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Commercial Scope of Portable Corn Roaster Cum Boiler in Socio-economic Advancement of Indian Hawkers Who Sellroasted and Boiled Corn

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A B S T R A C T

The Portable Corn Roaster cum Boiler, an equipment which can roast and boil corns simultaneously using heat from charcoal was developed to reduce the drudgery of Indian hawkers who sell roasted and boiled corns at various public places. The scope of the developed equipment in progressing the socio-economic conditions of these hawkers was identified by emphasizing its price followed by the net present worth, benefit cost ratio, internal rate of return and payback period of the roasted and boiled corn vending business enabled by it. They were determined as Rs. 14200/-, Rs. 2732757/-, 1.065, 2432 per cent and 0.041 years respectively.

Introduction

In India, hawkers selling roasted and boiled corn can be commonly seen at public places such as fairs, recreational parks and tourist spots. The conventional process in which they roast corns involves drudgery as they have to keep the corn rotating on the red hot charcoal with one hand while constantly fanning air onto the charcoal with other. This process is not energy efficient as it is not carried out in an enclosure but in an open vessel. Moreover, most of the hawkers are limited to selling either roasted or boiled corn but not both which thereby limits their profit from the daily business. Electric corn roasters are available in the international market but not in India (Source: www.originalcornroast.com, USA) while the use of electric corn boilers available in India has been limited to malls and multiplexes owing to their dependence on electricity. Addressing this scenario, a Portable Corn Roaster cum Boiler which could roast as well as boil the corns using charcoal was developed (Figure 1). The main parts of the equipment are boiling chamber and roasting chamber (Figure 2). The corns are held inside the roasting chamber by means of corn holder as shown (Figure 3). The equipment derives its energy from charcoal

combustion. The charcoal is combusted in the charcoal combustion chamber whose bottom is made of perforated mild steel sheet. This, along with the hollow roasting chamber, gaps for air passage in the boiling chamber and the chimney maintain an upward draft of hot air from the bottom to the top of the equipment which conveys the heat required for roasting and boiling corns. The equipment is provided with 4 caster wheels at the bottom and it can be easily dismantled and assembled, making it easily portable. Other specifications of the equipment are mentioned in Table 1.

The present investigation sheds light upon the possibility of Portable Corn Roaster cum Boiler in uplifting the socio-economic conditions of Indian street vendors who sell roasted and boiled corn.

Materials and Methods

The following economic parameters of the developed equipment and the business enabled by it were determined by considering the assumptions mentioned in Table 2.

Price

The price of the equipment was determined by adding up the material and labour cost incurred to develop the equipment with the assumed profit margin of the manufacturer.

Net present worth

The sum of the present values of the yearly net profits to be earned in future during the equipment's lifetime is its Net Present Worth. The present value is calculated at presently prevailing rate of interest on money with the following equation (Shively, 2012).

$$NPW = \sum_{i=0}^{10} P_i$$

Where,

$$P_i = \frac{P}{(1+d)^i}$$

NPW = Net Present Worth of the street vending business, Rs.,P_i = Present value of the net profit of i^{th}year, Rs., P= Net profit per year, Rs., d = Rate of interest (presently prevailing), per cent

Benefit cost ratio

This is the ratio obtained when the net present worth is divided by the present worth of future yearly cash outflows which shall be incurred during equipment's lifetime. It is determined with the following equation (Shively, 2012).

$$BCR = \frac{NPW}{\sum_{i=0}^{10} O_i}$$

Where,

$$O_i = \frac{O}{(1+d)^i}$$

BCR = Benefit Cost Ratio of the street vending business, NPW = Net Present Worth of the street vending business, Rs., O_i = Present value of the cash outflow of i^{th} year, Rs., O = Cash outflow per year, Rs., d = Interest rate (presently prevailing), per cent

Internal rate of return

The Internal Rate of Return is the rate of interest at which the net present worth would be zero (Shively, 2012). The Internal Rate of Return which satisfies the following equation was determined using Microsoft Excel.

$$\sum_{i=0}^{10} P_i^* = 0$$

Where,

$$P_{i*} = \frac{P}{(1 + IRR)^i}$$

P_{i*} = Present value of the net profit of i^{th} year at Internal Rate of Return, Rs., P= Net profit per year, Rs., IRR = Internal Rate of Return, per cent

Payback period

The payback period is the amount of time taken by the business to recover the initial investment made to start it (Al-Ani, 2015). It is determined with the following equation.

$$\text{Payback period (years)} = \frac{\text{Inv.}}{P}$$

Where,

Inv. = Investment required to start vending on first business day, Rs., P = Yearly net profit, Rs.

Results and Discussion

Price

The price of the functional prototype was estimated as mentioned in Table 3. It is obtained as Rs. 14200/- (fourteen thousand and two hundred rupees only) which is affordable by the Indian street vendors based on the monthly income of a roasted corn vendor (Rajendra, 2013) (Table 4).

Net present worth

The Net Present Worth of the street vending business with Portable Corn Roaster cum Boiler was determined by adding the present values of yearly profits determined in Table 5. It was obtained as Rs. 2732757/-(twenty seven lakh thirty two thousand seven hundred and fifty seven rupees only) which deems that the business with the developed equipment has the ability to support Indian hawkers who sell roasted and boiled corn (Shively, 2012).

Benefit cost ratio

The Benefit Cost Ratio of the street vending business with Portable Corn Roaster cum Boiler was determined by dividing the Net Present Worth by the sum of present values of yearly cash outflows determined in Table 5. It was obtained as 1.065 and as it is greater than 1, the business is sustainable (Shively, 2012).

Internal rate of return

The Internal Rate of Return of the street vending business with Portable Corn Roaster cum Boiler was determined as 2432 per cent. It is sufficiently high when compared to the presently prevailing rate of interest and hence suggesting the feasibility of the business (Shively, 2012).

Table.1 Specifications of Portable Corn Roaster cum boiler

Specification	Value
Roasting capacity per batch	6 corns
Boiling capacity per batch	9 corns
Roasting time per batch	4 minutes
Boiling time per batch	12 minutes
Maximum capacity (roasting and boiling combined)	135 corns per hour
Charcoal requirement	2.6 kg per hour
Time taken to prepare red hot charcoal bed	8 minutes
Heat utilization factor	0.66
Thermal efficiency	21.24 per cent

Table.2 Assumptions

Assumption	Value
Vending business period per year	300 days
Vending business duration per day	4 h (04:00 pm to 08:00 pm)
Minimum corns sold per hour	20 corns
Life of functional prototype	10 years
Manufacturer's profit on functional prototype	100 per cent of manufacturing cost
Yearly maintenance and repair cost to vendor	5 per cent of purchasing cost
Cost of a raw corn (*Zea mays* var. *indentata*)	Rs. 8/-
Cost of charcoal per kg	Rs. 30/-
Daily wage to vendor's helper	Rs. 100/-
Daily travel and miscellaneous cost to vendor	Rs. 100/-
Yearly vending license fee	Rs. 310/- (Anonymous, 2019a)
Cost of 1 roasted/boiled corn	Rs. 30/-
Present rate of interest in India, d	6 per cent (Anonymous, 2019b)

Table.3 Price estimation of portable corn roaster cum boiler

S. no.	Part	Fabrication material	Quantity	Rate	Cost
1.	Chimney cum lid	Mild Steel sheet (1.2 mm)	7.02 kg	Rs.50/- per kg	Rs.351/-
2.	Boiling chamber (outer frame)		4.5 kg		Rs.225/-
3.	Roasting chamber and corn holders		7.5 kg		Rs.375/-
4.	Charcoal combustion chamber		15.7 kg		Rs.785/-
5.	Boiling vessel	Stainless Steel 304 sheet(1.2 mm)	3.3 kg	Rs.250/- per kg	Rs.825/-
6.	Insulation	25 mm rockwool blanket	1.2 kg	Rs.30/- per kg	Rs.36/-
7.	Caster wheels (100 mm dia.)	-	4 nos.	Rs.120/- per piece	Rs.480/-
8.	Insulation on corn holder handles	15 mm diameter Plastic pipe (5 mm thick)	2 m	Rs.100/- per metre	Rs. 200/-
9.	Fabrication works (Labour)	-	38.02 kg	Rs.100/- per kg metal	Rs.3802/-
A.	Manufacturing cost of functional prototype (Sum of S.no. 1 to 9)				Rs.7079/-
B.	Manufacturer's profit (@100 per cent of manufacturing cost)				Rs.7079/-
Price of the functional prototype (A+B, rounded off)					Rs.14200/-

Table.4 Yearly cash flow of the business

S. no.	Parameter	Value
1.	Price of the equipment	Rs. 14200/-
2.	Yearly repair and maintenance cost (@ 5 per cent of price)	Rs. 710/-
3.	Yearly Raw material cost: • For corns, Rs. 8×20 corns/h×4 h/day×300 days = Rs. 192000/- • For charcoal, Rs. 30×2.6 kg/h×4 h/day×300 days = Rs. 93600/-	Rs. 285600/-
4.	Yearly wage to helper = Rs. 100/day ×300 days	Rs. 30000/-
5.	Yearly travel and miscellaneous costs to vendor = Rs. 100/day ×300 days	Rs. 30000/-
6.	Investment required to start vending on first business day, Inv. = S.no. 1 + 3 + 4 + 5	Rs. 15352/-
7.	Cash outflow per year, O = S.no. 2 + 3 + 4 + 5 + vending license fee (@Rs. 310/- per year)	Rs. 346620/-
8.	Cash inflow per year from street vending business, I = Rs.30 ×20 corns/h×4 h/day×300 days	Rs. 720000/-
9.	Net profit per year, P = I - O	Rs. 373380/-

Table.5 Present values of future yearly profits and cash outflows

Parameter	Yearly profits		Yearly cash outflows	
	P, Rs.	P_i, Rs. (@ d = 6 per cent)	O, Rs.	O_i, Rs. (@ d = 6 per cent)
0th year	-15352	-15352	15352	15352
1st year	373380	352245.28	346620	327000.00
2nd year	373380	332306.87	346620	308490.57
3rd year	373380	313497.05	346620	291028.84
4th year	373380	295751.93	346620	274555.51
5th year	373380	279011.26	346620	259014.63
6th year	373380	263218.17	346620	244353.42
7th year	373380	248319.03	346620	230522.10
8th year	373380	234263.23	346620	217473.68
9th year	373380	221003.05	346620	205163.85
10th year	373380	208493.44	346620	193550.80
Total	3733800	2732757	3481552	2566505

Fig.1 Portable corn roaster cum boiler

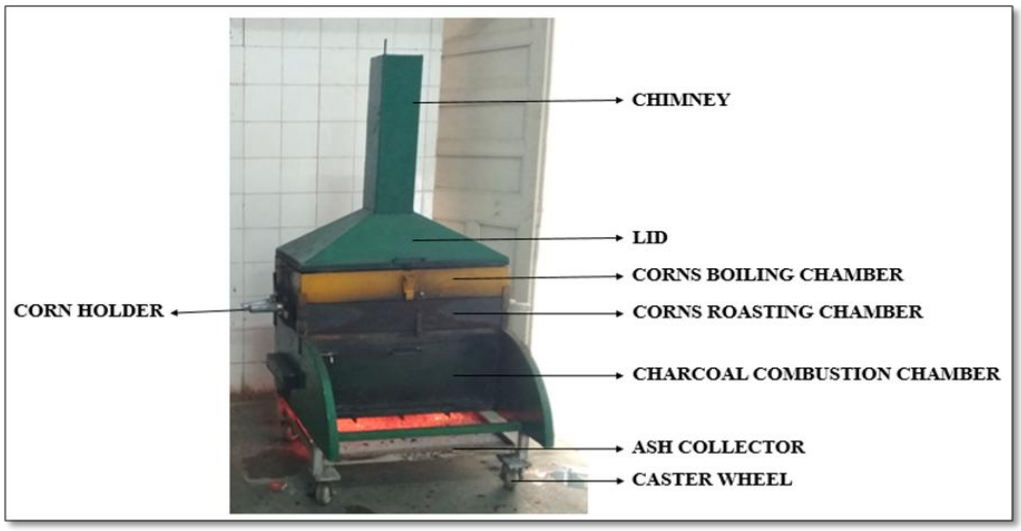
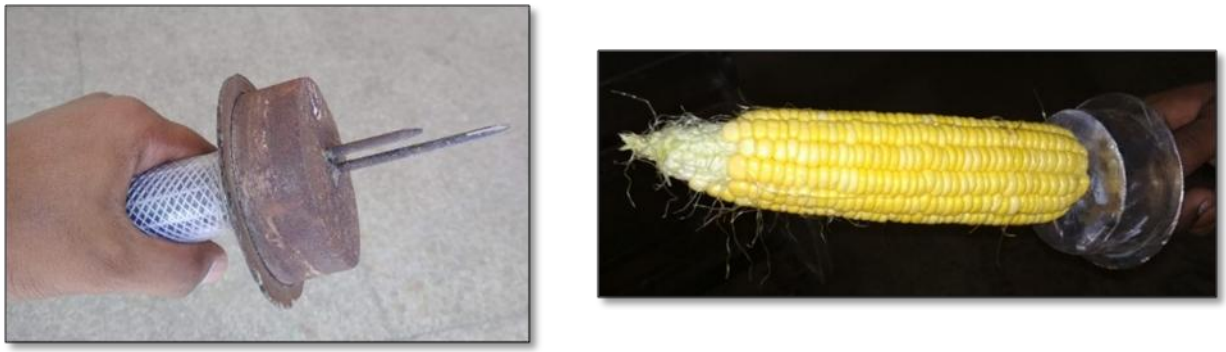


Fig.2 Boiling chamber (left) and roasting chamber (right)

Fig.3 Corn holder (left) and corn holder pricked into corn (right)



Payback period

The payback period of the street vending business with Portable Corn Roaster cum Boiler was determined using the values determined in Table 4. It was obtained as 0.041 years which approximately amounts to 13 business days. A payback period so short is ideal for the Indian hawkers who wish to borrow money to start their business with the help of the equipment.

The parameters determined above indicate the theoretical feasibility of the street vending business with the developed Portable Corn Roaster cum Boiler. However, a study focused on real-time comparison between the businesses with the equipment and the conventional process will give a deeper insight.

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References

Al-Ani, M.K. 2015. A strategic framework to use payback period in evaluating the capital budgeting in energy and oil and gas sectors in Oman. International Journal of Economics and Financial Issues. 5(2): 469-475.

Anonymous. 2019a. Rates, taxes, fees & charges for the year 2019-2020. https://www.kmcgov.in/KMCPortal/downloads/License_Tax.pdf, accessed on 21st April 2019 at 03:41 p.m. IST.

Anonymous. 2019b. India Interest Rate. https://tradingeconomics.com/india/interest-rate, accessed on 21st April, 2019 at 03:51 p.m. IST.

Rajendra, R., 2013 I am Nagender Sahani, Corn Vendor. http://www.thehindu.com/features/metroplus/i-am-nagender-sahani-cornvendor/article4829466.ece, accessed on 4th September, 2017 at 07:20 a.m. IST.

Shively, G. 2012. An overview of benefit-cost analysis. https://www.researchgate.net/publication/255661807_An_Overview_of_Benefit-Cost_Analysis, accessed on 15th May, 2019 at 04:52 p.m. IST.

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