PRODUCT MANAGEMENT

(MAN303T)

CASE STUDY REPORT

CASE STUDY ON AUTOMATION IN HIGH RISE WINDOW CLEANING

GROUP NO. : B2-43

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1.Abstract

Cleaning external windows on commercial high-rise buildings at present is expensive, less efficient and potentially very dangerous as it is traditionally labour intensive. There is an increasing awareness of the commercial benefits of regular window cleaning yet the currently available mechanised solutions are limited in their application. Involving automation in facade cleaning helps mainly in reducing the risk of human labours working at heights as well as improves the overall efficiency and quality of the cleaning service compared to the existing solution. Generally the time taken by the existing service provider is more and also at present, the wages for window cleaners and the overall payment for the service is calculated by number of hours of working using a rough estimation by the service provider which when prolonged will increase the cost of cleaning both for service provider and customer. Also adding to that ,in manual cleaning, efficiency of cleaning is restricted as accessibility of certain area for the laborers at such heights is limited. Therefore ,developing a successful product in this field might expect differentiation features in both total time and efficiency of cleaning as major characteristics.

2.Introduction

Heaven's RoAr: A double arm window cleaning robot is designed with suction plunger system to adhere to glass surface for holding the machine with the wall and the cleaning action is done using rotating cleaning brushes where the entire robot rotates with centre as pivot and also the cleaning brushes rotate about their own axis providing 360 degree sustainable cleaning .The movement of the robot is inspired from the movement of spider legs. Since the suction plunger system is involved the robot with compatible software will make the it adapt to different complex architectures. With the help of sensors obstacle detection and rerouting is done which reduce the collision between two robots /between robots and architectural obstacles.

Motivation: At present since the high rise window cleaning industry is mainly dominated by manual window cleaning firms, the penetration of a product with technological innovations with differentiating features will be easy and reap lots of profits. From Porter's Five Forces Model Analysis we found that the threat of new entrants is less while buyer power was high due to the prevalent manual form of cleaning. While manual labour is extremely cheap in countries like India, sufficient human protection is not taken while in developed countries precautionary measures are followed, cheap manual labour for cleaning activities is not available creating a need for automation in this industry. The current Covid-19 pandemic has increased the demand for firms to maintain clean environment around them thereby increasing the customer base of our product.

3.Product market fit

►►►► Identifying the target customer

Based on the global window cleaning market analysis, the market is mainly segmented into two major sub categories based on type namely

- Commercial window cleaning services which also includes industrial window cleaning

- Residential window cleaning services

Considering the both the segments most of the residential buildings are not made full of glasses and the cleaning required is only in the windows hence the user needs to place the robots after cleaning one window. Also most of the residential buildings are not of great heights which does not pose safety issues on the other hand commercial window cleaning grab customers including all the skyscraper buildings where height and safety pose a threat to the window cleaning process. Hence we aim to develop a window cleaning robot that mainly targets on commercial cleaning which involves high rise buildings.

GLOBAL CLEANING SERVICES MARKET BY TYPE

2015 | 2022

Commercial | Residential
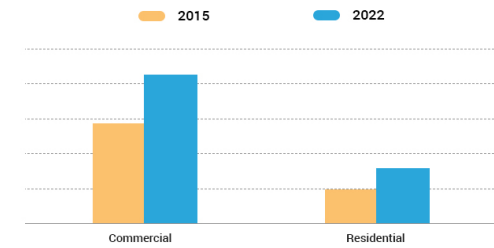
Commercial cleaning services is projected as one of the most lucrative segments with **CAGR of 5.8%** during forecast period.

GLOBAL COMMERCIAL CLEANING SERVICES MARKET BY TYPE

2015 | 2022

Window Cleaning | Vacuuming | Floor Care | Other Services
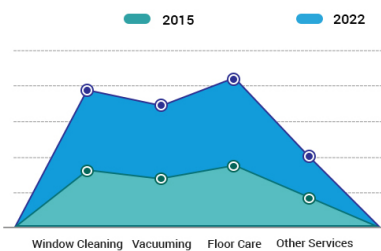
FLOOR CARE services held a dominant position in 2015 and would continue to maintain the lead over the forecast period.

Also the market can be segmented based on the geographic locations namely,

- North America (United States, Canada and Mexico)
- Europe (Germany, UK, France, Italy, Russia and Turkey etc.)
- Asia-Pacific (China, Japan, Korea, India, Australia, Indonesia, Thailand, Philippines, Malaysia and Vietnam)
- South America (Brazil, Argentina, Columbia etc.)
- Middle East and Africa (Saudi Arabia, UAE, Egypt, Nigeria and South Africa)

The success of the product based on the **market segmentation** with respect to geographic locations will depend on the economy of the country/state etc and the weather conditions of that particular region. Because Middle east countries like Saudi Arabia proves to be an important hub for our product based on the economy of the country, number of skyscrappers per km ,and the weather conditions prevailing there is usually dusty because of the deserts nearby which increases the frequency of our product usage.

Choosing the correct customer segment plays a major role in providing a compelling value hypothesis of our product and market fit is achieved when our intended functionality satisfies the very need of the customer segment.

Identifying the unstated needs of the customer

Most of the customers satisfaction is based on the quantifiable key performance indicator like overall time of cleaning and qualitative parameters like quality of cleaning which involve technical terms like (dust density per square inch after cleaning /dust density per square inch)*100. But there are needs that are not stated by the customers which is identified using design tools like ethnographic analysis.

- **Frequency of cleaning** - The time interval between one cleaning period of the customer and the successive cleaning period of the customer. Usually customers prefer the frequency of the cleaning to be less which actually quantifies the long lasting parameter of the cleaning

- **Warranty based cleaning** - In general customer expect warranty for certain period of time for any product but when it comes to our industry since the weather conditions are unpredictable usually accumulation of dust even after cleaning the previous day is also possible. Hence customer expect agreement/warranty based cleaning.This need is applicable to us since we are servicing instead of selling the product since the market for selling the product saturates even more at a faster rate than the servicing market

- **Safety of cleaning** - Irrespective of automation/manual cleaning the safety of the worker and the building is usually remains unstated need of the customer if fails creates dissatisfaction among customers.

⟫⟫ Quantifiable - Alternatives to our product

Inspite of innovative and automated product, there are two major reasons that might enable options for customers to restrict themselves from buying our product.

- Since cleaning industry is an undignified industry ,customers tend to opt out costly solutions and usually go with manual cleaning solution itself on the other hand involving automation can not be compromised to a cost as of with manual cleaning .This perception of the customers can be sought out if our product is designed in such a way that it meets the technical competencies with low cost materials satisfying all the criterias.

- Also involving lots of high technologies involve higher electricity consumption which is beared by the customer adds to the overall cost of cleaning from customer side hence considering the preceeding statement customer tend to rethink on using our service for this industry.

- Since the we come under the category of high tech products there are chances that solutions with higher technology than us might enter which is called as technological uncertainity might provide options for the customers in the near future.

Unique feature that delights customers - measurable value

The extent of automation usually plays a major role in determining the differentiation parameter between two automated solutions. Hence customer usually gets delighted when the product performs the intended task even without monitoring and rectifies itself under any circumstances. Our product with the help of intelligent system is made to self monitor and control actions which reduce the stress on customers. Also features like dust density identification reduces the amount of water consumption which reduces the water tax that is beared by the customer.

Unstated needs that our product addresses - Relevancy

Unstated needs like frequency of cleaning and safety of cleaning can be addressed by our product by choice of material selection for cleansing agent or efficient mechanism to dry out the cleansing solution after cleaning and safety of cleaning is addressed in many aspects and one among them is the force between the suction pump and the glass increases according if the wind speed is more than the threshold warranty of cleaning cannot be promised where it might reap losses for us.

8. Minimum Viable Product

In the phase of product design, in order to create a minimum viable product still not compromising with differentiation in the product, the parameters that are of immense importance are the movement of the robot over the building, cleansing action and its related parametric activities like obstacle detection, dust density detection etc. The important parameters for the minimum viable product are:

- Spider leg movement (Biomimicry)

- Cleaning movement (360-degree cleaning)

- Interconnected Robotic Systems

- Dust Density Index Identification

- Obstacle detection and Rerouting

- Reusable internal cooling system

- Software compatability checking with one standard architecture
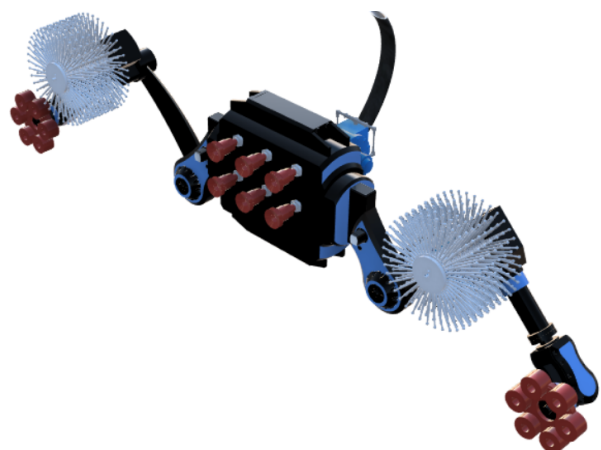
**Conceptual model simulated in Fusion 360**

9. Need for MVP and Validation

≫≫ Need for MVP

Our product is a high technology product. The market for us is uncertain. People don't believe in new high tech products. We don't know at what pace the product will get adopted. We cannot forecast the market size and the customer needs also changes over a period of time. Also being a new technology we need to ensure that the product works as promised. We don't know all the consequences without building a prototype and use it. Also, we are unaware of the difficulties in manufacturing the product. for all these reasons we need to build the MVP and test it.

≫≫ Validation
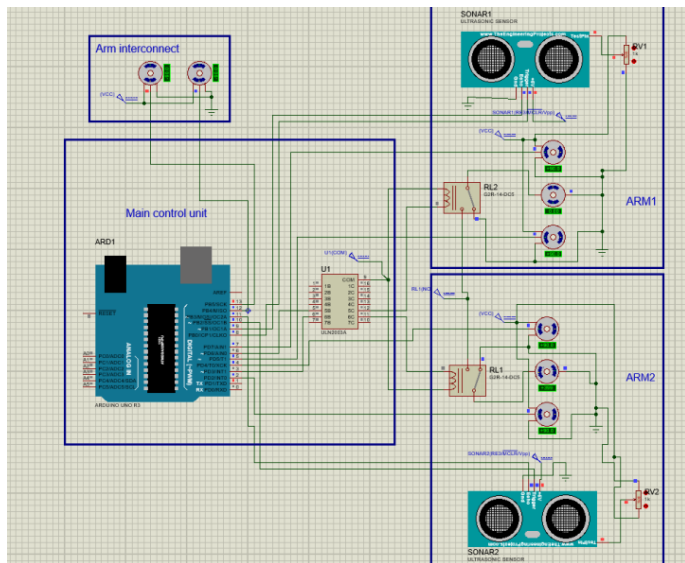
In the first phase the circuit of the entire robotic system is simulated using electronic simulation softwares like Proteus and the working of circuit is checked.Once the circuits performs the intended technical functionality the model is proceeded for prototyping.
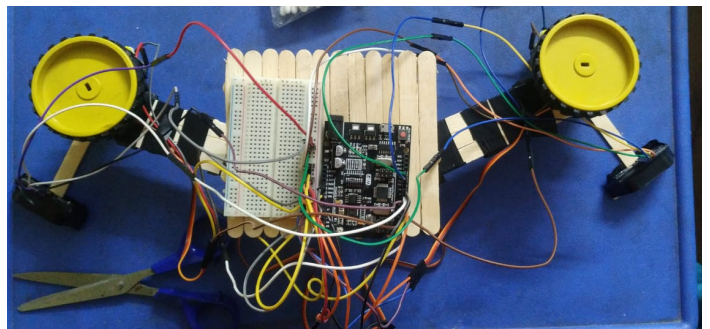
MSE: 0.00, SSIM: 1.00

MSE: 746.06, SSIM: 0.63

MSE: 1446.89, SSIM: 0.84

The important feature which is dust density identification is simulated using programming language where the image with different level dust density is compared with cleaned window pane and the results are generated and this generated output is given as input to microcontroller for controlling the valve of cleansing agent solution. **This feature results that is processed using image processing is validated with the output of dedicated sensor (Dust sensor)**

Since we are introducing the feature of adaptability to different complex architectures which is not available with the existing solutions this require intense dedicated software development. This software is initially designed for compatability for one standard architecture .Also the reusability of coolant in internal cooling system is showcased as another product to make customers which is actually a internal mechanism to make customers believe of the features that we promised. Once the MVP is released into the market the customer feedbacks are obtained using net promoters score and iterations are undergone, till value hypothesis satisfies the product market fit.

Product Marketing

Product Marketing is of foremost importance for a product's success in the industry. It is done by understanding the customer need of our target audience and problems that they face in which other competitors have not addressed yet. Our special brand of marketing is the personalized adaptive cleaning technology and this is done by modifying the product to adapt to the complex architecture controlling the usage of resources and increasing the efficiency of cleaning when compared to the other service providers.

The personalized touch we provide with our cleaning helps create differential advantages and over the long run our novel features and methodology will be used to create a brand in the cleaning industry. This brand is developed over time by addressing the unstated needs of the commercial high rise buildings. Having identified our target customers of high rise, it is integral to the product's success to come up with a strategy to convince our customers to buy and use our service.

A novel product with differentiating factors can be made to stand apart from its competitors if a well planned strategy is executed efficiently.

▶▶▶ Strategic:

Market Problems: Due to an already established cleaning industry, as a new product it will be tough task to penetrate this industry since most customers in this industry are engaged with a existing player. Initially our product and its efficient cleaning will spread amongst customers only through **word of mouth**.

Market Definition: We will try to tap high rise commercial building owners who are not satisfied with their existing service provider. By showing various use cases of our product on complex buildings, we will showcase our product's feature to new customers. By having competitive pricing, our goal would be to start with a small number of known customers and slowly build from there. Our market will be only high rise commercial building owners.

Product Portfolio: We will have two types of products, one that is applicable only to small scale buildings and owners. By using larger capacity and battery, tall buildings can be cleaned for longer periods of time thereby reducing the time period of cleaning drastically. We will have different naming and logos for each product to create a brand identity.

Profitability: Companies and owners of such commercial buildings generally look for service providers who provide wholesome service that encompasses floor, carpet, curtains in addition to facade cleaning. By leasing out our product to well established names, once our product is sufficiently popularized, we will try to enter into alliances with other new clean technology budding startups and start providing a complete service 3-5 years down the line after our initiation of production.

Strategy Plan:

- **Strategic/functional results**
- **Customer based results**
- **Internal business process**
- **Organizational and employee capabilities**
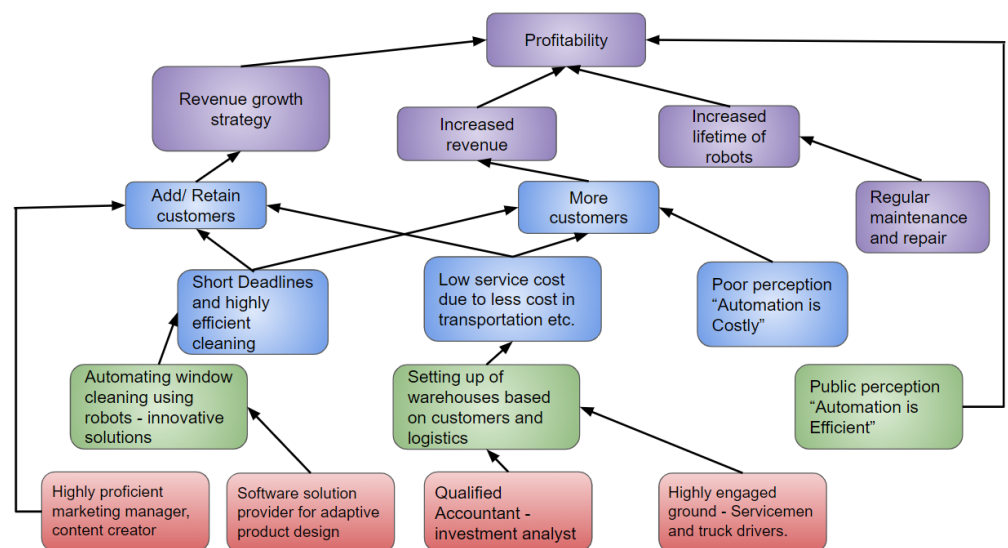
▶▶▶ 4P's of Marketing:

Product: It is physical product.
Price: Taking into consideration various factors it is competitively priced with our competitors.
Place: Online renting platforms and Website for product leasing and other service details
Promotion: Local Newspapers and magazines with contact details, pamphlets and posters near industrial estates

Technological:

The product is inspired by the **spider's movement** executes a novel **360 degree cleaning mechanism**. It has the additional feature of **adaptive cleaning** that helps in reducing the water usage. A **override switch** to manually power the robot is available which is provided to reassure the users in case of any mishap. The status and extent of cleaning with continuous monitoring is provided. Using the concept of **interconnected systems**, multiple robots are simultaneously employed managed using cloud and ground servers. The key differentiator is the substantial reduction in time of the service using automation with **sustainable cleaning equipment** that does not scratch the glass and much more. The components used in the product are all industry validated components and we have implemented our novelty using standard yet efficient components making us stand out from the rest both functionally and aesthetically.

Marketing:

The product is initially manufactured in small numbers and **leased out** to other industry partners to popularise the product amongst our customers. We obtain our components from **local suppliers** to reduce our total product cost and manufacturing warehouses and setups are identified on the **outskirts of the city** for easy distribution and larger customer reach. We hope obtain customers by leasing our product first to our industry partners and use the perception that automation is efficient of reduced cost. By providing exemplary quality service, we personalize their need by taking into their needs and provide **repeated check up** and **cleaning services** if required on a timely basis. This will create a bond between the customer and us thereby helping us retain customers for the long run.

Our launching pad will be **technology expos** conducted in India and Abroad where we advertise our product using stalls. This will **attract more investors** in our product and help us widen our customer base and manufacturing capacity. The product is patented and since we have the IP rights, if the product is to be mass manufactured, we will still make ample profit in the long run.

Sales:

We hire dedicated **qualified professionals** who believe in our service and product with a good number of industrial experience preferably one who has been employed by a startup before. Small scale businesses requires dedicated sales channels where a portion of investor's capital is allocated every quarter in the company budget for **newspaper** and other **local magazine advertisements**.
We will initially create our **own website** and that will serve as a platform for our new customers to approach us directly. We believe in person meeting to clearly understand the wants of the customer so as to appropriately make our product suitable for their architecture. We will need a team to enable adaptive cleaning and to keep our website robust to enable orders from customers as well as to address any customer's problems and qualms. We will have trained professionals for regular maintenance of the product and the new updates will expressed to our customers using **presentations and video demos** of our product in existing product. We will show our product performance using graphs and charts.

Product Launch Steps

The launch of the product has to answer to some vital questions of why those steps are being employed. The primary market is commercial high rise buildings and their owners. We will aim to participate in maximum number of technology expos before our grand launch so as to attract some prospective investors. The launch will be given at the strategic time of 3rd quarter of the year where many investors look to invest in products and also when more number of customers are interested in the service. Depending on the country of launch, if India the months of September is when it after summer and companies look to acquire the services of the cleaning industry. We advertise our product with our differentiating features such as adaptive cleaning and water consumption, maximum area coverage using automated interconnected service bots. Standard testing markets are used where our MVP will be released to get customer reviews. Net Promoter Score from requirement surveys in these markets can be used to review and validate our product before the grand launch.

Step 1: A proper team will be assembled that help with the product launch. Expert opinions of industrialists and marketing professionals will be used to get various opinions. The product launch is vital for its success and sufficient time and effort will be put to make sure the product does not have any glitches.

Step 2: Sampling will be done where we impress potential investors by showcasing our final product working in person for validation. Videos of working demos will be available on our website providing sneak peaks of its efficient functioning and its ability to be versatile irrespective of the architecture of the building.

Step 3: A Product Roadmap that had been established will be cross checked and made sure various deadlines, timelines and milestones are met and exceeding customer and investor satisfaction. Competitor Analysis and product release will followed up to make sure our product launch is not eclipsed by another product's release.

Step 4: The MVP and its iterations will be showcased at popular technology expos and differentiating functionalities will be showcased in a pompous manner with plenty of vibrant eye catching posters.
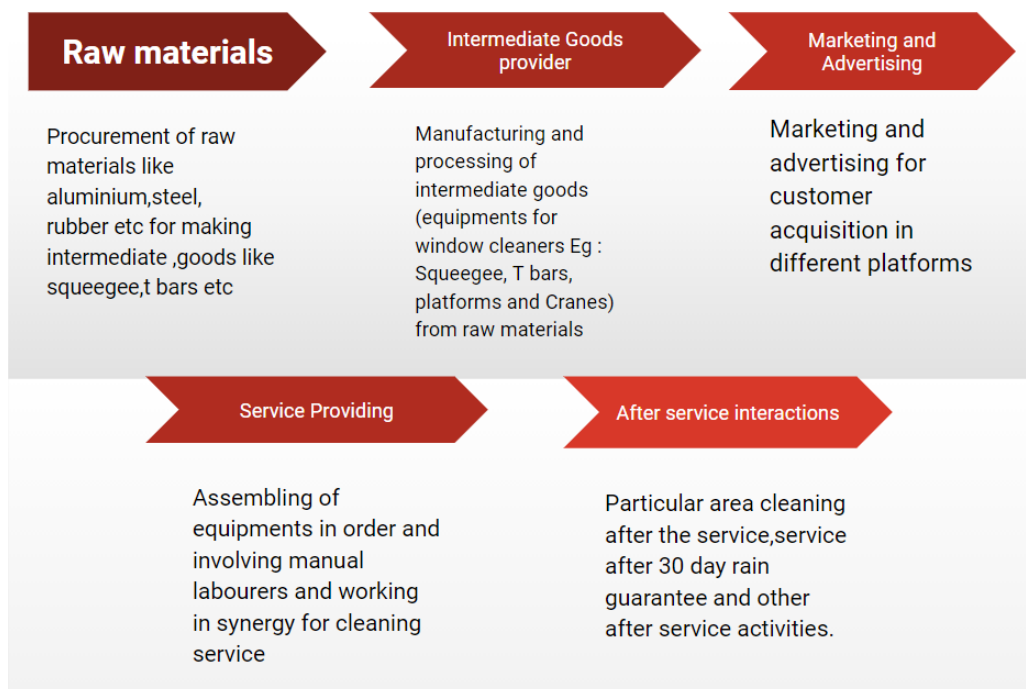
Step 5: A grand release will be done taking into consideration the location of release and time of the year of release. Considering the pandemic and high importance given to gathering of crowds and hygiene, the new normal method of a virtual release may be done followed by a official release by a well known figure like the Innovation Council Head of India.

Step 6: Once the product is launched, there will be trained help staff at all customer sites to ensure customer safety and satisfaction. The product will be leased to industry partners for widespread initial usage at reduced prices.

Step 7: Completion of the cleaning either by us or our leased partner, we do not believe in leaving our customer high and dry rather we follow up with continuous check ups and provide personalized services on a regular basis.

Product economics

Window Cleaning Industry Value Chain Analysis

Raw materials

Procurement of raw materials like aluminium, steel, rubber etc for making intermediate, goods like squeegee, t bars etc

Intermediate Goods provider

Manufacturing and processing of intermediate goods (equipments for window cleaners Eg : Squeegee, T bars, platforms and Cranes) from raw materials

Marketing and Advertising

Marketing and advertising for customer acquisition in different platforms

Service Providing

Assembling of equipments in order and involving manual labourers and working in synergy for cleaning service

After service interactions

Particular area cleaning after the service, service after 30 day rain guarantee and other after service activities.

In order to find the economics of the product first step we have found where we place ourself in the window cleaning market using value chain analysis .Here as a product we fit in intermediate goods provider but since we have chosen service providing as the preceeding market saturates faster we fit in "Service Provider".Based on this we have formulated the cost of the product in the below analysis.

Inbound logistics	Operations	Outbound Logistics	Marketing	Service
Motor: Selling Price - 4000/pc *4pc = Rs 16000 **Wires:** Single strand : 15/meter*2 meters Multiple strand : 30 / meter *5 meters Total Selling price : 180 **Processor and Accessories:** Selling price : Rs 3000 **Aluminium and Steel :** Selling Price : Rs 143.67 /kg * 10 Selling Price : Rs 300 a sheet for steel Total Selling Price - Rs 1736.7 **Brushes - Plastic/ Biodegradable :** Selling Price : Rs 1000/piece *4= Rs 4000 **Battery :** Selling price - Rs 1500 **Vacuum Suction Pump :** Selling Price - Rs 900 * 3 = RS 2700 **Internal PVC Pipes :** Selling Price - Rs 180/3m = Rs 90 **Total Selling Price of Raw Materials :** Rs, 27, 000	**Workspace Rental :** Rs 5000 **Labour :** Rs 1200 per person * 5 **Electricity and Water bills :** Rs 4000 **Redesigning and engineering depending on Customer :** Rs 5,000 **Cost incurred :** Rs 15000	**Warehouse Storage :** Selling Price - Rs 20 per/ft^2 * 400 ft^2 Total Selling Price - Rs 8000 **Transport Vehicle - Mini Tempo including driver labour / hr :** Selling Price - Rs 2000	**Advertisement of Cleaning Service in newspaper :** Selling Price : Rs 11000 Total Selling Price : Rs 1.3 Lakhs **Hiring of Salesman to call appropriate customers :** Selling Price - Rs 10000 per month **Total Selling Price - Rs 1.2 lakhs**	**Investment :** Rs 75, 000 per robot Expected Cleaning Service would require 2 to 4 robots hence a total investment will be around Rs 8, 50, 000 would be put in if the product excels. The entire cleaning process is expected to occur for 2 months depending on the customer building.
Total Selling Price : Rs 33, 000 **Margin :** Rs 6000	**Total Selling Price :** Rs 60 ,000 **Total Margin :** Rs 7, 000	**Total Selling Price :** Rs 75, 000 **Total Margin :** Rs 5000	**Total Selling Price :** Rs 3.5 lakhs **Total Margin :** Rs 25000 (profit made by advertising company)	**Investments in Robot:** Rs.75,000/bot **Total Investment :** Rs.8,50,000 **Our selling price:** Rs. 2,50,000 for two months

Considering all the inbound and outbound logistics, operational cost, marketing,etc we have obtained the investment per robot is 75,000 INR and our selling price for two month duration is quoted for 2,50,000 INR considering the India as customer base and the prices may vary across geographical locations. And we plan to manufacture 4 robots for cleaning a entire building at a time

Initially we aim to do utmost 3 projects in a year using the 4 bots manufactured. Accordingly we earn a revenue of 4.5 lakhs in the first year. For a time interval of 4 years of lean repayment and predicting the lifetime of the 1 robot to be 2 years we invest 1.5 lakhs to manufacture 2 robots additionally from the revenue generated. Reducing the miscellaneous cost(Setting up warehouses and distribution centers near customer reduces the inbound logistic cost) giving us a profit of 1 lakh at the end of first year.Now as we increase the number of projects and the customer in the second year as a result we are able to manufacture 6 more robots and increase the revenue. We have a cumulative profit of 3 lakhs in a span of 4 years and using this we will break even in 4 years

Product Risk

In order to define the product risks we have to first define the key performance and business metrics

Important Product Performance Metrics:

1. **Swept Area of Cleaning per minute:** The product covers maximum area when it is inclined at 180 degree. However lack of lubrication at hinges or strong adhesion to surface of window many restrict its cleaning motion.
2. **Dryness of Glass Window after Cleaning:** The area cleaned should be dry and free of soap residue. Slight wetness may lead to immediate sedimentation of dust particles on the cleaned surface. Dripping of water along the edges and on the panes must be reduced to maximum extent.
3. **Time taken to traverse a vertical and horizontal portion of the window surface:** Predicted, estimated and actual time values must corroborate
4. **Sensitivity of the robot to MCU trigger:** Data generated by the sensors contains noise and the computer vision model being used has to iterated multiple times and its actual functioning on the window must be cross checked.
5. **Electricity consumption per unit distance traversal:** A sudden spike in electricity consumption must be looked into as it is an indication of wearing of electronic components.
6. **Water consumption values over time:** If there is an increase in the soap powder being released and water mixing quantity increase, blockages in valves and adaptive filters have to be looked into. The dust density identification senor may also need a component change.
7. **Temperature increase per hour of working:** The internal temperature of the robot may increase at higher altitudes during the middle of the day, the internal cooling system should start working controlled by the temperature sensor and beyond a certain temperature the robot should automatically stop working.
8. **Wear rate of component :** SInce we are involving a lots of electrical components and sensors,the components tend to fail over a period of time.The time interval between one failure of the component and the second failure of the same component gives us the detail about how often the components tend to wear out

Important Business Performance Metrics:

RETENTION MANAGEMENT METRICS :Retention is probably one, if not the most important, growth driver of a business. It is therefore very key to track the retention of our business: The customers tend to unsubscribe (churn rate) from our service if we don't meet their requirements. This rate must be carefully monitored has this directly tells a quantified number on number customer who are dissatisfied with our product.

CUSTOMER RETURN ON INVESTMENT METRICS : Supporting customers has a cost, whether it is a fixed or marginal cost, it will impact our bottom line. It is therefore key for us to measure and maximize our return on investment on customers. That will be key to continue building great products and services to them as well. There are two main metrics :
Customer Acquisition Cost (CAC) - This represents the amount invested to get one customer. we can measure per type of customer. To have a high-level idea, we can divide our sales and marketing costs (incl. people), for a given period by the number of customers we converted during that period.
Life time value (LTV) -That's the total revenue brought by one customer from the day he becomes a customer to the day he stops using our product. It is also measured in $.It is key that our LTV is significantly higher than our CAC. We should measure how fact our LTV break even your CAC (ideally less than 12 months) and then how many times it multiplies the CAS overall (ideally LTV = 3*CAC minimum)

Top line : When our product generates revenues, that's the most obvious thing to look at. we'll look at it based on the last period (day, week, month), from the beginning of the current year aka Year-to-Date (YTD), versus the Year before aka Year-on-Year (YoY), etc. You'll look at the type of revenue very closelyand build separate metrics for Recurring revenue and One-Off revenue.

Bottom line : The other key, and actually often most important criteria, is the bottom line, or margin. one can make a whole lot of revenues but if we lose 2$ for every 1$ of revenue, we'll not go very far. Same as for revenues, we should have a dynamic view on this to ensure things are evolving in the right manner.

Risks based on Performance and Business metrics

Since our high rise window cleaning robot involves lots of technological innovation it involves lots of electrical and mechanical component which fail over a period of time. Frequent failure of component reduce the overall efficiency pf our product as well increase additional cost. This can be rectified by monitoring the wear rate of the component and if the wear rate of a particular component is high it means that the component fails too often. By monitoring the wear rate we can make design changes of that particular component that has higher wear rate. Another risk is that even after efficient cleaning if the dryness of the window pane if not calculated might attract dust particles after cleaning which makes our product not meet its desired function. Hence the dryness of the window pane must be monitored carefully.

Any robot/machine heats over a period of time of usage. Since we have to reduce the total time for cleaning and there is day and night restriction for robots, the robots are made run for long duration which heats up the machine. The capacity of the machine with efficient internal cooling system maintains the temperature of the machine in the suitable range and this temperature increase per hour gives us the idea about the efficiency of the internal cooling system. Swept area per minute also tells us about the speed of the cleaning motion combined with movement which also affects the overall time of cleaning which when not monitored might affect the demanded need of the customer. Also if the cost is spent more on marketing believing that product might succeed after expensive advertisement it might also leads to large losses this can be monitored using customer acquisition cost where the cost spent per customer is analysed which when kept on track will lead to success of the product with minimal amount of spending. The most important risk that needs to be prevented is the loosing of customer for every new customer this is basically shown by retention rate of customers/churn rate where we keep track of number of customers who unsubscribe from our service. This vaguely gives us the idea about why people withdraw from the service and can be rectified at the earliest if we keep track of this metric. Also when it comes to product and revenue generation start we must also keep track of top line and bottom line revenues which tells us about for every 1 dollar revenue generation how much percentage of the amount is lost in terms of additional cost. Also Net promoter score must also be in track of measurement since in this industry our major mode of marketing is through previous customers satisfaction and recommendation and this number less than 50 will prove that we are on the negative side and this also tells about the inefficiency of fitting our value hypothesis with product market

Conclusion

High tech products usually involve unanticipated consequences which needs to be rectified at the earliest for which we should efficient prediction on the probability of failure and the source of failure which when done might lead to the success of the product. Also in the near future with competing technologies could be developed that might suppress our success hence upgradation of technologies over a period of time plays major role for a product to sustain in this type of market. Also from the above analysis there is no prior market for high rise window cleaning alone hence collaboration with other innovative/existing other cleaning solution providers like floor cleaning, carpet cleaning etc is required for penetration into the market.

The risks predicted using appropriate key performance and business metrics must be taken into account for monitoring the inclination towards the success of the product. We can be considered to be an Early Entry in the automation of the Cleaning Industry. Identification of our market and target customers has helped us realize that there is a high demand in this market where human safety and reduced usage of electricity and water is of utmost importance. If the product strategy mentioned is followed taking into account the volatile service pricing, it is important we try to address the shortcomings and customer needs when the product is released into test markets.

Certain focus groups can be created where members of the company can help popularize the product to whom they service may be offered at a discount and using these as beta testing sampling, further iterations can be brought about. Using these valuable feedbacks, the product can be launched in the future to attract investors and to widen our customer base and increase the manufacturing of our product. A reasonable product pricing and estimation of product demand has been forth and break even analysis was done. indicating that our product Heaven's RoAr is a product that is going to rule the cleaning industry in some years to come.