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OLOP: A Pioneering Technology for the Filtration of Microplastics – Market Analysis

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Group Part

Abstract

Microplastics bear an unpredictable risk for our ecosystem. We often use one of their prime sources: washing machines. To counteract this problem, we would found OLOP, incorporating our vision of a plastic free planet. We see the company as research-based and solution driven, introducing a pioneering end-to-end filter, fully dissolving microplastics. Our market research revealed the ideal location to be France, supported by the newly introduced law for mandatory microplastic filters. To reach our goals, our semi-virtual structure will rely on partnerships, strong supply chains, and dedicated employees assisting us in our mission. Our technology will be patented and protected, and logo trademarked to avoid plagiarism. A humble branding, value-based pricing, and attention-grabbing advertising strategy, combined with our retail partners, will widen our reach. Our operations funded by multiple sources will project our company value to almost €100 million in less than six years, while reaching our break-even point in three, this making us viable candidates for an acquisition representing our exit plan.

Keywords: Entrepreneurship, Business Plan, Sustainable Innovation, Filtration, Microplastics

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Table of Contents

List of Figures

List of Graphics

Executive Summary

Around 700,000 microplastic (MP) particles are released per wash load. This is equivalent to each household throwing 57 plastic bags into the ocean per year. Our company will offer a solution. Together, we are OLOP, which stands for ‘One Life, One Planet’. Through key partnerships, and strong supply chains, OLOP will make MP filtration systems a reliable solution to this problem for our potential customers.

We intend to develop a filtration system that can be connected to any washing machine. OLOP will be the first company to offer a fully closed-loop solution, the only one that leads to the complete degradation of MPs. Our mission is to offer a simple, practical way to reduce MP pollution and restore marine ecosystems.

We believe we have found a gap in the fairly new market and are therefore confident in the validity and potential success of our company. Our product will offer higher efficiency, less maintenance and complete decomposition of plastic particles, as compared to our competitor’s offering which is more preliminary and unwieldy. Nevertheless, we are aware that our success will depend on the strength of our partnerships, brand and consumer awareness of the problem. As such, we intend to establish strong partnerships, a well structured marketing plan that includes clear communication strategies such as to build a memorable brand name and image, and a patent portfolio intended to protect our technology from plagiarism.

The company will operate only in France for the first few years. This decision is based on cultural and economic advantages combined with the advantage of a supporting legislation.

The capital requirement for our company is going to be around €3 million and, all three founders will invest €150,000 themselves. As is normal, in the first two years, the company is not projected to generate profit. In order to pay our expenses in these years, sufficient funds will be acquired through governmental grants and external investors. From the third year on, the company will be profitable, and thus be able to finance its costs of growth and development. Most of the costs will refer to operations, overhead and marketing. In addition, we will have administrative costs such as accounting and legal services. The company's main investments will be made in the first year to acquire the filtration technology and obtain a European-wide patent.

Ultimately, we will permanently develop the technology and our product in collaboration with the Technical University of Lisbon and the Hong Kong Polytechnic University, allowing us an advantage over the competition. Our five-year goal is to achieve proof of concept and a high market value, to become atractive candidates for acquisitions by manufacturers of high-quality household appliances such as Miele, Bosch and Siemens.

1 Microplastic an Underestimated Danger

Last week you ate about one credit card, which is about five grams of MPs (Senathirajah, et al. 2021, 12). This month you will eat a hanger from your closet, which amounts to 21 grams of MPs. MPs are in the food we eat, the water we drink, and even the air we breathe. You are probably ingesting them at this very moment! Nowadays, we cannot escape it because it is in every single element of our daily lives. Should we be worried in light of these facts? Probably, but let's take a closer look at what we mean by MPs and how it affects our ecosystem.

> *"Microplastics are any synthetic solid particle or polymeric matrix, with regular or irregular shape and with size ranging from 1 μm to 5 mm, of either primary or secondary manufacturing origin, which are insoluble in water."*
>
> (Frias and Nash 2019, 146)

We use the definition listed above because we believe it contains all the relevant elements. However, the first definition of MP was done by Thompson et al. (2004), which describes the microscopic plastic fragments and fibers that are formed during the decomposition of macroplastics. The size limitation can be traced back to Arthur, Baker, and Bamford (2009). A further redefinition was made in 2011 by Cole et al. with the distinction between primary and secondary MPs (Cole, et al. 2011, 2589).

Primary MPs are produced as such and can be found for example in facial cleansers and cosmetic products (Cole, et al. 2011, 2589).

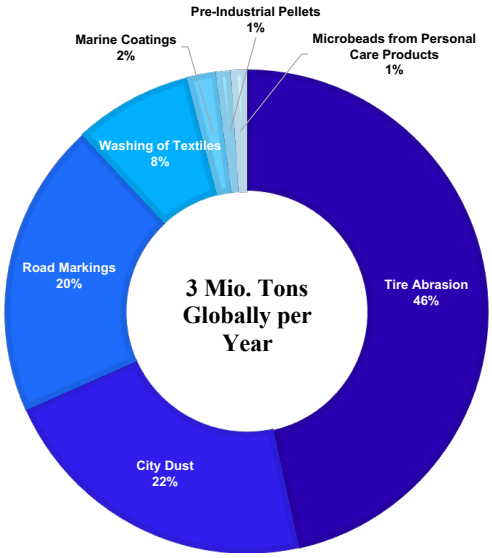
Secondary MPs are the result of the breakdown of larger plastic pieces, known as macroplastics. The degradation is fostered by photolytic, physical, and biological impacts (Browne, Galloway and Thompson 2007, 559).

MPs originate from macroplastics which are made of natural, organic materials such as natural gas, cellulose, salt, coal, and crude oil (Plastics Europe 2022). The invention and use of plastic has had societal benefits in terms of health, safety, energy-saving, and material conservation (Andrady and Neal 2009). However, we face many challenges with it.

Like described earlier, plastic waste can be found everywhere, due to its slow decomposition. As a matter of fact, only 9% of plastic ever manufactured is recycled and more than 12% is incinerated (National Geographic Society 2015). The reasons behind it are:

- The difficulty to separate the mixture of the many chemicals, due to their different properties and composures (Loria 2021)
- Contamination by food or other substances, making the plastic not clean enough to be repurposed (Plastics For Change 2021)
- Up to 40% of the 400 million tons of plastic produced annually are single-use products (BBC 2020)
- It is cheaper to manufacture new products, rather than to repurpose old ones (Loria 2021)

However, plastic waste is not the only challenge facing society. Studies have uncovered multiple sources of primary plastic release, which are shown in graphic 1.



Graphic 1. Microplastic Dispersion

(Manshoven, et al. 2022, 9)

In fact, the biggest source of MPs is tire abrasion (Goßmann, Halbach and Scholz-Böttcher 2021, 2). Nevertheless, our focus is on the

8% release through washing of textiles. This was identified as the main source of primary MPs in the ocean (De Falco, et al. 2019, 2). The emission of MPs from synthetic textiles is mainly caused by the chemical and mechanical stress that the clothes are subject to during the washing process (De Falco, et al. 2019, 1). This leads to the loosening of the microfibers from the yarns of the textile. Microfibers are a type of MPs. For simplicity reasons we will continue to refer to microfibers as MPs from here onwards. Due to their size, the detached MPs can easily pass-through sewage treatment and filtration facilities, ending up in the ocean and other bodies of water (De Falco, et al. 2019, 1).

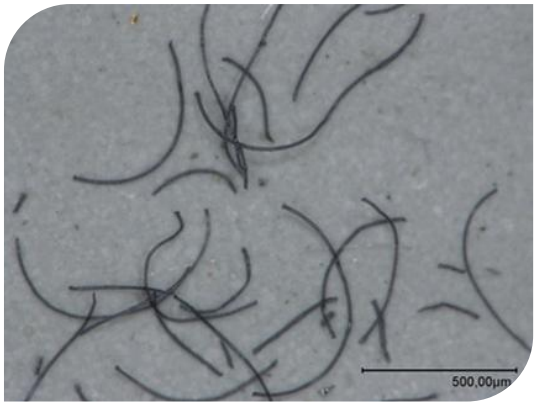


Figure 1. Microfibers

(Swiss Federal Laboratories for Materials Science and Technology 2017)

Consequently, it causes unbalances in our ecosystems and natural processes. One of the best and most known examples is the Great Pacific Garbage Patch, an ‘island’ formed of plastic floating between California and Hawaii (Lebreton, et al. 2018, 1). The ‘island’ has an estimated surface area of 1.6 million square kilometers, this is more than three times the area of France, and 17 times the size of the whole of Portugal. Out of this amount, a minimum of 8% is composed of MP particles (Lebreton, et al. 2018, 1). These plastic particles floating in our oceans have negative impacts, as heavy metals picked up from nearby metal sources turn them into vectors (Brennecke, et al. 2016). Thus, becoming spreaders of organic contaminants and maritime microbes, including antibiotic-resistant bacteria (Caruso 2019, 922).

With such large amounts of contaminated MPs in the environment, it is not surprising that they have found their way into the animal ecosystem. Both small and large animals often confuse

the MPs with their prey (Shaw and Day 1994, 39). Ingesting such particles represents a major health threat for these creatures (Brennecke, et al. 2016, 192).

However, the problem is even bigger. Since we humans consume some kinds marine animals in our diets, we can also ingest these contaminated particles through our food chain (Miranda 2016). The amount depends on different factors such as geographic location, age, and lifestyle (Barboza, et al. 2020, 11). Besides the ingestion through sea food, MPs can also be found in food like salt, honey, beer, tap water, and even the very bottled water we drink (Diaz-Basantes, Conesa and Fullana 2020). Research has shown that MPs are already found in our stool (Schwabl, et al. 2019) and recently, in March of this year, even in our blood (Leslie, et al. 2022). An accumulation of MPs in our bodies could lead to a variety of biological reactions such as inflammation, oxidative stress, genotoxicity, necrosis, and apoptosis (Wright and Kelly 2017, G). The chemical additives absorbed by the MPs could cause further harm due to the contained reactive oxygen species (Wright and Kelly 2017, G) such as illness, visible aging (Villines 2017) and even a higher cancer risk (Tchounwou, et al. 2012).

There is still a major lack of research on the impact of MP on human health. However, it has been established that the toxicity mainly depends on the exposure concentration, particle components, the adsorbed pollutants, and individual vulnerability (Rahman, et al. 2021, 6). Since more and more plastic decomposes forming MPs, the amount to which we are exposed to will likely increase and given the lack of research, the effects are not easily predictable. Therefore, it is obvious that a solution is needed to reduce MP dispersion in our waters, protect our natural ecosystems and to prevent humans' health from worsening.

2 Market Analysis

Demonstrating the attractiveness and dynamics of our intended market, we evaluated industry data and came to several noteworthy conclusions, which are explored in more detail in the following sections.

2.1 Market Gap

Washing machines are ‘white goods’ that belong to the category of major household appliances (Bhandalkar and Das 2019). In 2022, global sales of washing machines and tumble dryers are estimated to be around $74,500 million, with the highest sales in China (Statista 2021). The compound annual growth rate for the next four years is estimated at 3.49% (Statista 2021). We found several striking factors that explain the reason for this continuous increase. On the one hand, in the residential sector the increased demand and consumption of apparel products, fueled by fast fashion, entails the need for washing machines (Fortune Business Insights 2021). On the other hand, in the commercial sector the urbanization movement and improved infrastructures have a major positive impact on sales figures (Fortune Business Insights 2021). Industry reports have pointed out that more than two-thirds of purchases are still made through offline sales channels (Statista 2021). This in turn means that, despite the trend towards online shopping stated by Singh (2019), only a small proportion of purchases in this segment are made online. Overall, we recognize that the market penetration of washing machines is more than 80% of households (Electrolux 2016, 42). Despite the large market potential and numerous major players, the environmental problem caused by MPs in the market has not yet been solved, which for us indicates a gap in the market and great potential for OLOP (Yang, et al. 2019). According to the ‘UN Environment Program’, the loss of textiles and MPs through washing, with an estimated annual global release of 0.26 million tons, is one of the primary sources of MP release into the environment (Ryberg, Laurent and Hauschild 2018, 16). For a better

understanding, we have converted this number in a more tangible figure: The MPs released annually weigh a staggering amount, about as much as 1,200 blue whales, the heaviest animals alive today. Reportedly, about 11% of these are released in Europe and the Commonwealth of Independent States alone (Ryberg, Laurent and Hauschild 2018, 73).

2.2 Target Market

Since our potential customers are generally all habitants who own or want to buy a washing machine, we decided to carry out a market segmentation, helping us narrow down our target market. This step will enable us to establish a detailed and more strategically targeted marketing strategy as well as to achieve satisfying sales figures in the future.

OLOP made the strategic decision early on to focus on the European market first, primarily because that is where most of the founders' networks are located and where we want to be headquartered. Considering the economic prosperity (Walters 2010), we have chosen the GDP as the indicator, narrowing the market to the top three strongest countries in Europe. In the process, this led us to the following countries: Germany, United Kingdom, and France (World Bank Group 2020). We decided to exclude the United Kingdom based on the increased barriers due to the newly introduced rules resulting from the Brexit, stating the exit from the European Single Market. This act makes it easier for members of the European Union to do business by reducing complications and costs, as well as allowing for easier global expansion (Santagostino 2017). Even though Germany shows a higher unit sale of washing machines compared to France and therefore indicates a larger potential market volume for our product, the target market we finally selected is France (Statista 2021).

The influential factor behind our decision is the adapted law made by France in March 2020, proposing that by 2025 every new washing machine must be equipped with a filter that catches MPs that come off clothes during washing (Ries 2020). We consider this as a strong advantage and a prime reason for our decision, as we expect to have a positive impact on our target group. Our product will not only be important for environmentally conscious consumers, but technical solutions like the one we will provide will become mandatory, therefore targeting everyone who owns a washing machine. To strengthen our decision, we examined additional economic aspects and found many benefits, which we present in more detail below.

An important economic benefit for OLOP would be governmental support for business start-ups through tax incentives such as tax breaks (PricewaterhouseCoopers LLP, Center for Social and Economic Research and Institute for Advanced Studies 2017). It enables local as well as foreign investors to invest in our company with more ease. They face fewer obstacles and benefit from lower costs, resulting in a higher likelihood of us raising funding. We also believe that investors benefit from France's economic performance and developed economic and political environment, as they provide the necessary stability (World Bank Group 2020). Moreover, we could benefit from tax incentives for R&D projects (OECD 2021). In addition, France offers a respectable workforce due to its advanced education system (Miller and Warren 2011). This ensures high standards, especially when combined with the high productivity levels of the workforce (National Productivity Board 2019) and makes it easier and less costly for us to recruit new personnel at later stages. According to a European Commission report in 2018, the cost of starting a business in France is relatively low compared to the EU average. Thereby it also favors our decision from a financial perspective (Clark 2022). Additionally, an invaluable economic advantage of being located in France is the existing environmental awareness. France ranks 5th in the world in terms of environmental performance based on the ‘Environmental

Performance Index' (Yale Center for Environmental Law & Policy 2020). In light of the above ranking, we concluded that environmental performance plays an important role in France, achieved through political enforcement, such as legislation, and societal support.

In view of these advantages, we would launch our OLOP Filter initially in the geographical region of France. Considering our long-term prospects and the company's goals, it represents the most promising market for our product launch.

2.3 Target Group

To understand our potential customers and their needs, we conducted an online survey and based on the positive response of more than 100 participants (Appendix A), we were able to create two relevant personas. By accurately defining our target audience, we can better target our marketing efforts and resources. However, our goal is not to individualize or specialize, so that the size of the target group defined, and thus of the potential customers, remain at a good level.

Figure 2. Target Group Persona 1

(iStockphoto LP 2022)

Chloé, a woman in her early thirties, started her professional life not that long ago. She is a very independent and ambitious woman who attaches great importance to an environmentally conscious lifestyle. After all, she has already gained some experience in this field. However, due to the many changes and necessary investments that come with the beginning of the new stage of life and an entry-level salary, Chloé is very thoughtful in her purchasing decisions. As a result, she is very price sensitive and reluctant in spending. Small

household appliances that are more expensive than €100 are less of an option for her. For these types of purchases, Chloé tends to use online options to make better price comparisons.

Figure 3. Target Group Persona 2

(iStockphoto LP 2022)

Jean, a man in his mid-fifties, is already firmly established in life. He is happily married and has two teenage children. Professionally, he is very successful, which is why he looks back with pride on what he has achieved so far. Nevertheless, he learns something new every day, including from his children. The topic of sustainability has come into focus, especially through them, and since then it has taken on an ever-greater significance in his life. In addition, he has a strong interest in technical novelties and regularly informs himself about innovations. However, the user-friendliness of a product is still at the forefront of his purchasing decisions. Due to his regular and good average income, he is less price-sensitive and more quality-conscious. Moreover, he is an in-store buyer, as he prefers to physically see and touch a product before making a purchase decision.

2.4 Competitor Analysis

We assume that our competitors would share the same target group therefore, we decided to analyze them in detail. Being aware of the fact that any kind of MP removal system can be referred as our competition, we start off by splitting them into direct competitors and indirect competitors.

Direct competitor: Any company that offers an external filtration system that is placed or installed outside the washing machine, to capture any MP that is discharged from the wastewater.

Figure 4. Direct Competitors

(PlanetCare 2022) (Filtrol 2022) (Environmental Enhancements 2022)

Indirect competitor: Any company offering drum devices that focus more on reducing the release of MPs from clothing during washing.

Figure 5. Indirect Competitors

(LANGBRETT GmbH 2022) (Cora Ball 2022)

The Competitive Profile Matrix (Appendix B) we conducted gave us a concrete picture of the strengths and weaknesses of our competitors (Adom, Nyarko and Som 2016). For this purpose, we identified the following nine critical success factors (CSFs):

1. Patent claimed
2. Target Market
3. Target Group
4. Sales Channel
5. Product Price
6. Installation Cost
7. Cleaning Effort
8. Compatible Detergent Type
9. Efficiency

The latter five are key characteristics of the product itself. Consequently, of the survey results (Appendix A), we assigned a percentage weighting to each of the CSFs. For comparative purposes, we then assigned a score to each CSF in the next step. In doing so, we used the common scoring system: four – a major strength, three – minor strength, two – minor weakness and one – a major weakness.

The resulting matrix showed us that PlanetCare's strengths lie in its low-cost strategy and low cleaning effort. The weaknesses, on the other hand, include low efficiency and the lack of a patent for the filter technology, which could lead to possible imitation and ultimately to a loss of value for the company. In contrast, Filtrol claims to have protected its innovation with a patent, which ultimately strengthens its brand value. The company's second major strength is its high efficiency rating of 89%. This efficiency rate places the company among the market leaders. However, only 100 households have been reached by 2020, which highlights their low penetration. In addition, the brand's high price of over €100 puts it in a weak position compared to its other competitors. The third direct competitor Environmental Enhancement, with its 'Microplastic Luv-R' filter, has a strength in its large reach due to worldwide shipping, but weakens in comparison in cleaning effort, efficiency, as well as product price. The product price of €156.43 is the highest on the market. In addition to the product price, this product requires a plumber for installation, which costs around €50 extra. Moreover, Environmental Enhancement also lacks patent protection. Langbrett and Coraball, both indirect competitors, stand out for their low price and average efficiency. However, both imply high cleaning efforts for customers, resulting in a weakness. Coraball is also unable to offset the negative effect of the lack of a patent with its greater reach, making Langbrett's 'Guppyfriend' the strongest competitor in the industry. Nevertheless, one study questioned the quality of laundry cleaning with 'Guppyfriend' (Napper, Barrett and Thompson 2020, 6). In addition, we found articles criticizing that the filling quantity of a washing machine is limited to three quarters due to the washing bag (Napper, Barrett and Thompson 2020, 3). Consequently, more wash cycles are required for the same amount of clothes. It results in more energy and water consumption. Therefore, the sustainability factor is significantly reduced.

Based on the analysis and the resulting scores, we were able to identify Langbrett as our principal competitor, followed by Coraball. We explain this mainly by the high importance of the CSF ‘Product Price’ among our respondents, which is lowest for these two companies. In addition, the reach of the two products is greater, which has a positive effect on the overall weighted score.

We as OLOP would perform best in the overall comparison because we are aware of the weaknesses of our competitors described above and turn them into our strength. We aim to have a patent on our technology that ensures our unique value. Our reach, while still limited, will be large enough to be competitive and it allows us to better target audiences. With the highest efficiency available while requiring the least amount of maintenance, our product will be the most user-friendly and effective on the market. In addition, we will be the only company that offers a product compatible with any type of detergent, so as not to limit the customer in any way.

Emerging competitor: Any company doing R&D around plastic filtration.

Figure 6. Emerging Competitors

(Matter 2020) (Bosch Global 2022) (BSH Home Appliances Group 2018) (Miele 2022) (Xeros Technology Group 2022)

We are aware that we will have to deal with emerging competitors in the future. Two other companies are already exploring this area and are in the development phase of a product. However, Matter and Xeros Technologies show similar characteristics to our direct competitors analyzed above. Hence, we are more than convinced that we are ahead of them in terms of

product performance. We also want to highlight that we are conscious of OEMs such as Miele, Bosch and Siemens. In our favor, the research has revealed that these companies are currently still in the early stages of research and are just starting to get involved. Our goal, therefore, is to grow fast enough in the first few years and build a good reputation in the market to become attractive to these types of companies for acquisition. Due to the required knowledge and research prerequisites, the market entry barrier in our area is very high, which is why we do not expect too many relevant new competitors in the short term. Nevertheless, one of our tasks is to continuously monitor and re-evaluate the market.

2.5 Market Potential

Using various calculations, we were able to determine both the total market, as well as our own promising future market share. As we will exclusively focus our business on the French market in the first phases, we have calculated our potential solely for this market. We assume that otherwise the high assumption rate could lead to inaccuracy. As mentioned above, our potential customers are all households that have a washing machine. Since the percentage of households equipped with washing machines in France was already 96.4% in 2016 (See 2022), we have assumed for simplicity that this rate stayed constant untill today. This results in more than 29 million potential households based on European statistics (Eurostat 2022). For deviation purposes we anticipate that only 80% of the households will cover the entire market, to further prevent us from overestimating its value. Due to the unknown penetration rate of our product, we forecasted three scenarios: Worst Case, Expected and Best Case (Appendix C). In all three scenarios, we have chosen the most conservative results so as not to misjudge ourselves, but we aim to exceed the projected numbers. Using our expected scenario as a benchmark, we have assumed a penetration rate of 5%, resulting in a market volume of approximately 1.2 million customers and a market value of around €82 million at a product selling price of €69.99.

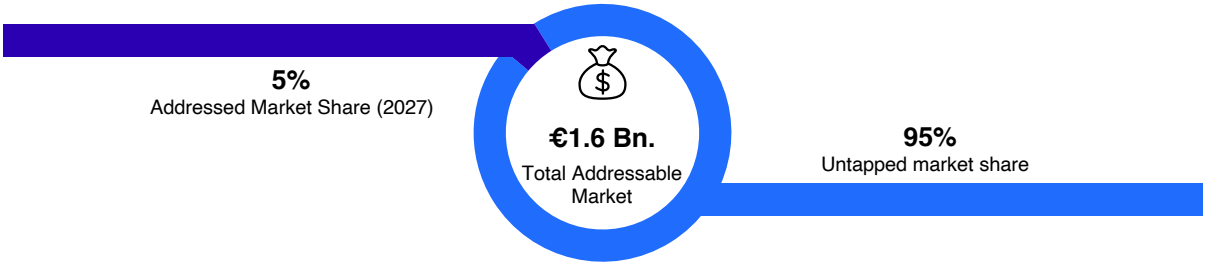


Figure 7. Market Potential

Own Figure

Looking at the figures, we are convinced that OLOP has great potential and will reach the market share of 5% after the first five years.

2.6 Market Trends

Ensuring we are always at the forefront of the market, we have undertaken the decision to look at market trends as they can have an impact on the ongoing business. We have been able to identify three fundamental trends and will use them strategically to our advantage.

1. Rising demand for smart washing machines
2. Increased sustainability efforts especially regarding energy efficiency
3. Higher investment in R&D

First, there is a strong trend towards the use of new technologies, which is due to the rapid advancement of science and technology. This is also referred to as the Industrial Revolution 4.0 (Velmurugan, Saravanasankar and Bathrinath 2022, 1). It includes technological developments such as the Internet of Things, Artificial Intelligence, Machine Learning or Cloud Computing. Such developments are useful for Computer Integrated Maintenance Management systems. These maintenance methods are divided into three categories: Planned Maintenance, Condition-based Maintenance and Predictive Maintenance (Velmurugan, Saravanasankar and Bathrinath 2022, 1). Nowadays the emphasis is on the last method. Together with the Internet of Things,

processes can be simplified as it enables the monitoring, controlling, and computerizing of machines through intelligent devices. This will play an important role in smart household appliances in the future. Smart home appliances can be defined as devices that are programmed to operate independently and automatedly. An additional feature is that they can be controlled remotely, for example via an application using a smartphone device (Robles and Kim 2010). The latest technology introduced in washing machines are radio frequency identification sensors. This technology allows the detection of each item of clothing in the washing machine. Based on the information obtained about the material and weight, the settings of the machine are automatically adjusted (Shen, et al. 2019). As a result, there is a trend toward fully automated smart washing machines (Ablondi 2021). The advantage of these machines is the self-sufficient maintenance process and the continuous monitoring and information transfer to inform both the service provider and the customer in a timely manner. We see this as a need to continuously work on our product to become even more self-sufficient and convenient and to use today's technologies to develop, for example, an application that tracks consumers' green footprints.

The second trend we noted was the growing importance of efficiency improvements in the context of sustainability. The 2016 Paris Agreement highlighted the importance of climate protection targets to significantly reduce global greenhouse gas emissions and limit the global temperature increase to two degrees Celsius this century (United Nations 2016). As global energy demand is expected to continue to rise, resulting in a growing negative contribution to climate change, the search for solutions to improve energy efficiency has begun. Since washing machines are among the most energy-intensive wet appliances in the household sector, they belong to an appliance class whose energy intensity must be reduced (Cranston, Askalany and Santori 2019, 683). This seems to be the single most effective way to achieve the climate change

goals set in Paris (Cranston, Askalany and Santori 2019, 683). As a result, regulations such as the mandatory energy labels in the European Union have been introduced. The goal of these labels is to push manufacturers and companies to improve the energy and water efficiency of their products, resulting in lower electricity and water consumption (European Commission 2021), which ultimately will in turn help to reduce greenhouse gas emissions. Nonetheless, it is not just the companies themselves or the authorities that have recognized the urgency of this problem, consumers are also playing an important role in this trend. A study shows that consumers are willing to pay a premium price for more efficient labels, leading to an increased pressure on brands (Sammer and Wüstenhagen 2006, 21). This implies that retailers have a high probability of increasing their sales and profit by following the trend of offering more sustainable washing machines, which we could support them with.

According to a report by Fortune Business Insights, another trend among major industry players such as LG Electronics, Samsung Electronics and Haier is the increased investment in R&D (Fortune Business Insights 2021). In order to keep pace with the above-mentioned innovations, it is essential for companies to acquire their own knowledge. Furthermore, today more than ever, first mover advantage plays an important role in maintaining market share. This is mainly due to our fast-changing and short-lived product world. Investments are being deployed in various areas such as design and composition, sustainability, technological improvements and consumer understanding. New products, such as the recently developed washer-dryer combo machines, are launched on the market based on the insights gained. Another example is the more thorough research into wastewater contamination from washing machines, which leads to a generally better understanding and further research into filtering systems. At the same time, the gained knowledge is evoking new partnerships. In general, it has been proven that R&D in the private sector has a positive impact on innovation and ultimately leads to a higher return on

investment (Bilbao-Osorio and Rodríguez-Pose 2004, 452). In addition, growing investments suggest that the industrial sector is perceived as having great potential. Consequently, we will put this trend at the center of our company and act as an R&D-based company.

2.7 Opportunities and Challenges

As we continue to build our business and want to be at the vanguard of our product category, we will make the most out of the four opportunities available to us.

1. European Union Standards
2. Sustainability Awareness
3. Market Expansion
4. Innovation Technology

One factor that will have a major impact is European Union standards. As briefly mentioned earlier, France has already passed a law making it a requirement to have MP filters for washing machines from 2025 onwards. However, this is only the beginning of such regulations, as the United Kingdom (Costa 2022) and the entire European Union (Ries 2020) are already working on passing a law on this very topic. Enforcing such regulations will allow us to increase our customer base and ultimately our sales, as we will be one of the few companies offering a solution to this problem. Households with any income will be able to buy our product to comply with the new law without major obstacles.

In addition, we see consumers' increasing awareness of sustainability and health issues as an opportunity to work more easily with washing machine brands. Purchasing behavior is highly dependent on consumers' interests and beliefs (Creyer 1997). Therefore, it is essential for brands to act accordingly to generate sales. Consequently, our bargaining power and position is much stronger since we have the customers' purchasing power and their environmental consideration on our side.

Market expansion will be another possibility for us to maintain our position in the market in the long term. Since we have chosen France as our starting country, we will have the opportunity to expand quickly and without major regulatory obstacles throughout Europe. Moreover, we recognize a high market potential given the currently limited competition and high barriers for newcomers to enter the market. These barriers are mainly the required scientific R&D.

The fourth and final option we see as an opportunity is our technological innovation, which enables the first fully closed-loop system. All competitors commit to cleaning the filter and disposing of the filtered MP. Since we are aware that MPs are also transported through the air and cannot yet be properly recycled, disposal via plastic waste does not completely solve the problem. With our technology we will tackle this issue resulting in a first mover advantage and better consumer usability.

However, we are aware that we have not only opportunities but are also presented with some challenges ahead.

1. Problem Awareness
2. Emerging Competitors
3. MP Degradation by Bacteria

One of the most prominent being to raise awareness of the issue among consumers. Nowadays, most consumers know about the general plastic problem, but usually not specifically about our niche market. We cannot solely rely on introduced legislation. Consequently, to raise awareness and thus change consumer behavior, we will need an excellent marketing and communication strategy. We can accomplish this by educating consumers about the existence and the negative effects of MPs on the human body and the environment, creating a demand for our product.

Furthermore, while researching and analyzing our competitors, we came across two companies, Matter and Xeros Technologies, that we classify as emerging competitors. They could become a threat to our market share, but we can already conclude that they do not use the same technology and require a higher cleaning effort of the filtration system. Because of that we will maintain our closed-loop advantage. Nonetheless, we must seriously consider them and constantly keep them in mind. In general, we need to monitor the market development, as the great potential and further findings on MPs will tempt more companies to conduct research and start business in this direction.

The final and certainly most important challenge we will face is the development of MP degradation by bacteria. For the purpose of a closed-loop system of our product, it is imperative that we enable the degradation of MPs without human intervention. Since the use of bacteria has already been proven for certain types of plastic and the universities' research teams are studying the use of bacteria to break down MPs, we are optimistic to achieve our goal in a timely manner.

3 Organizational Plan

We initiated our project approach with a clear look towards the mission, the values and goals that would guide us toward attaining it. Adhering to our self-set guide, will keep us on track as future organizational decisions need to be addressed.

3.1 Our Vision and Mission Statement

'Live in a planet free of plastic pollution – we only have one.'

'We are committed to offering our planet a simple, practical way to reduce microplastic pollution and restore marine ecosystems. Easy, simple, impactful.'

3.2 Our Values

Throughout our business operations, we will stay close to our values and transmit them to our consumers through our work. Our three main values are:

- Honesty: Communicated through the transparency of our processes and supply-chain systems.
- Relatability: We are a team of down to earth individuals who just want the best for our environment. To be relatable is to reflect ourselves in our consumers.
- Sustainable: Relieving our environmental impact as mankind is what drives our operations. Therefore, we strive to reach our growth, production and distribution goals in a sustainable and low-impact manner.

3.3 Economic and Environmental Goals

In the following section, we will elaborate OLOP's economic and environmental goals, the first of which is divided in short-term and long-term goals.

To set our short-term goals, we followed the SMART criteria, assuring they were specific, measurable, achievable, realistic, and time bound. In accordance with our market penetration estimations, we kept our goals conservative. OLOP's primary goal is to decrease the total amount of domestic MP dispersion in France by 0.18% with OLOP's new filtering technology, by launching our product on the French market in 2023. We aim to reach over 58,000 households, thus acquiring 5% of our total expected market share for 2027, generating almost three and a half million euros in revenue through our online and physical marketing campaigns, by the end of the first operational year. By taking into account our estimated growth rates, we aim to acquire our target market share by 2027 and reach our break-even point as early as 2024.

When determining long-term goals for the company, we considered the impact we want to have on the environment, our rate of growth and our exit strategy. As first movers in the market, we will benefit from the novelty that our product represents for the market. Therefore, we strive to maintain this competitive advantage and become technology leaders in our sector, offering the highest level of efficiency and quality. Additionally, aligned with our R&D objectives, the search for lower-impact packaging that better fits our products would result in increased cost efficiency, by eliminating unnecessary wasted material and occupying less space in our warehouses. We envision that the implementation of supporting laws for the use of filters like ours will pivot us into faster growth, therefore giving OLOP more visibility.

Our business will keep having a positive environmental impact as a main driver of our daily activity. Our objective is to contribute to the Sustainable Development Goals (SDG) set by the United Nations in 2015, by striving to reach cleaner water and sanitation (SDG 6) and protecting life below water by preventing its pollution (SDG 14) (United Nations 2022). By reinvesting our company profits for our R&D projects, we aim to increase the capacity of our filters, and

shorten purification times. Additionally, by our fifth year of operation, we expect our efforts to result in a more sustainable material to produce our filters, thus replacing High Density Polyethylene but maintaining its same strength and resistance, fundamental characteristics for the product's efficiency. To communicate our quality standards and our reliability of our company, we plan to be verified by certificates such as the ISO 9001 and ISO 14001 (SGS SA 2022).

3.4 Key Performance Indicators

To monitor our growth and profitability, company specific key performance indicators (KPI) were established. These will be used to maintain transparent communication with both internal and external stakeholders. Of primary importance are year on year demand and revenue growth. The first refers to the monitoring of our market penetration and gradual gain of market share. The latter is fundamental to reach our break-even point in our set goal, and additionally to assure initial investors a payback period of three years. Following, the return on net sales is an important profitability indicator, used to communicate the profit for every euro of sales. Related to this KPI is the Compound Annual Growth Rate, important for current and future investors to evaluate the return of their investment over a period longer than one year. The Customer Acquisition Cost will be adopted as a measure to determine our marketing return on investment, therefore the efficiency of our marketing campaigns and the cost per new customer acquisition. Finally, customer satisfaction will be an important indicator for us to assure proof of concept, determined through yearly customer surveys, allowing us to listen and change accordingly.

We will monitor the progress towards our sustainable development goals through impact KPIs, associating to our positive impact a quantitative and comparative measurement. Our goals of water detoxification will be directly related to the number of households we will be able to

reach. Therefore, our impact will be monitored by the quantity of MPs collected yearly in kilograms. To do so, we will consider the average yearly MP dispersion per washing machine, our filter's efficiency rate and total households reached, which is dependent on our year-on-year demand growth rate.

4 Administrative Plan

For us to be able to function, there are various personnel decisions we have to make. In this respect, it is important for OLOP to ensure that our cooperation within the company and with external partners works well and is built on a solid foundation.

4.1 Management and Personnel

Based on our strengths, we will divide the most important positions within the company among us three founders, to ensure that all departments function smoothly. All three of us have previously acquired knowledge in the specific areas that qualify us for the respective positions.

Rebecca Pierobon
OLOP Founder

Christoph Sigmann
OLOP Founder

Maike Henkel
OLOP Founder

Figure 8. Founders

Own Figure

Christoph is going to be the Chief Executive Officer (CEO) and the Chief Marketing Officer (CMO). In the role of the CEO, he will assure the overall success of the company by developing strategies, setting goals and working closely with the remaining Chief Officers. As a CMO, he will be responsible for all marketing related activities. He will oversee the planning, developing, implementing and monitoring of OLOP's overall marketing strategy. This includes promoting the brand and its products to the previously identified target group through online and offline channels. Some additional duties include pricing and packaging. Rebecca will be the Chief Financial Officer (CFO) in addition to being the Chief Product Officer (CPO). She will supervise all financials for the organization by preparing financial reports, analyzing cash flows and budgeting revenues and expenses. Furthermore, in her role as a CPO she will be accountable for decisions and strategies related to the product development and production. The

primary objective of her position is going to be leading and driving the development of our product to add value to our customers and our business. She will be the visionary who oversees the product research and design as well as any R&D related activities that aim for a product enhancement. Maike will be the Chief Operation Officer (COO) and Chief Strategy Officer (CSO) of OLOP. Her day-to-day activities will include developing procedures, supervising employees, and designing business strategies. Some of her responsibilities will include regularly analyzing the market, seeking potential audiences and other partnership opportunities, identifying potential risks and providing assistance in mitigating them.

In conjunction with us three founders, we believe it is important to expand the management team to run the company smoothly. Therefore, we will hire a CTO who serves as oversight for the development and dissemination of our technology. In addition, we will consider an advisor who can guide us through the initial stages of our startup.

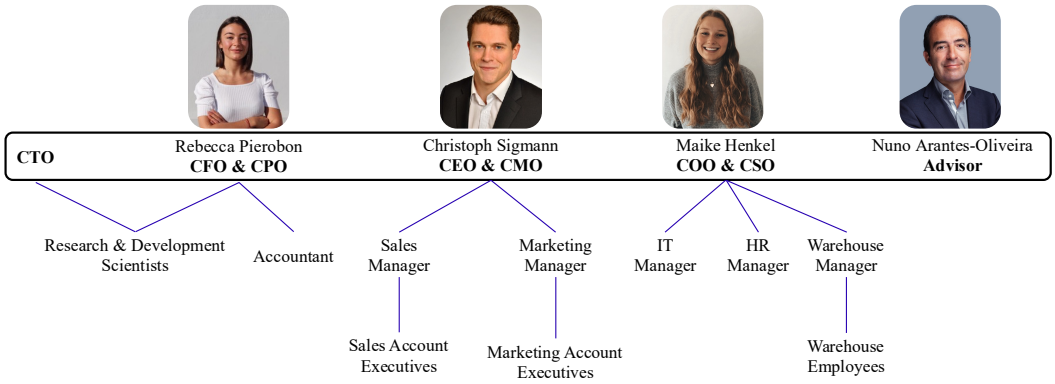


Figure 9. Organizational Chart

Own Figure

For our operations, we will employ one human resources manager, who will be responsible for all personnel matters. Furthermore, to ensure that our marketing and sales strategies will be well executed, we will add up to five full-time employees to our team, by the end of 2027. Additionally, a team of three full-time customer service employees will take care of costumer concerns. In these areas we will be in direct contact and exchange with our sales partners and

customers. In order to be able to guarantee a good support, we think it is necessary to have an adequate team size. We additionally intend to hire one IT Manager to ensure a smooth launch of the externally build website. However, the plan is to grow the team over the years. Our goal will be to use this support to constantly improve our online store and make it more user-friendly. Since we want to grow quickly, we will also need an accountant.

The rented warehouse is going to be coordinated by two qualified full-time warehouse managers. Half of the warehouse employees will be responsible for the biotechnical process of growing and maintaining the bacterial batch and mixing the ferrofluid solution. The second half will be responsible for the smooth handling of the packing of each order. This division will help us to ensure a quick and seamless process from the order to the delivery to our customers. In addition, we can ensure that our new process technology remains in-house. With additional warehouse employees, we as a management team will also gain capacity to perform regular quality control checks.

4.2 Partnerships

Our business will depend to a large extent on partnerships. To establish these well, we will conclude individual contracts with our partners depending on mutual interest and need. In our supply chain, one of the most important partnerships will be with the two research universities. They will play an important role in our development phase and are going to be essential to the functioning of our product. Therefore, we will pay a lump sum total of €500,000 to the Technical University of Lisbon over the first five years. In return, this will give us the rights and ownership of the technology and all further developments. This step will be important for us to ensure our independence and allow us to file a patent application. Since we want to continue working with the inventors of the technology, we will also negotiate a service contract

with the institution. This contract will allow us to continue our work with the scientists, but also give us the opportunity to stay agile. The results achieved will be assessed by our CTO and a new decision will be made each year on further cooperation. With this method, we will ensure that we will reach our goal and always have the best possible cooperation partners. We will also use this type of service contract as the basis for our partnership with the Hong Kong Polytechnic University. The contract stipulates that the university research teams share their acquired knowledge and further research results with us and that we will provide each university with an annual sum in return reflected in our R&D expenses. Due to the fact that both Universities are not allowed to have equity in a business, the monetary renumeration represents the best solution. In the next phase of our supply chain, we will conclude supplier and manufacturer contracts. These will specify costs, responsibilities and liabilities, duration, quality, quantities and orders, as well as any other contractual provisions such as NDAs. As far as costs are concerned, in these cases we aim to take advantage of economies of scale and negotiate in our favor based on the volumes we will buy and produce. Finally, we will enter into distribution agreements with our retail partners with the likes of Fnac and Media Market. The terms and conditions going to be used in this agreement are particular to the sale, marketing, defect and return provisions, ownership of the goods and supply. In our case we will focus on distribution agreements for commissions only. Commission-based distribution agreements will specify how much each distributor receives if it reaches or exceeds our sales targets. We believe this type of agreement provides an excellent opportunity to drive growth and sales while properly rewarding distributors for their efforts.

5 Intellectual Property

The legal side of our business will be important to build and protect our brand at the same time. In the following sections, we explain in more detail what outcomes this will have for our competitors and contractors.

5.1 Patent

For the long-term continuity of our unique value proposition, it is important that we protect our idea. An intellectual property such as a patent portfolio will be inevitable. A patent allows us to protect our profitable invention from imitations. On the one hand, the patent rewards us owners by granting us a monopoly of use limited to a maximum of 20 years. On the other hand, it will also fulfill an important information function by publicizing the invention as an incentive for further innovations. A European-wide patent is of great importance for our R&D-based business. Without our own consent, third parties will be prohibited from manufacturing the patented product in the defined countries, offering it, placing it on the market or importing or possessing it for the beforementioned purposes. Furthermore, it will reflect our company's research performance and innovative strength.

For the positive reasons mentioned above, OLOP will apply for a European patent portfolio at the European Patent Office (EPO) (European Patent Office 2016). The portfolio will consist of the following technical process and product patent applications:

1. The degradation process of MP by bacteria
2. The technical construction of our filtration system
3. The application in connection with washing machines

As we would need to file more than four national applications, the European procedure allows us to be more cost- and time-efficient. However, the procedure is still intensive and time-consuming, which is why we will consult an attorney to assist us. There are several steps to go through from application to grant.

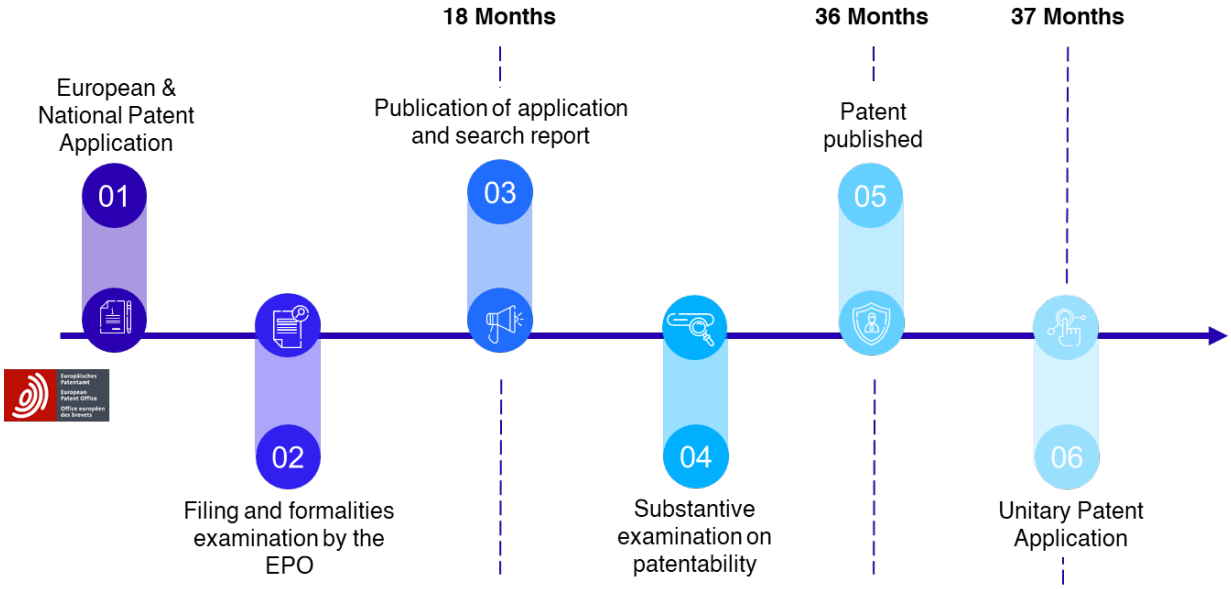


Figure 10. Patent Process

(European Patent Office 2022)

Since 2022, a new system has been introduced that allows us to file a request for a Unitary Patent at the EPO (European Patent Office 2021). This must be done within the first month after publication of the grant in the European Patent Bulletin. It permits us to not let the 'bundle patent' granted by the EPO, subsequently break down into individual national patents as previously. Given that currently only 25 European Member States participate in the enhanced cooperation regarding the Unitary Patent Treaty (European Patent Office

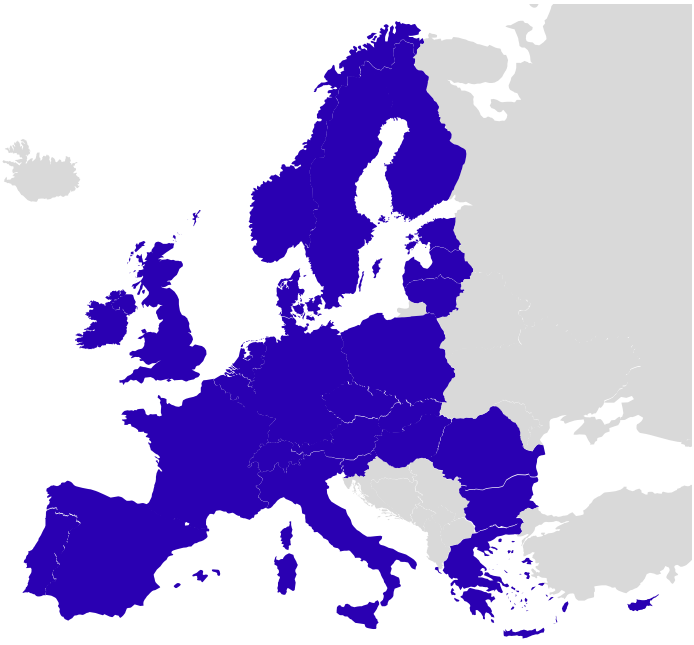


Figure 11. Areas Protected by Patent

Own Graphic

2022), we will extend the Unitary Patent to include four national patents that we have identified as relevant. Thus, we will have a product patent in the 29 countries highlighted in figure 15.

In order to maintain the patents over the years we will be obliged to pay renewal fees for the unitary as well as the national patents. Furthermore, it is important to mention that in the future an extension of the patent applications will be necessary, which, for example, will allow the technology to also be used for other applications such as water treatment plants.

5.2 Trademark

The second form of intellectual property we will have, is a European Union trademark (EUIPO[B] 2022), to be renewed every ten years. It will ensure that our product name and logo are protected from unauthorized use in the 27 Member States. It will lead to the strengthening of our brand and support our uniqueness and recognition. A trademark has the advantage of prohibiting any marks that are at risk of confusion with an existing trademark. This means that another company will not be able to use our symbol and brand name if it looks or sounds similar or has a similar meaning to our then existing brand. This will apply if the products or services are related to ours. Overall, the trademark will enable us to gain and maintain the loyalty of our customers and create value and growth by defending our brand.

5.3 Non-Disclosure Agreements

For OLOP, our invention is not going to be the only item to be protected, but also our knowledge and all accompanying sensitive information. That is why we will enter into NDAs with our contractual partners. NDAs are important for us to build trustworthy relationships. It is a legally binding contract in which both parties agree that sensitive information they receive will not be shared with third parties. A contract like the one described is common in the corporate world,

as it ensures that private information does not become public. Our objective is to agree only on mutual NDAs with our suppliers and manufacturers to avoid any mistrust. In this way we will be able to minimize our risk and exposure to dangers. Nevertheless, any intellectual knowledge would only be shared if strictly necessary.

6 Financial Plan

All our activities described in the above plans are displayed in the following finance section, which, we divided into three main stages:

1. The Kick-off
2. The Launch
3. The Growth

6.1 Funding Opportunities

For the diversification of our funding resources, OLOP will resort to a mix of different opportunities in its early stages of development. In the kick-off stage, these will be represented by: founders' personal resources, angel investors, venture capital funds and grants from the European Union. Additionally, to maintain attractiveness for future investors, we intend to maintain a low equity dilution among our shareholders.

For the first level of funding in our kick-off stage, we as the founders of the company will invest an equal amount of liquidity into OLOP's equity, having ownership on equal stakes. This will result in three investments of €150,000 for a 20% stake in the company equity each, subsequently the founders will hold majority shares of the company. Second to the founders are going to be two separate angel investors. These individuals are close to all three founders, who supportive of our idea and convinced of our inevitable success, are dedicated to investing the amounts of €97,500 and €90,000, for a relative stake of 13% and 12% of OLOP's equity. As external investors with limited knowledge in the specific sector of OLOP's operations, we made the decision to limit their managerial rights, this way preventing the business from steering away from its niche sector. However, we will make use of their extended experience in investing in capital markets and discovering promising startups, mentoring us through the crucial initial stages of coordinating our operations and allowing for a sustainable growth. Still in the seed funding stage, we intend to approach 'XAnge PE', a private equity fund dedicated

to the growth of startups, and a brand under the well-known Siparex Group, which is among France's leading independent private equity groups (SIPAREX Group 2022). The groups values, previous experience, and interest in OLOP's sectors of operations made for it to be an ideal investor for us to approach. XAnge PE states to be impact driven and passionate about innovation and technology, pillars deeply imbedded in our promising core business. The solution the fund offers would be the ideal support for our future business needs, taking the position of an active but hands-off shareholder. Overall, they focus on the organizational scaling of start-ups, which aligns with our business scope and exit strategy, offering to invest an initial seed amount and then again along the way. We envision that the group will invest an initial sum of €112,500 of the ten million euros available in the very beginning of our development, for the equivalent equity stake of 15%. The three different sources of seed investing will bring the initial value of the company's equity to €750,000. Parallel to stakeholder investments, we will cover our remaining need for liquidity in the kick-off and launch stages through EU grants specific to our area of operations. The grants we would target which best fit our business trajectory and in order of application are:

1. EUIPO (EUIPO[A] 2022)
2. EUROSTAR 2022 (TechFunding 2022)
3. HORIZON 1 (European Commission 2018)
4. EIC Accelerator (TechFunding 2022)

The first grant, EUIPO, is targeted towards the protection of our intellectual property and powers the registration of our business' trademark and patents. We expect to receive the entire available sum of €2,250. EUROSTAR 2022 is an intergovernmental program supporting R&D initiatives and projects in explicit support of the UN's Sustainable Development Goals. We intend to use the expected sum of €1,050,000 to fund the first stages of our technology

development initiatives, scheduled to present its results by the end of 2022. Moving onto stage one of our development, the launch of our product on the market and the beginning of our operational activity, we expect HORIZON 1 and the EIC Accelerator to grant us with our remaining need for resources. The first program in question calls for innovative approaches for the restauration, protection and preservation of our oceans, seas, and water, therefore implementing solutions for the prevention of further pollution. Given the particular fit with our company vision, we expect to receive the sum of €600,000, to be used almost entirely to cover our R&D projects of 2023. The last program, the EIC Accelerator, is part of Horizon Europe, a European wide framework for innovation and research, targeted to boost innovative technology-based products like ours into a market-ready concept. Out of the vast sum on offer, we expect to receive €1,500,00, additionally to the Business Accelerator Services they provide such as mentoring, partnership opportunities and the exposure to new networks. For all four grants we will go through similar submission and evaluation procedures, after which the granted amounts will be distributed as vouchers or deposited directly into the company's bank accounts.

6.2 Cost structure

The majority of OLOP's cost structure in year 2022 and 2023 will be made of fixed costs, these representing 55% of our total costs. However, this proportion is highly dependent on our yearly demand. In fact, the impact of fixed costs on our cost structure is expected to steadily decrease from the first year of operations, as variable costs will increase in function of our forecasted sales. From the initial division stated above, we estimate the impact of our fixed costs on our cost structure to be of 24% by 2027, noticeably decreasing the risk of their coverage. Though a substantial difference from the initial proportions, the increase of variable costs on the total expenses stands to indicate the flexibility of our cost structure. The division of fixed costs will go as listed below:

Group Part

- Selling, General and Administrative
- Marketing costs
- IT Operations
- Employee expenses

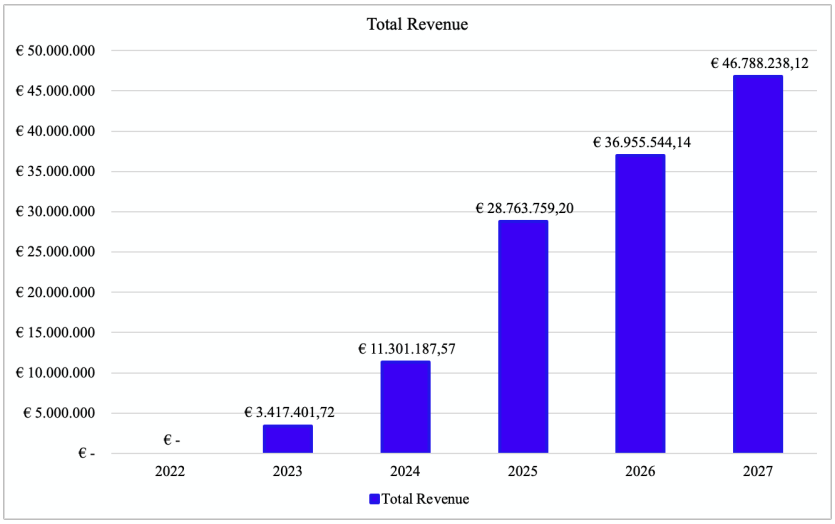
The decision to keep employee salaries separate is an intentional subdivision for calculating simplicity purposes. Among the biggest costs within this category will be our R&D investments. In the kick-off phase this investment is projected to be worth a total amount of €500,000 for our R&D program to be distributed between our partner research universities, according to the service contracts we have with them. This is necessary to assure the expected R&D results in the forecasted time frame. In the following years, investments in R&D will start from a lower sum of €300,000 to steadily increase each year, to sustain the constant innovation of our technology, prime resource for OLOP's success.

OLOP's variable costs will be comprised of COGS estimated collecting expenses for the raw materials, the outsourced manufacturing of the plastic filter, and the internal production of ferromagnetic fluids and active bacteria. The contribution margin of our filters is estimated to be 78%, meaning that for each filter sold at the price of €69.99, is a remaining €54 after the coverage of per unit costs. The same concept applies for the similar contribution margin for our bacteria refill cartridges, at the level of 65%, and for the ferrofluid refill cartridges, at the slightly lower level of 59%. Both of them require direct manual labor for their production and upkeeping, substantially covered by the profit that results from their sales.

6.3 Revenue Planning

Our expected revenues are based on our sales estimations. The thorough market analysis allowed us to derive from our target audience the desired market share, which we intend to acquire by the end of 2027. We then estimated the demand growth rate by following market

and sector trends, and relevant opportunities. By investing in effective marketing campaigns before and during the product launch, we expect to have an initial market penetration of 0.5% by the end of the first year of operations. A steady growth will follow until 2025, when we expect demand levels to increase exponentially due to the implementation of the supporting French law, making it mandatory for people to use a filter like ours when using their washing machines. A realistic jump in demand quantities of 160% over the previous year would then result in the successful reaching of our halfway milestone towards our aspiration of 5% total market share, and drive our revenue to around €28.7 million. In the following year we expect growth rates to be lower than the previous jump, but steadily increasing overall, nonetheless. Following our repurchase strategy, unlike OLOP's first years of operations, the periodic supply of bacteria and ferrofluid cartridges will become our main revenue stream from the year 2026 on. The units of cartridges to distribute will accumulate each year based on the number of existing OLOP customers, in need of periodic refills. Finally, our revenue estimations associate 50% of our filter sales with indirect sales through our retail partners, and account for their commission of 20% on selling prices. Further information on this topic can be found in the Partnership section.

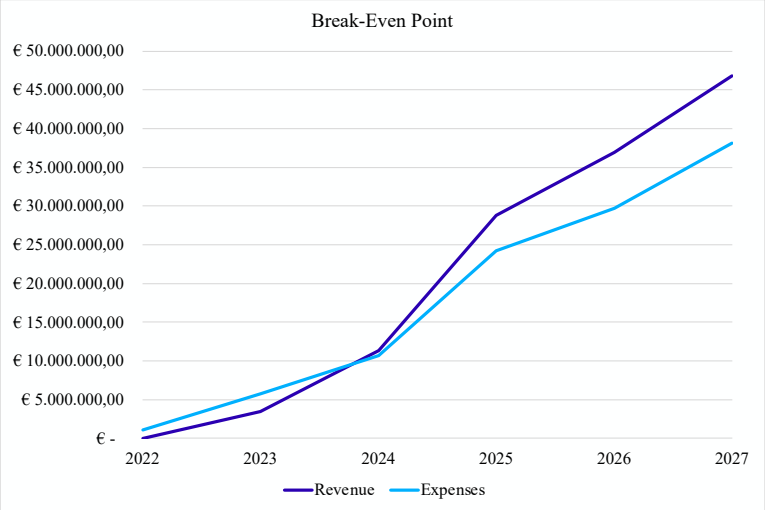


Graphic 2. Revenue Growth

Own Graphic

6.4 Break-Even Analysis

For us as a start-up, it is crucial to keep track of our expenses and revenues over the years. It is important to know at what moment the business becomes profitable. This can be seen very well with the help of a break-even analysis. The break-even point shows the necessary level of sales to absorb or neutralize our costs. According to our calculations, we could reach this point by the year 2024. To this metric we associate our Compound Annual Growth Rate ratios, ranging from 69% prior to our break-even point, to 43% after it. This implies a strong and steady growth that we are confident to provide our investors through our business operations.



Graphic 3. Break-Even Analysis

Own Graphic

6.5 Risks and Mitigation

While mapping our estimations and future growth, we identified three possible risks that could slow down our path to reach our goals in the forecasted timeframes.

1. Excess demand
2. Under demand
3. Competitors

In the event of any of these risks happening, we would implement mitigation strategies to prevent our situation from worsening. The first risk we identified was excessive growth rates, leading to overwhelmed supply chains resulting in the incapacity to meet demand. This would ultimately leave space for emerging competitors to acquire our lost market share. In the event

of this happening, we would fund the operational upsizing by raising equity through our current shareholders and reverting to capital markets to attract bigger investing opportunities. The second risk is the opposite of the first phenomenon, referring to lower growth than expected due to stagnant market conditions. To mitigate this from happening, R&D projects will be dedicated to the adaptation of the OLOP Filter technology to different products, already from early stages of our operation. Lastly, the third risk we found relates to emerging competitors. Our market analysis states that many of our competitors are yet in pre-operational theoretical stages, allowing us to benefit from first mover advantage. However, given the fast pace and ever-increasing interest in this sector, these emerging competitors offering new technologies would compromise a threat to our trajectory and threat our market share. Therefore, we trust our innovative marketing campaigns and transparent communication to spike interest in our product and maintain a strong relationship with our customers. In addition, we would anticipate our approach to OEMs such as Bosch, looking to negotiate the implementation of our product in their end products and appliances involving water.

6.6 Valuation

For the valuation of our company, we used standard multiples based on similar industries in all sectors in which our product falls into. For consistency purposes we remained conservative, using the lowest multiples to evaluate OLOP. Because our company is only profitable from the second year of operations, the evaluation was based on a different multiple from that year on. The two multiples we used were based on sales and profitability metrics. The first was used just before reaching profitability, which was then replaced with the latter multiple. Using this method, OLOP's value is expected to reach €97.7 million by the end of 2027 with an exit multiple of 11.3.

7 Milestones and Exit Plan

For the roll out of our business our first target is the company registration which we plan for the coming months. The second milestone to be reached is the signing of the contracts with the Technical University of Lisbon and the Hong Kong Polytechnic University. The technology is at the core of our business, therefore having the rights to it is fundamental for it to run. Once this has been secured, the patent process can be kicked off, protecting the technology from competitors. After that we can start negotiations with partners and suppliers to prepare for the product production and distribution. In the coming years our efforts will be put on the launch and testing of the OLOP Filter on the market, then in the following the focus is going to be placed on our sustainable growth.

With the ongoing R&D, we expect to launch the OLOP Filter in the second quarter of 2023, which initiates the 'Launch' phase, followed by our first revenues. The next milestone to be reached is the break-even point in the year 2024. To support our growing sales, production and thus the number of warehouse employees will need to grow, reaching double digits in the same year. Due to the vast market size, growing environmental consciousness, and the implementation of the supporting French law, we expect strong growth peaking in the year 2025. In this year, warehouse employees are expected to increase by 160% compared to the previous year, that is from 11 to 28. This will be a necessary step to meet the growing demand of around 300,000 filter systems and the accumulating 850,000 bottles of ferrofluid solution and active bacteria. From this point on, we expect the OLOP Filter to have fully proven its concept.

On the long run, we would find ourselves in a very competitive environment, since washing machine producers will highly likely become direct competitors. Furthermore, there is the risk

that our product becomes obsolete because new washing machines could be equipped with integrated filters. That is why we envision our revolutionary technology being used in washing machines, where it will have its greatest impact for now. To achieve this, we aim to grow our overall company value and market share, in order to prove competence for an acquisition. The value of our company is highly influenced by our intellectual property rights such as the European patent. Furthermore, this would be beneficial for the acquirer given the low expansion barriers allowed by the European Union, evermore frequent laws on water filtration systems and the increased sustainability awareness throughout the continent (Yale Center for Environmental Law & Policy 2020). OEMs would represent the best candidate for our acquisition, and represent our ultimate exit strategy, to reach around 2027. OEMs would gain a competitive advantage by implementing our filters to their products and increase brand awareness through their sustainable initiatives. Companies with global operations such as Bosch, Siemens or Miele have the financial means to support mass production supply chains and protect the technology across globe. This is an important characteristic, which determines the full potential and success of our technology.

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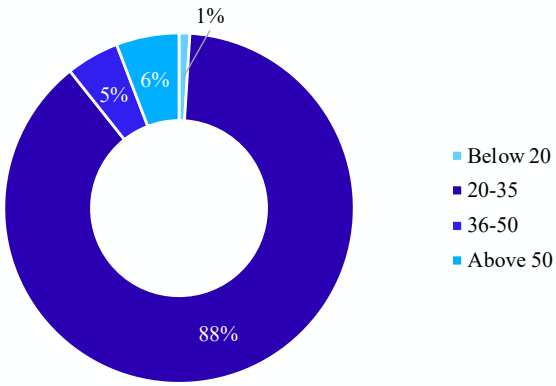
Appendix

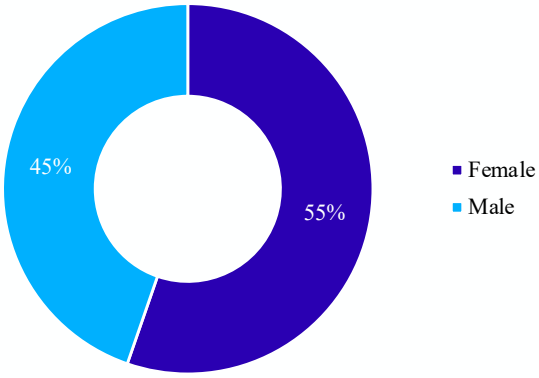
Appendix A Survey Results

Appendix A.1 Age Split



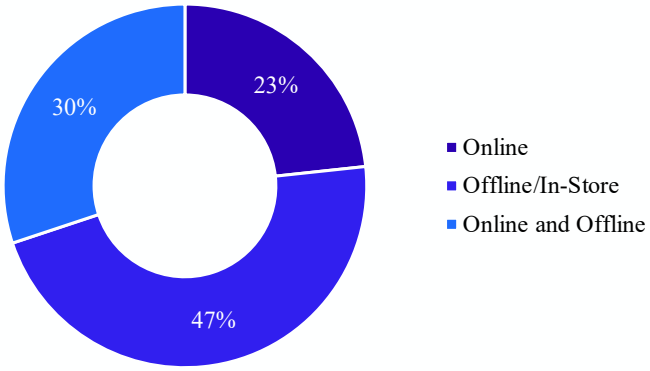
Graphic 4. Age Split

Appendix A.2 Gender Split



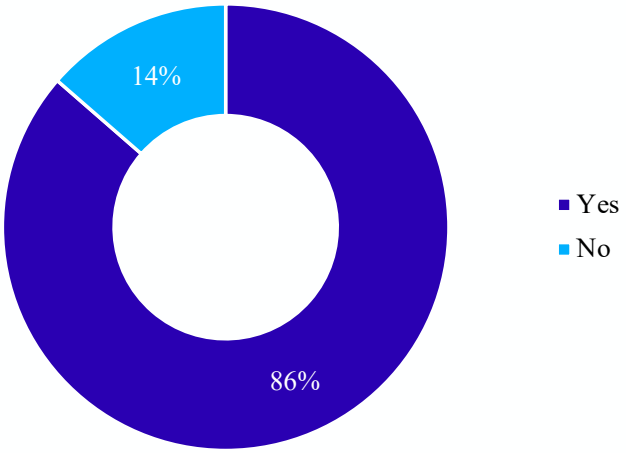
Graphic 5. Gender Split

Appendix A.3 Preferred Purchase Channels for Washing Machine Accessories



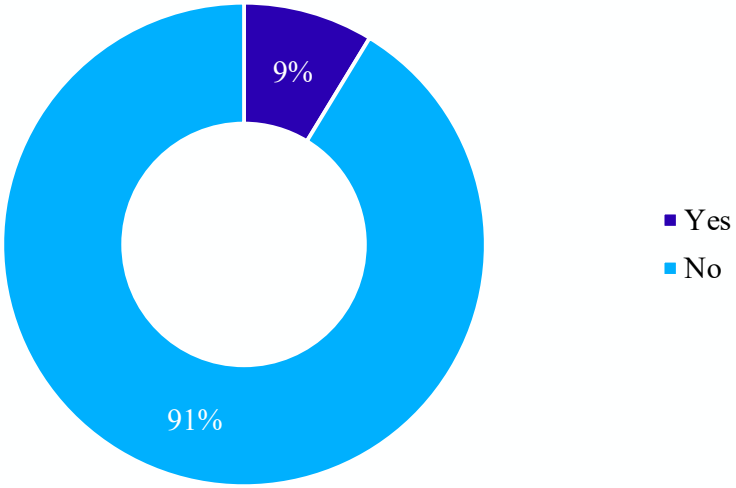
Graphic 6. Purchase Channels

Appendix A.4 Problem Awareness



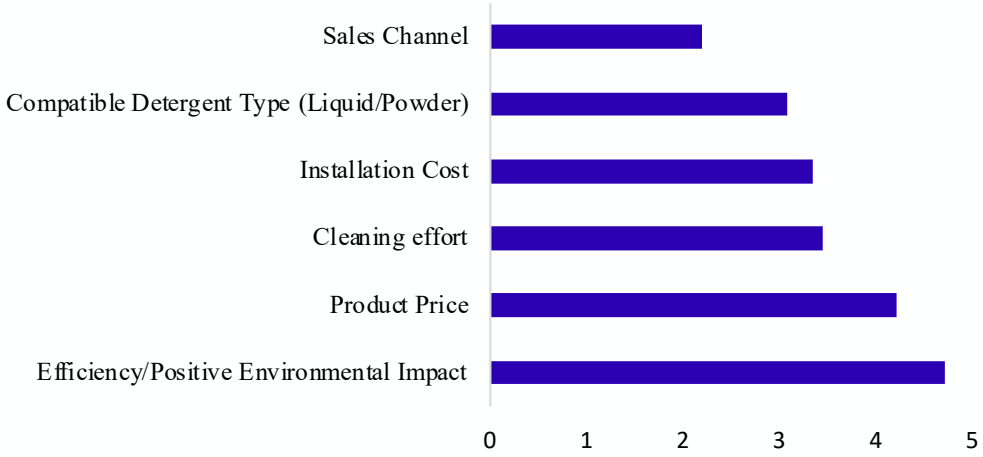
Graphic 7. Problem Awareness

Appendix A.5 Presence of a filtration device in percentage



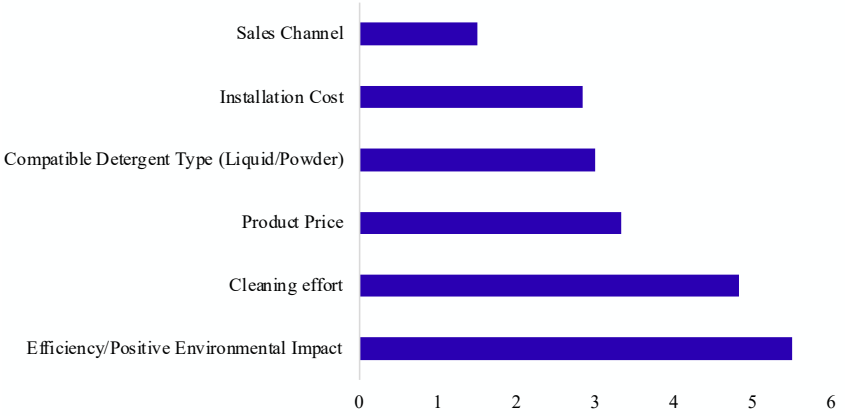
Graphic 8. Presence of a filtration device

Appendix A.6 Purchase Factors (Age Group 20-35)



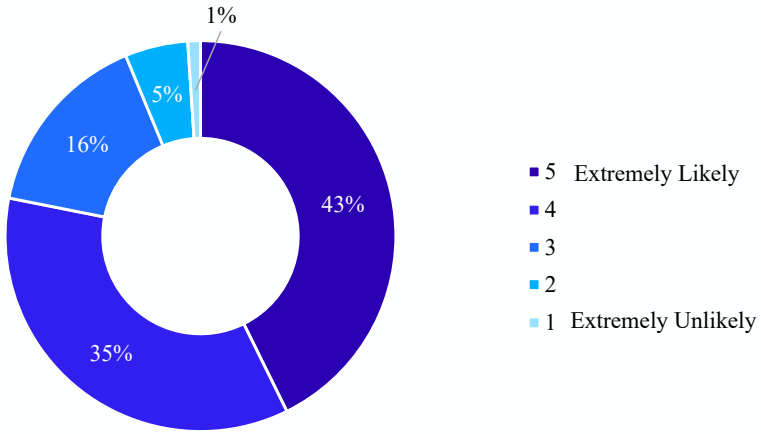
Graphic 9. Purchase Factors (Age Group 20-35)

Appendix A.7 Purchase Factors (Age Group above 50)



Graphic 10. Purchase Factors (Age Group above 50)

Appendix A.8 Buying Likelihood



Graphic 11. Buying Likelihood

Appendix B Competitor Analysis

B.1 Competitor Information

			Competitor 1	Competitor 2	Competitor 3	Competitor 4	Competitor 5			
		OLOP	PlanetCare	Filtrol	d Enhancement (Micro	angbrett(Guppyfriend)	Coraball		Matter(Gulp)	Xeros Technologies(Xfiltra)
		Our Business	Direct Competitor	Direct Competitor	Direct Competitor	Indirect Competitor	Indirect Competitor		Emerging Competitor	Emerging Competitor
Company Highlights	Business Model	Suscription Model	Suscription Model	One - time charge	One - time charge	One - time charge	One - time charge		One - time charge	One - time charge
	Patent Claimed*	Yes	No	Yes	No	Yes	No		Yes	Yes
Market Information	Target Market	EU & UK	EU & UK	17 Countries	Worldwide	43 Countries	Worldwide		No information	Depends on Partnerships
	Target Group	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic & Commercial		Domestic	Domestic & Commercial
Sales Information	Sales Channel	Online & Offline	Online	Online	Online	Online	Online & Offline		Available Autumn 2022	Available end of 2022
Product Information	Product Price	69,99 €	59,50 €	147,21 €	156,43 €	29,75 €	35,88 €		221,00 €	83,94 €
	Retrofit	Yes	Yes	Yes	Yes		Yes		Yes	No
	Installation Cost	No	No	No	Yes	No	No		No	Yes
	Maintenance	156-208 Washes*	15-20 Washes	8-10+ Washes	2-3 Washes	1 Wash	5 Washes*		20 Washes	3-4 Weeks
	Detergent Compatibility	Powder & Liquid	Liquid	Liquid	Liquid	Liquid	Liquid		Powder & Liquid	Powder & Liquid
	Efficiency	90%	25%	89%	29%	54%	31%		No information	78%

Sources			PlanetCare Website	Filtrol Website	MicroPlastic Luv-R Website	Guppyfriend Website	Coraball Website		Gulp Website	Xfiltra
			Study Results		Study Results	Study Results	Study Results			Study Results
Assumptions		* Once per year with an average of 3-4 washes per week					* Bunch of Washes has been assumed to be about 5 washes			
Conversion Rates				Conversion rate used (8.4.22) $1 = €0.92 Original price $159.99	Conversion rate used (8.4.22) $1 = €0.92 Original price $170		Conversion rate used (8.4.22) $1 = €0.92 Original price $38.99		Conversion rate used (8.4.22) £1 = €1.20 Original price £184.29	Conversion rate used (8.4.22) £1 = €1.20 Planned price £70
Note	* Research on USPTO and DEPARTISNET did not produce any patent registrations									

Figure 12. Competitor Information

Own Figure

B.2 Competitive Profile Matrix

					Competitor 1		Competitor 2		Competitor 3		Competitor 4		Competitor 5	
			OLOP		PlanetCare		Filtrol		Environmental Enhancement (MicroPlastic Luv-R)		Langbrett (Guppyfriend)		Coraball	
			Our Business		Direct Competitor		Direct Competitor		Direct Competitor		Indirect Competitor		Indirect Competitor	
		Percentage Weight	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Company Highlights	Patent Claimed	15,00%	4	0,6	1	0,15	4	0,6	1	0,15	4	0,6	1	0,15
Market Information	Target Market	13,00%	2	0,26	2	0,26	1	0,13	4	0,52	3	0,39	4	0,52
	Target Group	12,00%	2	0,24	2	0,24	2	0,24	2	0,24	2	0,24	3	0,36
Sales Information	Sales Channel	5,00%	3	0,15	2	0,1	2	0,1	2	0,1	2	0,1	3	0,15
Product Information	Product Price	13,00%	2	0,26	3	0,39	1	0,13	1	0,13	4	0,52	4	0,52
	Installation Cost	9,00%	3	0,27	3	0,27	3	0,27	2	0,18	3	0,27	3	0,27
	Maintenance	11,00%	4	0,44	3	0,33	2	0,22	1	0,11	1	0,11	1	0,11
	Detergent Compatibility	7,00%	3	0,21	2	0,14	2	0,14	2	0,14	2	0,14	2	0,14
	Efficiency	15,00%	4	0,6	1	0,15	4	0,6	1	0,15	3	0,45	2	0,3
	Sum	100,00%	27	**3,03**	19	**2,03**	21	**2,43**	16	**1,72**	24	**2,82**	23	**2,52**

Figure 13. Competitive Profile Matrix

Own Figure

Appendix C Market Potential

		Worst Case Scenario	Expected Scenario	Best Case Scenario
	Private Households 2020	30.304.000	30.304.000	30.304.000
	Share of households equipped with a washing machine (2016)	96,4%	96,4%	96,4%
	Private Household with washing machines	29.213.056	29.213.056	29.213.056
Target Group	Adaption rate 80%	23.370.445	23.370.445	23.370.445
	Penetration rate	1%	5%	10%
Market Volume/Size	Number of Target Customers * Penetration rate	233.704	1.168.522	2.337.044
	Product Price	69,99 €	69,99 €	69,99 €
Market Value	Market Volume * Product Price	16.356.974 €	81.784.872 €	163.569.743 €

Figure 14. Scenario Analysis

Own Figure

Appendix D Interviewee Overview

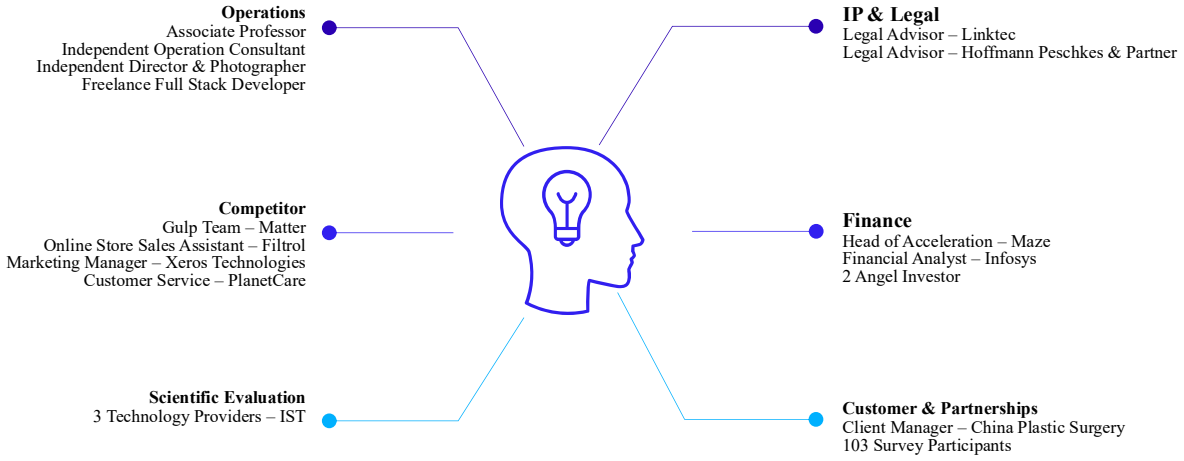


Figure 15. Interviewee Overview

Own Figure