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Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

Smart Switch System

SUBMITTED BY

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INTRODUCTION

Smart switches are basically a device to facilitate home automation systems by closing the technology gap between conventional appliances and modern IOT powered devices. Smart switches provide a promising new solution. This makes all the existing, conventional appliances compatible. This switch board comes with a pre-installed Bluetooth connection for the switches. So, a user can connect his mobile to the switch board using a Bluetooth app (or personal assistant devices like google home/ Alexa) and can control all his electrical appliances. So, the customer who is buying this switch board will choosing the number of switches, as the sizes of switch board is standard.

ABSTRACT

To redefine home automation, the solution is our product, “Smart Switch Board.” We replaced the existing manual switchboard with our Smart Switch Board. This switchboard comes with a pre-installed Bluetooth connection for the switches. So, the user can connect his mobile to the switchboard using a Bluetooth app (or personal assistant devices like google home/ Alexa) and control all his electrical appliances. So, the customer who is buying this switchboard will choose the number of switches, as the sizes of the switchboard are standard. The proposed minimum viable product is restricted to a small house, with a range of about 316m2.

PROBLEM DEFINITION

This type of switch board is used to overcome the use of multiple normal switch boards and to take away the confusion of the usage of these multiple switch boards by Bluetooth means. Smart switches

provide a promising new solution. This makes all the existing, conventional appliances compatible. This switch board comes with a pre-installed Bluetooth connection for the switches. So, a user can connect his mobile to the switch board using a Bluetooth app (or personal assistant devices like google home/ Alexa) and can control all his electrical appliances. So, the customer who is buying this switch board will choose the number of switches, as the size of the switchboard is standard.

SCOPE AND OBJECTIVES

Smart switches are basically a device to facilitate home automation systems by closing the technology gap between conventional appliances and modern IOT powered devices. For any device (such as a fan) to be home automated, it must be IOT compatible. Therefore, for a person seeking home automation he has to modify all his existing appliances which is highly cumbersome and expensive. Smart switches provide a promising new solution: Just replace your existing switch board with our switchboard !! This makes all the existing, conventional appliances compatible. Further, another unique feature in smart switches is that, It has dual operation modes – manual and Bluetooth. This increases reliability of the system and by establishing two pathways of operation.

METHODOLOGY

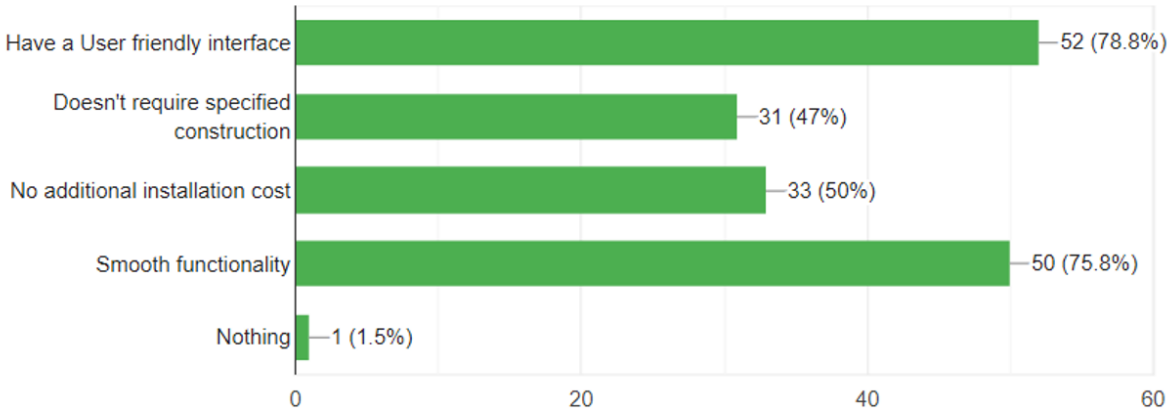
It is about the connection between company and community members, by using aspects such as: provided convenience, prices and design. By providing these values – it will make connections more effective and provide possible low-cost advertisements. Our value propositions will target the following pain points of customers: compatibility, reliability, economic barrier and convenience for differently abled people. At first, prices will not be set in order to

achieve profit but to increase sales. And as the time progresses, better and different designs will also be launched. Further strengthening facts include compatibility, reliability, etc.

RESULTS

WHY DON'T PEOPLE USE SMART SWITCH SYSTEM?

WHAT DO YOU EXPECT FROM A SMART SWITCH TECHNOLOGY SYSTEM?



CUSTOMER VALUE PROPOSITION

- **What unmet needs will this venture serve?**

  Smart switches is basically and a device to facilitate home automation system by closing the technology gap between conventional appliances and modern IOT powered devices.

- **What will be the roadmap for adding features?**

  Our goal will be to make our product reach more number of people and those who are interested in technology but not willing to pay more than rice of regular switches. We will try to use waste material for manufacturing hardware part of out product so that it will cost cheaper so that we can add more functionalities in same price and avoid environment pollution as much as we can.

- **How will the product be priced? Penetration or Skimming?**

  In the initial phase (First three years) penetration method of pricing will be followed which means we will offer a low price to attract many customers and in the later phase (after 3 years) skimming will be followed, which means our prices will be set high to maximize profits.

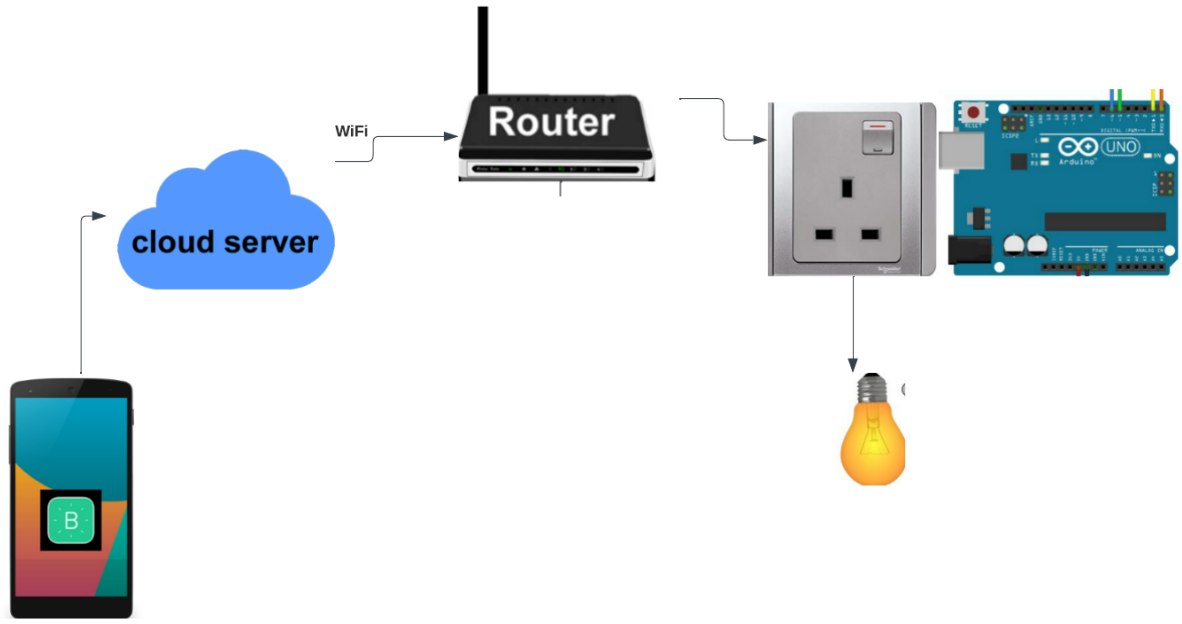
- **What is the expected life of customer relationship?**

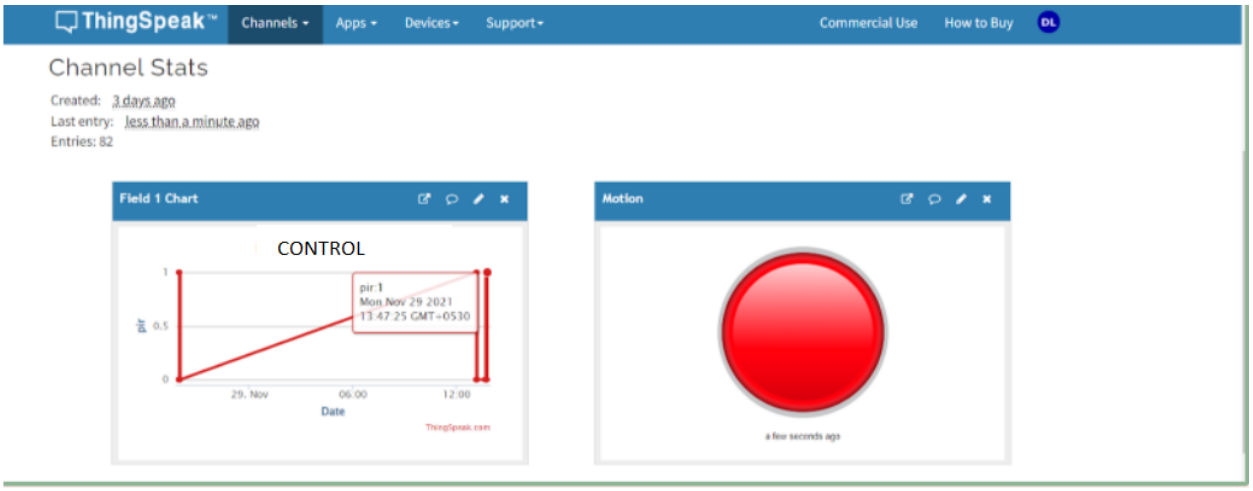
Expected life of customer relationship is 5 years but we will be improving the existing customer relationships, and customer segments will be focused upon.

- **What will be the whole product solution?**

Compatibility: Conventional electrical appliances need to be modified using sensors
for home automation which is a tedious and expensive operation
Reliability: In case the AI powered home automation system fails due to technical glitch or change in operating conditions, there is no alternative.
Economic Barrier: Apart from the elite crowd, our product can also tap into the 'middle class' families using our Bluetooth application interface

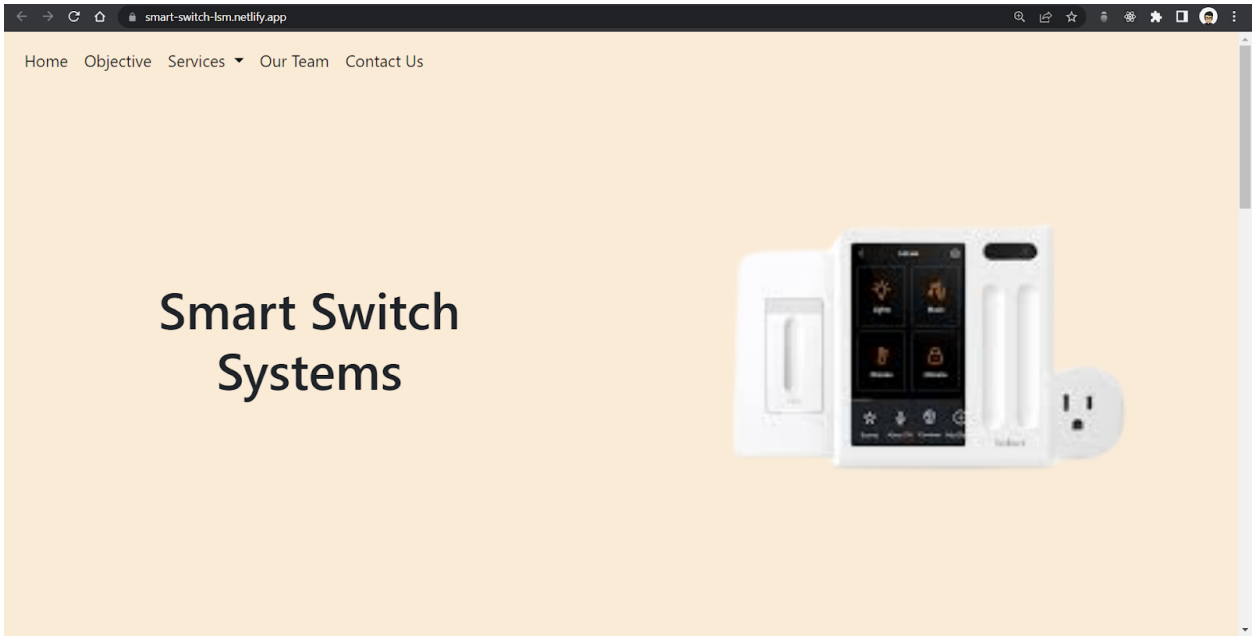
WORKFLOW



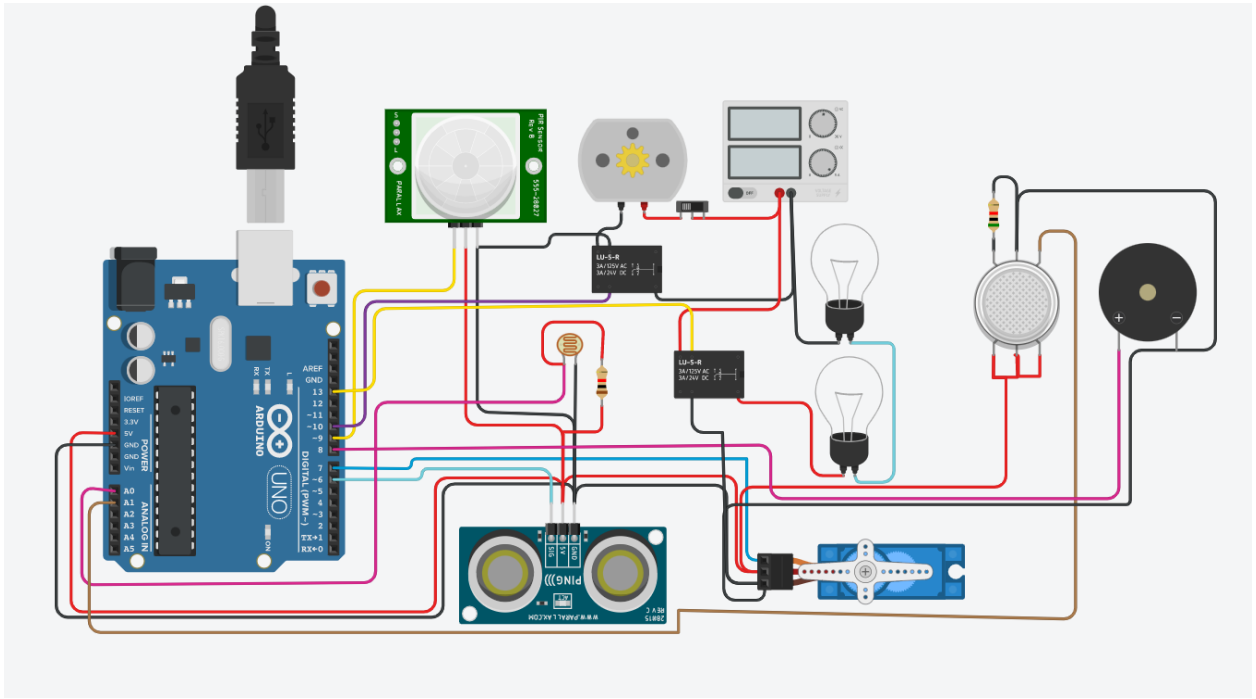


GitHub: https://github.com/Rohan1572/LSM-R3

Website: https://smart-switch-lsm.netlify.app/



WORKING SIMULATION



BUSINESS PLANS AND MARKETING STRATEGY

- Direct and indirect channels the venture would employ

  We use the indirect channel, in which we create our product and sell it through the company with which we are partnering.

- Margin and other exclusive right channel partners would require

  The first year will expand our network and seek assistance from well-established businesses to give higher-quality vital resources. Because the company's success will depend on our ability to strengthen our relationships with our important partners.

- Customer Acquisition Cost (CAC)

  There will be a website and clickbait and adverts within some apps. The cost will be low, and the emphasis will be on popularizing the product.

- Mix of free and paid demand generation methods

  Minor changes to the cost will be made dependent on the level of success we achieve throughout that time.

- Shape of the customer conversion funnel for CAC

  For each method Web insight, social media interaction, and Lookalike Audiences will be some of our primary methods. Lookalike audiences are custom audiences based on demographic and behavioral characteristics and closely resemble users who have already expressed an interest in our product. We may upload bespoke audiences developed using data we've already obtained from our actual users to social media sites like Facebook and create doppelganger audiences that share many of the same features.

- Is there a strong motivation for the company to scale up because of:

- Exorbitant switching costs
- There are network effects (a phenomenon whereby a product or service gains additional value as more people use it)
- Benefits of being the first to market

As a result, our smart switchboard has a solid motivation to help automate devices. In general, IoT compatibility is required for home automation. A person who wants to automate their home must adapt all of his existing equipment, which is very costly. Replace their existing switchboard with ours!! As a result, all existing, traditional appliances are compatible.

BUDGET AND FUNDING SOURCES

•Our business is mainly based on the sale of our product.

•The Revenue Model to be used by our startup is the production model/ Markup Model.

•Our product, the smart switchboards will be manufactured in the industries with the required expertise.

•Then, we will validate the product based on the manufacturing cost, time and effort put in, profit addition, and competition.

•Then we will sell the product to our customers to generate our revenue

Detailed finance

The total loss bearer or profit incurred would be divided equally among the partners and so would be the capital required or necessary to run the business

1. Capital Requirements
    a. STARTUP COSTS :

        Incorporation fees: No ROC fee needed as it's a partnership. But for legal standards

        Marketing: To Sell on Amazon

        - Buying Initial Inventory (Rs 2000)
        - Buying UPC Codes (Rs 1010)
        - Investing in Product Photography (4000)
        - Creating a Logo and Product Branding

        (5000) Total Amazon Business Lean Startup

        Cost: Rs 12010

        Travel: Variable (incurred on personal basis and then split evenly)

        Shipping: Rs. 17,500 (on customer)

        Consultants: NIL (Expertise given by Family)

    b. FIXED CAPITAL:
        - Office space lease (@5yr) : Rs 10,00,000/-
        - Furniture : Rs 20,000/-
        - Plant and machinery : Rs 50,000/-
        - Appliances and laptops : Rs 1,50,000/-
        - Total ~ Rs 12,20,000

    c. WORKING CAPITAL:

        Workforce breakup:

            5 laborers @ Rs 10,000

            2 Supervisor @ Rs

25,000 1 Manager @

Rs50,000

Total: Rs 18,00,000 p.a =335 per piece

Running costs:

Energy demands = Rs 20,000 per month

Miscellaneous = Rs 10,000 per

month Maintenance = Rs 8000

per month Total = Rs 85 per piece

Distributor Breakup:

Depends on amazon T&C.

- Raw material cost : Rs1000
- Distribution cost : 48%
- Workforce: Rs 18,00,000
- Sales expected: 2500-3000 units per year

d. CAPITAL FOR CONTINGENCIES :

Raw materials costs aren't expected to escalate in the for-see able future therefore the capital for contingency is low. I.e. Rs 1,50,000

2. List of Incentives, Grants and Subsidies available from Govt. in general and in specific for your product.

a. Credit Linked Capital Subsidy Scheme for Technology Up gradation:

Up gradation of the procedure and the corresponding plant and equipment is essential to enable SMEs to lessen the cost of generation and remain cost competitive in the worldwide market. To enable SMEs to thrive in global trade markets, the Ministry of Small Scale Industries (SSI) runs a scheme for technology up gradation of Small Scale Industries. Known as the Credit Linked Capital Subsidy Scheme (CLCSS), it goes for encouraging technology up gradation by giving the forthright capital subsidy of 15% to SSI units for credit benefited by them for the modernization of their plant and machinery.

b. The Credit Guarantee Fund Scheme for Micro and Small Enterprises:

   The Credit Guarantee Fund Scheme for Micro and Small Enterprises (CGMSE) was propelled by the Government of India to give security free credit to Indian MSMEs. Both the current and the new undertakings are qualified for the plan. The Ministry of Micro, Small and Medium Enterprises and Small Industries development Bank of India (SIDBI) set up a trust named Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) to actualise the plan.The plan gives credit offices as term advances and the working capital office of up to Rs. 100 lakh for every acquiring unit. The amount is contributed by the Government and SIDBI in the proportion of 4:1, separately. The plan additionally offers recovery help to debilitated units secured under the assurance plot.

c. Baba Saheb Ambedkar Hastshilp Vikas Yojana (AHVY) :-

   Funding on marketing support

   Subsidies or funds up to the extent of:- Up to 100% for most

of the components with specific ceiling for each of the components.

d. Instrument development Programme (IDP) :-

   Funding on following points :- Programmers leading to indigenous development and up gradation of instruments in the following thrust areas

   a) Analytical / Optical Instrumentation

   b) Medical Instrumentation

   c) Industrial Instrumentation

   d) Sensors

   e) Imaging Techniques and Instrumentation.

   No support is provided towards creating basic infrastructure and building. Subsidies or funds up to the extent of :- Assistance towards project staff salaries, equipment, consumables, domestic travel and other miscellaneous items.

   Open ended, assistance not specified.

3. Source of funds:

a. Personal Investment: We have to make some personal investments, which could include our savings or other assets.
b. Friends and Family: We'll also try to reach out to people in our social circle and ask them either to invest or to lend you the money.
c. Angel Investors: These investors are typically leaders in their respective fields. They contribute by means of their

network of contacts and experience and also provide their technical and management knowledge. If possible we'll try to find a person who can be of such help.

d. Business Loans: Banks and other financial institutions offer many types of business loans in return for regular interest payments. We won't consider the option to offer collateral to get money.

4. Production cost

The production cost is:

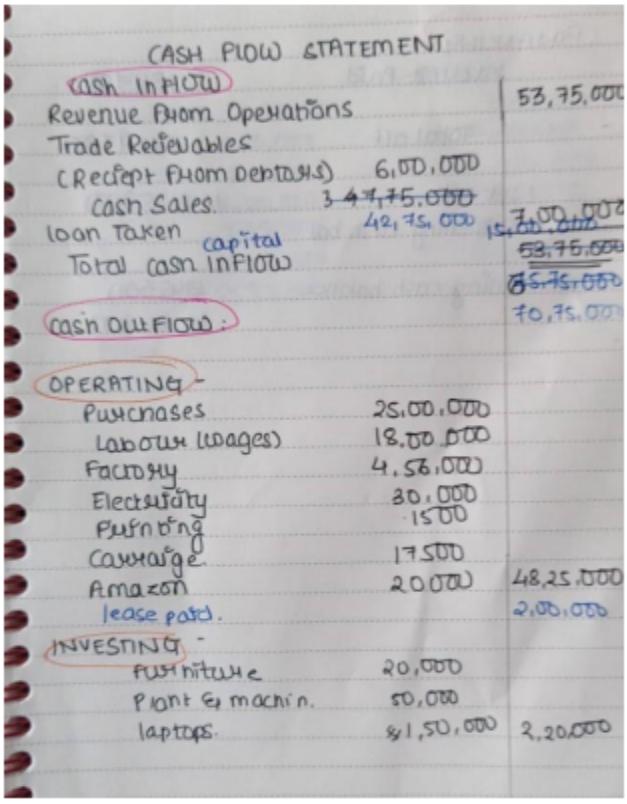
- Raw material cost : Rs1000
- Energy demands = Rs 20,000 per month
- Workforce breakup:
    1) 5 laborers @ Rs 10,000
    2) 2 Supervisor @ 25,000
    3) 1 Manager @ Rs50,000

5. Income statement

Income statement for Review 3

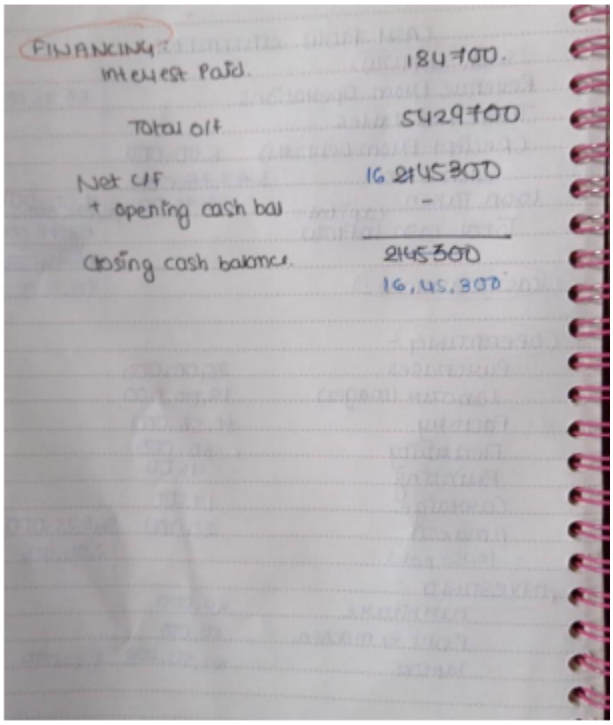
		Expenses			**Incomes**	
		Purchase (RM)	25,00,000		Sales	53,75,000
		factory expenses				
		Energy	2,40,000			
		miscellaneous	1,20,000			
		Maintainance	96,000			
		Administrative expense				
		Printing and stationary	1500			
		Electricity	30,000			
		Salaries and wages	18,00,000			
		Selling and distribution				
		Carriage outwards	17,500			
		Charges to amazon	20,000			
		Net Profit	5,50,000			
		Total	53,75,000		**Total**	53,75,000

6. Cash flow statement:



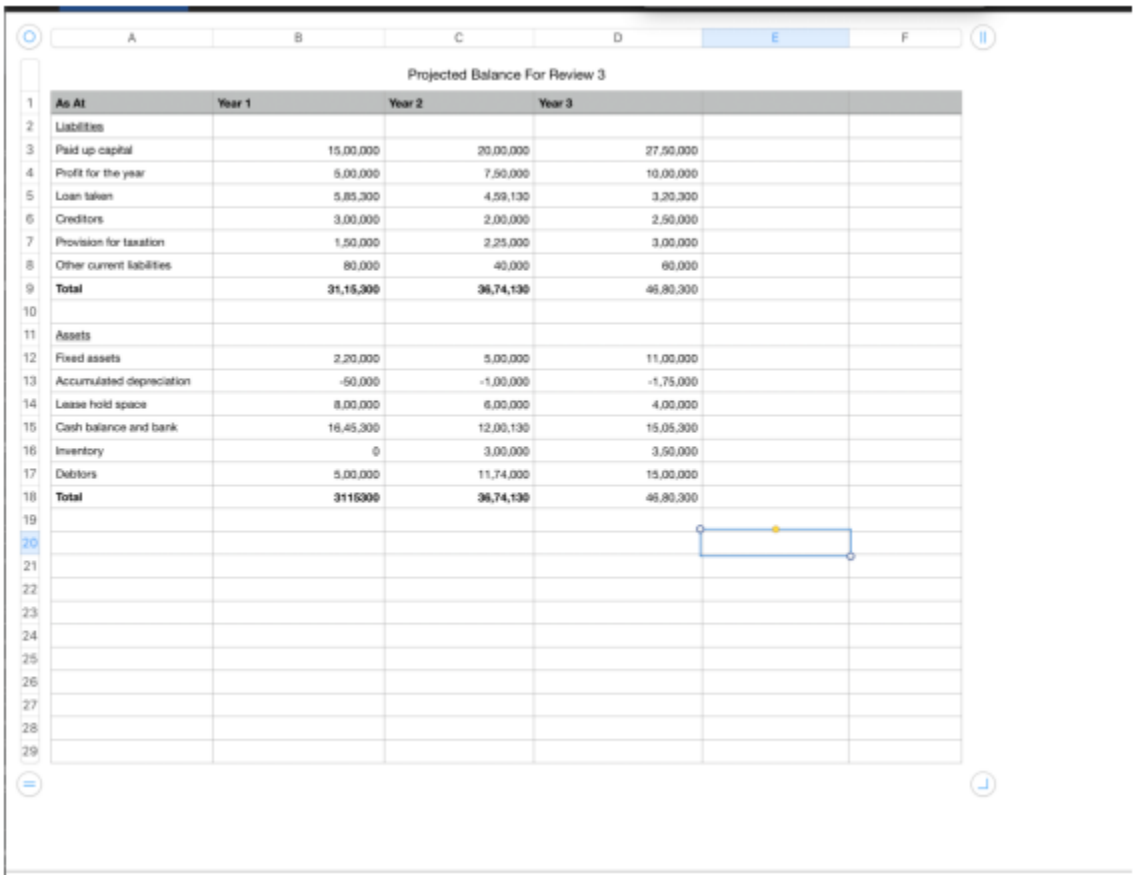
CASH FLOW STATEMENT

CASH INFLOW		
Revenue from Operations		53,75,000
Trade Receivables		
(Receipt from debtors)	6,00,000	
Cash Sales	~~3 47,75,000~~ 42,75,000	7,00,000
Loan Taken (capital)		~~15,00,000~~ ~~53,75,000~~ ~~35,75,000~~ 70,75,000
Total cash INFLOW		
CASH OUTFLOW:		
OPERATING -		
Purchases	25,00,000	
Labour (wages)	18,00,000	
Factory	4,56,000	
Electricity	30,000	
Printing	1500	
Carriage	17500	
Amazon	20000	48,25,000
lease paid.		2,00,000
INVESTING -		
Furniture	20,000	
Plant & machin.	50,000	
laptops	1,50,000	2,20,000



FINANCING:		
Interest Paid	184700	
Total o/f		5429700
Net C/F		16 2145300
+ opening cash bal		-
Closing cash balance		2145300
		16,45,300

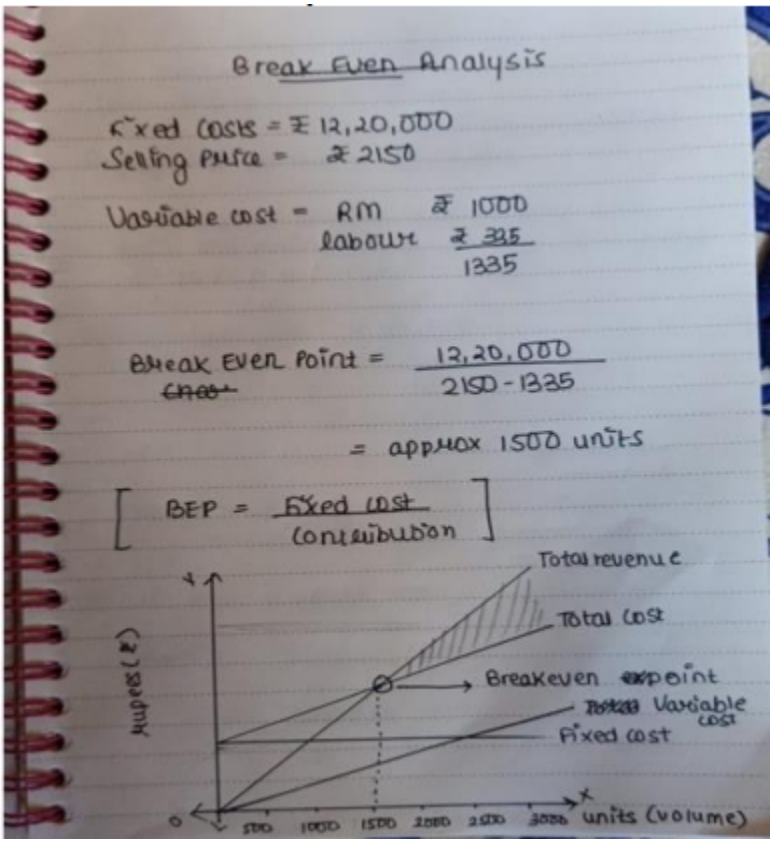
7. Projected balance sheet for 3 years



Projected Balance For Review 3

As At	Year 1	Year 2	Year 3
Liabilities			
Paid up capital	15,00,000	20,00,000	27,50,000
Profit for the year	5,00,000	7,50,000	10,00,000
Loan taken	5,85,300	4,59,130	3,20,300
Creditors	3,00,000	2,00,000	2,50,000
Provision for taxation	1,50,000	2,25,000	3,00,000
Other current liabilities	80,000	40,000	60,000
Total	**31,15,300**	**36,74,130**	46,80,300
Assets			
Fixed assets	2,20,000	5,00,000	11,00,000
Accumulated depreciation	-50,000	-1,00,000	-1,75,000
Lease hold space	8,00,000	6,00,000	4,00,000
Cash balance and bank	16,45,300	12,00,130	15,05,300
Inventory	0	3,00,000	3,50,000
Debtors	5,00,000	11,74,000	15,00,000
Total	**3115300**	**36,74,130**	46,80,300

8. Break even analysis



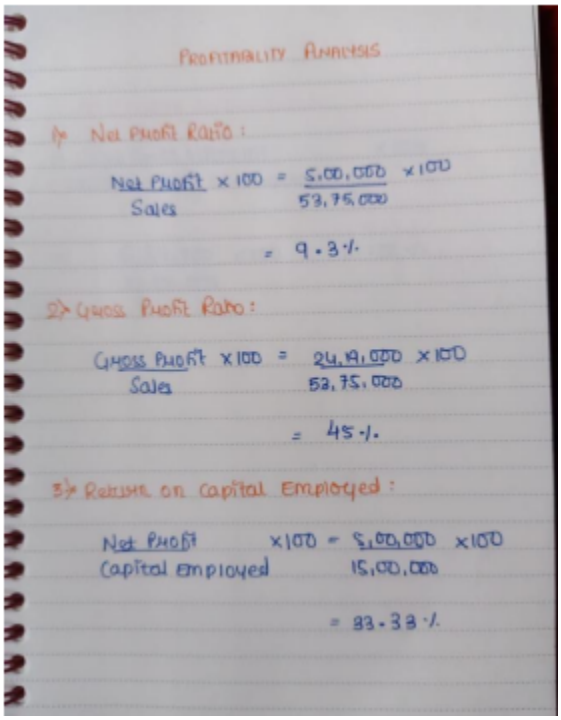
Inferences drawn from BEP:

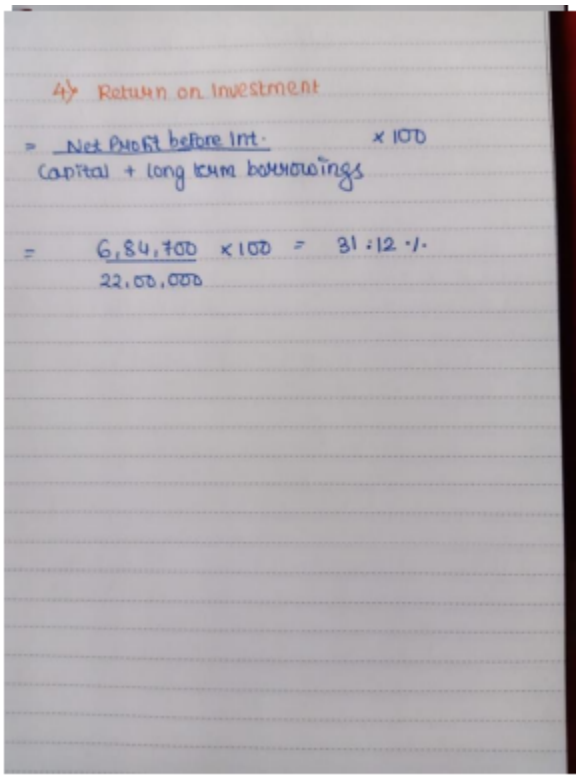
Since fixed costs aren't very high, BEP can be achieved at 1500 units only.

Expected units to be sold are 2500-3000 units per year so incremental profit from sale of 1000 units after achievement of BEP is Rs.815000(1000x815[Contribution]).

Angle of incidence represents profit

9. Profitability analysis





So from the calculations the following can be inferred:

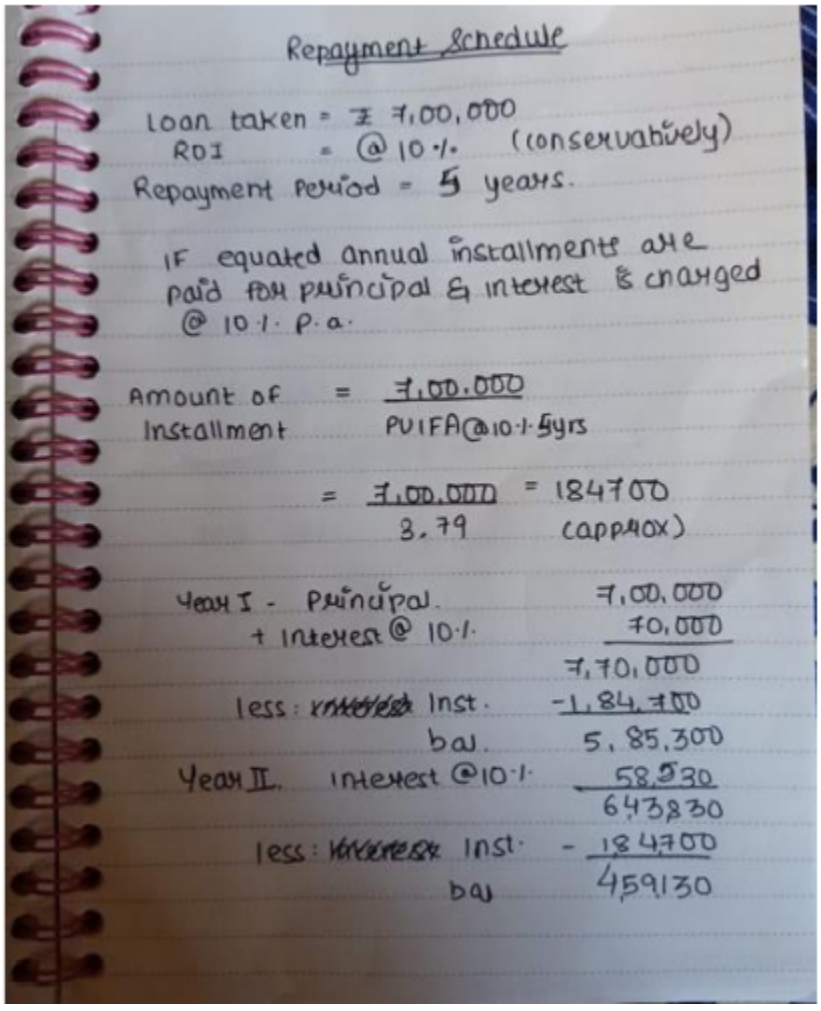
Net profit Ratio: 9.3%

Gross Profit Ratio: 45%

Return on capital employed: 33.33%

Return on investment: 31.12%

10. Repayment schedule (Principle and Interest):



Repayment Schedule

Loan taken = ₹ 7,00,000
ROI = @ 10 % (conservatively)
Repayment Period = 5 years.

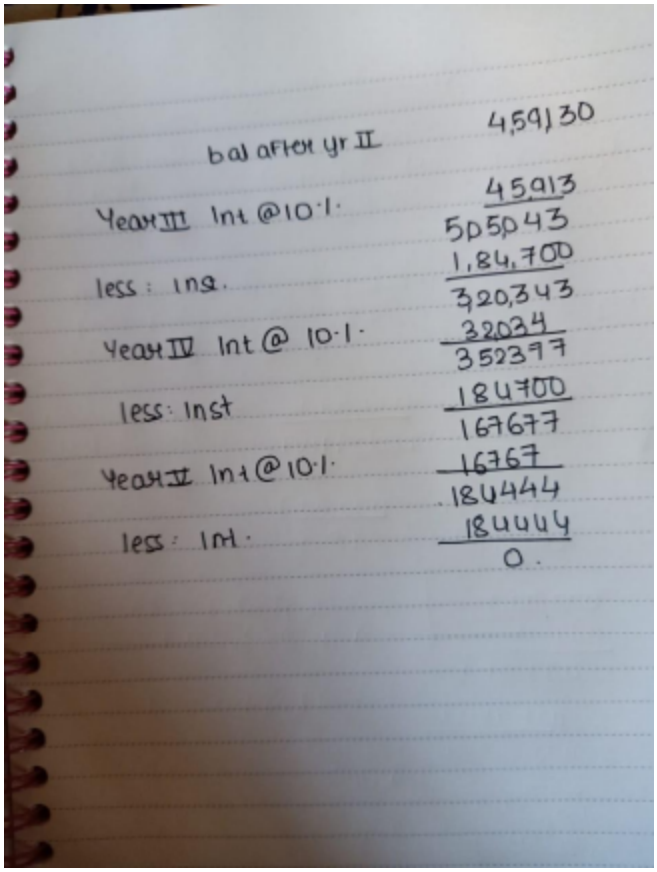
IF equated annual installments are paid for principal & interest is charged @ 10 % p.a.

Amount of Installment = 7,00,000 / PVIFA@10%,5yrs

= 7,00,000 / 3.79 = 184700 (approx)

Year I - Principal.		7,00,000
+ Interest @ 10%		70,000
		7,70,000
less: ~~Interest~~ Inst. bal.		-1,84,700
		5,85,300
Year II. Interest @10%		58,530
		643830
less: ~~Interest~~ Inst. bal		- 184700
		459130

REPAYMENT SCHEDULE 1



REPAYMENT SCHEDULE 2

11. Exit strategy/plan : Options to consider:

    a. Mergers and acquisitions: This means our firm either is purchased by, or merges with, a company with similar or aligned goals to your company. Depending on who we merge/sell with, it could mean flexibility in terms of our involvement, or the freedom to walk away. Perhaps the best thing about this exit strategy is the ability to negotiate the price of the sell, whereas selling to the public (an IPO) would value your company relative to the industry.
    b. Selling stake to a partner/investor: As we aren't the sole proprietor, it's possible to sell off just your stake to a business partner or other investor.

RESULTS AND DISCUSSION

Cost Analysis

Smart Switches for a 1BHK house

Smart Switches Needed:

Fan = 3 (Hall, Dining, Bedroom)

Light = 6 (Hall x2, Dining x1, Bedroom x1, Kitchen x1 , Washroom x1)

Exhaust = 2 (Kitchen, Washroom)

Geyser = 1 (washroom)

Charging Sockets = 4 approx.

Total = 16 switches = 4 switch boards

<u>Floor Area</u>

586 sq ft = 55 m2

<u>Range of switch board:</u>

radius = 10m

Area = 314 m2

<u>Cost</u>

Installation cost Rs 300

Cost per switch board

- Rs 3000 – from retailer
- Rs 2675 – from website

Total cost = 2675 * 4 pieces + 300 = Rs 11,000 !!

Discount 10% off = Rs 1100 off Therefore, a 1BHK flat with kitchen, dining room, hall, bedroom and bathroom can be automated using smart switches at just Rs 9900.

CONCLUSION

Today no one wants to be left out in this scientifically advancing world and hence everyone craves for the latest technology that is available at present, promising them maximum comfort. In this view virtual home assistants such as Amazon Alexa have been developed for home automation. Statements in these aforesaid slides, describing Smart Switches' estimates and expectations may be forward-looking statements. Actual results may differ materially from those expressed or implied. Important factors that could impact Smart Switches' operations include economic conditions affecting demand and supply for the products manufactured.

FUTURE WORK

On the software side, our Android application ensures that the system enables energy saving, and can suggest task scheduling with both instantaneous power and cost considerations . Proposed system is only able to control the appliances within short range, for future research work it is recommended to increase the range and interface more sensors and it should be a low cost and user friendly system. Moreover home automation systems can be interfaced with

biomedical (EMG) signals. It will be beneficial for amputees, they will be able to control the appliances using their muscle's movement.

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