prediction	123959.25	102551.06	21408.19	17.27%
COGS and expenses increase by 10%	123959.25	112806.17	11153.09	9.00%
COGS and expenses increase by 20%	123959.25	123061.27	897.98	0.72%
COGS and expenses increase by 30%	123959.25	133316.38	-9357.12	-7.55%
Sales decrease by 10%	111563.33	102551.06	9012.27	8.08%
Sales decrease by 20%	99167.40	102551.06	-3383.66	-3.41%
Sales decrease by 30%	86771.48	102551.06	-15779.58	-18.19%

Figure 20: Sensitivity analysis

Any increase in COGS& Operating expenses more than 20.88% will make this project lose;

Any decrease in sales more than 17.27% will make this project lose.

Thus, the project is financially feasible, and the margin of safety is relatively high.

b. Break-even analysis for the first 5 years

The break-even point= COGS & Operating Expenses/ total sales=82.73%

Current weighted average price per pad for first five years is €23.83, The break-even Price=€19.72 /pad

6. Funding requirements

Since the project is profitable from year 1 and afterwards, we only need to raise funds for the first year. The fixed assets cost €1610 in total in year 1. Other costs and expenses include materal costs, additional costs, operating expenses, rent, marketing expenses, website package, G&A expenses, and other expenses. The table below shows the total amount of cash invested in the first year.

Fixed costs	1610
Materal costs	1235.40
Additional costs	80.000
Rent	6000.00
Marketing expenses	2752.80
Website package	120.00
General& Administration expenses	1376.40
Other expenses	1376.40
Funding requirement	**14551**

Figure 21: Funding requirements

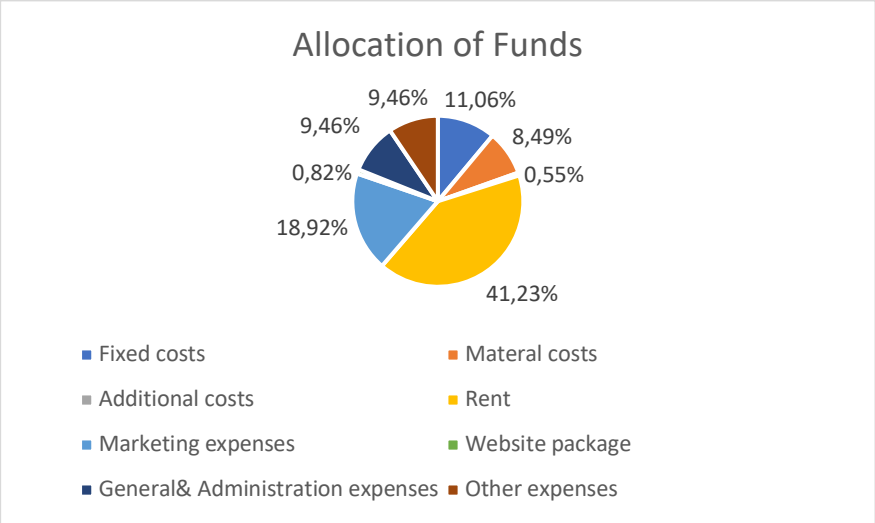


Figure 22: Funds allocation

X. Conclusion

1. A dream on the horizon

After more than a year in this venture, we are fully motivated to continue focusing on developing our brand and achieving our development objectives. Circle aspires to become successful and expand our vision on a global scale. Extending our solutions worldwide would provide the opportunity to educate more people and promote a sustainable solution within the surf industry.

Changing surfers' mindsets is one of our long-term objectives, and we believe that we can achieve this by becoming the number one brand in terms of sustainability within the surf industry. Additionally, we hope that our product line will be a success. This success would enable us to reuse more tires and have a more significant environmental impact, thus helping us fulfil our goal of being a key player in ocean preservation.

2. Key achievements and challenges

Embarking on our journey, Circle has achieved significant milestones and key successes in the development and promotion of sustainable solutions within the surf industry. In terms of the technical aspect, our primary achievement lies in the successful creation of a surf product using an entirely new material—a pioneering feat in the surfing industry. We proudly stand as the first mover in the market, introducing surf pads made from recycled tires. The development of a high-quality prototype, boasting an exceptional grip, is particularly noteworthy. What sets this accomplishment apart is that it was achieved without prior experience in the surfing industry and with no external assistance. Through extensive testing and research, we managed to craft the prototype independently. Moreover, we take pride in the fact that our surf pad is

created with zero emissions. The use of a wooden mould and eco-responsible raw materials reflects our commitment to sustainability, marking a significant milestone.

On the validation and recognition front, we are equally pleased with our progress. The feedback received during our test day with surfers provided valuable insights for future improvements. The unanimous love for the exceptional grip our traction pad provides is a noteworthy achievement. Considering that we developed our product with a small financial support and crafted it by hand, this positive reception is a testament to our dedication. In the professional sector, the insights gathered from industry experts were constructive. Despite offering suggestions for enhancement, they expressed positive surprise at what we managed to achieve independently, adding to our sense of accomplishment.

However, even though this adventure has been marked by significant accomplishments, we still encounter several challenges in our future development. A primary focus for our product is to enhance both its design and overall performance. Addressing aspects such as weight, graphics, and packaging will be crucial steps as we strive to achieve the highest level of performance. On the business front, our main challenge lies in penetrating the Portuguese market and establishing more partnerships within the surf sector—an industry in which we are entirely new. Convincing people to choose and invest in our product will be a key aspect of overcoming this challenge.

3. Lessons learned

From a personal standpoint, this project has been a life-changing and illuminating journey full of learnings and personal development. It emphasized how important it is to be resilient and adaptable when negotiating the complexities of market dynamics and product development.

More than a year has passed since our founding in September 2022, during which time we have faced many difficulties and accomplished important goals. Research and development, organization, teamwork, and dedication were a few of the crucial components that made this entrepreneurial endeavour successful.

One of the most important lessons we took away from this experience was the value of teamwork. This required efficient task division and organization. Based on individual skills, we effectively divided up the work, giving different people tasks related to marketing, product development, and overall organization. In addition, none of us had ever launched a business before, so this was the group's first attempt at entrepreneurship. As a result, all of us gained insightful knowledge about the complexities involved in working on an entrepreneurial project. We learned how to multitask from this experience, which helped us become more adaptable and capable of making decisions under duress.

In conclusion, we recognize that there is a significant journey ahead of us, but we remain steadfast in our commitment to lifelong learning and development as we work to refine and grow our project. We acknowledge that every step presents new opportunities for growth and learning, and we seize the chance to improve and advance our endeavour. Our commitment to the project is unwavering, and we look forward to its continued development, knowing that the lessons we have learned thus far will lead us to success.

IV. Prototyping process

1. Funding grant

Around the mid-end of September, Circle's team came across an exciting opportunity through the daily communication channels at Nova SBE. It was an offer from the DESIS Lab at Nova SBE Haddad Entrepreneurship Institute – a prototyping fund. This program provides student teams with funding of up to €600 to create hardware or software prototypes. Additionally, it connects them with essential resources, tools, and mentors to help bring their innovative ideas to fruition. Consequently, we swiftly seized this opportunity and submitted our project proposal.

2. Application

For Circle, navigating the complexity of the grant application for prototyping was a major accomplishment. Throughout the process, we had to provide answers to a wide range of inquiries concerning our project, its present state, and its intended course. We described our vision, including the form, purpose, and expected success metrics of the prototype. Full of passion and commitment, our answers were sent in, and we then wished for the best *(For more information, see Appendix F: Grant Application Form)*. Thankfully, we were selected a week after applying. The adventure and collaboration with Nova SBE Haddad Entrepreneurship Institute's DESIS Lab then started.

3. Grant’s resources offerings

The funding provides access to several prototyping and start up resources, including the Nova SBE Digital Experience lab (D134), an area to study digital transformation and explore the potential of contemporary technology. We can also get assistance from DESIS Lab's mentors with design research, problem description, scoping, and prototyping possibilities. They

participate in our projects and are incredibly helpful. Additionally, DESIS Lab collaborates with FabLab, a community-accessible facility with industrial equipment like computers, CAV and CAM software-supported small and large milling machines, laser cutting and vinyl cutting machines, a 3D printer, an electronics bench, and other accessible and secure tools. Referencing us, our mentor approached them with a request for assistance and support. They consented to meet us and provide assistance. In the following sections of the report, more information will be provided regarding our partnership with FabLab.

4. Grant's participation requirements

Two workshops are required for us to attend during the procedure. The first took place October 3rd and was focused on prototyping. At that moment we did not start the prototyping process yet since we were waiting for theoretical knowledge about it. And it was a pivotal event for us as a team, since the beginning of the project early September we were mainly looking to create partnerships with suppliers, Labs or people with the knowledge to help us, but the workshop was an enlightening and interactive experience, highlighting the crucial role of prototypes in the project development process that at that time we haven't consider enough.

The workshop was led by an engaging and experienced instructor, Anne Laura Fayard, who began by emphasizing the fundamental importance of prototyping in the project management landscape. She stressed that prototypes serve as tangible representations of ideas, allowing teams to visualize, refine, and validate their concepts. By providing a concrete manifestation of abstract ideas, prototypes help bridge the gap between vision and execution.

One of the key takeaways from the workshop was the teacher's emphasis on creating multiple prototypes throughout a project's lifecycle. This iterative approach enables teams to explore

various design options, uncover potential flaws, and refine their solutions continuously. This process minimizes the risk of overlooking critical details and increases the likelihood of achieving a successful project outcome. We also learned about the significance of testing prototypes rigorously. The instructor stressed that testing is a crucial phase in the prototyping process, as it allows teams to gather valuable feedback from stakeholders, end-users, and other relevant parties. By soliciting feedback early and often, teams can identify issues, make necessary adjustments, and ensure that the final product aligns with user needs and expectations.

Furthermore, the workshop covered the importance of improving prototypes based on the feedback received during testing. This iterative improvement cycle is essential for enhancing the quality and functionality of the final product. By continuously refining prototypes, teams can address issues, optimize design elements, and ultimately create a solution that meets or exceeds project objectives. Through this workshop we have learned that the principles of creation and testing are integral to our project. Implementing these principles significantly contributes to project success and greatly enhances the user experience.

The second workshop for our grant project, which took place on October 26th at Nova SBE, was a valuable experience that further enriched our understanding of the prototyping process and highlighted the importance of collaboration and feedback. In this workshop, the six teams, including ours, were divided into two groups of three teams each. We found ourselves grouped with Obelix and Rehome, and our group was led by Anne Laure, while the other group of three teams was led by Maria, a guest mentor for the day.

The workshop commenced with each team providing an update on their prototyping progress. To facilitate this, we had prepared a prototyping board in advance, which served as a visual aid to help us convey our current stage in the prototyping process. During our update, we candidly

shared our challenges, with a specific focus on the issue we were facing concerning the creation of the mould. We explained that our current wooden mould could not withstand the high temperatures required for melting rubber. The feedback we received from the other teams and our mentor, Anne Laure, was particularly enlightening.

The teams in our group suggested exploring the processes used for products that also utilize recycled rubber, such as skates or shoes. This investigation helped us in shaping our unique process. As a result of their guidance, we delved into the shoe sector, allowing us to examine the shoe construction process and unveiling crucial details, such as the requirement for rubber to be melted at a precise temperature of 220°C and the exact methodology to achieve this. Moreover, they advised us to create an imperfect product using the moulds we had on hand and our available materials and then test it in the market. Following this, we could approach enterprises specializing in surf pad production to inquire about using some of their aluminium moulds, which can handle high temperatures effectively. Anne Laure recommended testing the design and shape of our pad using alternative materials like EVA. While not a sustainable option, it would allow us to assess the visual appeal of our product to potential customers. We later took her advice into consideration and ordered recycled Eva, which turned out to be a very suitable material.

The feedback received from both the mentor and fellow student teams, who approached our project with a fresh perspective, was invaluable. Their honest feedback emphasized the importance of seeking input from diverse sources rather than relying solely on the opinions of those we are familiar with, who might unintentionally share our biases.

In conclusion, the second workshop was a crucial step in our project journey, offering us a renewed perspective, practical advice, and a deeper appreciation for the power of feedback and iteration in the development of our recycled rubber surf pad.

Figure 1: Workshops and Showcase – Pictures by Alice Martins, from DESIS Lab at Nova SBE Archive

As part of the grant, a final showcase took place on November 28th. We had the opportunity to present our project and prototype at the university. It was open to the general public, allowing people to ask questions and observe the progress of our project as well as those of the other five teams. This was a chance for us to connect with individuals interested in our project who could potentially offer assistance. We were eagerly hoping to meet individuals interested in our project, particularly those with connections in the surfing world or a willingness to support our project. We also had the opportunity to meet Alessandro Fracassi, the co-founder of Surf Eye, an AI camera network that records every wave automatically. He expressed a great deal of interest in our idea and offered us a lot of insightful counsel, mostly on the price strategy. Given that we are a relatively new and unknown brand on the market and that our production expenses are cheap, he recommended that we lower the pricing. According to him, the starting prices we had decided upon—39 for B2C and 29 for B2B—were excessively expensive. We modified our approach in response to its feedback.

5. Funds

Finally, the award provided us with access to €600 in funding. They were split according to a 50/50 arrangement, which meant that half of the awarded sum (€300) was supplied upfront, and the remaining sum (€300) was given as compensation for our expenses. This financial

support was instrumental as it enabled us to create the mold and purchase the necessary materials, marking a pivotal step forward in our project's realization.

6. Prototyping process

a. Drawing prototypes

In the early days of October, our journey into prototyping took its first steps following an insightful workshop conducted by Anne Laure. Gathering at Benjamin's workspace, we armed ourselves with an array of tools and materials – paper, cardboard, scissors, glue, and more; and attempted to build some prototypes by hand. We delved into the process of visualizing our idea for the surf pad and sketched three distinct prototypes. We selected the simplest of the designs and attempted to construct a rudimentary, handmade version of it. The essence lay in creating a tangible product to present at our upcoming meeting with Andre Martins from FabLab. It was a pivotal moment that brought us onto the same page, forging a shared vision of the design we aimed to create.

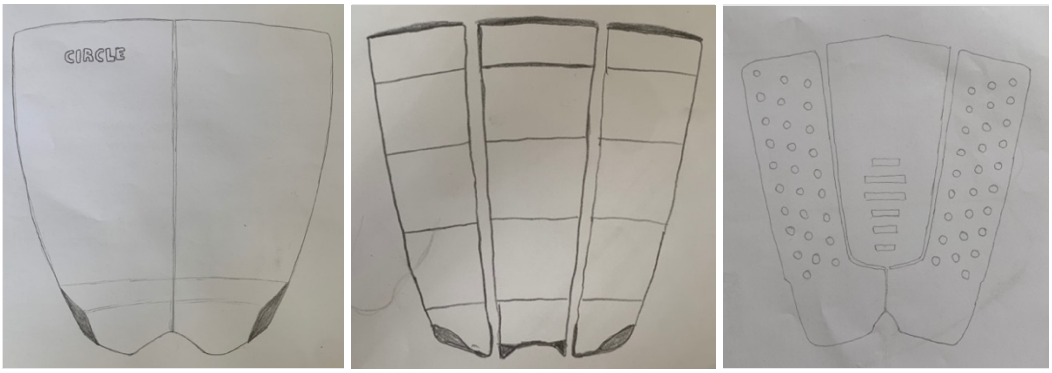


Figure 2: Drawing Prototypes Designs 1, 2 and 3 of the Surf Pad

Figure 3: Hand Made Prototypes 1 of the Surf Pad (from Design n1)

Simultaneously, we commenced brainstorming about a possible packaging solution. We explored existing packaging designs and tried to understand customers' preferences. We even ventured into sketching a packaging concept that could complement our product seamlessly. However, we realized that our primary focus at this juncture should be the prototyping of the surf pad itself. We collectively decided to table this discussion until we had a finalized prototype of the surf pad.

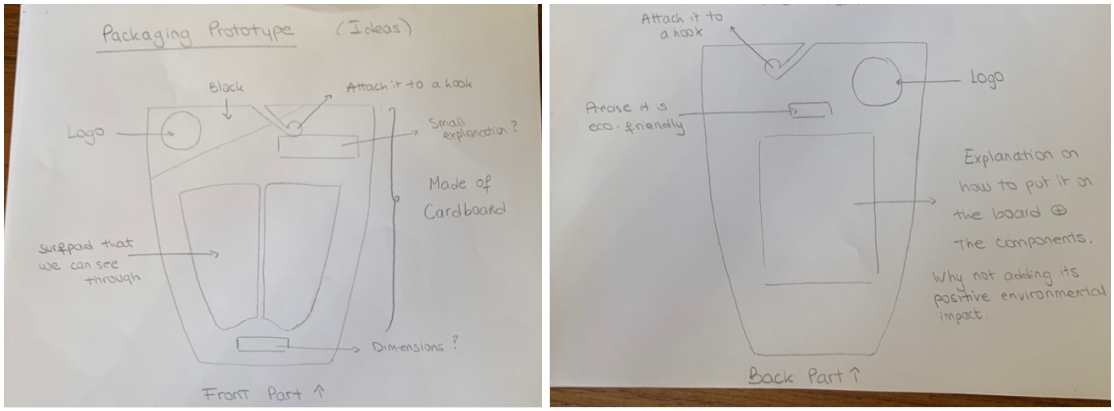


Figure 4: Drawing Prototype 1 of Packaging

b. Developing prototypes with OnShape

A few days later, we embarked on our inaugural visit to FabLab, a pivotal step in our journey. Welcomed by André Martins, the project coordinator. Our initial interaction began with a brief

catch-up meeting, providing the opportunity to review the progress we had achieved in the preceding days and set our collective objectives for the project. During the meeting, he outlined our current priorities – first, creating the prototype at FabLab and second, sourcing all the necessary materials for when the mold would be prepared and ready for use. He introduced us to OnShape, a comprehensive product development platform that unites all the essential tools required to transform a concept into a tangible product. As we delved into our first OnShape class, André shared his knowledge of the software. OnShape, designed to empower businesses of all sizes in transforming their creative ideas into tangible products, presented a robust yet flexible platform.

Throughout the day, we explored the extensive capabilities and tools that OnShape offered, an experience akin to putting digital ink to virtual paper. We began shaping the concept of our project, simultaneously tapping into the software's potential. Then, armed with a popular surf pad, which served as our indispensable reference model, we embarked on a complex journey toward creating our prototype on OnShape. This surf pad took center stage as we delved into the intricate process. Our foray into prototype creation commenced with the meticulous conceptualization phase, marking the inception of our adventure. Employing OnShape as our trusted instrument, we embarked on the methodical process of measurement and experimentation. Continuously comparing our progress with the acquired surf pad, we devoted hours to testing various forms and iteratively refining our design.

Simultaneously, we launched an assertive campaign to forge crucial collaborations with other suppliers, including EcoIberia, Flexospuma, and Newstep. Our objective was to secure samples of essential raw materials such as Rpet, EVA foam, and glue. This strategic move aimed to ensure the availability of an adequate raw material supply for the forthcoming testing phase, as

elaborated further in our business model. As we progressed, the harmonious collaboration between supply chain management, design, and practical experience laid the groundwork for the successful realization of our prototype. André's leadership and the invaluable support of our chosen suppliers propelled us further toward the actualization of our visionary project.

In the course of shaping our surf pad prototypes using OnShape, we explored two distinct variations, each distinguished by its unique top layer design. Our initial approach entailed a relatively simpler design featuring lines on the pad's surface (OnShape Prototype 1). However, recognizing that this design might compromise quality and anti-slip performance, we showed the online prototype to some of our surfers' friends and they advised us to transition to a lozenge-shaped one to be more performant (OnShape Prototype 2). For a comprehensive insight into the progress made during the prototyping phase, we invite you to *peruse Appendix G: Album of Prototyping Process.*

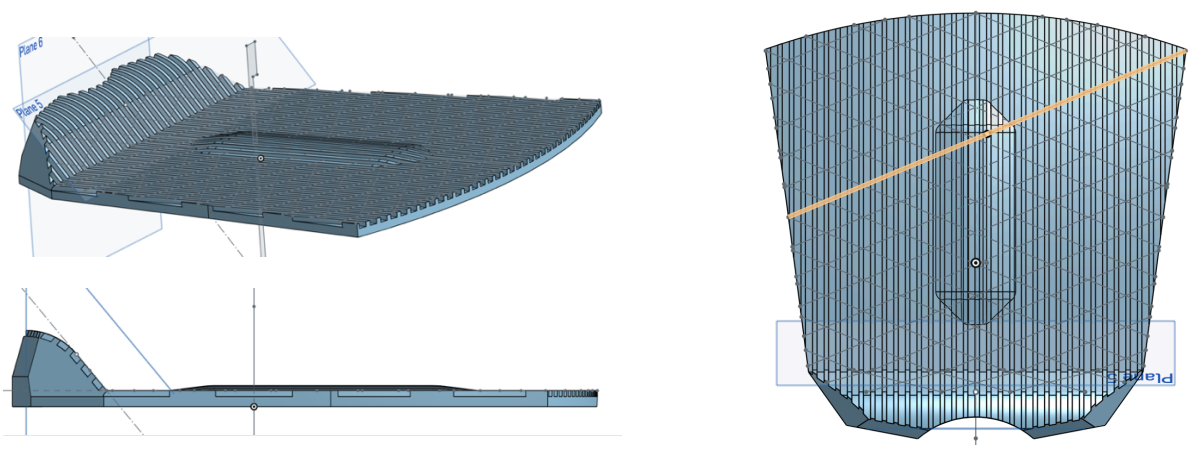


Figure 5: OnShape Prototype 1

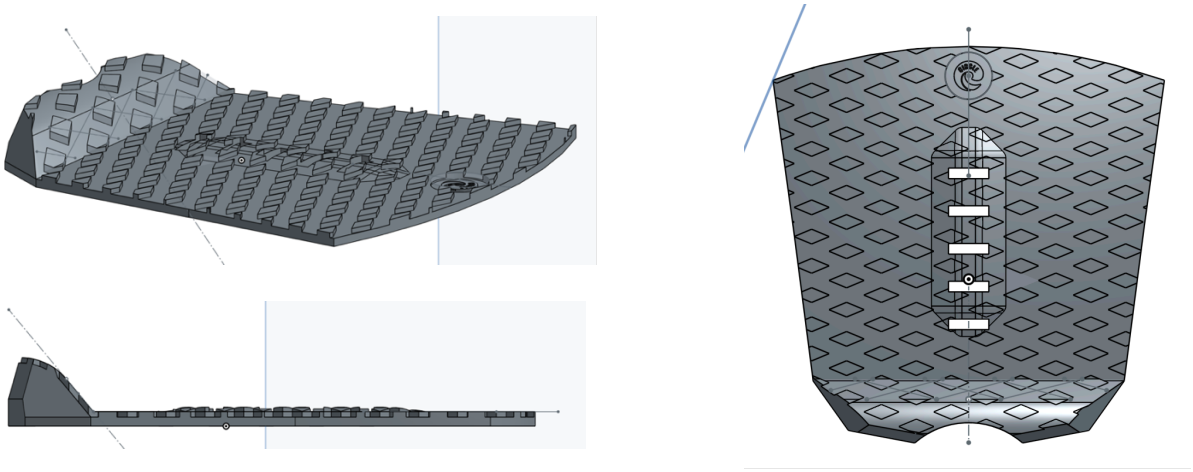


Figure 6: OnShape Prototype 2

c. Testing Materials and Creating mould

As previously mentioned, we opted for the second prototype design to serve as the basis for our mold, anticipating improved quality. The crucial task at hand was selecting a suitable material for crafting the mold, considering both the lab's equipment limitations and our budget constraints. After careful consideration, we arrived at the decision to use wood for its cost-effectiveness and compatibility with the lab's 3D printing equipment. Consequently, we proceeded to fabricate the mold.

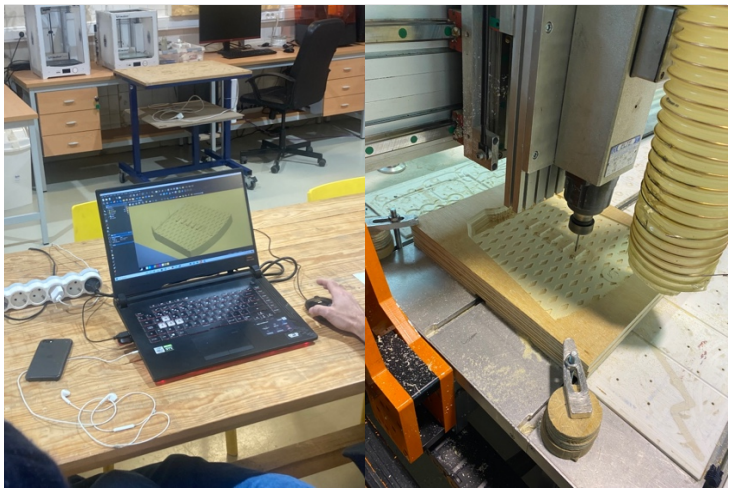


Figure 7: Creating the mold

Simultaneously, during the mold creation process, we initiated a series of tests to assess material compatibility and the mold's resistance. In order to test various materials, we made multiple tiny wood molds. In addition, we explored optimal temperature and duration for rubber melting, among other factors. We also experimented with a silicone mold, that we had previously purchased from a kitchen supply store, recognized for its potential advantages, albeit temporarily deemed cost prohibitive. Further experimentation involved various material combinations, including pure rubber, rubber with R Pet, and rubber with EVA *(refer to Appendix H: Materials' Combination in Molds).*

Figure 8: Testing several materials combinations and oven temperature/time

Our assessments revealed that, regrettably, wood was not the ideal mold material for surf pads. Wood proved insufficient in withstanding the requisite rubber-melting temperatures, unlike silicone or aluminum molds, which would have been the preferred options. However, constrained by budget and time limitations, we elected to persist with the wooden mold and proceeded to test the resulting product. This decision acknowledges that an imperfect product enables us to introduce it to potential customers, gather valuable feedback, and refine our offering in response to real-world market conditions.

Figure 9: Wood mold

Subsequent to this phase, and prior to direct implementation in the final mold, we conducted a series of experiments to identify the optimal substance for the mold's base, preventing materials from adhering to it. Various products, including lubricant, climbing powder, oven paper, and aluminum, were tested, with climbing powder proving to be exceptionally effective.

Furthermore, rather than immediately proceeding with the rubber granules, a deliberate decision was made to craft an initial pad using EVA. While the ultimate goal was to integrate rubber into our pads, our initial focus was on producing a pad comprised solely of EVA for preliminary testing with potential customers. Acknowledging the potential damage rubber could inflict on the wooden mold, our emphasis was on presenting an aesthetically pleasing pad to potential customers, an approach endorsed by Anne Laure during the second workshop. Therefore, we experimented with EVA n25 and climbing powder, yielding highly satisfactory results. Expanding our efforts to larger molds, more representative of the pad dimensions and coated with climbing powder, we explored the combination of EVA n25 and rubber, resulting in unexpectedly excellent outcomes. Recycled EVA n25 proved ideal for the pad, imparting flexibility, solidity, and water resistance to the prototype. Additionally, placing rubber at the mold's base enhanced the pad's grip significantly. Hence, the idea of exclusively presenting a

pad made solely of EVA n25 to customers for aesthetic appeal became unnecessary, as the combination of EVA n25 and rubber produced an equally pleasing result.

Figure 10: Trial in a wood mold covered with climbing powder and having the dimensions of a pad with EVA n25 & Rubber.

d. Testing in the pad mold

With the mold ready for use, the subsequent phase involved experimenting directly within the mold, as opposed to relying on silicone cups or small wooden molds. As previously explained, employing EVA n25 and positioning rubber strategically at the base of the mold to maximize product quality produced encouraging results. Even though the final pad had some imperfections particularly in the tail area where there were visible holes, the overall grip and water resistance were excellent, which may be due to the rubber's thoughtful placement. It soon became obvious that wood could not hold up to the level of accuracy needed to make our surf pads due to its inherent limits. Due to the limitations of the original mold, the surf pad included flaws such as holes and uneven lozenge shapes. As a result, we decided to create a second prototype for testing as we knew that the lozenge shape—while not perfect in this version—would work well in the finished product. However, we realized that an aluminum mold was required to produce this exact shape. We quickly came up with a fresh, straightforward design,

made a wooden mold, and started building. Despite the less-than-ideal design, the results were enhanced, exhibiting great grip, flexibility, and resistance. This version, devoid of flaws, was selected for the product validation stage in order to collect feedback from prospective B2C and B2B clients.

Appendixes:

Appendix A: Circle's Team Backgrounds

			
Alice Maiorca	Benjamin Soulié	Livina Mazzoni	Victor Font
Italian Bachelor in Languages and International Relations at Cattolica University Educated in an international environment Deeply concerned by environmental issues Has good communication skills and an innovative approach	Swiss Bachelor's in Economics and Management at HEC Lausanne Surfer from Geneva for years Coming from the Alps I build a strong awareness for my environment Excellent soft skills and communication skills	Belgian Bachelor's in International Business at Maastricht University Involved in volunteering for years Extremely conscious about the environment Has good leading and organizational skills	French International Bachelor of Business Administration at Kedge business school Surfer and strong network in the surf industry Born and raised at the sea, huge connection to the ocean Has an incredibly creative mindset

Appendix B: Circle's Team Roles

The unique contributions and roles played by each team member are fundamental to Circle's success as an entrepreneurial endeavour. Here, we examine the valuable contributions that each member makes to our shared vision.

Victor and Ben: Surf Enthusiasts and Designers

Victor and Ben, two passionate surfers, are the designers behind our surf pad. Their practical experience and in-depth knowledge of surfing help to shape the practical aspects of product development. They play a crucial role in the success of the product, whether it is by testing prototypes in the water or perfecting the design.

Livina: Organizer and Communicator

Livina handles a variety of roles. She coordinates the project and makes sure that every facet of our endeavour operates smoothly. Her talent for delegation keeps the team on task, and her aptitude for planning gives our operations structure. With her outstanding communication abilities, Livina is a key player in the growth of our company since she can sell investors, clients, and other stakeholders on our ideas.

Alice: Remote Researcher and Marketing Specialist

Despite residing far away, Alice is essential to the plot of Circle. Her emphasis is on conducting market research and developing powerful marketing plans as our committed researcher and marketing specialist. Our decision-making is influenced by her ideas, which are based on data-driven research. Alice's contributions extend beyond

Appendix C: Surf Traction Pad Explanation

Definition	A traction pad is a piece of foam attached to the tail of a surfboard to prevent the back foot from slipping off. The traction pad's primary purpose is to increase the rear foot of the surfer's grip and to reduce wax usage. Learning how to position their back foot correctly on the board can be an excellent alternative for beginning surfers. Moreover, the surf pad is self-adhesive, adheres to the surfboard, and once applied cannot be taken off
Composition	There are frequently many surf pads hanging out from the wall in surf shops. A traction pad can be made of a single piece, two, three, four, or even five parts. To fit various surfboard models, numerous types of pads are available. For instance, due to the restricted space, a single piece pad is typically used for shortboards with narrow tails. The other pads, which are composed of numerous sections, are excellent for adapting to various types of boards, such as fun or fishing boards, for instance. Moreover, to make additional room on the tail of your board, you can divide the traction pad's parts into little spaces. **The Kick tail** is the back of the traction pad, that is higher than the rest of the pad. It allows the surfer to block his Blackfoot and put more power during manoeuvres. **The Arch bar** is the central part of the grip on traction pads. It is higher than the left and right side. We can say that the more skilled a surfer is, the higher the arch bar needs to be.
Materials	• The most popular and least environmentally friendly surfboard pads are made of EVA (ethylene vinyl acetate), a copolymer of ethylene and vinyl acetate. It is a very elastic substance that can be processed in the same ways as other thermoplastics. The material has low-temperature toughness, stress-crack and UV radiation resistance. • Sugarcane-based bio fam (as FCS for example) • Biodegradable foam (as Creature of Leisure)

Appendix E: Persona B2C & Persona B2B

JOAO RIBEIRA

BACKGROUND
Working as surf instructor for a surf shop
Engaged in creating unique surfing-related products to meet customers' needs
Currently working as product designer for a surf business

OBJECTIVES
Aims at blending surfers' practical needs with his artistic vision
Wants to create innovative and cutting-edge products
Strives for changing customers' patterns of consumption

DEMOGRAPHICS
Age: 32
City: Lisbon
Job: Product designer
Family status: Celibate

MOTIVATIONS
Interested in learning new skills and techniques that might aid in his career and personal growth

Committed to respect the environment and create a positive impact through his products

FRUSTRATIONS
Does not have deep knowledge about sustainability regulations

FRANCISCO SANTOS

BACKGROUND
Impact Entrepreneurship and innovation student at Nova SBE
Surfer concerned in sustainability
Educated in an international environment

OBJECTIVES
Aims at committing himself to change his patterns of consumption
Wants to reduce waste and act as a positive contributor to the society
Strives for working in a company that fully reflects his values

DEMOGRAPHICS
Age: 24
City: Lisbon
Job: Student
Family status: Celibate

MOTIVATIONS
Interested in promoting an environmentally friendly model of economic development

Committed to try out innovative products and make conscious purchases

FRUSTRATIONS
Does not have deep analytical and quantitative skills

Appendix F: Grant Application Form

Prototyping Fund 2023-2024

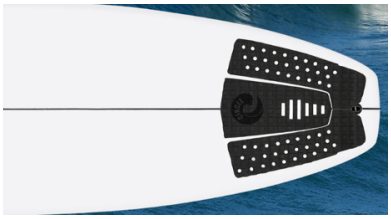
Name of the project: Circle

Information of each team member: Alice Maiorca; 53805@novasbe.pt; Benjamin Soulié; 54395@novasbe.pt; Livina Mazzoni; 54702@novasbe.pt & Victor Font; 52947@novasbe.pt

Question 1 – Please describe the prototype you plan to build:

The focus of our master's thesis involves the innovative use of recycled tires to develop water-resistant sports foot grips. Given that most sports foot grips available in the market are predominantly composed of rubber, our objective is to explore sustainable alternatives by repurposing discarded tire materials. To this end, my research partner and I have already established a partnership with a tire granule supplier, which has provided us with the necessary raw materials. We are currently in the phase of investigating suitable combinations of these recycled tire granules with other components to create functional and effective sports foot grips.

One specific application of our research is in the design of surf pads, which are foam attachments placed at the tail of a surfboard to enhance traction and prevent the surfer's back foot from slipping off during rides. The surf pad is self-adhesive, adheres to the surfboard, and once applied cannot be taken off. Our pad will be composed of three separate parts, all in black, with the brand name in the middle. The pad's dimensions will be the following: 32cm length, 32cm width and 3cm depth (See picture).



Hence, Circle's aim is to give a second life to old tires by creating surf pads while increasing our customers' satisfaction regarding sustainability and our brand image.
We are therefore now looking for an assistant teacher or research facility where we could discuss potential collaboration and conduct scientific research to further our project and develop our prototype (surf pad). To do so, we contacted FCT who agreed to help us. Therefore, receiving a grant at this moment will be extremely helpful for us as we would be able to start prototyping our product and maybe launch our dream.

Thank you for considering my inquiry, and I eagerly await your response. Please feel free to reach out to me at your convenience via the contact information provided below.

Question 2 – How much funding are you requesting for this project?

We are still in the research process. For now we are in contact with Genan, a rubber company creating granules (see question below). However, we're missing two suppliers for the moment but are in the process of finding them with the help of FCT. Hence, we're not hundred percent

sure about how much money will be required to start this project. However, we know that rubber granules are extremely cheap and that production costs will be around 7000€. In fact, the pad mold will cost 6000€, as explained by YnaForm; a mold company, and then we'll need money for the production.

Following this, money will be required for salaries, mold depreciation, shipment and logistics, R&D, web development and maintenance, marketing, sales, storage, taxes etc. We are not sure for the moment about the costs of all these activities. But our objective for the moment is to prototype our product and then we'll start launching our idea.

Question 3 – Please provide us with an overview of the materials / resources you plan to purchase with an amount for each item. This does not need to be fully articulated but please provide us with some general breakdown and rationale.

In order to create Circle's traction pads the following materials are required: rubber, glue, and vegetal material. Circle decided to make Genan, a company that recycles end-of-life tires and transforms them into rubber granules, their exclusive supplier. Due to their cutting-edge technology and superior mechanical, chemical, and environmental performance, Genan rubber granules are highly-quality products manufactured at state-of-the-heart tire recycling plants that can be used for a wide range of applications. Sports surfaces are one of the three primary uses for rubber granules and the company is already cooperating with leading contractors and specialists within the industry. Hence, we have decided to choose them as our rubber suppliers. We have already established a partnership with them, and they have provided us with the necessary materials. At the moment, we have two types of recycled granules differentiated into two types of formats. 20kg of each are waiting to be used.

We are currently investigating suitable combinations of these recycled tire granules with other components like sugar cane, and algae to create functional and effective sports foot grips. Finding a knowledgeable lab that can provide us with the knowledge to identify the ideal chemical combination to pursue the project is our top priority. Thankfully, FCT is helping us. Then, as soon as we have the components we'll start prototyping.

Furthermore, once the rubber, vegetal material and glue are obtained, molds are required to create the final product. Therefore, as this activity will be outsourced, Circle needed to find a suitable partner for this task. Circle has decided to outsource this activity to Ynaform, a company creating molds. They have already agreed to assist us in developing our prototypes, and we are in contact with them. Determining the amount of rubber and the vegetal material that we are going to add in the pads is the first and most crucial thing we will do with them.

Question 4 – Please explain why you need to build this prototype. What will building this prototype help you achieve?

Building a prototype for surf pads made from non-recycled and discarded tires is a crucial step in Circle project's development and aligns with our long-term goals and aspirations. Our need for this prototype can be explained as follows. Over the past year, we have extensively researched the feasibility and environmental benefits of using discarded tires for surf pads. While our theoretical groundwork has been promising, building a physical prototype is essential to validate our concept. It will demonstrate that our idea can be translated into a tangible, functional product.

Moreover, creating a prototype will allow us to assess the technical feasibility of manufacturing surf pads from discarded tires. It will enable us to identify any design or production challenges and refine our approach accordingly. This process is essential to ensure the eventual scalability and reliability of our product. Furthermore, and as previously mentioned, our team is deeply committed to sustainability. By repurposing discarded tires into surf pads, we aim to significantly reduce the environmental impact of tire disposal while providing an eco-friendly alternative to conventional surf pads. Building the prototype will help us quantify the exact environmental benefits and assess how our product aligns with sustainability goals.

Last but not least, the prototype will serve as a tangible representation of our idea, which is vital for engaging potential stakeholders, including investors, customers, and partners. It will allow us to conduct market testing, gather feedback, and assess the product's appeal, ensuring its viability in the competitive surf gear market.

To conclude, as we are working on this project for our master's thesis, building the prototype will provide valuable academic insights. It will enable us to apply theoretical knowledge to a real-world problem, fostering a deeper understanding of materials science, sustainability, and entrepreneurship. But not only, we are all passionate about this idea. We've been working on it for a year now and we cannot wait for this project to start seeing the day. Ultimately, this prototype is the bridge between our passion and a tangible, eco-friendly product that can benefit both surfers and the environment.

Question 5 – Think about what you want to learn from the prototype and explain the following: Function: What needs will it answer? What are the assumptions that are at the core of your idea? Form: What will be the experience of the users?

We will be able to test the surf pads and evaluate their effectiveness in the water thanks to the prototype. In order to test our product and get input to improve its performance, we will ship the prototype that we have built and produced to professional surfers and surf schools in Portugal. After completing this phase, we will know whether we need to make any modifications to our product, whether we need to switch out one of the materials, or whether the pad will be durable and effective enough to be sold on the market.

After conducting our research on the current industry, we noticed that there is an established, robust, and competitive market for surf accessories, particularly surf traction pads. In fact, one of the most popular items on the surf market is surf pads since surfers require them as they advance in their ability. Additionally, there are already some large and established corporations on the market for traction pads. However, we observed that the majority of rival companies use "light" EVA foam that is primarily made of plastic. In other words, the majority of our competitors are not making a difference for the environment

Thus, Circle can be regarded as being incredibly innovative and one of the only companies to address a current issue, namely tire pollution, while also producing a top-notch surf product. Hence, concerning the experience of our users, we expect them to be satisfied with a new eco-friendly and innovative product that has good performance in the water, and at the same time does not pollute the environment and the ocean. Furthermore, we anticipate that our product will not function flawlessly throughout the creation of the first prototype because we are aware that revisions will be required. Despite this, we are aware that the testing phase will be one of

the most important for this kind of product because the surf pad must be water-resistant. We'll spend a lot of effort into this phase because of this, and the prototype will be crucial to the success of our project.

Question 6 – How will you evaluate if you are successful with this prototyping project?

If we had to answer this question in a business way, this would be our answer.

Evaluating the success of our prototyping project for surf pads made from discarded tires is crucial for measuring progress and ensuring that we achieve our objectives. We would then evaluate our success through different means. Success can be measured by the development of a functional surf pad prototype. This means the pad should meet the basic requirements of providing traction, comfort, and durability to surfers. It should be capable of performing its intended function in a real surfing environment. And evaluate whether the production of surf pads from discarded tires is cost-effective compared to traditional materials. If our prototype demonstrates cost savings or a competitive pricing advantage, it can be considered a success from a business perspective. Moreover, measure the environmental impact of your prototype. Calculate the number of discarded tires diverted from landfills, the reduction in carbon emissions, or other relevant environmental metrics. Success would involve a significant positive contribution to sustainability. Additionally, conduct market tests and surveys to gauge the acceptance of our surf pad prototype among surfers and potential customers. If we receive positive feedback, pre-orders, or indications of strong demand, it suggests success in terms of market viability.

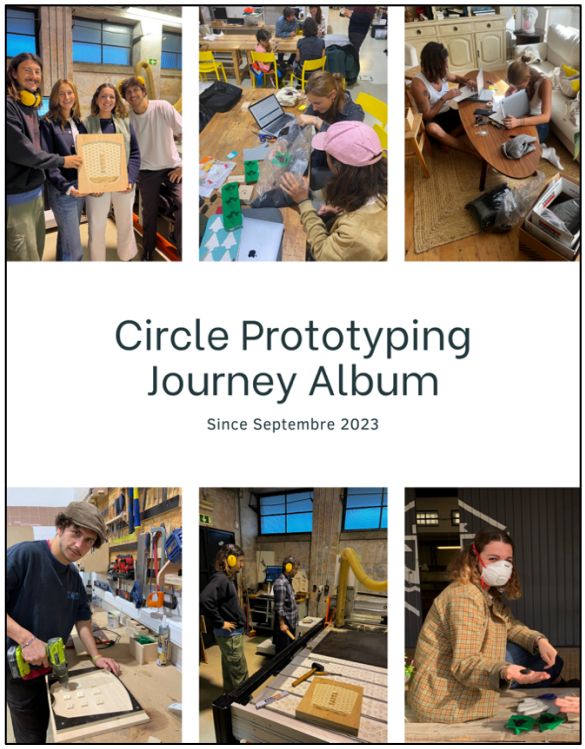
Our success would also be evaluated regarding whether the prototype can be manufactured at scale without significant technical challenges, ensuring that the surf pad prototype meets safety standards and offers sufficient durability to withstand the rigors of surfing, and collecting feedback from users, partners, and experts in the field. We would use this feedback to make necessary improvements and iterate on the prototype. Success would also be evaluated by assessing whether the prototype contributes to our academic and research goals, as outlined in our master's thesis. This could include generating new knowledge, advancing the field of materials science, or providing insights into sustainable product development. Then, evaluate our success in engaging stakeholders such as investors, advisors, or potential collaborators. A successful prototype should generate interest and support for our project.

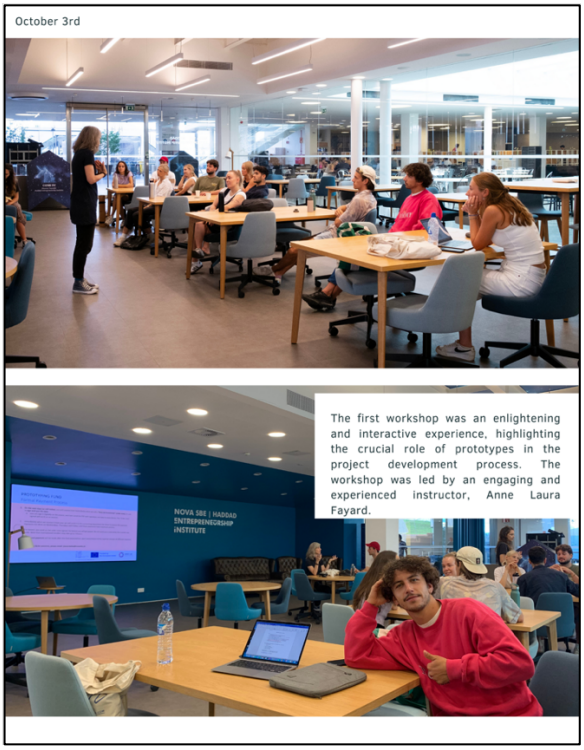
Hence as our goal is to turn this project into a sustainable business, success can be measured by achieving milestones in business development, such as securing funding, partnerships, or entering the market.

But, to us, it is not only about business success. We are dreaming to see this project happening and having the prototype in our hands would make us proud and happy, that’s from our point of view, success.

Payment information: Full name; Taxpayer number; Fiscal address & Bank account information.

Appendix G: Album of Prototyping Process





October 18th

Armed with a popular surf pad, which served as our indispensable reference model, we embarked on a complex journey toward creating our prototype. Our foray into prototype creation commenced with the meticulous conceptualization phase, marking the inception of our adventure. Employing OnShape as our trusted instrument, we embarked on the methodical process of measurement and experimentation. Continuously comparing our progress with the acquired surf pad, we devoted hours to testing various forms and iteratively refining our design.

Ocotber 24th

When buying the wood for creating the mold we went to a known shop where the employees advised us on which wood to use

Ocotber 25th

In order to create the mold we had to cut and glue several planks of wood

Ocotber 26th

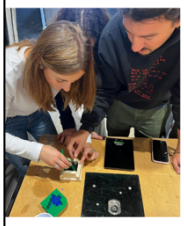
The second workshop commenced with each team providing an update on their prototyping progress. Then, teams were divided in two groups and had to share their challenges to receive feedback.

Ocotber 27th - November 8th: 2 weeks process



We created small wood molds in order to test materials combinations and products to prevent the material from sticking to the mold. We also tested them in silicone kitchen molds. Then, after two weeks, we knew which materials to use, how long to cook them and at which temperature.



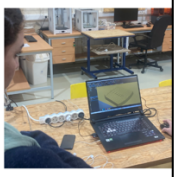



Ocotber 31st

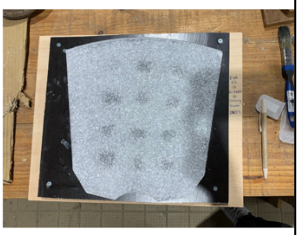
Thanks to the machine we had access to at the lab we created the final mold with the OnShape design

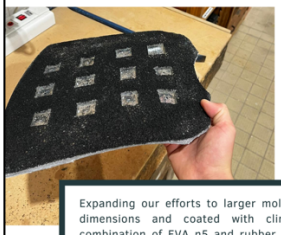






November 8th

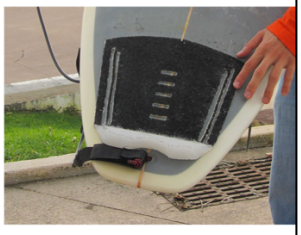




Expanding our efforts to larger molds, more representative of the pad dimensions and coated with climbing powder, we explored the combination of EVA n5 and rubber, resulting in unexpectedly excellent

November 22th - Testing in the real mod

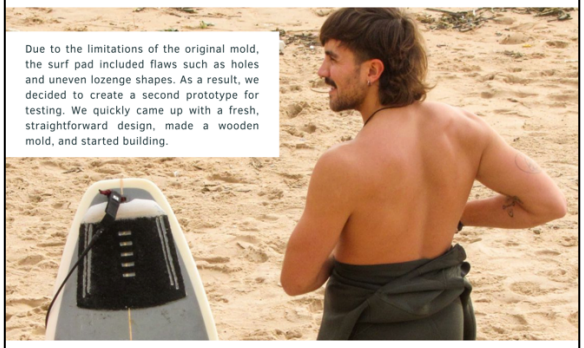
With the mold ready for use, the subsequent phase involved experimenting directly within the mold, as opposed to relying on silicone cups or small wooden molds. Even though the final pad had some imperfections particularly in the tail area where there were visible holes, the overall grip and water resistance were excellent, which may be due to the rubber's thoughtful placement. It soon became obvious that wood could not hold up to the level of accuracy needed to make our surf pads due to its inherent limits.



November 27th

Due to the limitations of the original mold, the surf pad included flaws such as holes and uneven lozenge shapes. As a result, we decided to create a second prototype for testing. We quickly came up with a fresh, straightforward design, made a wooden mold, and started building.



November 28th - Final Showcase

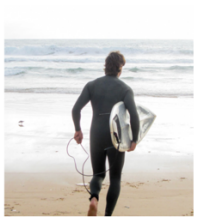
As part of the grant, a final showcase took place at the university where we had the opportunity to present our project and prototypes. We connected with individuals interested in our project who were eager to offer assistance.

December 8th - B2B Product Validation

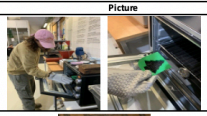
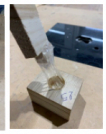
Validation process demanded engaging in meaningful conversations with key players in the surf industry, specifically targeting business professionals. Following a thorough analysis, we discerned that establishing connections with owners of surf shops and surf schools proved to be a more accessible avenue.

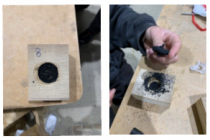
December 9th - B2C Product Validation

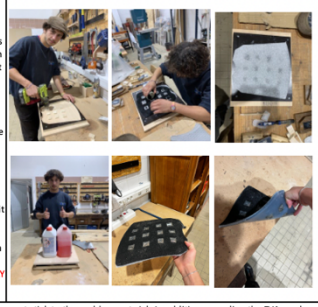
In the context of B2C tests, the logic was crystal clear – what better way to assess a surf product than by subjecting it to authentic, real-world conditions? Thus, we positioned our prototype on a surfboard, and extended invitations to surfers in Carcavelos, asking them to ride a few waves.



Appendix H: Materials' Combination in Molds

Experiments	Materials (Ingredients)	Percentage of each (gr)	Mould	Temperature	Time in Oven	Results	Picture
Exp n1 - Friday 27th	Rubber Genan Fine Mix 20221122_01 (LARGE)	20gr in the tree cup	Sylycone	120 degree	15min	We took a look after approximately 7.5 minutes and nothing happened. The granules were unchanged. Even if the time isn't finished yet. We are already sure the temperature needs to be way higher. After 15min - nothing has changed. The granules are a bit hot but not even that much as we're able to touch them with our hands without hurting ourselves. The granulesin the bottom of the sylycone cup are not even a bit melted. CONCLUSION - NOTHING HAPPENED	
Exp n2 - Friday 27th	Rubber Genan Fine Mix 20221122_01 (LARGE)	20gr in the tree cup	Sylycone	180 degree	15min	Again, we checked after 7.5min and as the previous experiment, nothing has changed. Even after 15min it was unchanged. Of course, hot and we could see some smoke. CONCLUSION - NOTHING HAPPENED	
Exp n3 - Friday 27th	Rubber Genan Fine Powder 20221122_01 (SMALL)	20gr in the tree cup	Sylycone	180 degree	15min	Again, we checked after 7.5min and as the previous experiment, nothing has changed. However, after 15min, it was not melted but it became sticky. It was extremely hot, the smoke was present. It became sticky and we could observe some aglomerations. CONCLUSION - STICKY RUBBER	
Exp n4 - Friday 27th	Rubber Genan Fine Powder 20221122_01 (SMALL)	3gr in the small wood hole	Wood	180 degree	20min	First good observation - wood is not damaged meaning it can easily handle the temperature. Moreover, the granules are unchanged. We believe it is because the wood piece is really thick hence the heat didn't passe through it. Hence, we want to try it again longer than 20minutes and higher than 180 degrees. For sure, the wood isn't the right material to use for molding as it is isolating the granules (from the heat). However, we'll stick to that option as aluminium or sylycone mold are too expensive. Hence, we'll try again with higher temperatures and timing. Furthermore, the compression should be used as it will allow to centralize the heating of the chosen piece. We will search for the right process to use; compress and heat; heat compress; or heat compress and heat again etc. CONCLUSION - ADAPT TEMPERATURE AND HEATING TIME + THINK ABOUT COMPRESSING IT	
With these experiments, we noticed that the Genan Fine Powder will be the preffered one for the final product as because its particules are smaller, it becames sticker faster even with a (small) temperature of 180 degrees. It becomes softer and it's easier to work with these granules.							 
Exp n5 - Tuesday 31st	Rubber Genan Fine Powder 20221122_01 (SMALL) + R Pet	50 percent of each. 20gr each - so 40gr in total. The recipient was bigger than the others.	Wood	200 degree	15min + 15min	We noticed after 15min that the rpet was almost fully melted on the top but not inside. The rubber was not that sticky because it was not long enough in the oven. The two materials were not too homogenous. Then, after the second time we put it in the oven for 15min, we noticed the materials were stick together and it was hard once it cooled down. Hence, unfortunately, not flexible at all. CONCLUSION: IT STICKS TOGETHER BUT IT IS NOT FLEXIBLE	  
Exp n6 - Tuesday 31st	Rubber Genan Fine Powder 20221122_01 (SMALL) + R Pet	70% Rpet and 30% of rubber. We put the rubber in the bottom of the mold. We hoped it wouldn't stick by doing so.	Wood	200 degree	20min	As we put rubber in the bottom, it did not stick to the mold at all. Also the materials didn't mix together. The Rpet was on the top and fully melted and hard but the rubber unchanged. CONCLUSION: DO NOT PUT THEM APART	 
Exp n7 - Tuesday 31st	Rubber Genan Fine Powder 20221122_01 (SMALL) + R Pet	The mold was covered with vaseline in order for the materails not to stick. Then we put 60% or Rpet and 40% of rubber (mixed together)	Wood	200 degree	15min	As we put vaseline in the bottom everything was sticked to the mold and we could not remove it. We saw that the Rpet was super sticky and hard while the rubber was not at all. They were a bix mixed together but it is sure that these two materials do not match with the vaseline. CONCLUSION: VASELINE MAKES IT WORST AS IT GETS STUCK TO THE MOLD	
With these experiments, we concluded that Rpet should not be used as it melts very easily and becomes super hard, which is not suitable as a pad should be flexible. In addition, the longer the rubber stays in the oven the better. In fact, last week it stayed only for 15min and when we tried 30min (15+15) the results were better. In addition, a highest temperature gives also better results (we used 180degrees last week commpared to 200degrees this week). We could even increase it more in the future experiments.							 
Exp n8 - Monday 6th	EVA n5	3gr in the small wood hole	Wood	220 degree	20min	The EVA was fully melted and very sticky when we took it out of the oven. We took a wood stick and tried to push very hard in the mold (a bit like the compress process). At first, the material was sticking to the wood stick hence we concluded that it would never work. However, once the material cooled down and was totally cold it was kind of easy to detach it from the wood stick and it was not sticky anymore. The material was flexible which is a good thing.	 
Exp n9 - Monday 6th	EVA n8	3gr in the small wood hole	Wood	220 degree	20min	Exactly like the n5 it was fully melted and very sticky at first. However, it seems more malleable when we tried to press it with the wood stick. Hence, n8 could be better than 5. Once cold, we took out the wood stick and its shape stayed in the mold + it was easy to take it out. Could be a good material.	
Exp n10 - Monday 6th	EVA n5 + Rubber Genan Fine Powder 20221122_01 (SMALL)	20gr in the tree cup. 50% of each.	Sylycone	220 degree	20min	Both materials stick together. They become homogeneous. Nothing stickes to the mold, however it was predictable as it is a sylycone mold. However, when we tried to put the wood stick it was very much sticky However, once again, once cold it was fine. Both materials stayed together and were flexible + solid.	 

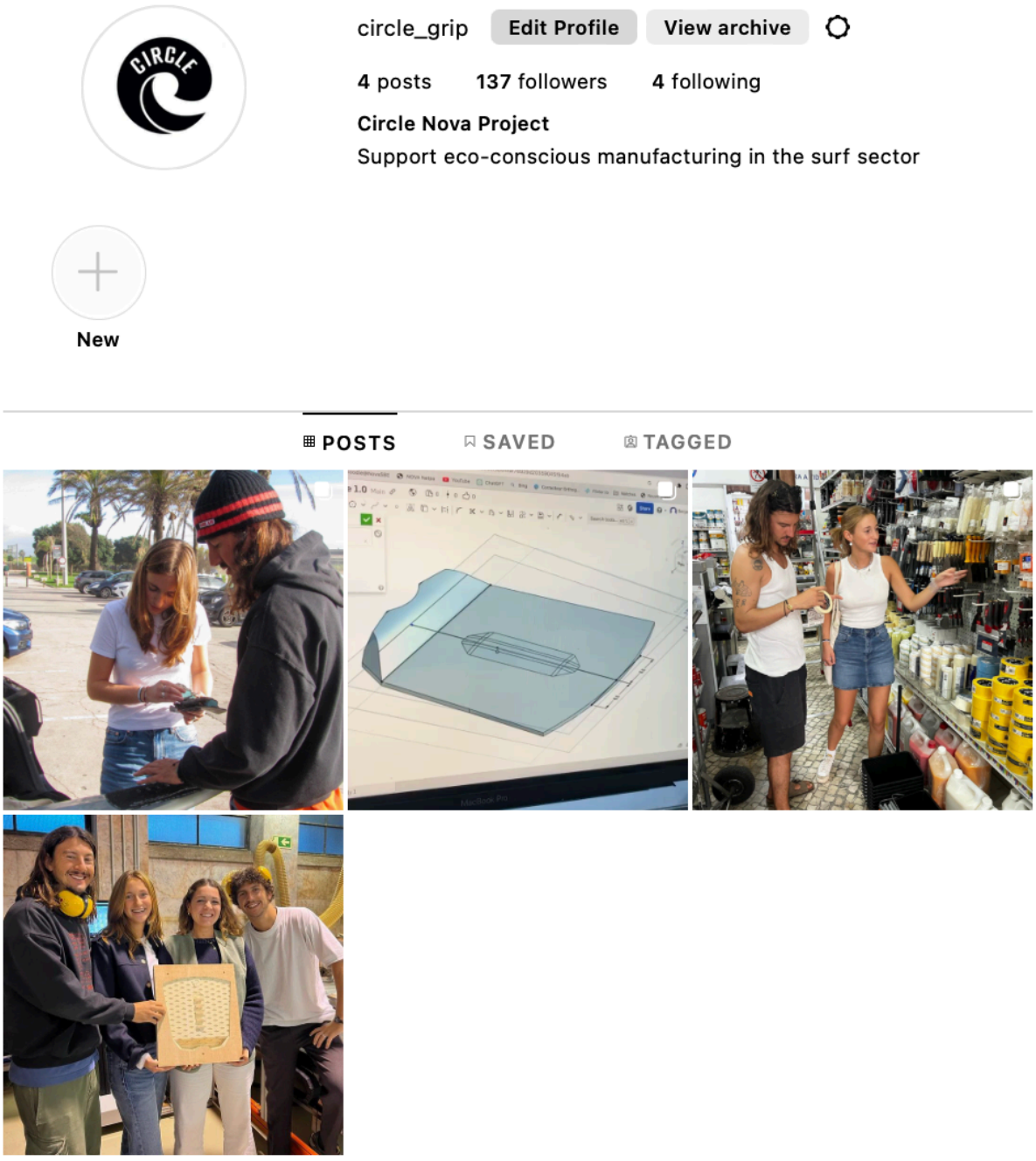
Exp n11 - Monday 6th	EVA n8 + Rubber Genan Fine Powder 20221122_01 (SMALL)	20gr in the tree cup. 50% of each.	Sylycone	220 degree	20min	Same conclusion as the one above. However, a bit more flexible and hence less resistant and robust.	
Exp n12 - Monday 6th	EVA n5 + Rubber Genan Fine Powder 20221122_01 (SMALL)	3gr in the small wood hole. 50% of each.	Wood	220 degree	20min	Bad combination - not exploitable here. It way too sticky.	
Exp n13 - Monday 6th	EVA n8 + Rubber Genan Fine Powder 20221122_01 (SMALL)	3gr in the small wood hole. 50% of each.	Wood	220 degree	20min	We put the rubber around the EVA and on all the borders of the mold. It worked pretty well. The material became flexible and strong. It did not stick and the aspect was good - similar to a tire (especially as it looked like it thanks to the rubber around). When we touched it with our hands, it felt like the material of a pad. We even tried to put it under water and the material did not change. Nothing was detaching.	
With these experiments we concluded that for the wood mold the most appropriate EVA is the number 8. In addition, for the pretty prototype Anne Laure told us to create (without rubber) we ned to run more tests. We did not took them out of the mold properly and way too early hence we do not know which one will keep the shape the best. We should try in bigger molds, more representative of the real one. 							
Exp n14 - Wednesday 8th	EVA n8 + Climbing powder	26.03gr	Wood	200 degree	40min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). After 10 to 15 min (until it cooled down) we removed it. Excellent result! The material did not stick to the mold at all and it took the shape of the wood stick. In addition, very flexible and easily malleable. CONCLUSION - CLIMBING POWDER IS EXCELLENT	
Exp n15 - Wednesday 8th	EVA n8 + Lubricant	15.8gr	Wood	200 degree	40min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). After 10 to 15 min (until it cooled down) we removed it. Very bad result. Was sticked to the mold and impossible to detatch. CONCLUSION - WE WILL NOT USE THE LUBRICANT AS IT STICKS TO THE MOLD	
Exp n16 - Wednesday 8th	EVA n8 + Oven paper	21.91gr	Wood	200 degree	40min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). After 10 to 15 min (until it cooled down) we removed it. Was easily detached from the mold. Took roofly the shape of the wood stick. Was very hard to detatch the oven paper from the material itself. Not the best option CONCLUSION - SHOULD NOT USE OVEN PAPER AS IT STICKS TO THE MATERIAL	
Exp n17 - Wednesday 8th	EVA n8 + Alluminium		Wood	200 degree	25min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). After 10 to 15 min (until it cooled down) we removed it. Did not work at all. Was easy to remove it from the mold but the alluminium stick to the material. Impossible to detatch it. CONCLUSION - WE WILL NOT USE THE ALLUMINIUM AS IT STICKS TO THE MATERIAL	
Exp n18 - Wednesday 8th	EVA n5 + Climbing powder		Wood	200 degree	25min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). After 10 to 15 min (until it cooled down) we removed it. Excellent result! The material did not stick to the mold at all and it took the shape of the wood stick. In addition, very flexible and easily malleable. It was even better than the n8 EVA. More flexible and looked better - took the shape even better CONCLUSION - CLIMBING POWDER IS EXCELLENT & EVA 5 LOOKS BETTER THAN 8.	
Exp n19 - Wednesday 8th	EVA n5 + Lubricant		Wood	200 degree	25min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). After 10 to 15 min (until it cooled down) we removed it. Very bad result. Was sticked to the mold and impossible to detatch. CONCLUSION - WE WILL NOT USE THE LUBRICANT AS IT STICKS TO THE MOLD	
Exp n20 - Wednesday 8th	EVA n5 + Oven paper		Wood	200 degree	25min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). After 10 to 15 min (until it cooled down) we removed it. Weirdly it was easy to remove it from the mold and the oven paper did not stick to the material. Weird cause it sticked to the EVA n8. Could be because we waited longer before trying to remove it. CONCLUSION - WE COULD POTENTIALLY USE THE OVEN PAPER	
Exp n21 - Wednesday 8th	EVA n5 + Alluminium		Wood	200 degree	25min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). After 10 to 15 min (until it cooled down) we removed it. Did not work at all. Was easy to remove it from the mold but the alluminium stick to the material. Impossible to detatch it. CONCLUSION - WE WILL NOT USE THE ALLUMINIUM AS IT STICKS TO THE MATERIAL	

Exp n22 - Wednesday 8th	EVA n8 + Rubber Genan Fine Powder 20221122_01 (SMALL) + Climbing Powder	Climbing powder in the mold. Then, rubber in the bottom covered with EVA	Wood	200 degree	40min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). However, had to wait longer than 10-15min to remove it as it took longer to cool down. Could be due to the rubber. Once cold, we removed the stick and the result was not that good. Was kind of easy to remove but did not look good. CONCLUSION - EVA 8 IS NOT THE BEST WITH RUBBER	
Exp n23 - Wednesday 8th	EVA n8 + Rubber Genan Fine Powder 20221122_01 (SMALL) + nothing in the mold	Climbing powder in the mold. Then, rubber in the bottom covered with EVA	Wood	200 degree	40min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). However, had to wait longer than 10-15min to remove it as it took longer to cool down. Could be due to the rubber. Very bad result. When there is nothing in the mold (like climbing powder) it sticks to the mold and cannot be removed. CONCLUSION - SHOULD PUT CLIMBING POWDER IN THE MOLD	
Exp n24 - Wednesday 8th	EVA n5 + Rubber Genan Fine Powder 20221122_01 (SMALL) + Climbing Powder	Climbing powder in the mold. Then, rubber in the bottom covered with EVA	Wood	200 degree	30min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). However, had to wait longer than 10-15min to remove it as it took longer to cool down. Could be due to the rubber. Once cold, we removed the stick and the result was good. Materials were well fixed together. Did not stick to the mold nor the wood stick. Took the shape of the wood stick perfectly. It was a bit rough (rugeux) so exactly what we're looking for. And it was flexible and strong. Will not break appart and will resist water. CONCLUSION - EVA5 SEEMS TO BE THE PERFECT ONE AS WORKS WELL WITH RUBBER & CLIMBING POWDER	
Exp n25 - Wednesday 8th	EVA n5 + Rubber Genan Fine Powder 20221122_01 (SMALL) + nothing in the mold	Climbing powder in the mold. Then, rubber in the bottom covered with EVA	Wood	200 degree	30min	Right after we took it out of the oven we put a wood stick in the material (stick had been put in climbing powder in advance in order not to stick). However, had to wait longer than 10-15min to remove it as it took longer to cool down. Could be due to the rubber. Very bad result. When there is nothing in the mold (like climbing powder) it sticks to the mold and cannot be removed. CONCLUSION - SHOULD PUT CLIMBING POWDER IN THE MOLD	
Exp n26 - Wednesday 8th	EVA n5 + Rubber Genan Fine Powder 20221122_01 (SMALL) + Climbing Powder.	Climbing powder in the mold. But this time, rubber and EVA are mixed (50% of both). More precisely - 50.31 gr for both	Wood	200 degree	30min	Immediately after taking it out of the oven we realized that putting that much rubber would not work. Combination was not good and the materials not homogene enough. Would not be able to take it out of the mold. Will never be flexible or solid enough. We would therefore need to put way less rubber in the pad. CONCLUSION - TOO MUCH RUBBER DOES NOT WORK	
Exp n27 - Wednesday 8th	EVA n8 + Rubber Genan Fine Powder 20221122_01 (SMALL) + Climbing Powder.	Climbing powder in the mold. But this time, rubber and EVA are mixed (50% of both). More precisely - 33.33 gr for both	Wood	200 degree	40min	Immediately after taking it out of the oven we realized that putting that much rubber would not work. Combination was not good and the materials not homogene enough. Would not be able to take it out of the mold. Will never be flexible or solid enough. We would therefore need to put way less rubber in the pad. CONCLUSION - TOO MUCH RUBBER DOES NOT WORK	
Exp n28 - Wednesday 8th	EVA n5 + Rubber Genan Fine Powder 20221122_01 (SMALL) + Climbing Powder.	Climbing powder in the mold. Only rubber in the bottom of the mold, covered with EVA.	Wood	230 degree	25min	To explain a bit more the process - we wanted to try it in a bigger mold, more representative of the real pad. Hence, we created a huge and rough pad with some squares in the middle, to see how perfectly the materials will take the shape of these squares. We put a lot of climbing powder in the mold and rubber in the bottom then covered it with Eva5. We put it in the oven for approximately 25min at 230 degree. When we took it out we tried to press it with a plank of wood. We did not use the press but instead we put some weight on top (give the same effect). Once cooled down, we took of the weights and tried to remove it from the mold. It was kind of hard to remove it, took a lot of time. Hence, maybe we could put more powder or remove it a bit earlier (cause we removed it 48 hours later). Regarding the results are excellent. The pad is very malleable, solid and flexible as shown on the picture. However, once removed it was not perfectly clean so we had to clean it a bit. For instance, we can see some white stains probably due to the climbing powder. Hence, we could try to put some vaseline as well or just clean it more properly. In addition, we tried putting it under water and the pad vas very resistant and had an excellent grip thanks to the rubber layer (exactly what we were trying to obtain). Finally, we had to remove with a cutter the EVA surplus; takes time but not a problem. CONCLUSION - VERY GOOD RESULTS WITH EVA5 & RUBBER & CLIMBING POWDER. ONLY THING IS - SOME STAINS.	

With these experiments we concluded that the allumium, the lubricant and even the oven paper were not suitable for our product. Instead we decided to use climbing powder as it is easy to use, does not stick to the mold or material. In addition, regarding the EVA, we have chosen to use the number 5 as it suits best the mold and rubber and it's very flexible and solid. We have also decided to apply the rubber as follows: Only in the bottom of the mold and not that much otherwise the result is not good and the pad will not be flexible enough. Furthermore, the melting temparture should be 230 degrees or maybe a bit less. And the time it should stay in the oven approximately 20 to 25 degree with the Eva 5. We will then try it in the real mold with all these new information.



Appendix L: Instagram Account & LinkedIn account



Link to LinkedIn Account:

https://www.linkedin.com/company/99076505/admin/feed/posts/

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