

New Product Development | Product Breakdown | Business Model | Circular Economy | Modularity

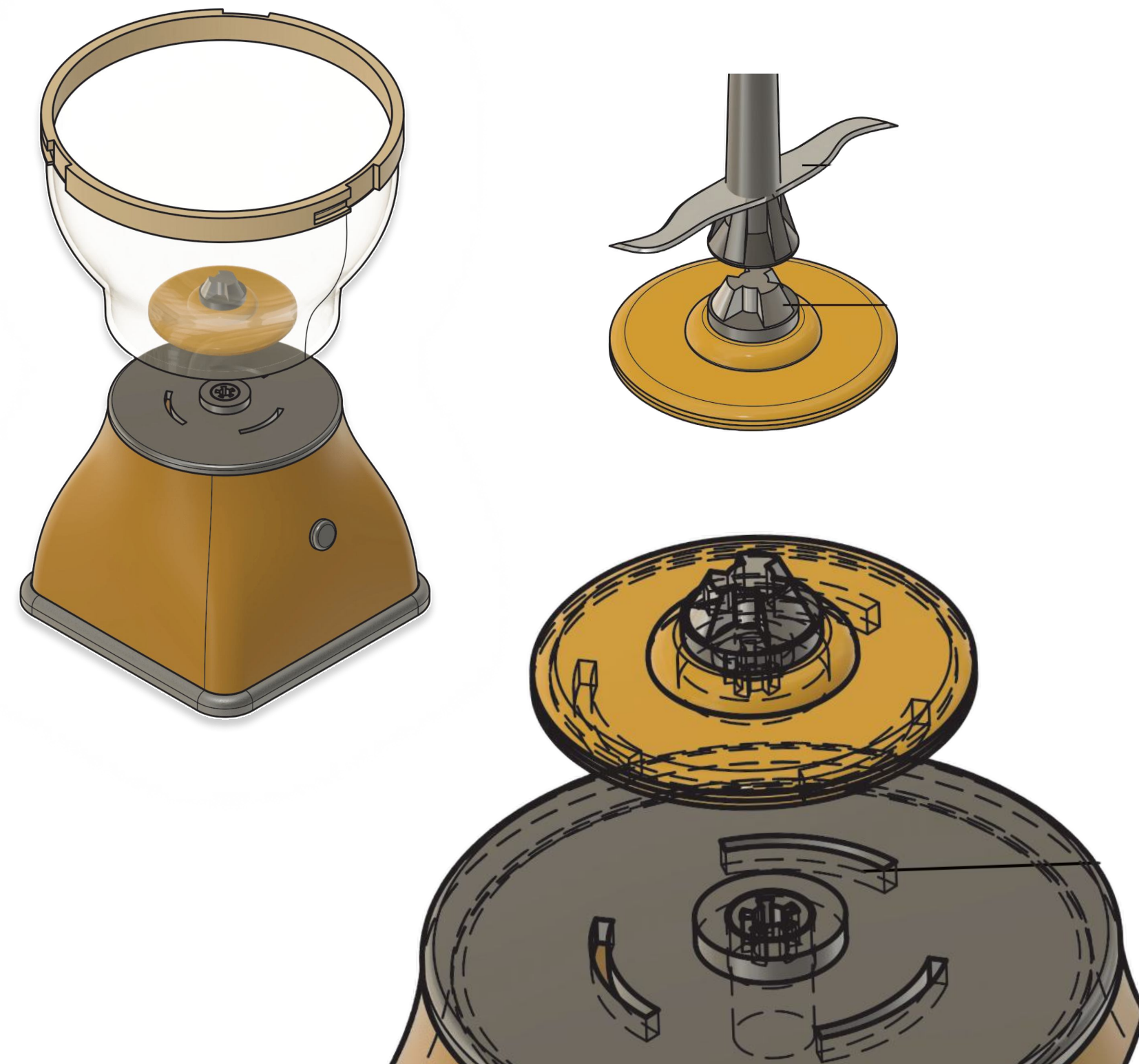
A Design Research paper to be presented on ICoRD25



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Department of Design
Indian Institute of Technology Hyderabad



Redesigning Electric Chopper for Indian Households: A Circular and User-Centric Approach

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Abstract. The motivation driving this paper stems from the pervasive presence of the linear design model, which prioritizes continuous production and sales without considering the lifecycle of products, leading to issues once they reach the end of their usefulness or encounter breakdowns. In response, the paper aims to redesign the electric chopper, tailored for Indian households, with a strong emphasis on eco-design and sustainable principles, prioritizing an enhanced cooking experience while minimizing environmental footprint to contribute to the development of kitchen appliances that promote both efficiency and environmental responsibility.

Detailed user research involving 16 regular electric chopper users uncovered several significant issues with the current products available in the market. These issues include inconsistent chopping results, difficulty in cleaning due to complex designs requiring dedicated tools and extended drying times, lack of modularity leading to product wastage even for minor damages, absence of safety features like locking mechanisms, and the use of materials that are difficult to recycle.

Our methodology focuses on enhancing product modularity to empower users with easily replaced or repaired components, thereby extending product lifespan and reducing waste. Beginning with the identification of key problems, we developed concepts and prototypes aimed at addressing these issues. Through iterative testing with real users, we refined our designs, for example, uniquely oriented detachable blade that facilitates easy cleaning, easy replacement and ensures uniform chopping.

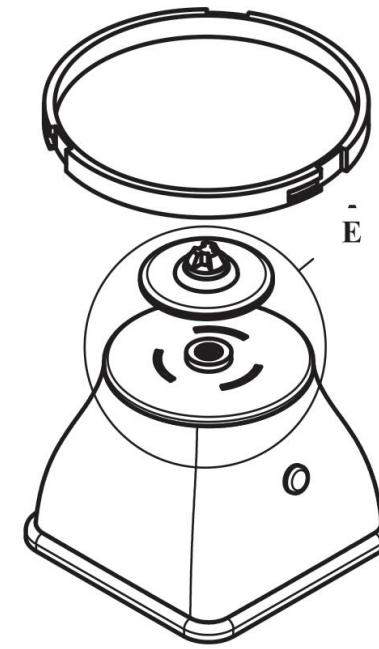
Through the integration of user-replaceable components and sustainable materials, the electric chopper emerges as an eco-conscious, and socially accountable solution, rendering it more sustainable for all stakeholders. In addressing broader issues within the realm of home appliances, our focus on the electric chopper exemplifies a tangible step towards fostering Circularity in everyday kitchen practices.

Keywords: Linear design model, sustainable principles, electric chopper, user research, modularity, environmental footprint, recyclable materials, circularity.

1 Introduction

In the realm of kitchen appliances, the electric chopper has become a ubiquitous tool for Indian households. However, the pervasive linear design model employed in their production and consumption has led to a significant increase in electronic waste on a global scale. This linear model prioritizes continuous production and sales without

Team



Hemanth | Shreya | Somnath | Bagisha



• Content

☐ *Google form and responses*

☐ *Product functioning videos*

☐ *Product tear down*

images and videos

☐ *Requirements*

- *Issues*
- *ISQ*
- *Requirements*
- *Function and function structure*
- *BOM*

☐ *Product circularity*

☐ *Target segment*

☐ *Project Planning*





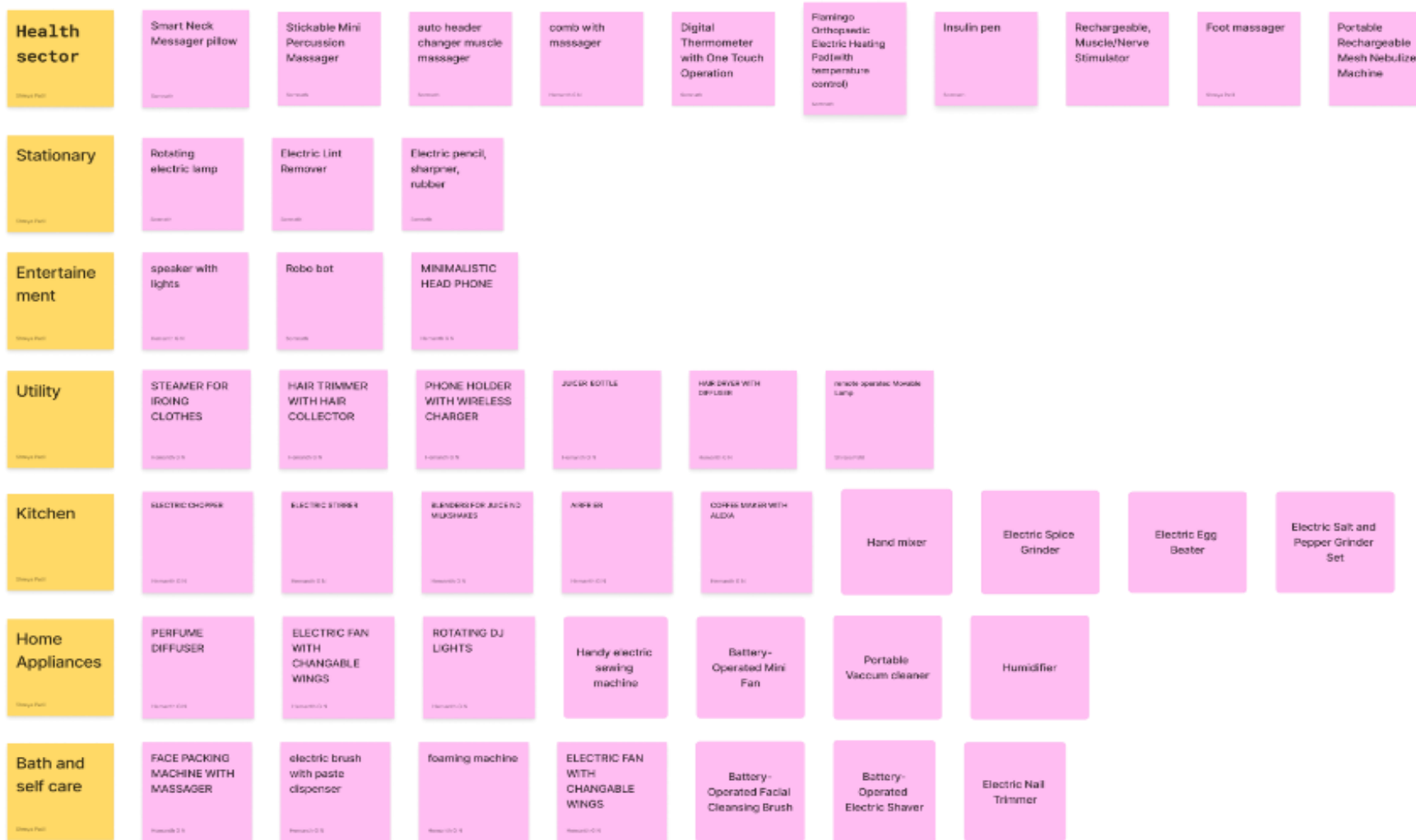
Opportunity Identification

Brainstorming for Opportunity Identification

45 ideas

| | | | | | | | | |
|---|--|---|--|--|--|---|--|---|
| FACE PACKING MACHINE WITH MASSAGER <small>Hemant G N</small> | Smart Neck Messenger pillow <small>Somesh</small> | Rotating electric lamp <small>Somesh</small> | electric brush with paste dispenser <small>Hemant G N</small> | Stickable Mini Percussion Massager <small>Somesh</small> | Electric Lint Remover <small>Somesh</small> | BLENDERS FOR JUICE ND MILKSHAKES <small>Hemant G N</small> | JUICER BOTTLE <small>Hemant G N</small> | Foot massager <small>Genya Patel</small> |
| foaming machine <small>Hemant G N</small> | ELECTRIC FAN WITH CHANGABLE WINGS <small>Hemant G N</small> | PERFUME DIFFUSER <small>Hemant G N</small> | ELECTRIC CHOPPER <small>Hemant G N</small> | ROTATING DJ LIGHTS <small>Hemant G N</small> | Robo bot <small>Somesh</small> | ELECTRIC STIRRER <small>Hemant G N</small> | remote operated Movable Lamp <small>Shreyas Patel</small> | Portable Rechargeable Mesh Nebulizer Machine |
| speaker with lights <small>Hemant G N</small> | ELECTRIC FAN WITH CHANGABLE WINGS <small>Hemant G N</small> | Handy electric sewing machine | Battery-Operated Mini Fan | Portable Vacuum cleaner | Battery-Operated Electric Shaver | HANDY VACCUUM CLEANER <small>Hemant G N</small> | Electric Spice Grinder | Hand mixer |
| STEAMER FOR IRONING CLOTHES <small>Hemant G N</small> | Electric Nail Trimmer | Electric pencil, sharpener, rubber <small>Somesh</small> | MINIMALISTIC HEAD PHONE <small>Hemant G N</small> | auto header changer muscle massager <small>Somesh</small> | Battery-Operated Facial Cleansing Brush | COFFEE MAKER WITH ALEXA <small>Hemant G N</small> | Electric Egg Beater | HAIR DRYER WITH DIFFUSER <small>Hemant G N</small> |
| comb with massager <small>Hemant G N</small> | Humidifier | Digital Thermometer with One Touch Operation <small>Somesh</small> | Flamingo Orthopaedic Electric Heating Pad(with temperature control) <small>Somesh</small> | Insulin pen | Rechargeable, Muscle/Nerve Stimulator | HAIR TRIMMER WITH HAIR COLLECTOR <small>Hemant G N</small> | Electric Salt and Pepper Grinder Set | PHONE HOLDER WITH WIRELESS CHARGER <small>Hemant G N</small> |

Affinity Analysis
























































MULTI VOTING

stage 1

| | | | | | | | | | | |
|--|--|---|--|---|--|---|--|---|--|--|
| Health sector <small>Design Pad</small> | Smart Neck Messenger pillow <small>Research</small> | Stickable Mini Percussion Massager <small>Research</small> | auto header changer muscle massager <small>Research</small> | comio with massager <small>Research 2.0</small> | Digital Thermometer with One Touch Operation <small>Research</small> | Flemingo Orthopaedic Electric Heating Pad(with temperature control) <small>Research</small> | Insulin pen <small>Research</small> | Rechargeable, Muscle/Nerve Stimulator <small>Research</small> | Foot massager <small>Research Pad</small> | Portable Rechargeable Mesh Nebulizer Machine <small>Research</small> |
| Stationary <small>Design Pad</small> | Rotating electric lamp <small>Research</small> | Electric Lint Remover <small>Research</small> | Electric pencil, sharpener, rubber <small>Research</small> | | | | | | | |
| Entertainment <small>Design Pad</small> | speaker with lights <small>Research 2.0</small> | Robo bot <small>Research</small> | MINIMALISTIC HEAD PHONE <small>Research 2.0</small> | | | | | | | |
| Utility <small>Design Pad</small> | STEAMER FOR IRONING CLOTHES <small>Research 2.0</small> | HAIR TRIMMER WITH HAIR COLLECTOR <small>Research 2.0</small> | PHONE HOLDER WITH WIRELESS CHARGER <small>Research 2.0</small> | JUICER BOTTLE <small>Research 2.0</small> | Hair DRYER WITH DIFFUSER <small>Research 2.0</small> | remote operated Movable Lamp <small>Research</small> | | | | |
| Kitchen <small>Design Pad</small> | ELECTRIC CHOPPER <small>Research 2.0</small> | ELECTRIC STRAWER <small>Research 2.0</small> | BLENNDERS FOR JUICE AND MUSHKES <small>Research 2.0</small> | ANIPER <small>Research 2.0</small> | CORRAS MIXER WITH ALIDA <small>Research 2.0</small> | Hand mixer <small>Research</small> | Electric Spice Grinder <small>Research</small> | Electric Egg Beater <small>Research</small> | Electric Salt and Pepper Grinder Set <small>Research</small> | |
| Home Appliances <small>Design Pad</small> | PERFUME DIFFUSER <small>Research 2.0</small> | ELECTRIC FAN WITH CHANGABLE WINGS <small>Research 2.0</small> | ROTATING DJ LIGHTS <small>Research 2.0</small> | Handy electric sewing machine <small>Research</small> | Battery-Operated Mini Fan <small>Research 2.0</small> | Portable Vacuum cleaner <small>Research</small> | Humidifier <small>Research</small> | | | |
| Bath and self care <small>Design Pad</small> | FACE PACKING MACHINE WITH MASSAGER <small>Research 2.0</small> | electric brush with paste dispenser <small>Research 2.0</small> | foaming machine <small>Research 2.0</small> | ELECTRIC FAN WITH CHANGABLE WINGS <small>Research 2.0</small> | Battery-Operated Facial Cleansing Brush <small>Research 2.0</small> | Battery-Operated Electric Shaver <small>Research</small> | Electric Nail Trimmer <small>Research</small> | | | |

MULTI VOTING

stage 2

| | | | | | | | | | | | |
|--|---|--|--|--|---|---|--|--|---|---|--|
| Health sector  | Smart Neck Massager pillow  | Stickable Mini Percussion Massager  | auto header changer muscle massager  | comb with massager  | Digital Thermometer with One Touch Operation  | Flemingo Orthopaedic Electric Heating Pad (with temperature control)  | Insulin pen  | Rechargeable, Muscle/Nerve Stimulator  | Foot massager  | Portable Rechargeable Mesh Nebulizer Machine  | Body massager  |
| Stationary  | Rotating electric lamp  | Electric Lint Remover  | Electric pencil, sharpener, rubber  | | | | | | | | |
| Entertainment  | speaker with lights  | Robo bot  | MINIMALISTIC HEAD PHONE  | | | | | | | | |
| Utility  | STEAMER FOR IRONING CLOTHES  | HAIR TRIMMER WITH HAIR COLLECTOR  | PHONE HOLDER WITH WIRELESS CHARGER  | JUICER BOTTLE  | HAIR DRYER WITH DIFFUSER  | remote operated Movable Lamp  | | | | | |
| Kitchen  | ELECTRIC CHOPPER  | ELECTRIC STIRRER  | BLENDING FOR JUICES AND MILKSHAKES  | AIR FRIER  | COFFEE MAKER WITH ALEXA  | Hand mixer  | Electric Spice Grinder  | Electric Egg Beater  | Electric Salt and Pepper Grinder Set  | | |
| Home Appliances  | PERFUME DIFFUSER  | ELECTRIC FAN WITH CHANGABLE WINGS  | ROTATING DJ LIGHTS  | Handy electric sewing machine  | Battery-Operated Mini Fan  | Portable Vacuum cleaner  | Humidifier  | | | | |
| Bath and self care  | FACE PACKING MACHINE WITH MASSAGER  | electric brush with paste dispenser  | foaming machine  | ELECTRIC FAN WITH CHANGABLE WINGS  | Battery-Operated Facial Cleansing Brush  | Battery-Operated Electric Shaver  | Electric Nail Trimmer  | | | | |

MULTI VOTING FOR TOP IDEAS



Winning Opportunities

Electric Vegetable Chopper

Body Massager

EXISTING PRODUCTS



Electric Vegetable Chopper



Body Massager

Ref : https://www.amazon.in/Rust-Resistant-Unbreakable-Polycarbonate-One-Touch-Operation/dp/B0CB3Q2GJS/ref=sr_1_2_sspa?crid=MTUU7ZYBS1GN&keywords=Electric+Chopper&qid=1706760882&sprefix=%2Caps%2C879&sr=8-2-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1

Ref : https://www.amazon.in/beatXP-Blaze-Electric-Massager-Massage/dp/B09NFBV919S/ref=sr_1_1_sspa?crid=34FYITXZO7OVJ&keywords=Body+Massager&qid=1706760986&sprefix=body+massager%2Caps%2C301&sr=8-1-

IDEA DESCRIPTION

Electric Chopper

- **Product type:** Kitchen Appliance
- **Target Market:** working professionals and parents, elderly individuals, individuals with physical limitations

Physical mechatronic:

- Motor and drive system

Moving parts:

- Rotor blades
- Drive mechanism

Product circularity:

- Recyclable materials
- Modular design
- Repairability

B2C product:

- Target market

Body Massager

- **Product type:** Personal & Health care
- **Target Market:** Individuals seeking relaxation and pain relief, athletes and fitness enthusiast, deskbound professionals, individual with chronic pain

Physical mechatronic:

- Massage Nodes or Rollers Motors
- Adjustable Arms or Handles

Moving parts:

- Massage heads
- Switch

Product circularity:

- Recyclable materials
- Modular design
- Repairability

B2C product:

- Target market



PROCESS

Criteria
of Product

Quality

- ☐ Durability
- ☐ Exterior look
- ☐ Material

Speed modes

- ☐ High
- ☐ Low

Modularity

- ☐ Motor & switch
- ☐ Container
- ☐ Chopper

Cleaning

- ☐ Easy to Clean

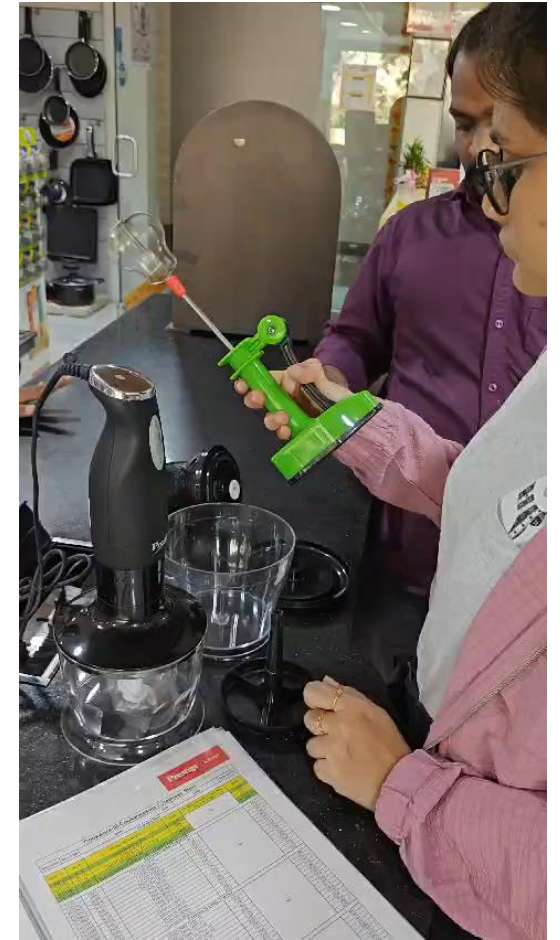
**Frame and
body**

- ☐ Compact and
Easy to use

PRODUCT

Prestige

PEC 4.0

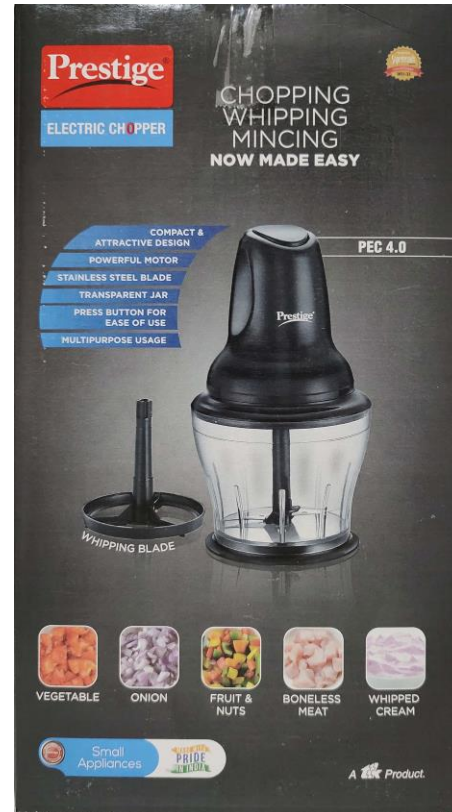


PRODUCT DETAILS

Prestige PEC 4.0

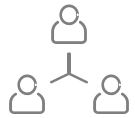


Message



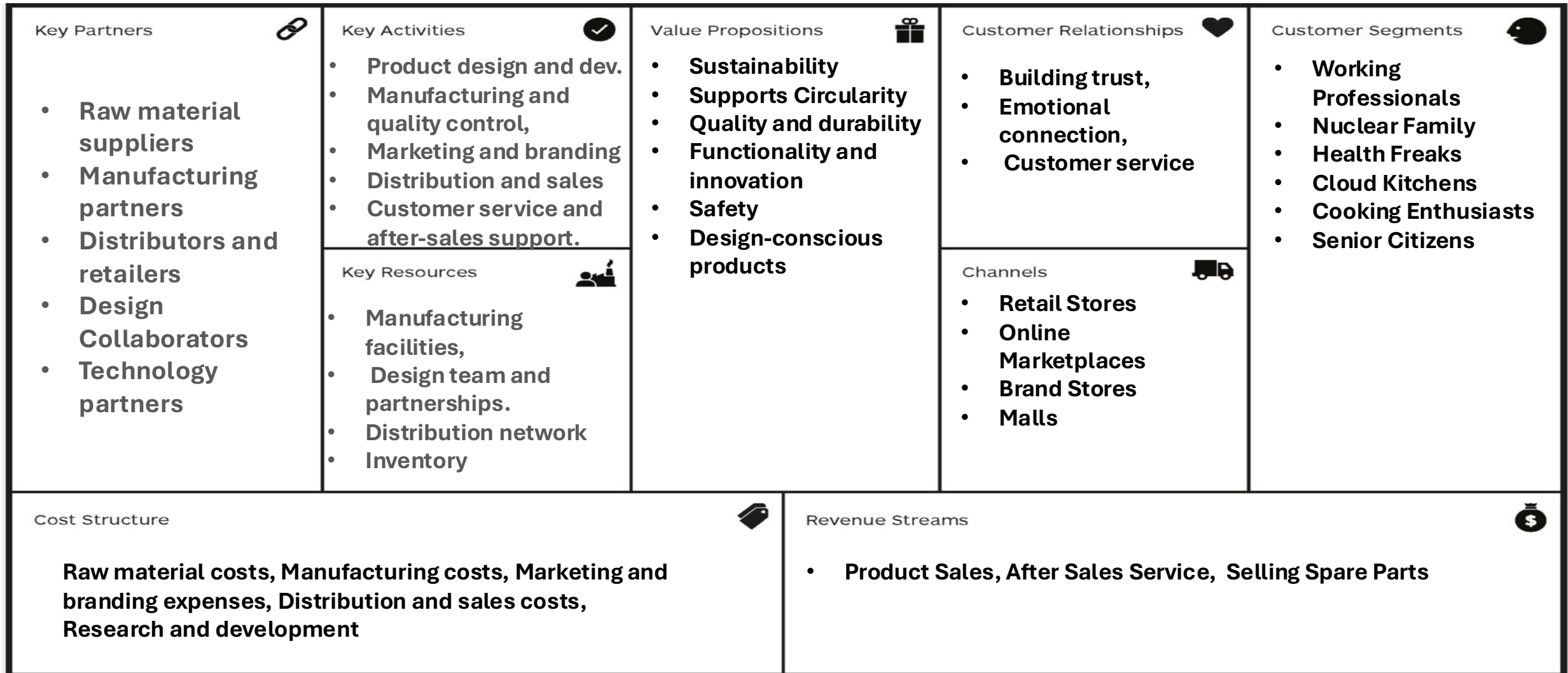
Features



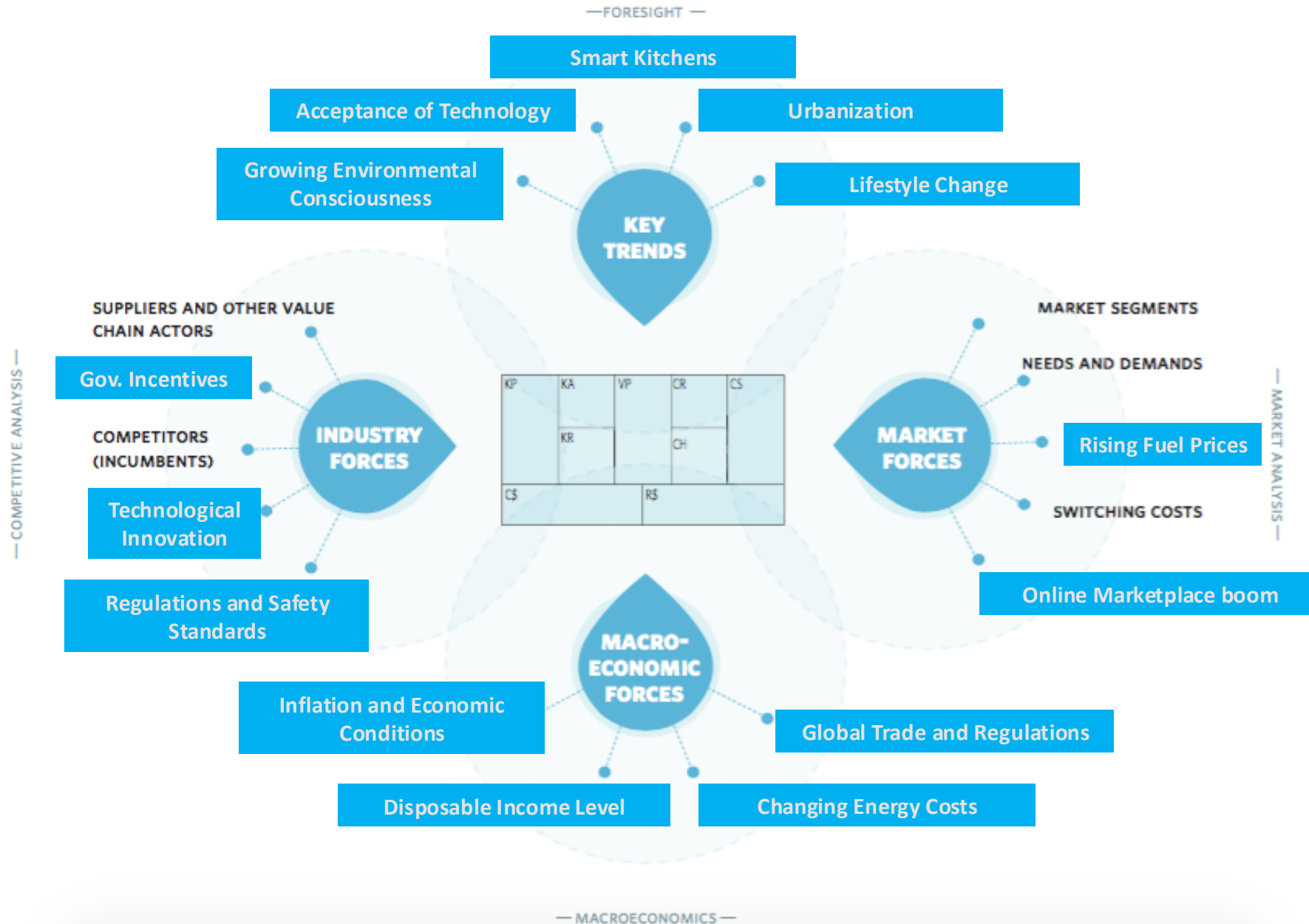


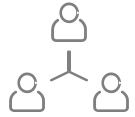
Business Modelling

Business Model Canvas



Business Model Canvas Environment





Market Segmentation

Target Market

Market Segmentation / Target Market

Occasion (Shadi)

On an average 10 MILLION wedding is celebrated in India

Cloud Kitchens

Requires fast Cutting and Chopping

Small Restaurants

Nuclear Families

Dual Income Couples with kids

Foodies & cooking Enthusiasts

Young Professionals (22-40 yr age group)

People with White Collar Job

18.1 million people are involved

Senior Citizen (50yr & above)

Need assistance in cooking and physically demanding



Target Market Segments



Competitor Study

Product Study

Product 1



Crompton

Product: Crompton ChopMaxx Electric Vegetable Chopper

Features:

- Powerful 300 watts motor for faster operation.
- Dual S-shaped blades for grinding, chopping, and whisking.
- 800 ml see-through food-grade bowl.
- Single-touch operation.
- Whisking attachment for beating eggs, butter, and curd.
- Rust-resistant stainless-steel blade for chopping various ingredients.
- Anti-skid base for stability during operation.
- **Pricing is in the range of 1249-1299 rupees.**(variation subjected to seller and sale festivals)

Product Study

Product 2



Borosil

- **Product:** Borosil Chef Delite 300 Watts Electric Chopper
- **Features:**
 - Twin blade technology.
 - 600 ml 'chop-n-store' plastic bowl with a lid.
 - Functions include chopping, mincing, dicing, whisking, and blending.

Pricing ranges from 1949 to 2349 rupees based on watts

[Buy Borosil Chef Delite 260W Electric Glass Chopper For Kitchen Use | White Chopper | Low Noise Operation | Kitchen Accessories Items | Stainless Steel Blades, Whisking Blade for Cream, Chaas, Lassi Online at Low Prices in India - Amazon.in](#)

Product Study

Product 3



Black + Decker

Product: Black+Decker 3-Cup Electric Food Chopper

Black+Decker Bxch1201In 120-Watt Electric Mini Chopper | 350ML Jar

- **Features:**
- Compact design with a 3-cup capacity.
- Suitable for chopping vegetables, nuts, and herbs.
- Easy-to-use one-touch operation.

Price : 3245 rupees

[Buy Black+Decker Bxch1201In 120 Watt Electric Mini Chopper | 350ML Jar Capacity | Stainless Steel Blade | 2-Year Warranty \(White\) Online at Low Prices in India - Amazon.in](#)

Product Study

Product 4



Pigeon

Product: Pigeon Zoom Electric Chopper 350 ml,

Features

- Chopper Capacity: 350 ml
- Powerful Motor: 30 W, 1700 RPM, 5.0V DC
- Battery type: Li-Ion Battery
- Battery Capacity: 1500 mAh
- Long Lasting Charge: 4 Hr charge can be use for 30 min One Chop: 10 to 15 Sec. Battery Support: 100+ Chops Power Cord Length: 1 meter

Price : 770 rupees

.(variation subjected to seller and sale festivals)

[Buy Pigeon Zoom Electric Chopper 350 ml, Portable with 3 Stainless Steel Blades for Effortlessly Chopping Vegetables and Fruits - Green, 30 Watts Online at Low Prices in India - Amazon.in](#)

Product Study

Product 5

EMSON

Product: Bionic Blade Countertop Personal Blender

Features

- Chopper Capacity: 468 g
- Weight = 499g
- Powerful Motor: 150 W,
- Operational Voltage : 7.4V
- Blade Material Stainless Steel
- Special Feature Lightweight
- Style Modern
- Power Source Corded Electric

Price : 3570 rupees

.(variation subjected to seller and sale festivals)



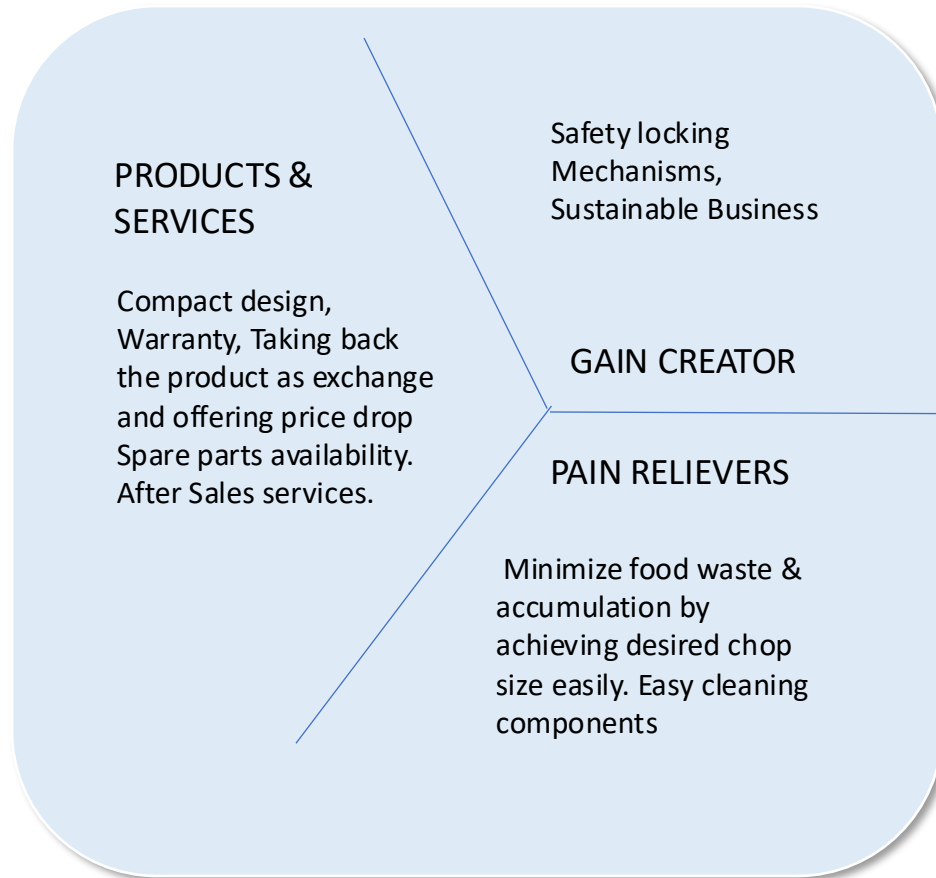
[Buy Bionic Blade Countertop Personal Blender Online at Low Prices in India - Amazon.in](https://www.amazon.in)



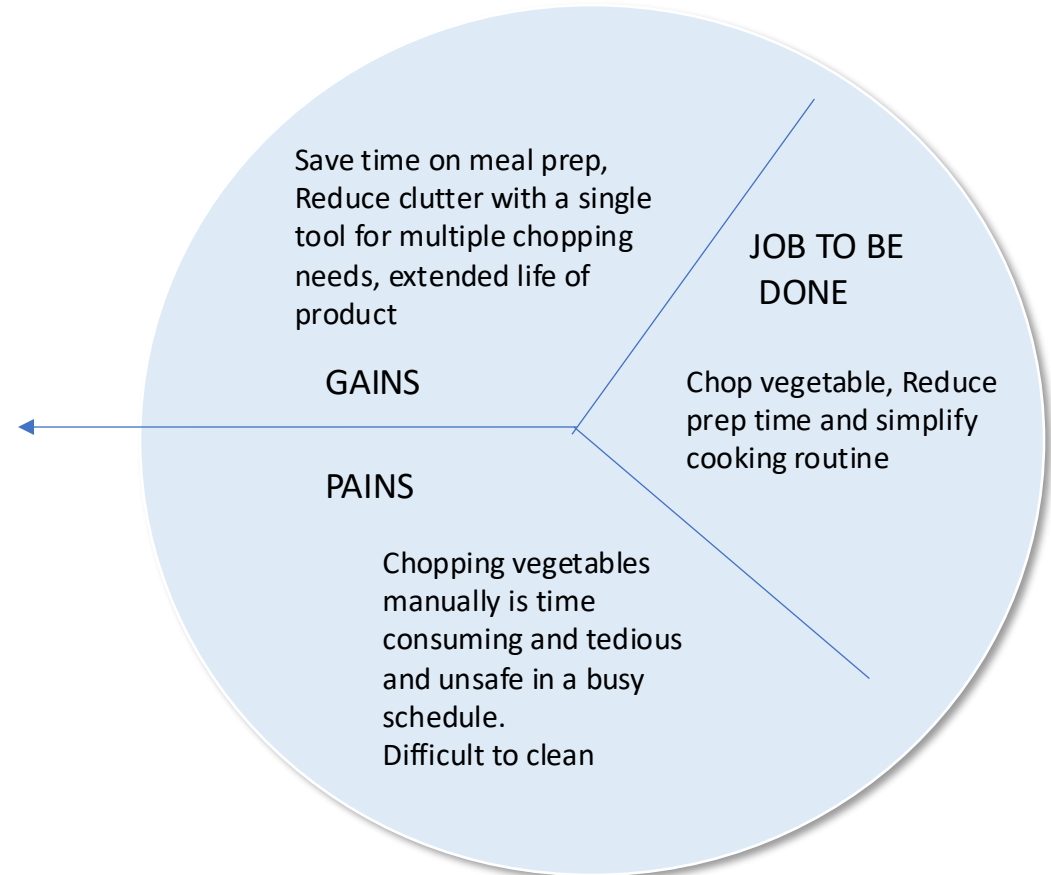
VP & Differentiation

Value Proposition Canvas

Value Proposition



Customer Segment





Value Proposition

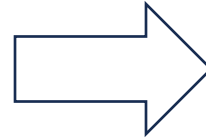
"Save time and chop vegetables safely and easily with our versatile electric chopper. It's the perfect tool for busy cooks who want to simplify meal prep and avoid the hassle of using knives."

Differentiators

WHAT ARE THE THINGS LACKING IN THE CURRENT PRODUCT ?

Cleaning is hard
No consideration of Circularity
Single blade option
Not comfortable to hold
Lid is not transparent

HOW ARE WE DIFFERENT?



Easy cleaning:

Considering the Bowl size and gaps formed for interlocking and reducing the accumulation of particles.

Circular Product:

We are planning to add a circularity perspective to our product where we introduce more components which can be reusable if the attaching components were damaged.

Changeable Blade Component:

For different sized chopping we are providing different attachments of blades which is modular and can be changed easily by the user.

Ergonomic Form:

The current form which doesn't have any handle or other form of grippers causing user issue with balancing so, we changed the form of the Chopper to more ergonomic form.

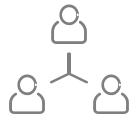
Transparent bowl and lid:

To increase the visibility and the progress of the work we are providing transparent Bowl and Lid which increase even the visual appeal.



Differentiators

| Features | Differentiator | Dimensions of Differentiations |
|--------------------------|---|---------------------------------------|
| Ease of Use and Cleaning | Easy-to-clean components for hassle-free operation. | Ergonomic design, Lesser crevices |
| Safety Features | Enhanced safety features that prioritize user protection during operation and handling. | Safety lock mechanisms, non-slip base |
| Durability | Robust construction using high-quality materials that ensure long-lasting durability and performance. | Material quality, warranty period |



Target Company

Target Company

- Prestige is a titan in the Indian kitchen appliance market. They have a well-established brand reputation synonymous with quality, reliability, and innovation.
- Their products have a wide reach and strong distribution network. Partnering with Prestige would ensure your enhanced electric chopper would find its way into homes across the country.
- Prestige has a history of embracing new technologies. This open-mindedness aligns with the focus on smart features and automation within your improved electric chopper.

Product Range:

TTK Prestige offers a wide range of kitchen appliances like

Pressure cookers

Cooktops: Gas stoves and induction cooktops.

Kitchen appliances: Mixer grinders, electric kettles, vacuum cleaners.

Cookware: Non-stick cookware, fry pans, and other kitchen essentials.



Prestige PEC 3.0 250-Watts
Electric Chopper (White)

Electric Chopper



Prestige Partner Stainless Steel
Food Processor 1000 W

Food Processor

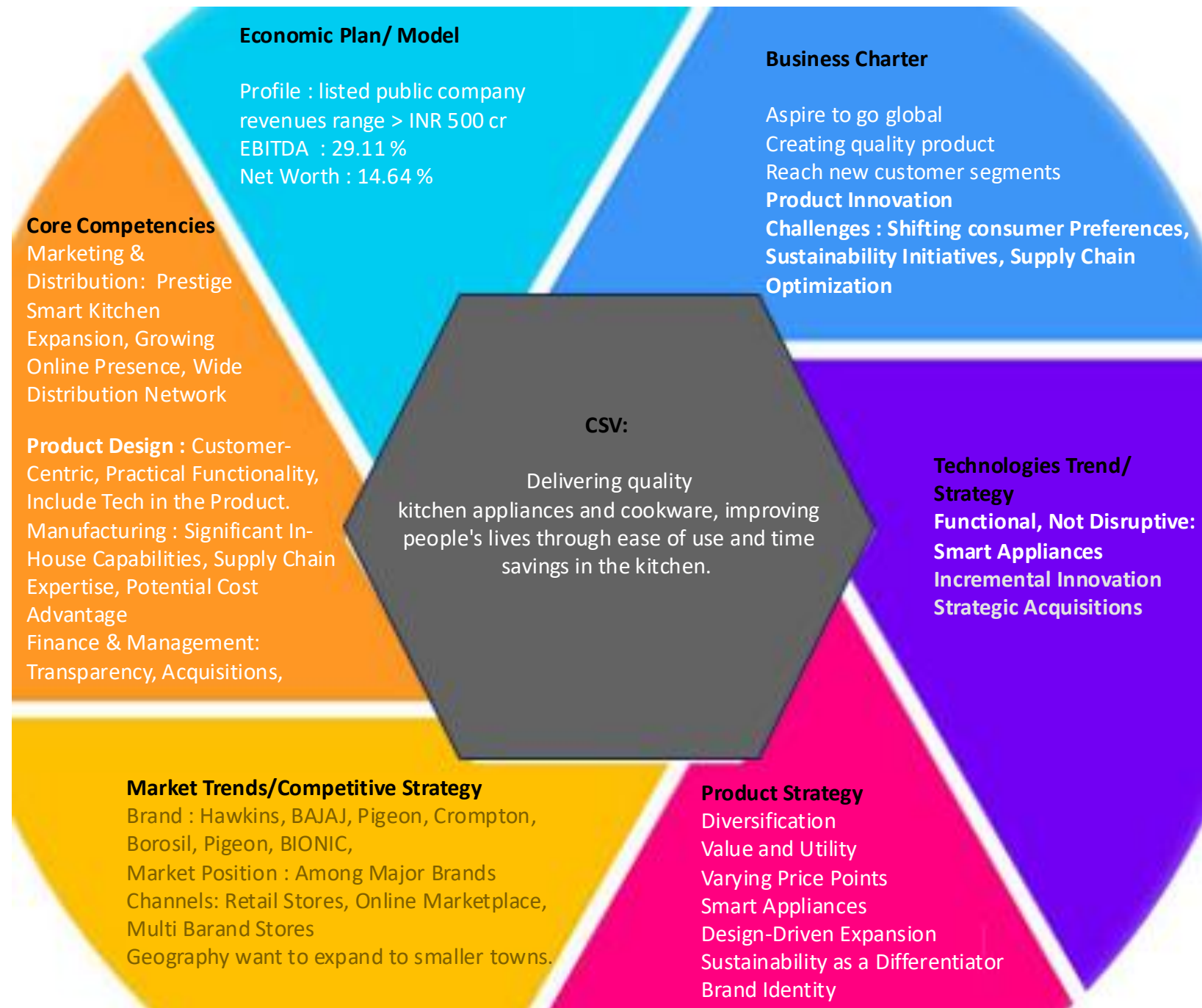


Why Target Fit

- **Brand and Market Fit:** Our improved electric chopper offers a level of convenience, safety, and technological advancement that complements Prestige's existing product line. It has the potential to be an appealing addition to their kitchen solutions.
- **Synergies in Technology:** Prestige is already exploring smart kitchen appliances. Our project, with its use of sensors and automation, aligns with this future direction. This could potentially open avenues for collaboration and technology sharing.
- **Shared Values:** Prestige emphasizes customer satisfaction and convenience. Our focus on safety and enhanced features through smart technology demonstrates a shared commitment to delivering user-centric products.



Core Strategic Vision

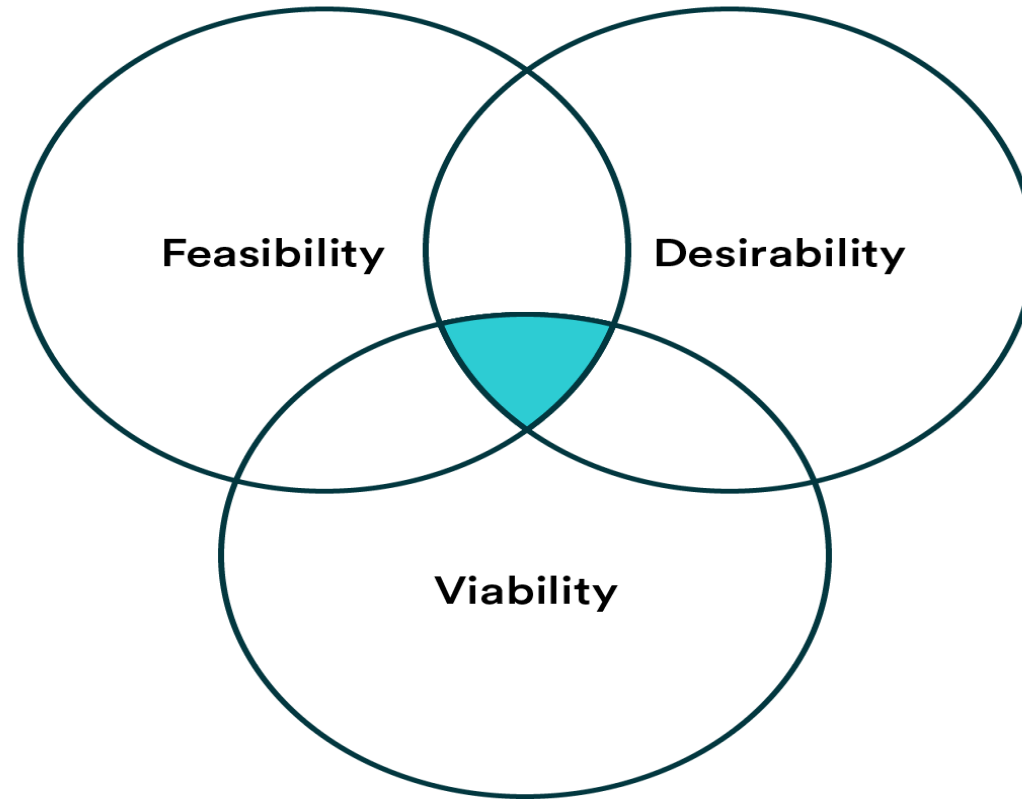


Assessment of Feasibility, Desirability, Viability

Technical: Existing technology can be readily applied, making it technically feasible to develop and manufacture.

Operational : Prestige has a well-established manufacturing infrastructure and distribution network for kitchen appliances.

Financial: Considering the potential market size and existing competitor pricing, there's a good chance the product can be priced competitively and achieve profitability within a reasonable timeframe.



Market Need: Busy lifestyles and growing interest in healthy cooking create a demand for appliances that simplify food preparation.

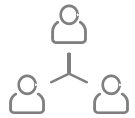
Target Audience: Busy professionals, elderly individuals, and single people are all potential target segments who would likely find the convenience and time-saving benefits of an electric chopper desirable.

Competitive Advantage: The interchangeable blade system offers greater versatility compared to fixed-blade choppers. Transparency and focus on easy cleaning address pain points of existing models.

Market Size and Growth: The global and Indian electric vegetable chopper markets are expected to experience positive growth driven by convenience, rising disposable income, and changing demographics.

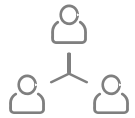
Competition: The market is saturated, but Prestige's brand reputation and focus on differentiation can help them compete effectively.

Profitability: The target price point, combined with efficient manufacturing and a large potential customer base, suggests the product can be profitable.



Timeline

[illegible]



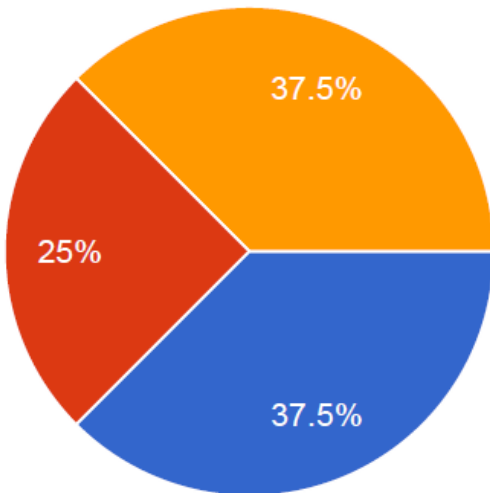
Survey

Google form and responses

Survey & Analysis on Electric Chopper

1

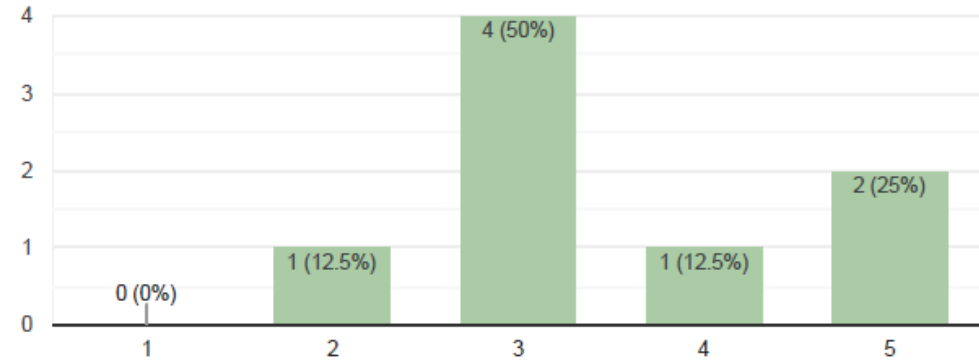
•Have you ever used any kind of 'Electric Chopper'.



- Yes
- No
- tried few times

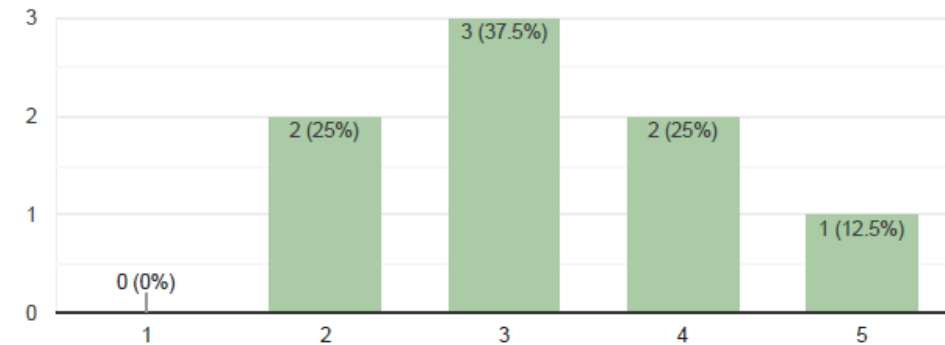
2

•How satisfied are you with the Electric chopper?



3

•How would you rate the chopping performance of the electric chopper?

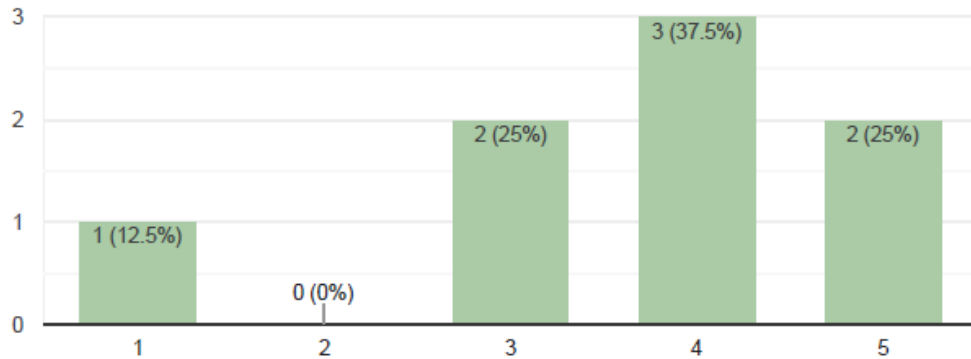


Google form and responses

Survey & Analysis

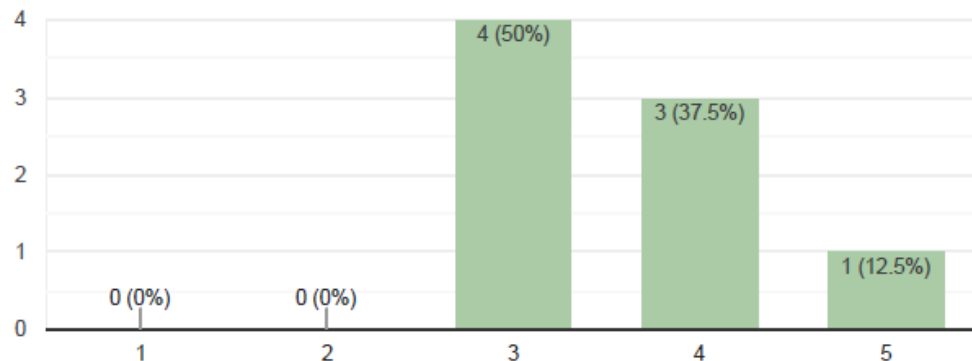
4

•How easy is it to assemble the electric chopper for you?



6

•How easy is it to operate the electric chopper?



5

•Are there any **specific features** or functions of the electric chopper that you find particularly convenient or inconvenient? Please elaborate.

Effortless

Blades are sharp

It's time saving machine

No

Charging capabilities

1. Cleaning

2. Prechopping is required

3. Blades will deteriorate easily

4. Requires frequent changing of components

Google form and responses

Survey & Analysis

7

•Are there any additional features you would like to see added to the electric chopper?

Auto cleaning of cutting blades

Bigger container to cut bigger vegetables

Slices

No

Chopper cum juice maker

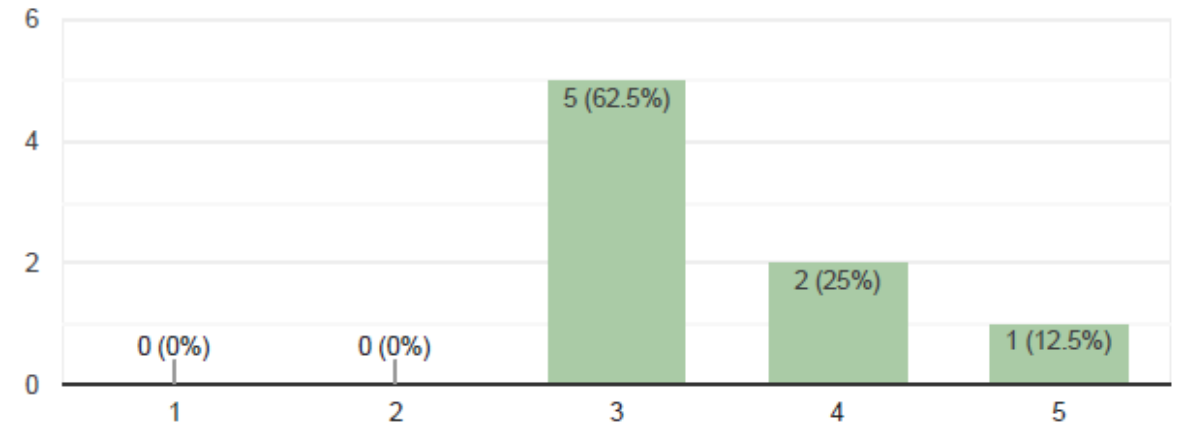
1. Single blade (say with rotation or sliding) for multiple size chopping

NIL

auto cleaning

8

•How durable do you find the electric chopper?



Google form and responses

Survey & Analysis

9

Is there anything else you would like to share about your experience with the electric chopper?

Nahi

Pretty good

Jo

No

Nil

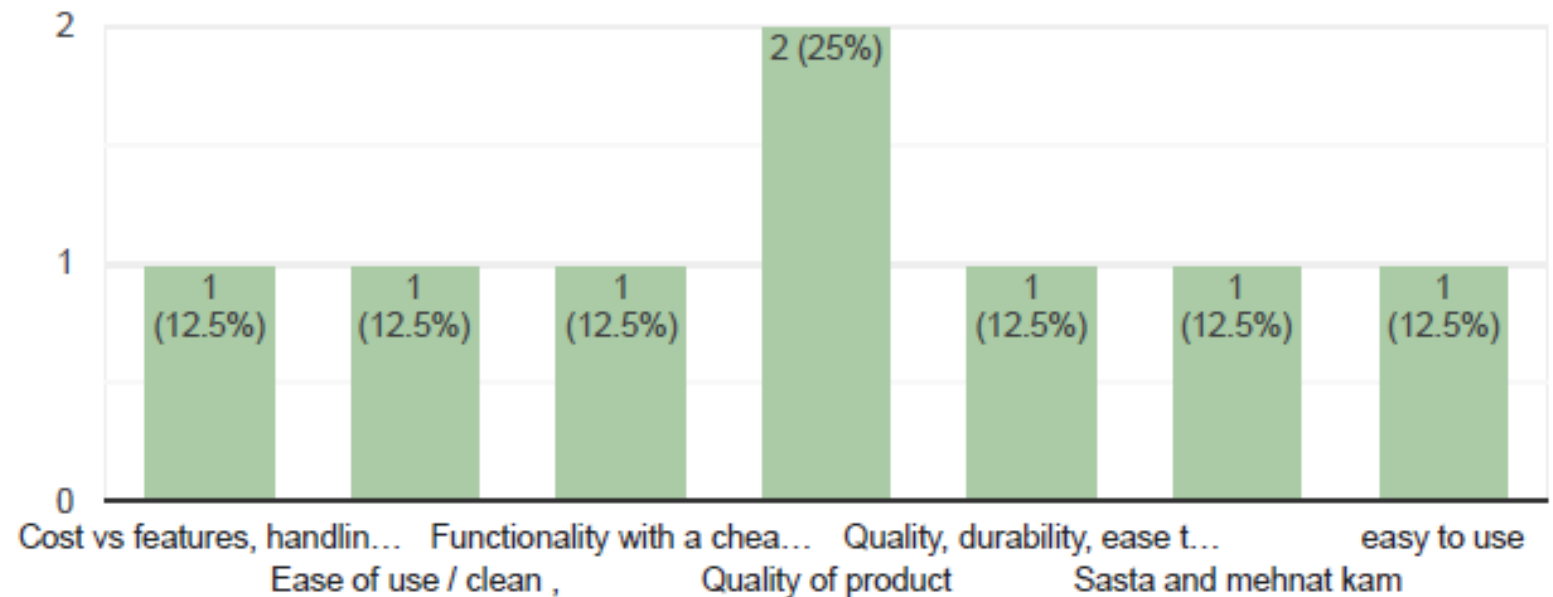
NA

NIL

no

10

How do you typically decide which kitchen gadgets to buy? What typical points do you consider before buying any Kitchen gadgets. (Like Quality of Product, Functionality, Compactness, Heaviness, Look & Feel, Price...e.t.c)



Quality of Life

Overall views

Survey & Analysis

75 %

consumers have
used

50 %

consumers are
satisfied

3.25/5

Overall Rating on
performance

3.5/5

Durable

Quality

Consideration

3.6/5

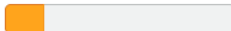
Difficulty level to
assemble

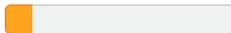
Customer reviews

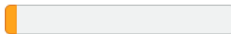
★★★★☆ 3.6 out of 5

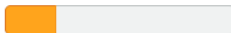
74 global ratings

5 star  45%

4 star  17%

3 star  12%

2 star  5%

1 star  22%

3.6 out of 5

3 ★ Good

Ok product helpful for small families

Ayesha Customer  Certified Buyer, Bangalore



Rohan

★★★★☆ Power

Reviewed in India on 17 October 2023

Verified Purchase

Cutting power low..



Placeholder

★★★★☆ Prestige chooper

Reviewed in India on 7 August 2023

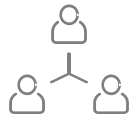
Verified Purchase

Chopping ability not at all good

2 ★ Decent product

It only cut lower part. Remaining will stay same. Waste of money for chopping vegetables.

Amjath Mohammed  Certified Buyer, Kanjirappally 2 months ago



Market Research

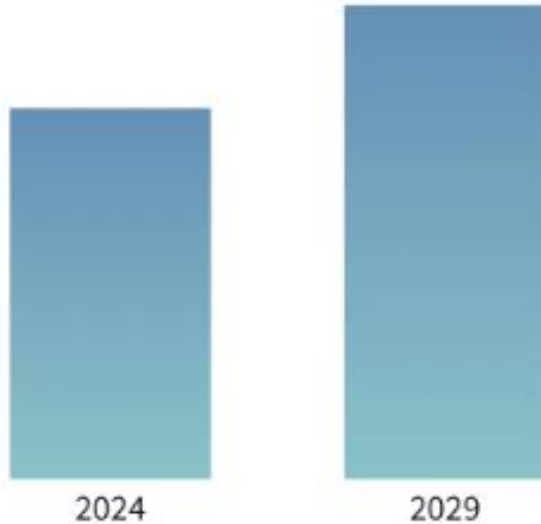
Market Research

Indian Market

India Electric Vegetable Choppers Market

Market Size

CAGR >5%



Source : Mordor Intelligence



Share

Study Period 2020 - 2029

Base Year For Estimation 2023

Forecast Data Period 2024 - 2029

Historical Data Period 2020 - 2022

CAGR > 5.00 %

Market Concentration High

Major Players

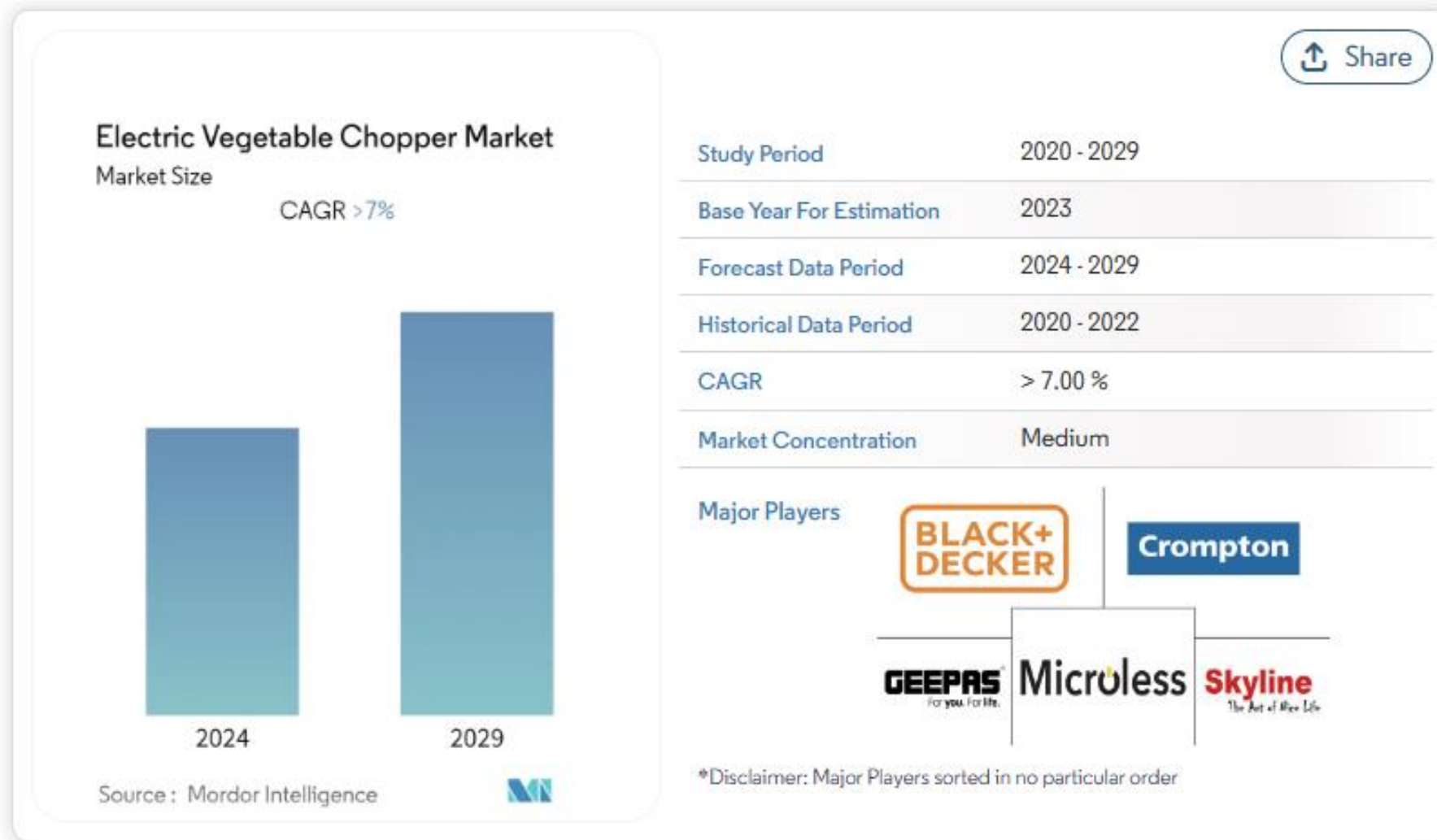


*Disclaimer: Major Players sorted in no particular order

•<https://www.mordorintelligence.com/industry-reports/india-electric-vegetable-choppers-market>

Market Research

Global Market



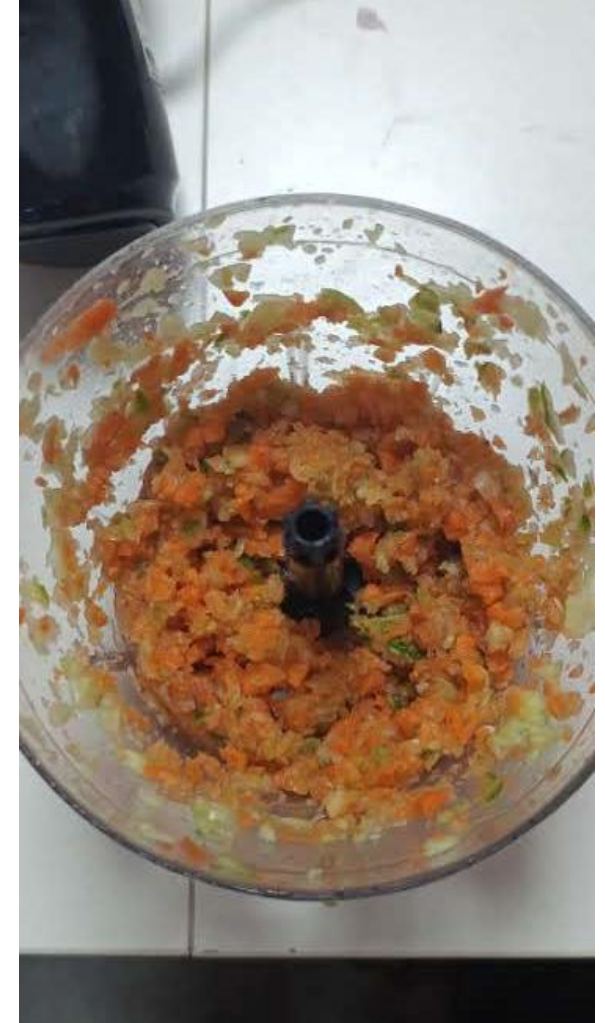
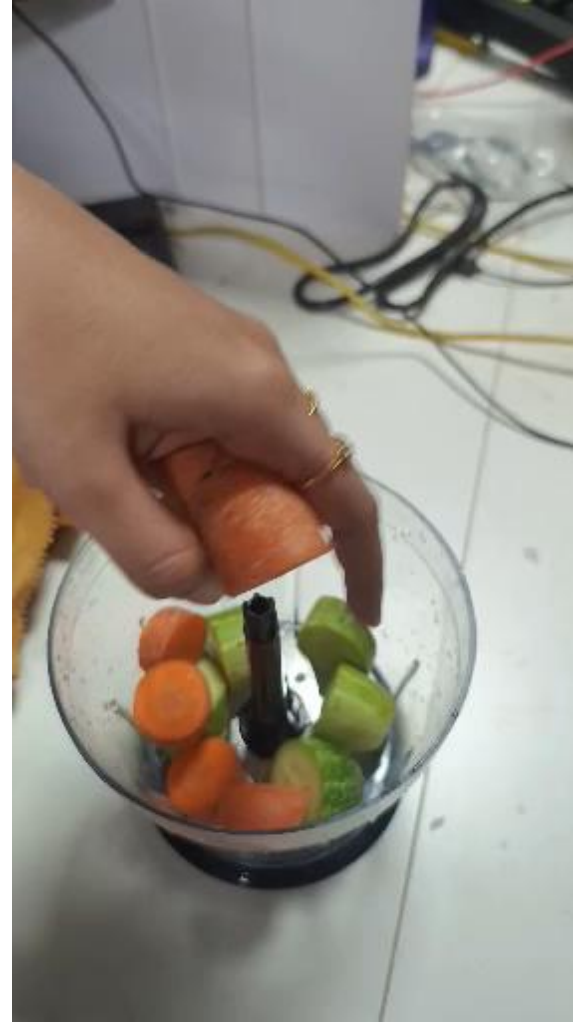
•<https://www.mordorintelligence.com/industry-reports/global-electric-vegetable-chopper-market>



Product Function

Product Functioning videos

Whipping Blade, Chopping & Mincing blade

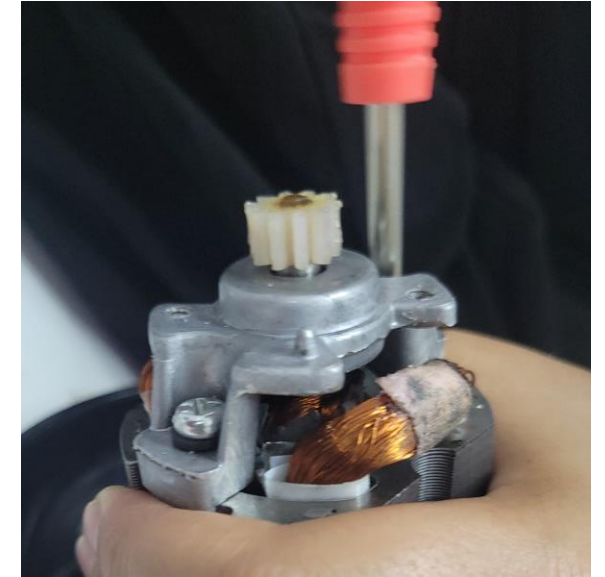
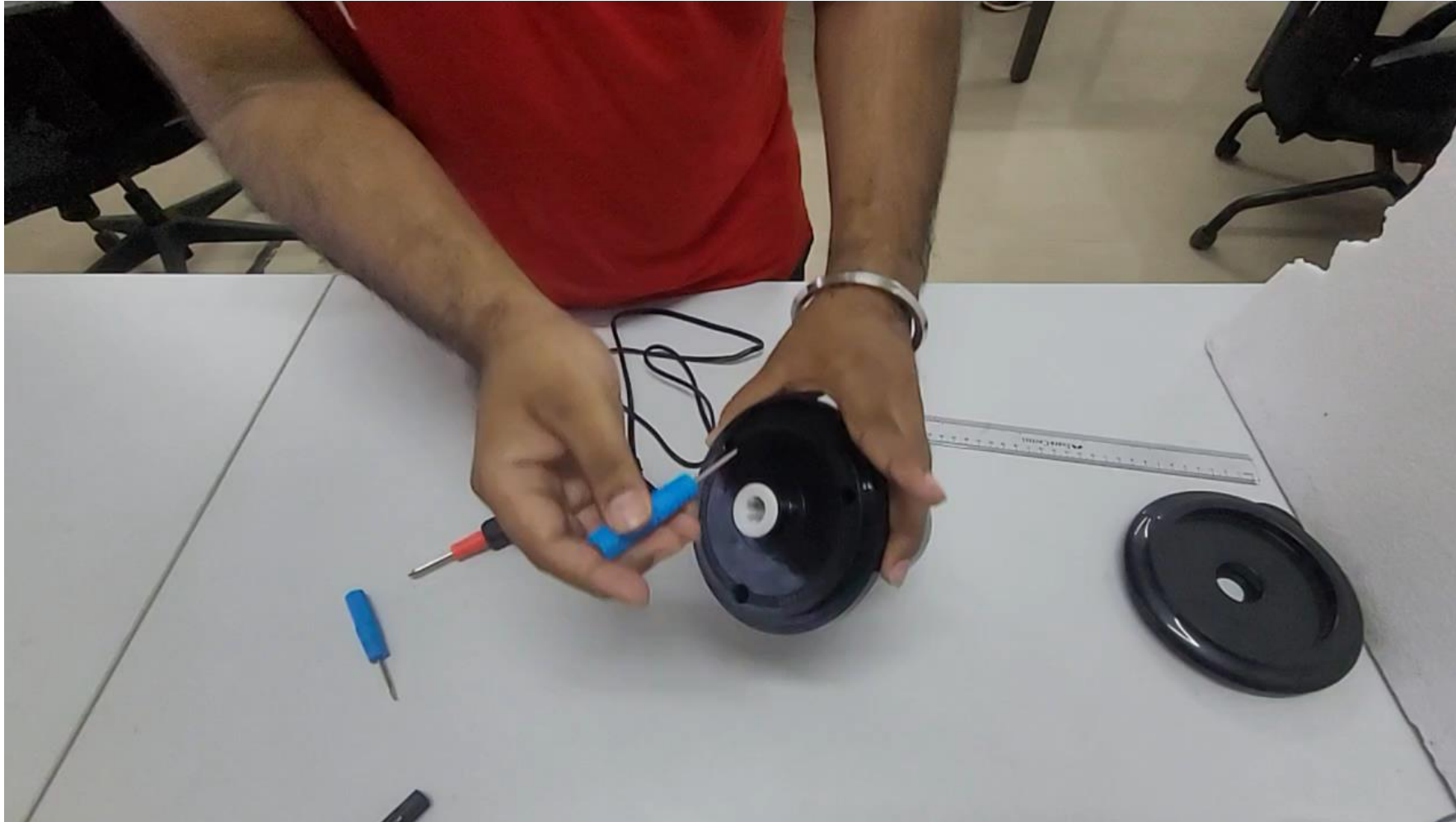




Product Teardown

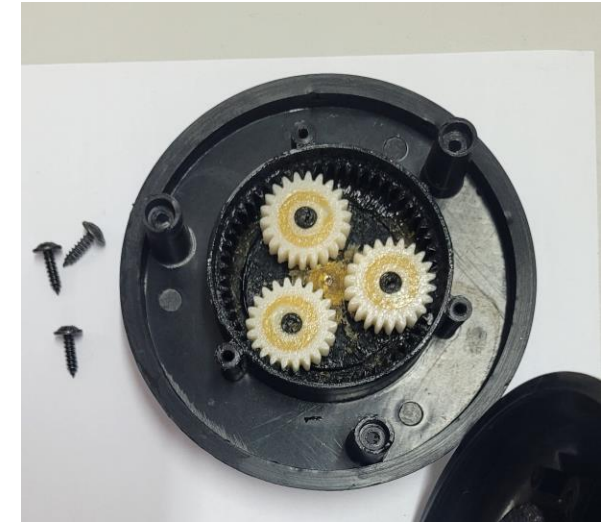
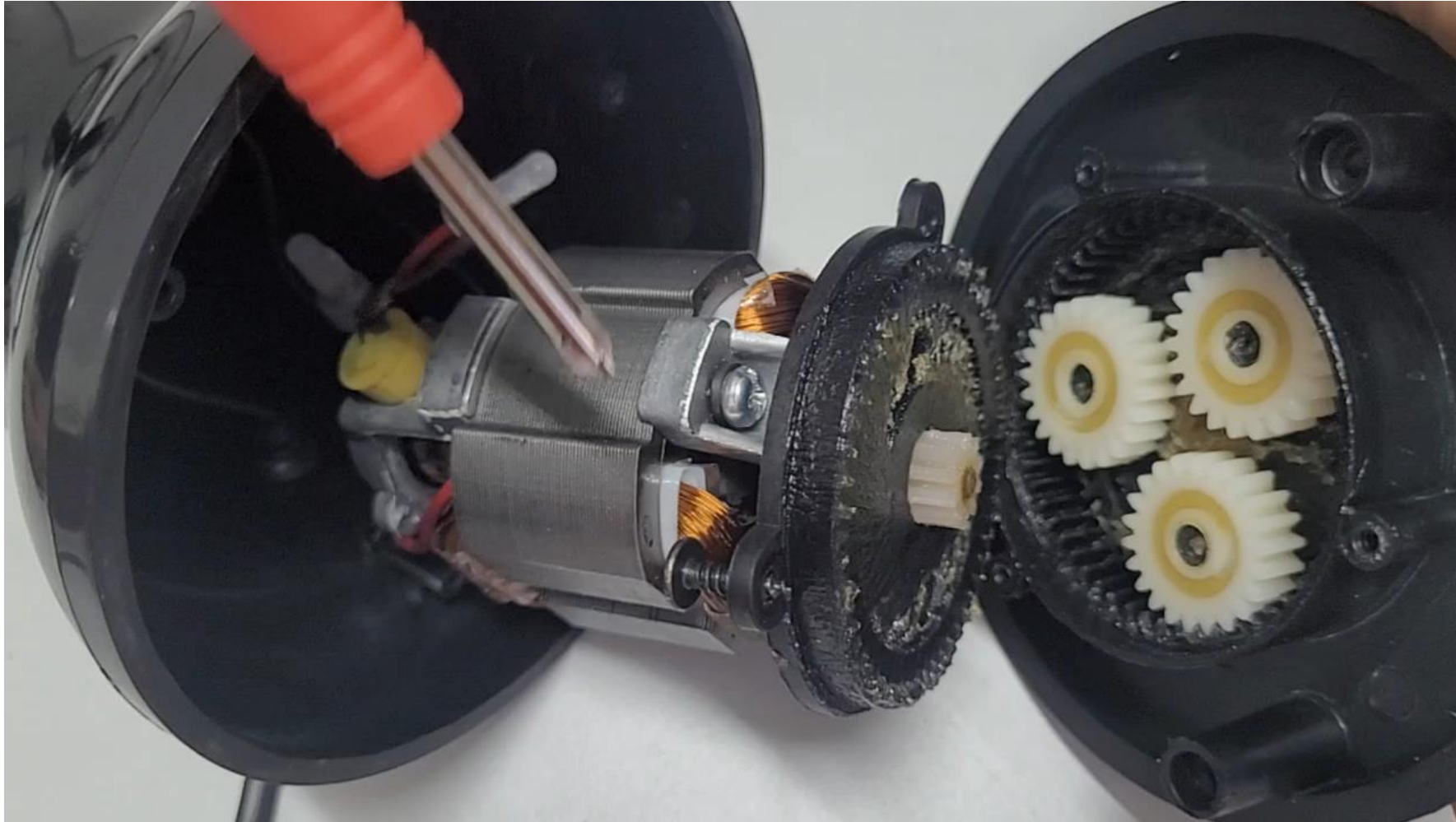
Product Tear Down

Process



Product Tear Down

Process



Product Tear Down

Process



1



2



3



4



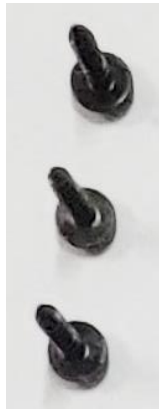
5



6



6a



6b



7



7a



8

1. Operating Lid
2. Chopper Blade
3. Whipper wheel
4. Bowl
5. Gear Mechanism
6. Gear Cover
 - 6a. Screw – 20mm
 - 6b. Screw – 40 mm
7. Motor Cover/ Housing
 - 7a. Screw –15 mm
8. Motor

Issues

Listing of issues..

Cleaning Time Consumption



1

Each part requires individual cleaning, leading to extended cleaning sessions.

Sharp Blade Cleaning Difficulty



2

The sharpness of the blades poses challenges during cleaning.

Drying Time



3

The hollow structure of the appliance prolongs the drying process after cleaning.

Issues

Listing of issues..

Inconsistent Chopping Results:



4

inconsistencies in chopping, leading to unevenly sized pieces.

Integrated Blade Housing



5

The blades are integrated with the blade housing, potentially complicating maintenance and replacement.

Lack of Speed Adjustment:



6

Users find it inconvenient that they cannot adjust the chopping speed to their desired preference.

Issues

Listing of issues..

Overheating Issue



7

during prolonged usage, which could affect the appliance's performance and longevity.

No Lid Interlocking System



8

absence of an interlocking system in the bowl lid, which affects secure closure.

Heavy Build



9

The appliance is noted for its heavy body, which may pose handling challenges for some users.

Innovation Situation Questionnaire

ISQ..

| Elements | Description |
|-----------------------|---|
| Name | Electric Chopper |
| Primary Function | Chopping vegetables |
| Structure | Electric motor, Blades, Chopping Bowl, Lid, Power Cord, Base. |
| Functioning | Preparation, Assembly, Power on, Chopping process, Adjustments, Completion, Disassembly, Cleaning, Drying and Storage |
| Available Resources | Material, Electric energy, Heat |
| Problems to be solved | Motor overheating, Difficulty in cleaning components thoroughly, Lack of durability in blade assemblies, Limited versatility. |
| Allowable Changes | Material, Dimensions, Form |



Function Structure



Functions

Listing of Functions..

1

Preparation

2

Assembly

3

Input signal

4

Chopping

5

Completion

6

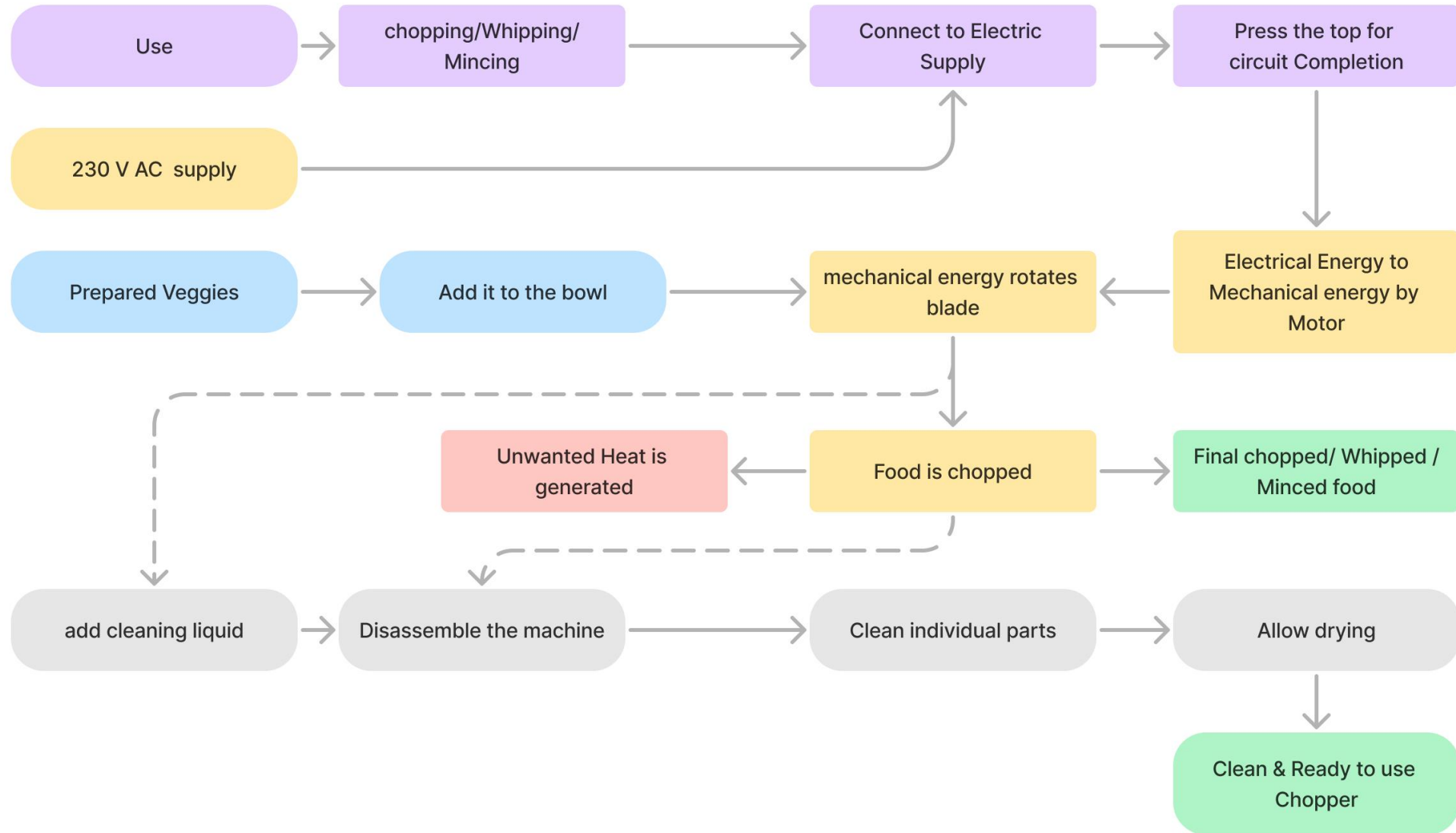
Disassembly

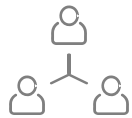
7

Cleaning and storing

Function Structure

Flow Diagram





BOM

| Component | Sub - Component | Description | Quantity |
|------------------------|---|------------------------------|----------|
| Motor | Stator | | 1 |
| | Pole Shoe | | 1 |
| | Armature | | 1 |
| | Commutator | | |
| | Shaft | | 1 |
| | Field Winding | | |
| Motor Assembly | Motor housing | Aluminium Housing | |
| | Wiring harness | Copper wires | |
| | Motor coupling | Stainless steel | |
| Blade Assembly | | Stainless steel | 2 |
| Chopping Bowl Assembly | Plastic chopping bowl | Food grade ABS | |
| | Bowl lid | Transparent polycarbonate | 1 |
| | Bowl base | ABS plastic | 1 |
| Control Panel | Control panel housing | ABS plastic | |
| | Button | ABS plastic | 1 |
| | Wiring connections | Copper wires, Pvc Insulation | |
| Frame and Housing | plastic housing | ABS plastic | |
| Power Components | Power cord | Copper wires, Pvc Insulation | |
| | Power switch | Plastic | |
| | Power connector | | |
| | | | |
| Packaging | Outer packaging box | Recylable cardboard | 1 |
| | Inner packaging materials | Plastic | 3 |
| | Instruction manual and warranty information | | 1 |
| Screws | 15mm | | 3 |
| | 10mm | | 3 |
| | 40mm | | 2 |
| Washer | 4mm dia | | 2 |
| Miscellaneous | User manual and warranty card | | |



Circularity



Product circularity

Opportunities

Acrylonitrile butadiene styrene (ABS) is a common thermoplastic known for its strength, impact resistance, and moderate heat tolerance.

Transparent Polycarbonate (PC) is a high-performance thermoplastic known for its exceptional clarity, impact resistance, and heat tolerance

Recycling: ABS & PC is theoretically recyclable under code 7 (Other Resins/Mixed Plastics).

Existing challenges exist

- **Contamination:** Food residue and mixed materials can complicate sorting and reprocessing.
- **Downcycling:** Recycled ABS often ends up in lower-quality applications due to degradation during processing.
- **Limited infrastructure:** Recycling facilities dedicated to ABS, especially food-grade, might be scarce in some regions.
- **Design for disassembly:** Modular designs with easily separable food-contact parts and housing could facilitate recycling.
- **Bio-based alternatives:** Exploring bio-based plastics with similar properties but greater composability could enhance circularity.

Product circularity

Opportunities

Material selection

Investigating alternative materials with better inherent circularity or biodegradability, while maintaining safety and performance.



Design for recycling

Integrating design features that simplify disassembly and promote sorting of food-contact parts from the housing.



Recycling infrastructure

Advocating for improved recycling facilities and processes dedicated to food-grade ABS specifically.



Consumer education

Raising awareness about proper disposal and recycling options for food-grade plastic components and products.



Requirements



Requirements

Listing of Requirements..

1

Ease of Cleaning

2

Modular Blade Design

3

~~Adjustable Speed Settings~~

4

Quick Drying

5

Weight Optimization

6

Heat Management

7

Secure Lid Closure

8

~~Uniform Chopping Results~~

9

~~Mix periodically~~



Needs

**Flexibility to
change the blades**

Easy Cleaning

**Fine and Uniform
Chopping**

**Grip for Secure
and Safe chopping**

Secure Lid Closure

Quick Drying



Requirements

Listing of Requirements..

1

Flexibility to
change blades

2

Easy
Cleaning

3

Uniform
Chopping

4

Base Grip

5

Secure Lid
Closure

6

Cost

7

Circularity

Matrix Method

Customer Requirements

1. Modular Blade Design

2. Easy Cleaning

3. Uniform Chopping

4. Grip

5. Secure Lid Closure

6. Cost

7. Circularity

- Rank

1. Modular Blade Design

2. Easy Cleaning

3. Circularity

4. Uniform Chopping

5. Easy Cleaning

6. Secure Lid Closure

7. Grip

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Sum |
|---|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | -- | 1 | 1 | 0.5 | 1 | 0.5 | 0.5 | 4.5 |
| 2 | 0 | -- | 0.5 | 0 | 1 | 1 | 0 | 2.5 |
| 3 | 0 | 0.5 | -- | 0 | 0.5 | 0.5 | 0.5 | 2 |
| 4 | 0.5 | 1 | 1 | -- | 0.5 | 0 | 0.5 | 3.5 |
| 5 | 0 | 0 | 0.5 | 0.5 | -- | 0 | 1 | 2 |
| 6 | 0.5 | 0 | 0.5 | 1 | 1 | -- | 0.5 | 3.5 |
| 7 | 0.5 | 0 | 0.5 | 0.5 | 0 | 0.5 | -- | 2 |



Technical Requirements

| Requirements | Metrics | Ideal Value |
|-----------------------------|---|----------------------------|
| Multifunction chopper Blade | Standard attachment system | |
| Easy cleaning | Cleaning time | 5-10 Mins |
| | Minimum Crevices | |
| Uniform Chopping | Size variance of chopped ingredients (mm) | 3 to 6mm |
| | Motor RPM | 1000-2000rpm |
| | Motor Power | 200-500W |
| Base Grip | Nonslip | |
| Secure Lid Closure | Lid locking mechanism | 100% Airtight (No leakage) |



Technical Requirements

| Requirements | Metrics | Ideal Value |
|--------------------|-----------------------|----------------------------|
| Base Grip | Nonslip | |
| Secure Lid Closure | Lid locking mechanism | 100% Airtight (No leakage) |
| Cost | Rupees | 1500 – 2000 Rs |
| Circularity | Recyclable Material | |
| | Durable | |

Relative Importance

QFD

1. Standard attachment system
2. Cleaning time
3. Minimum Crevices
4. Size of chopped ingredient
5. Motor rpm
6. Motor Power
7. Nonslip
8. Locking mechanism
9. Recyclable Material
10. Durable

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Sum |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | -- | 1 | 0.5 | 0 | 0.5 | 1 | 0.5 | 0.5 | 1 | 0.5 | 5.5 |
| 2 | 0 | -- | 0 | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 |
| 3 | 0.5 | 1 | -- | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 5 |
| 4 | 1 | 0.5 | 0.5 | -- | 0.5 | 0.5 | 0 | 0 | 0.5 | 0.5 | 4 |
| 5 | 0.5 | 1 | 0.5 | 0.5 | -- | 0.5 | 0.5 | 0 | 0.5 | 0.5 | 4.5 |
| 6 | 0 | 1 | 0.5 | 0.5 | 0.5 | -- | 0.5 | 0.5 | 0.5 | 0.5 | 4.5 |
| 7 | 0.5 | 1 | 0.5 | 1 | 0.5 | 0.5 | -- | 0.5 | 0 | 0 | 4.5 |
| 8 | 0.5 | 1 | 0.5 | 1 | 1 | 0.5 | 0.5 | -- | 0 | 0 | 5 |
| 9 | 0 | 1 | 0.5 | 0.5 | 0.5 | 0.5 | 1 | 1 | | 0.5 | 5.5 |
| 10 | 0.5 | 1 | 0.5 | 0.5 | 0.5 | 0.5 | 1 | 1 | 0.5 | | 6 |

Product Evaluation

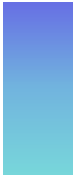
QFD



Our product



Competitor product



Product Evaluation




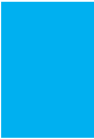

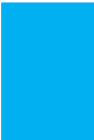








QFD



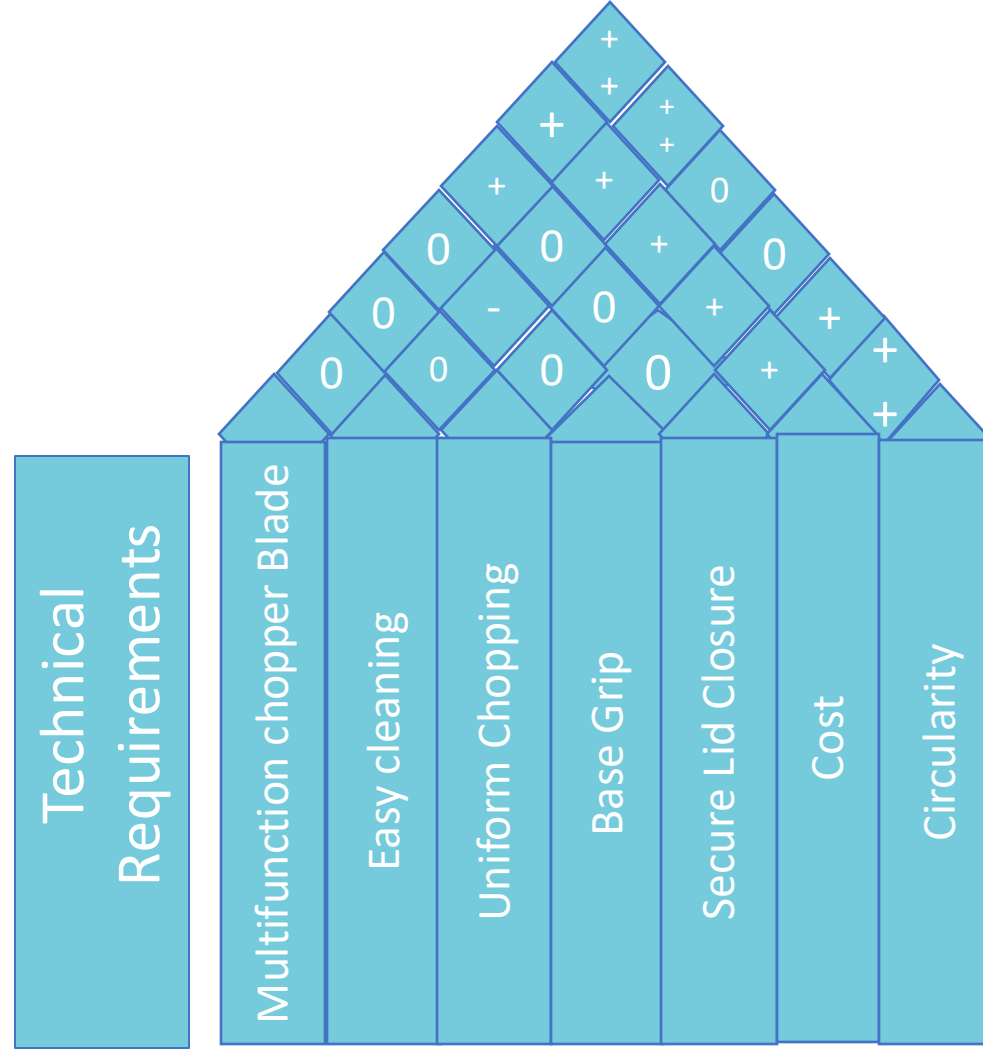
Borosil



Prestige

| | 1 | 2 | 3 | 4 | 5 | Target Value | Improvement Rate | Weight |
|------------------------------------|---|---|---|---|---|--------------|------------------|--------|
| Multifunction chopper Blade [5] | |  |  | | | 5 | 1.25 | 6.25 |
| Uniform Chopping [3] | |  |  | | | 4 | 1.3 | 5.2 |
| Circularity [3] | |  |  | | | 4 | 1.3 | 5.2 |
| Easy Cleaning[2.5] | |  |  | | | 3 | 1.2 | 3.6 |
| Secure Lid Closure [1.5] |  | | |  | | 2 | 1.3 | 2.6 |
| Cost [4.5] | | | |  |  | 5 | 1.1 | 5.5 |
| Grip[0.5] |  |  | | | | 1 | 2 | 2 |

Interrelationship b/w Technical Parameters

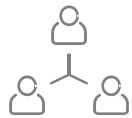




Target Values

QFD

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------------|-----|----------|-------|---------|-----------|---------|---|------|
| Prestige | 0 | 10mins | 5-7mm | - | 120mm | 80mm | - | 250W |
| Borosil | 0 | 15mins | - | - | 126mm | 100mm | - | 260W |
| Target Value | <=3 | 5-10mins | 3-5mm | 1500rpm | 120-130mm | 30-50mm | | |



Patent Study

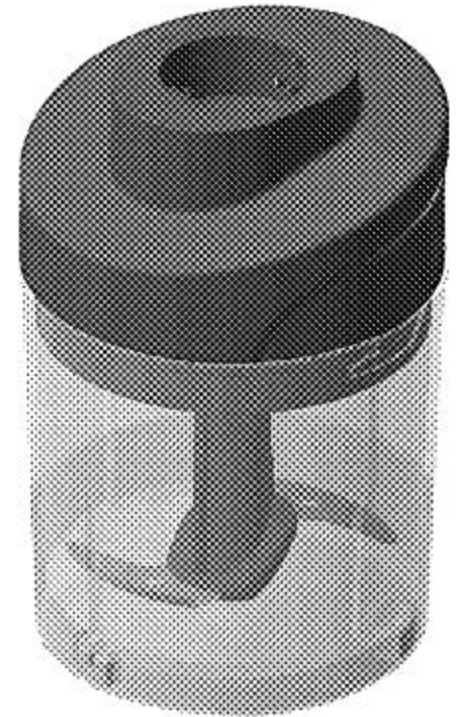
Patent Study

The existing Patents for Electric Chopper and its electronic circuit components are mainly design patents.

The Patent number US D933,417S has been awarded in OCT, 19, 2021 to **Sophie Bourgeois** and it was filed by **Babyliss Faco SPRL**.

CLAIM

- The ornamental design for an electric chopper, as shown and described.



Ref : [USD950305S1 - Electric chopper - Google Patents](#)

Patent Study

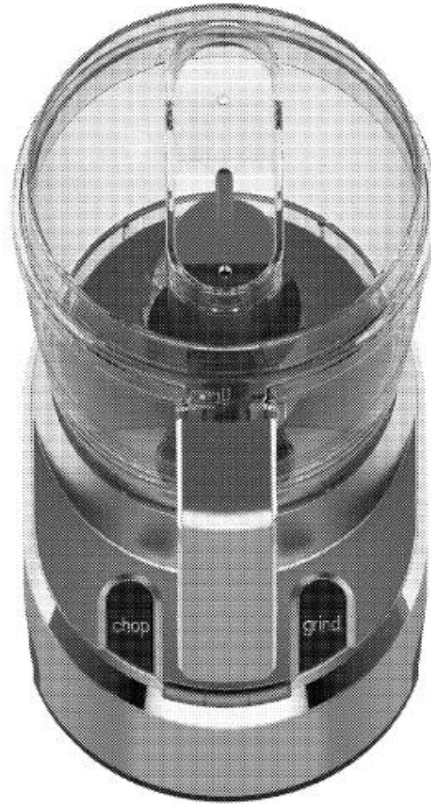
| Patent no. | Inventor | Country | References |
|-------------------------------|---------------------|---------|--|
| US D933,417S OCT, 19, 2021 | Sophie Bourgeois | USA | USD950305S1 - Electric chopper - Google Patents |
| DE550617C | H Putsch G mbh & Co | Germany | DE550617C - Electrically powered chopping machine - Google Patents |
| D999587 | Sophie Bourgeois | USA | US Patent for Electric chopper Patent (Patent # D 999,587 issued September 26, 2023) - Justia Patents Search |

Patent Study

1.3



1.7



1.8



Ref : [USD950305S1 - Electric chopper - Google Patents](#)

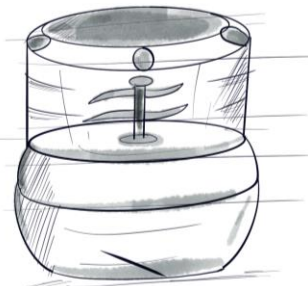
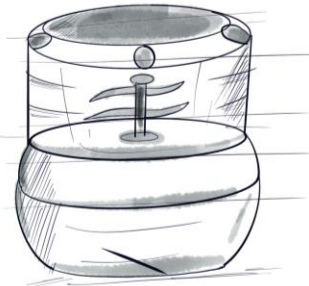
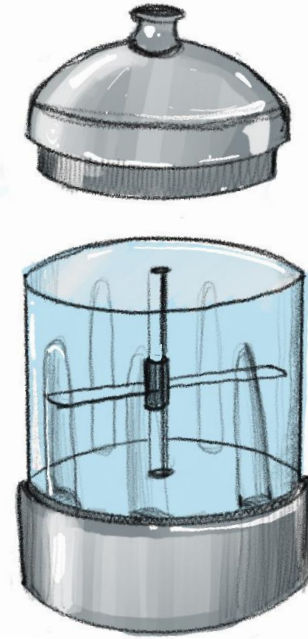
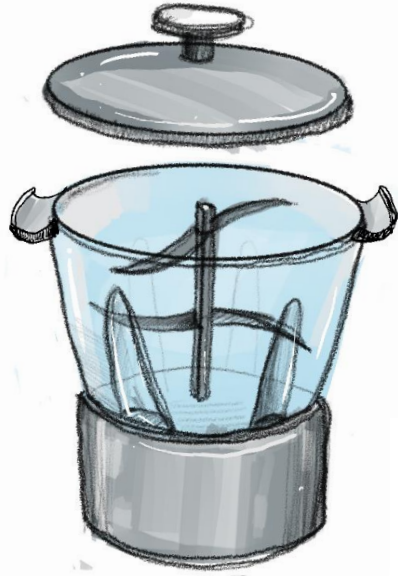


Solution Neutral Problem Statement

Current electric choppers available in the Indian market often suffer from design flaws that lead to inconsistent results, cleaning difficulties, premature product failure, safety concerns, and a lack of environmentally sustainable practices in their design and manufacture.

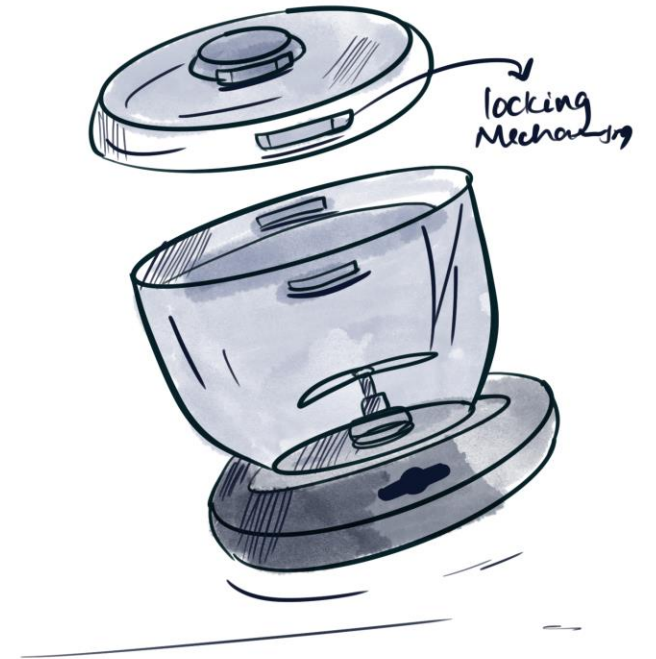
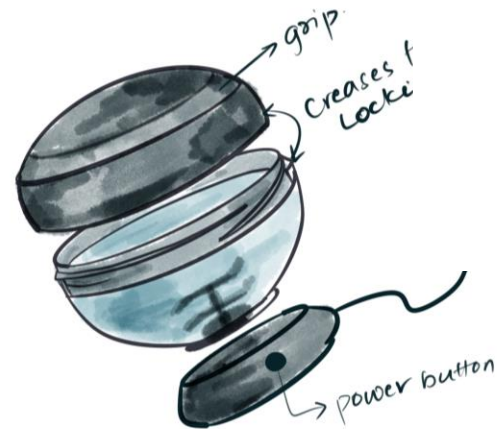
Concepts

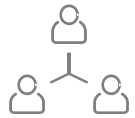
Selection of Concepts



Concepts

Selection of Concepts





Final Concept

Concept





Embodiment



Embodiment Determining Requirements

Layout

- **Form Factor:** Shape of the base, bowl, and lid impact handling and storage should be appealing.
- **Durability:** Materials must withstand regular use, heat from the motor, and cleaning.
- **Assembly Method:** Designed for ease of assembly and potential repair.
- **Safety:** Locking mechanism should be designed to withstand downward pressure during chopping.
- **Electrical Safety:** Compliance with applicable electrical product safety standards.
- **Ease of Cleaning:** Design favoring easy disassembly and dishwasher-safe parts.
- **Aesthetics:** Color choices and overall design to appeal to target consumers.
- **Bottom Grip** for firm grip and stability during Chopping.
- **Blade Locking** to the shaft for modularity.



Embodiment Determining Requirements

Dimensional view

Dimensions: Must fit within average kitchen storage constraints (countertop or cabinet space).

Bowl Capacity: 3-5 cups

Height: 10-14 inches

Base Diameter: Likely between 5-8 inches, depending on the shape and design.

Weight: 1-2kg for reasonable portability and stability during use.

Bowl Shape: Cylindrical bowls are common for efficient chopping . A wider, shallower bowl could reduce height.

Power Cord: A retractable cord or thoughtful storage solution prevents it from entangling and additional effort.



Embodiment Determining Requirements

Materials

Bowl: BPA-free clear plastic (Tritan is durable) or glass (heavier, but heat resistant)

Base: Durable plastic with non-slip feet for stability.

Blades: Stainless steel for sharpness and longevity.

Smooth and non porous inner surface of bowl.

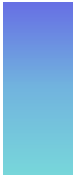
Additional Requirements

Noise level: Target a reasonable volume for user comfort in a home kitchen.

Ease of Cleaning: Dishwasher-safe bowl and lid are ideal. Blade design should allow for easy rinsing.

Durability: Materials and construction should withstand regular use and cleaning.

250-watt motor that operates silently



Function Carrier

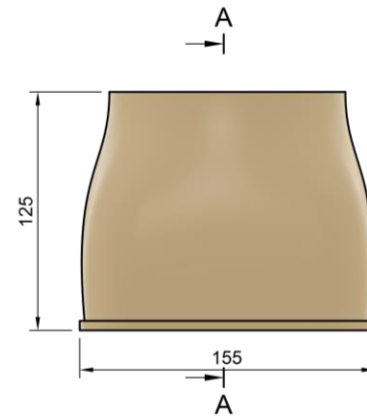
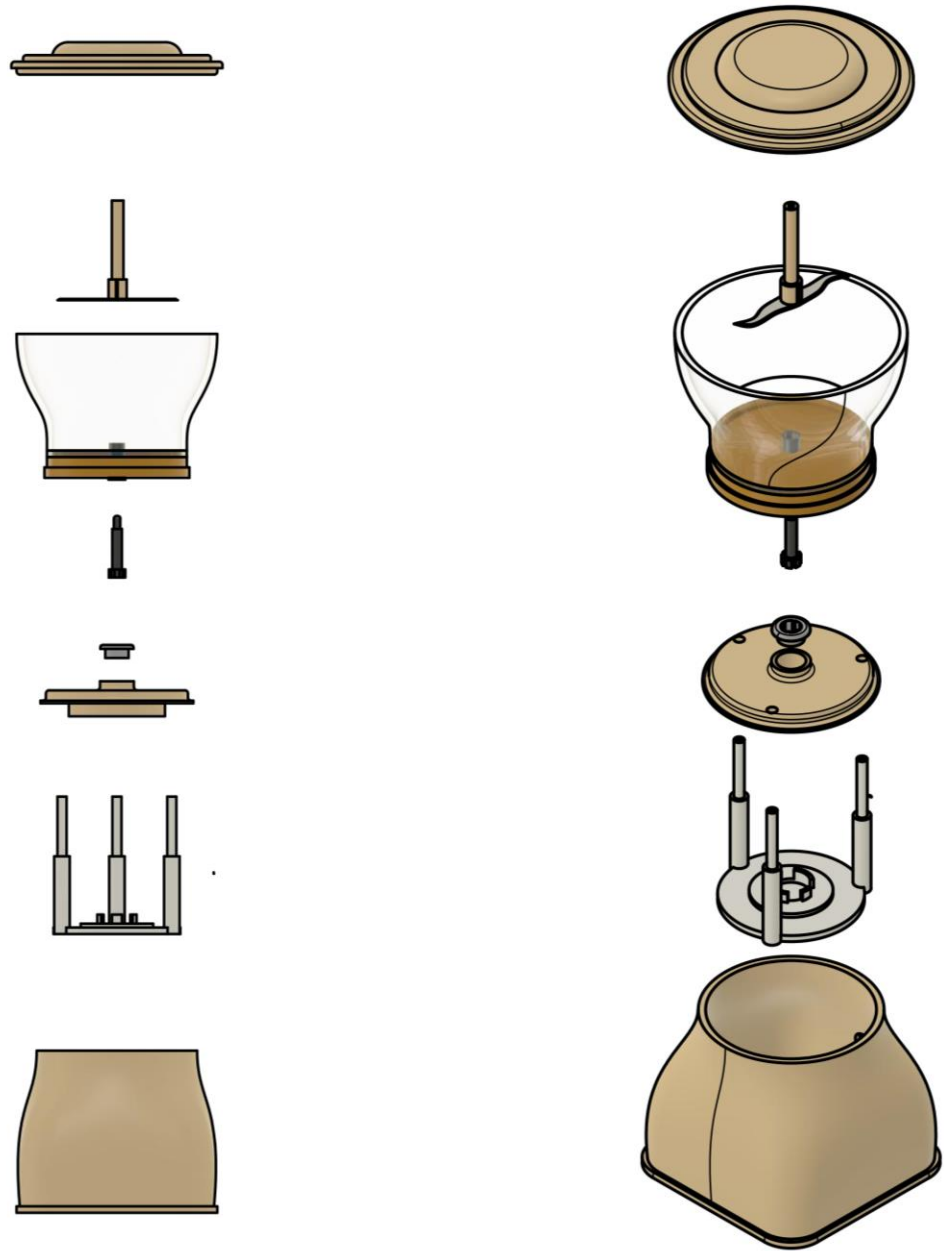
| Function | | Function Carrier |
|-----------------------------|-------------------------------------|---|
| Multifunction Chopper Blade | Chop, blend, whip | Interchangeable blade set with different blade geometries |
| Circularity | Recycled material | Bowl, lid |
| | Design for Assembly and Disassembly | Overall design |
| Uniform Chopping | Consistent blade rotation speed | Motor Specification |
| | Sharp blades | Stainless steel with sharp edges |



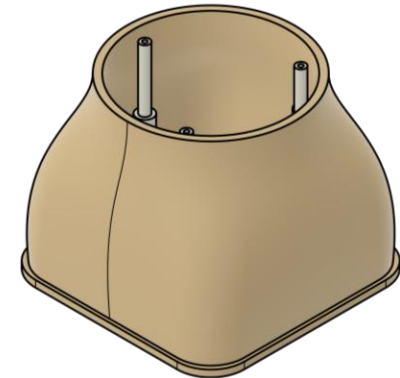
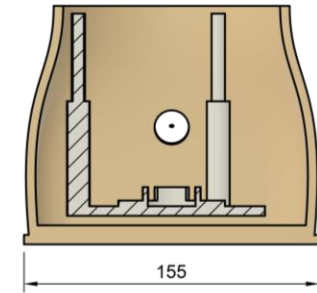
Auxiliary Function

| Auxiliary Function | Auxiliary Function Carrier |
|--|--|
| Power Cord Storage | Wrap-around cord storage |
| Non-Slip Base Pads | Rubber or silicone feet attached to the bottom |
| Attachment of motor holder with motor unit | Screws |

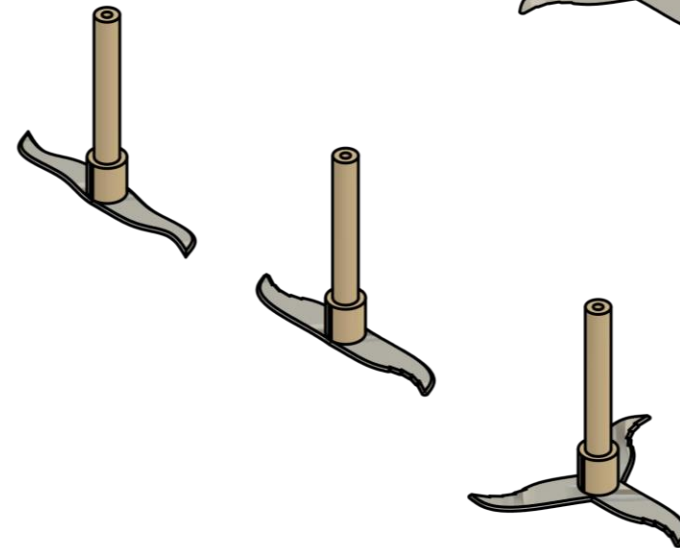
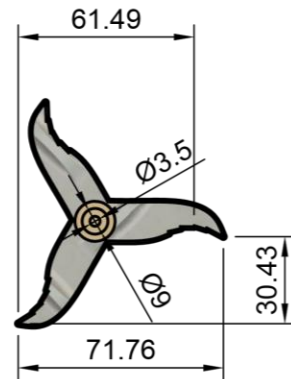
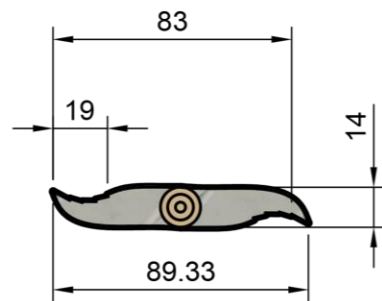
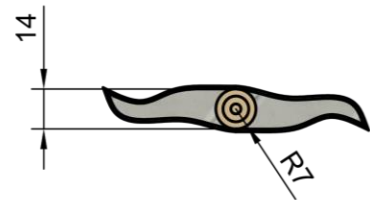
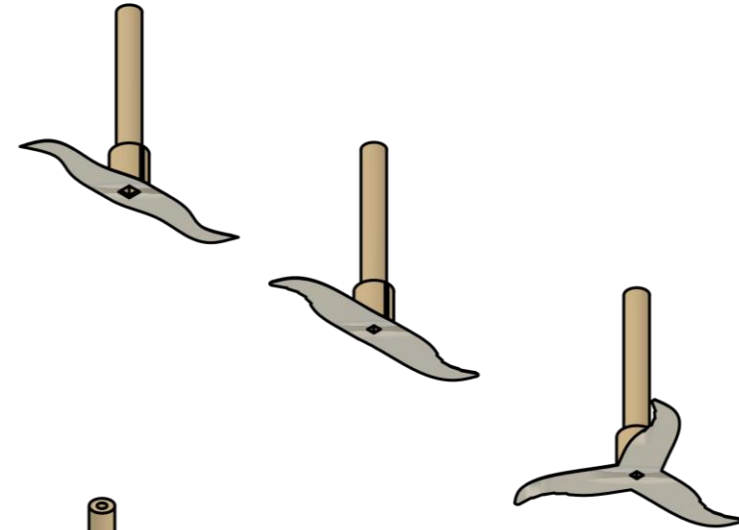
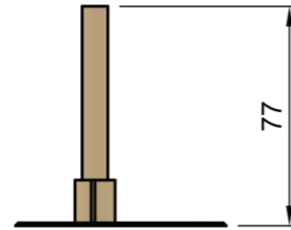
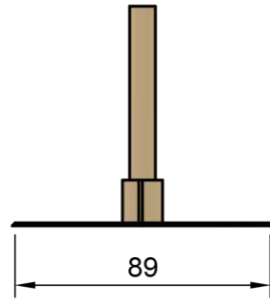
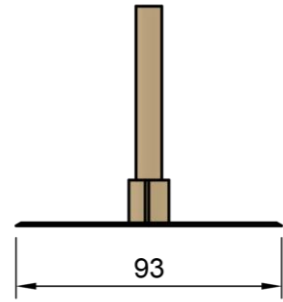
Exploded View & Details



A-A (1:2)



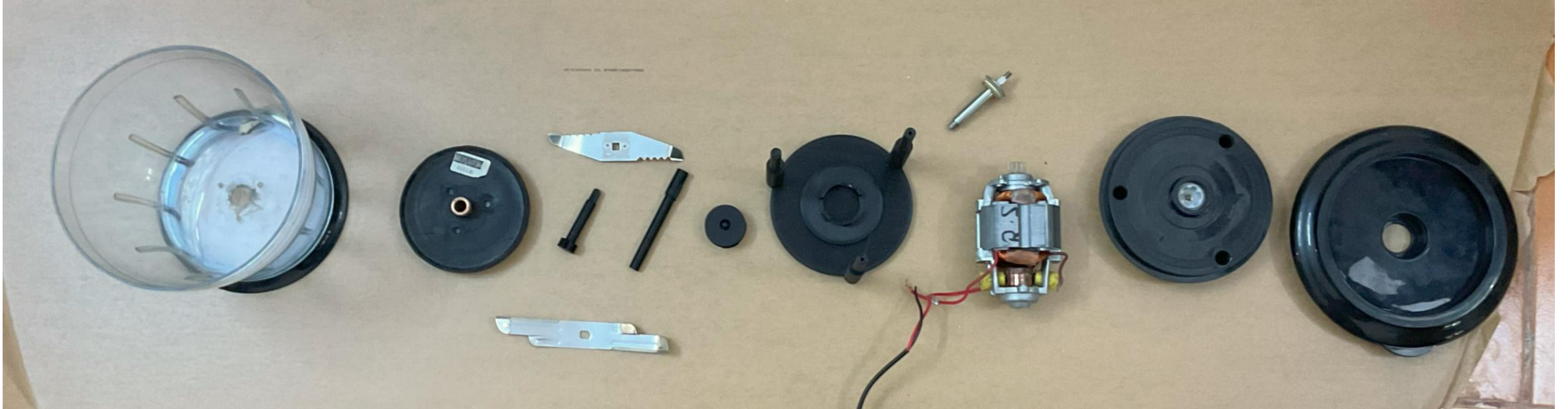
Details



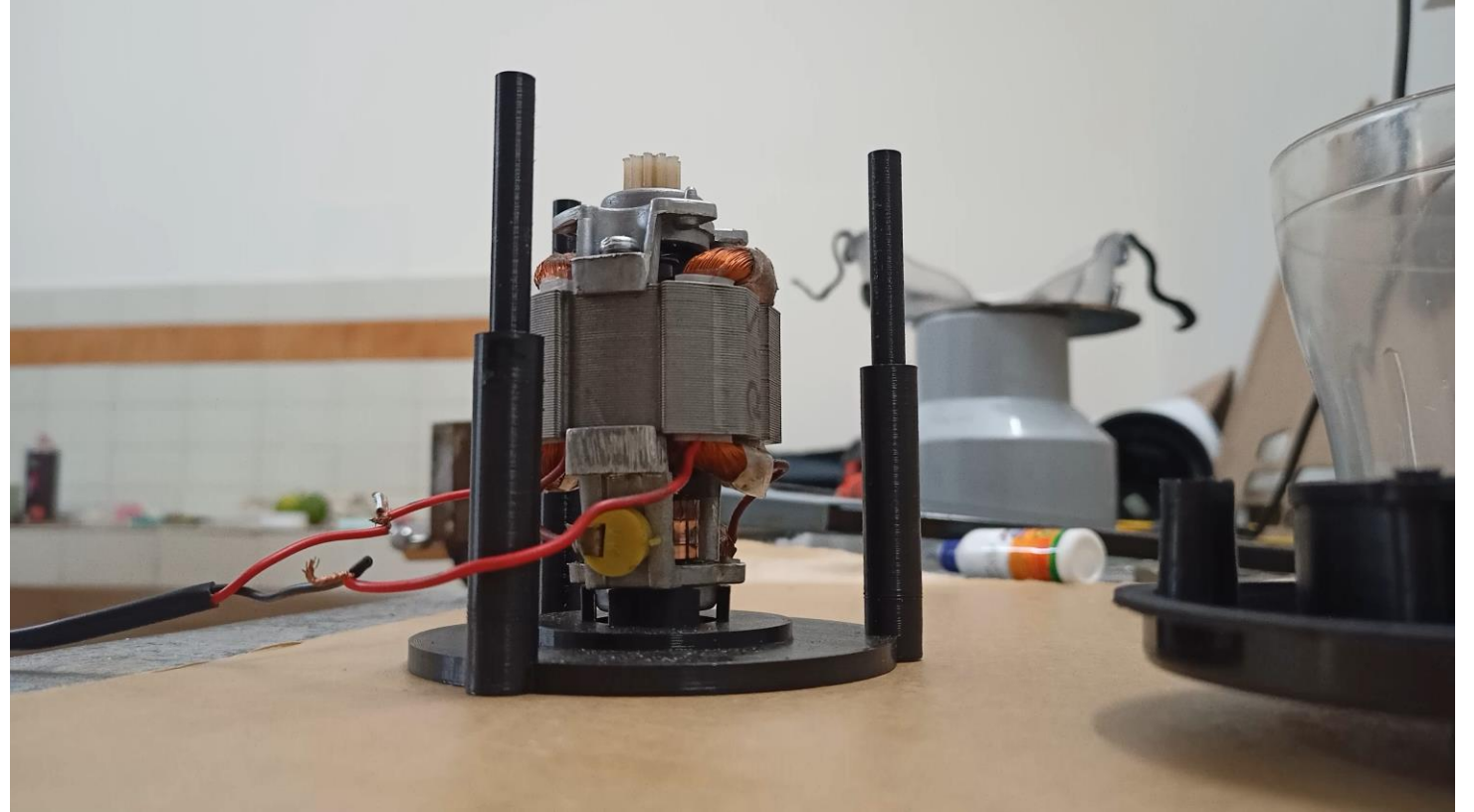
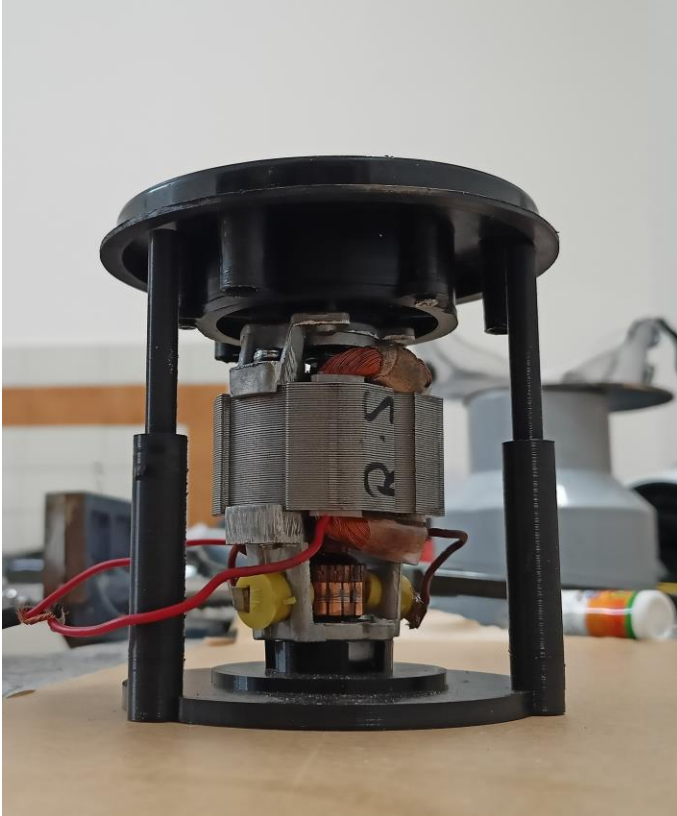


Testing

Testing



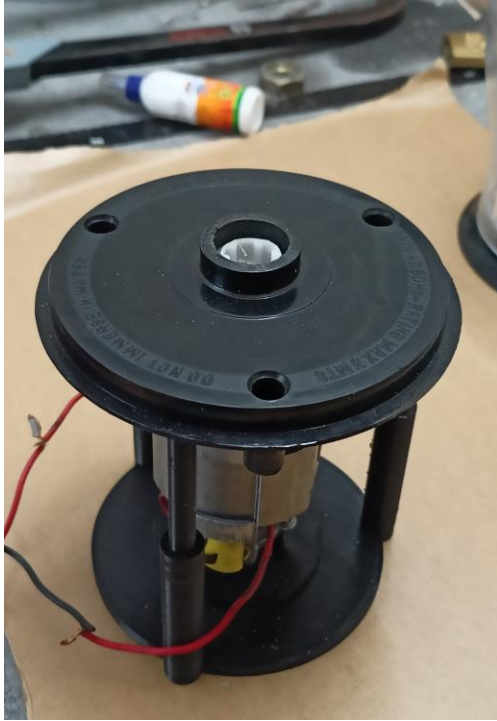
Testing



Testing



Testing

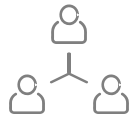


Testing



Final Prototype





Business Planning



Real, Win, Worth-it

| 1. Is there a real market and a real product? | Yes/No/May be |
|--|---------------|
| Is there a need? | Yes |
| Can the customer buy? | Yes |
| Will the customer buy? | May be |
| Is there a real product concept? | Yes |
| Is the product acceptable within the social, legal, and environmental norms? | Yes |
| Is the concept feasible? | Yes |
| Will our product satisfy the market? | May be |
| Can be linked with other products made by the company? | Yes |
| Can it be produced at low cost? | No |
| Are the risks perceived by the customer acceptable? | May be |



Real, Win, Worth-it

| 2. Can we win? Can our product/service be competitive? | Yes/No/May be |
|---|---------------|
| Do we have a competitive advantage? Is it sustainable? | Yes |
| Is the timing right? | May be |
| Does it fit our brand? | Yes |
| Will we beat our competition? | No |
| Do we have superior resources? | Yes |
| Do we have the management that can win? | Yes |
| Do we know the market as well or better than our competitors? | May be |



Real, Win, Worth-it

| 3. Is it worth doing? Is the return adequate and the risk acceptable? | Yes/No/May be |
|---|---------------|
| Will it make money? | Yes |
| Do we have the resources and the cash to do this? | May be |
| Are the risks acceptable to us? | Yes |
| Does it fit our strategy? | Yes |

New BOM

| Component | Material | Description | Quantity | Amount(Rs) |
|---------------|----------------------------|---------------------------------------|----------|------------|
| Motor | | 250 W AC motor | 1 | 650 |
| Motor housing | HDPE | | 1 | 32/kg |
| Gear Set | HDPE | Attached with the motor housing cover | 1 | 30 |
| Bowl | Glass fibre/ Polycarbonate | Transparent | 1 | 50 |
| Lid | Glass fibre/ Polycarbonate | Transparent | 1 | 30 |
| Shaft | Stainless Steel | Attachment between bowl and base | 1 | 10 |
| Blades | Stainless Steel | | 2 | 60 |
| Blade Shaft | HDPE | | 1 | 32/kg |
| Screws | | | 6 | 10 |
| Washer | | | 3 | 2 |
| Base Grip | Silicon Rubber | | 1 | 50 |
| Motor Holder | ABS | | 1 | 50-85 |

Occasion (Shadi)

On an average 10 MILLION wedding is celebrated in India

Cloud Kitchens

Requires fast Cutting and Chopping

Small Restaurants

Nuclear Families

*Dual Income Couples
with kids*



Foodies & cooking Enthusiasts

Young Professionals

(22-40 yr age group)

People with White Collar Job

*18.1 million people are
involved*

Target Market Segments

Senior Citizen (50yr & above)

*Need assistance in cooking and
physically demanding*

Revenue Projection

| Key Assumptions | |
|-----------------------------|---------------------------------|
| Segment Assumption | Nuclear Family Middle Income |
| % of potential buyers | 40% |
| Penetration Rate | 1% |
| Population growth rate | 0.81% |
| % SAM | 30% |
| Average selling price (ASP) | Rs 1500 |
| Development cost price | Rs 1000 |

[Total Households in India \(2010 – 2021, Million\) - GlobalData](#)

Direct & Indirect Costs

| Middle Income Nuclear Households | Estimated Customers | % of potential buyers | TAM | SAM(30%) | Target market size (50%) | Penetration Rate | Units | Average selling price(Rs) | Revenue (CR) | Direct Cost(800) (CR) | Indirect cost(100) (CR) |
|----------------------------------|---------------------|-----------------------|----------|----------|--------------------------|------------------|--------|---------------------------|--------------|-----------------------|-------------------------|
| Year 1 | 166320000 | 40% | 66528000 | 19958400 | 9979200 | 1% | 99792 | 1500 | 14.9 | 7.9 | 1.9 |
| Year 2 | 167667192 | 40% | 67066877 | 20120063 | 10060032 | 2% | 201201 | 1500 | 30 | 16 | 4 |
| Year 3 | 169025296 | 40% | 67610119 | 20283036 | 10141518 | 3% | 304246 | 1500 | 45.6 | 24 | 6 |
| Year 4 | 170394401 | 40% | 68157760 | 20447328 | 10223664 | 4% | 408947 | 1500 | 61 | 32 | 8 |

Projected P&L & EBITDA

| | Yr1 - Q4 | Yr1 | Yr2 | Yr3 | Yr4 |
|---|-----------|-----------|-----------|-----------|-----------|
| Revenues (Rs. Thousands) | 149688000 | 149688000 | 301800946 | 456368300 | 613419844 |
| Direct Costs (Rs. Thousands) | 79833600 | 79833600 | 160960504 | 243396427 | 327157250 |
| Gross Profit (Rs. Thousands) | 69854400 | 69854400 | 140840441 | 212971873 | 286262594 |
| Gross Profit (%) | 47% | 47% | 47% | 47% | 47% |
| Indirect Costs (Overheads) (Rs Thousands) | 19958400 | 19958400 | 40240126 | 60849107 | 81789313 |
| Total Costs (Rs Thousands) | 99792000 | 99792000 | 201200630 | 304245533 | 408946563 |
| EBITDA (Rs Thousands) | 49896000 | 49896000 | 100600315 | 152122767 | 204473281 |
| EBITDA % | | | 33% | 33% | 33% |

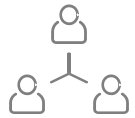
Investment Requirement, NPV

| | Year 1 | | Year 2 | | | |
|-----------------------|-----------|-----------|-----------|----------|----------|----------|
| | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Product 1 Revenue | | | 37422000 | 42865200 | 42865200 | 42865200 |
| | | | | | | |
| Product Development | 14968800 | 14968800 | | | | |
| Production Ramp Up | | 14968800 | 14968800 | | | |
| Marketing and Support | 29937600 | 29937600 | 29937600 | 29937600 | 29937600 | 29937600 |
| Production cost | | 14968800 | 14968800 | 14968800 | 14968800 | 14968800 |
| Period Cash Flow | 44906400 | 74844000 | -22453200 | -2041200 | -2041200 | -2041200 |
| PV Year 1, r=30% | -49260960 | -69622326 | -19429486 | -1643086 | -1528452 | -1421815 |

| Year 3 | | | | Year 4 | | | |
|----------|----------|----------|----------|-----------|-----------|-----------|-----------|
| Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| 75450236 | 86424816 | 86424816 | 86424816 | 114092075 | 130687286 | 130687286 | 130687286 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 29937600 | 29937600 | 29937600 | 29937600 | 29937600 | 29937600 | 29937600 | 29937600 |
| 14968800 | 14968800 | 14968800 | 14968800 | 14968800 | 14968800 | 14968800 | 14968800 |
| 30543836 | 34986576 | 34986576 | 34986576 | 69185675 | 85780886 | 85780886 | 85780886 |
| 19791231 | 21088330 | 19617051 | 18248420 | 33568469 | 38716619 | 36015459 | 33502753 |

Project NPV (Cr)

7.76



Thank You