**Product Scenario**

"Air Purifier Market Size was valued at USD 6.3 billion in 2022. The air purifier market industry is projected to grow from USD 7.0 Billion in 2023 to USD 13.4 billion by 2030, exhibiting a compound annual growth rate (CAGR) of 11.4% during the forecast period (2023 - 2030)."

Perfect Purifiers LLC (PP LLC) has been in the Air Purification business for over ten years. They specialize in producing three types of air purifiers.

* High Efficient Particulate (HEPA) Air Purifiers: HEPA filters suck in air through a special HEPA filter and push out fresh air. HEPA purifiers can trap air particles as small as 0.1 Microns.
* Spray Air Purifiers: These small and mobile purifiers spray air into a room or compartment and neutralize gasses or odors. PP LLC has options for cleaning agents to be included in the spray.
* Commercial Air Scrubbers: These are heavy-duty air purifiers used for industrial or commercial purposes. PP LLC produces both wet scrubbers and dry scrubbers.

**Opportunity and Team**

PP LLC believes they have an opportunity to improve upon their current HEPA air filter line and address a market problem. They have asked Robert Winston to be the Product Manager for this effort. Robert is assigned to Operations. Valerie Kumar will act as the Sponsor for all product initiatives. Valerie will provide funding to approve the Product Concept Document and the Business Case. A team is assembled with the initial goal of designing and developing several prototypes with various features. Initial funding of $30,000 has been allocated to support team resource needs during the Conceive and Plan phases. In addition, the team was tasked to develop value propositions and positing statements to support the ultimate product launch. Robert will work closely with the following team members. The team will meet every Tuesday afternoon to discuss the status.

* Sylvia Sanders: Marketing Lead
* Hiroshi Tanaka: Lead Engineer
* Ram Chopra: Design Lead
* Maggie Jones: Product Owner
* Sarah Newton: Project Management
* Raul Hernandez: Operations Lead

**Market Information**

HEPA Air Filters are extremely popular. However, there are issues associated with their purchase. PP LLC surveyed many current buyers and users and analyzed the market problem. Here are some of the biggest shortfalls PP LLC hopes to address with its new HEPA Air Filter product line.

* HEPA filters are not designed to remove volatile organic compounds (VOCs) and viruses from the air. This is a shortfall. Customers want a purifier that eliminates as many of these contaminants as possible.
* HEPA filters cannot remove odors from the air. Many customers have stated they want a purifier to address this issue and clean the air.
* Some HEPA purifiers generate Ozone. This can harm the health of the user and the environment. Many customers state they will not purchase any product with ozone emissions.
* HEPA purifiers must be regularly maintained. They can become a breeding ground for mold and bacteria if they aren’t maintained. Customers state that they want a purifier with minimal maintenance needs.
* HEPA filters are recommended to be replaced annually. Replacement filters are expensive. Customers state they would like an improved solution.
* Some HEPA purifiers are noisy and distracting. The less noise, the better.
* Many HEPA purifiers only cover a small area. Customers want wider purification coverage at lower prices.

**The Competitive Market**

There are many HEPA Air Purifiers on the market. Some primary competitors include Donaldson Company Inc., Hengst, MANN+HUMMEL, Honeywell International Inc., and Daikin Industries Ltd.

However, no product eliminates many issues cited by customers. PP LLC believes the time to market its new product line is now. Consumers are increasingly concerned about the air they breathe and are looking for an optimal product solution. It is currently 5th January. PP LLC wants to launch its new line in the next six months to satisfy the summer season that hazardous air conditions have recently plagued due to a few circumstances. They anticipate the design will take three months, development two months, and beta testing one month.

**Product Development**

Robert and Valerie worked together and estimated initial costs of $80k to build three distinct prototypes with five features. They believe that returns will exceed $200k annually for two years, with an Internal Rate of Return of more than 200%.

Valerie will initially want to measure current versus post-launch market share, sales, revenue, and customer satisfaction. The new and improved purifier line fits well with the current PP LLC vision to expand sales and the current market by offering new and improved air filtration technology to benefit current and future customers.

The Engineering team believes they can improve upon the current HEPA line as follows in priority order. They plan to break out product design and development into three phases.

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| **Phase** | **Purifier Deliverables** |
| **Phase 1:**  **Design: January**  **Develop: March** | * Develop a new dual HEPA purifier with an air freshener and cleaning option. * Reduce noise levels by 50%. |
| **Phase 2:**  **Design: February**  **Develop: April** | * Introduce a new HEPA filter that is easy to remove and replace, less expensive than average filters, and extends filter life to one and a half years. * Improve motor strength to increase filtration coverage by 50%. |
| **Phase 3:**  **Design: February**  **Develop: May** | * Eliminate or significantly reduce all ozone generation. |

The goal is to have three basic purifier models at various pricing levels.

* The Basic Purifier: Reduces noise and ozone emissions.
* The Better Purifier: Reduces noise ozone emissions and increases motor strength.
* The Ultimate: Reduces noise ozone emissions, increases motor strength, includes the new and improved HEPA filter, and adds an air freshener and cleaning option.

**Marketing Research Results**

Sylvia did some initial research and learned the following:

* "56% of consumers who decide to purchase an air purifier for their home are above the age of 35. Households in the 25-29 age demographic are the least likely to purchase an air purifier, with just 7.4% doing so. (Kaz, Inc.)"
* "46% of homes with 2+ adults own an air purifier. Single parents with children own an air purifier just 3% of the time. (Kaz, Inc.)"
* Customers want a safe and efficient system that is reasonably priced and eliminates as many issues as possible that impact current HEPA air purifier offerings on the market. Ultimately, they want to ensure the air they breathe is clean and void of as many health dangers as possible.
* Sylvia assumes that PP LLC can increase revenue by 25%, expand its existing market by 10%, and reduce product returns by more than 50% once the new product line is launched.

**Operations Overview**

Raul Hernandez believes PP LLC can distribute its products through wholesale, retail, and online channels. PP LLC currently has a solid distribution channel network it can leverage.

Raul cited that engineering delays, cost overruns, supply chain issues, and distribution channel price increases are the primary risk factors.

Raul recommended Sarah Newton to manage the project aspect of the launch. Sarah has a solid risk management background and numerous supply chain and distribution contacts she can work with to mitigate potential risks.

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| Project Charter Topic | Development and Launch of Enhanced HEPA Air Purifiers:  Perfect Purifiers LLC (PP LLC) is working on innovating and expanding its HEPA air purifier product line. The project is focused on developing air purifiers that address the current gaps in the market, such as the inability to remove VOCs and viruses, odor removal, ozone emissions, high maintenance, and noise issues. The goal is to launch the new product line within six months to capture the summer market, focusing on consumers concerned about air quality. |
| Team Composition | * **Robert Winston** - Product Manager * **Maggie Jones** - Product Owner * **Valerie Kumar** - Sponsor and Funding Provider * **Raul Hernandez** - Operations Lead * **Sylvia Sanders** - Marketing Lead * **Hiroshi Tanaka** - Lead Engineer * **Ram Chopra** - Design Lead * **Sarah Newton** - Project Management |
| Team Purpose | * The purpose of the team is to create HEPA air purifiers that are more efficient, environmentally friendly, and user-friendly to meet market demand. |
| Objectives | We aim to develop three new models of air purifiers with advanced features to meet specific customer requirements. These features will address VOCs, odors, ozone, maintenance, noise, and area coverage. We aim to launch these products within six months to be available during the summer season.  By launching these new models, we plan to increase our company's revenue by 25%, expand our market share by 10%, and reduce product returns by over 50%. |
| Key Performance Indicators (KPI) | * Successful development of three prototype models within the set timeline. * Achievement of a 25% increase in revenue and a 10% increase in market share post-launch. * Reduction in product returns by more than 50%. * Customer satisfaction metrics post-launch. |
| Sponsor | * Valerie Kumar is responsible for approving funds and providing overall project sponsorship. |
| Deadlines | * Phase 1 (Dual HEPA Purifier Development): Design by January, Development by March. * Phase 2 (Improved Filter and Motor): Design by February, Development by April. * Phase 3 (Ozone Reduction): Design by February, Development by May. * Product Launch: Within six months from 5th January. |
| Resources | * **Financial Resources:**   + **Initial Conceive and Plan Phase Funding:** The project has been allocated an initial funding of $30,000 to support team resource needs during the early conception and planning phases. This budget will cover preliminary expenses such as initial design work, feasibility studies, and market research.   + **Prototype Development Funding:** Robert and Valerie have estimated an additional budget of $80,000 for the construction of three distinct prototypes. This investment is intended to cover the costs associated with designing, developing, and testing these prototypes. This funding is critical for moving from the planning phase to tangible product development. * **Human Resources:**   + **Project Team:** The project team comprises individuals from various departments within PP LLC, each bringing specific expertise. This includes product management, engineering, design, marketing, operations, and project management.   + **External Consultants (if needed):** Depending on the project's progress and specific needs, PP LLC might engage external consultants or experts, particularly in areas such as advanced HEPA filter technology, eco-friendly materials, or innovative design. * **Technical Resources:**   + **R&D Facilities:** Access to PP LLC's research and development facilities, including labs and testing areas, will be critical for prototype development and testing.   + **Engineering Tools and Software:** The project will utilize various engineering tools and software for design, simulation, and analysis purposes. * **Operational Resources:**   + **Production Capacity:** Assessing the current production capabilities and potential need for expansion or modification to accommodate the new product line.   + **Supply Chain Management:** Ensuring a robust supply chain for sourcing materials and components, especially those unique to the new product design. * **Marketing and Sales Resources:**   + **Market Research Data:** Utilizing existing market research and conducting new studies to understand customer preferences and market trends.   + **Marketing Channels:** Leveraging existing marketing channels and exploring new ones to promote the new product line, including digital marketing, retail partnerships, and trade shows. * **Distribution and Logistics:**   + **Distribution Networks:** Utilizing PP LLC's existing distribution channels, which include wholesale, retail, and online platforms, for product distribution.   + **Logistics Planning:** Coordinating logistics for efficient distribution, including storage, transportation, and inventory management. * **Risk Management and Contingency Planning:**   + **Risk Assessment:** Regular assessments to identify potential risks related to the project, including engineering delays, cost overruns, and supply chain disruptions.   + **Contingency Funds:** Allocation of contingency funds to address unforeseen expenses or emergencies during the project lifecycle. |
| Meetings | * The team will meet every Tuesday afternoon to discuss status and progress. Along with daily stand up meetings. |

**HEPA filter Business Case**

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| Section | Description |
| Market Situation | * The air purifier market was valued at USD 6.3 billion in 2022, according to sources online, and is projected to reach USD 13.4 billion by 2030 with a Compound Annual Growth Rate (CAGR) of 11.4% by many analysts. While HEPA air filters are widely used, they have limitations such as their inability to remove Volatile Organic Compounds (VOCs) and odors, ozone generation, high maintenance, and noise. COVID was also a massive factor in this market’s growth and will continue to be a factor for the foreseeable future. |
| Opportunity | * PP LLC has recognized a chance to revolutionize the HEPA air purifier industry by addressing its shortcomings. By introducing an improved product line, PP LLC can take advantage of a considerable market share, boost its revenue, and establish itself as a leading innovator in advanced air purification technology. |
| Envisioned Solution | * The proposed solution involves developing a new series of HEPA air purifiers with advanced features such as dual filtration, air freshening, noise reduction, extended filter life, and reduced ozone emissions. The team arrived at this solution by conducting market research and analyzing customer requirements. This solution is superior to existing market offerings because it significantly enhances the current products. |
| Objectives and Assumptions | * Market Objectives: The company aims to achieve a 25% increase in revenue, expand its market share by 10%, and reduce product returns by over 50%. * Business Assumptions: The above objectives are based on the assumptions of stable market growth, continued consumer interest in air quality, and successful product development and launch within the set timeline. |
| Costs | * The estimated initial cost for developing the prototype is $80,000. |
| Strategic Alignment | * **PP LLC is a company that is dedicated to making a positive impact on air quality by implementing cutting-edge and innovative technology. The mission is to create a cleaner and healthier environment for everyone by developing and introducing new technologies that can help reduce pollution and harmful emissions. PP LLC is committed to working towards a sustainable future and believes that we can make a meaningful difference in the world by utilizing our expertise and resources.** |
| Timing | * PP LLC has set the project timing for a rapid development cycle, with design and development phases spanning six months. The aim is to strategically align with the market needs and meet the heightened air quality concerns during the summer. PP LLC has adopted a phased investment approach to ensure efficient progress, focusing on critical development milestones and market response. |
| Cost Benefit Analysis | * Financial Analysis: The project is projected to generate a return of over $200,000 per year for the next two years. The internal rate of return is expected to be over 200%. * Non-Participation Consequences: If we do not proceed with this project, we risk losing out on potential market opportunities and may fall behind in a rapidly growing industry. |
| Risk | * Potential risks that could significantly impact the project's success include delays in engineering, exceeding the budget, interruptions in the supply chain, and unexpected changes in the market. To minimize these risks, the team has developed contingency plans that involve utilizing flexible project management techniques, establishing solid relationships with suppliers, and setting aside funds for unforeseen expenses. These mitigation strategies will help ensure that the project stays on track and achieves its objectives despite unexpected challenges. |
| Initial Investment and Recommendation | * To launch our product, we require an initial investment of $80,000. This will cover the costs of prototype development and some operational expenses. In the long term, we will need to continue investing in marketing, enhancing our product, and expanding our distribution channels to ensure the growth and success of our business. |

**Market Requirements Document for PP LLC.**

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| Section | Title | Contents |
| 1 | Market Segment | * **Targeted Market Segment:** The primary market segment for PP LLC's enhanced HEPA air purifiers includes homeowners and businesses concerned about indoor air quality. The demographic primarily consists of individuals above the age of 35 and households with multiple adults. * **Specific Buyers and Users:** The buyers will likely be environmentally conscious, health-aware individuals, and families. Businesses such as offices, healthcare facilities, and commercial spaces seeking to improve air quality for employees and customers are also vital users. |
| 2 | Market Problem | PP LLC aims to address several limitations of current HEPA air purifiers, which include the inability to remove VOCs and viruses, the lack of odor removal, high ozone emissions, high maintenance and replacement costs, high noise levels, and limited area coverage. |
| 3 | Market Requirements | * Market Requirements: The HEPA air purifiers need to efficiently eliminate or considerably reduce VOCs, viruses, and unpleasant odors. They must also be environmentally friendly with minimal or zero ozone emissions. Additionally, they should require less maintenance, have cost-effective, long-lasting filters, operate quietly, and provide wider area coverage. |
| 4 | Prioritization | * Requirements Prioritization: The top priority should be to develop a dual HEPA air purifier that also includes an air freshener and cleaning option. After this, efforts should be made to reduce noise levels and ozone emissions. The next focus should be on improving the filter's lifespan and reducing its cost. Additionally, the motor strength should be enhanced to increase the area of filtration coverage. |

**Case Study for PP LLC HEPA Product**

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| Product Concept Document  Product: PP LLC plans to introduce a line of HEPA air purifiers with added functionalities to improve air quality. | |
| Recommended Entry | Considerations |
| Market Problem or Opportunity | * The foremost opportunity in the market is to address the shortcomings of existing HEPA air purifiers. These limitations include their inability to eliminate volatile organic compounds (VOCs), odors, and viruses; their tendency to generate ozone; the high costs associated with maintenance and replacement; noise issues; and limited coverage area. |
| Market Segments | * The primary market for air purifiers comprises consumers over 35. Homes with multiple adults also form a significant segment. On the other hand, single parents with children and individuals aged between 25 and 29 are the least likely to purchase air purifiers. |
| Key Financials | * The Net Present Value (NPV) for the key financial section of Perfect Purifiers LLC's new HEPA air purifier line, considering an initial investment of $80,000 and annual returns of $200,000 over a period of two years with a discount rate of 12%, is approximately $258,010.20. This positive NPV indicates that the project is financially viable and expected to generate a profit above the cost of the investment when considering the time value of money with an Internal Rate of Return of over 200%. |
| Market Window | * The new line of purifiers is scheduled to launch in the summer season, within six months from January 5th. This timing coincides with increased consumer awareness and concern about air quality. |
| Competitive Landscape | * Donaldson Company Inc., Hengst, MANN+HUMMEL, Honeywell International Inc., and Daikin Industries Ltd. are competitors in the HEPA air purifier market, but none of them offer a product that addresses all the issues identified by PP LLC. |
| Main Features and Functionality | * Introducing our latest line of air purifiers boasting of a range of new and improved features. These include dual HEPA filtration with air cleaning and freshening options, a 50% reduction in noise levels, filters that are easy to replace and cost-effective, extended filter life, increased motor strength for wider coverage, and a significant reduction or elimination of ozone generation. |
| Key Differentiators | * The air purifier has several unique selling points, including combined air freshening, longer filter life, broader area coverage, lower maintenance requirements, and reduced ozone emissions for environmental safety. |
| Go to Market Logistics | * PP LLC has announced that it intends to distribute its new product line through its existing wholesale, retail, and online channels, taking advantage of its well-established distribution network. The project will be under the management of Sarah Newton, who brings a wealth of experience in risk management and supply chain logistics. |
| Business Success Measurements | * Post-launch success will be measured by comparing current market share, sales, revenue, and customer satisfaction to those after the launch. This aligns with PP LLC's vision to expand sales and market presence by offering advanced air filtration technology. |