Vegan areca palm leather-waste to wealth generation through agri-startup

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ABSTRACT

Areca leaf sheath, the by-product which was otherwise wasted by farmers in the field has found utility in agro based Industries. Large number of areca leaf plates and bowl manufacturing units has mushroomed in the hinter land and escalated demand for leaf sheaths. The exponential rate of growth in area under arecanut ensures enormous supply of raw material in the state. The existing areca leaf product industries are not sufficient to utilize available raw materials. Hence, entrepreneurs have scope to think about its alternate uses. The Start- up India, a flagship scheme of Government of India provoked entrepreneurs and resulted in the evolution of Bhoomi Agri Venture. The venture converts wastes in the form of areca leaf sheath to wealth in the form of palm leather. Innovation lies in the manufacturing of palm leather without causing environmental pollution. The study examined the economics, economic viability and SWOT factors of the start-up. Arecanut growers reaped net returns of Rs. 38000 from the sale of leaf sheaths. Entrepreneur made net returns of Rs. 116.22 from Indoor slippers, Rs. 76.98 from diary covers and Rs. 253.52 from vanity bags. The positive NPW, BCR more than unity and IRR more than rate of interest revealed economic viability. Strength and opportunities emerged as crucial SWOT elements. The challenge lies in scaling up of enterprise to encash the glaring demand for palm leather.

Keywords: Enterprise Budgeting, Arecanut, Palm leather, Startup, Leaf sheath, SWOT.

Introduction

Arecanut is extensively cultivated in Karnataka, India in an area of 5.00 lakh hectares with annual production of 9.50 lakh tonnes[1]. It provides enormous employment in all the sectors of the economy. Nearly three million farmers rely on arecanut for their livelihood. Earlier, it was restricted to traditional belts but later in 2000, its cultivation expanded to non-traditional belts like Chitradurga, Davangere, Tumkuru at an exponential rate replacing annual crops. Dried and processed arecanut is the marketable produce from arecanut while various by-products such as areca leaf sheath, areca husk, trunk of areca palm etc. could also be utilized for economic purposes. Areca leaf sheath is used in manufacturing of bowls, plates, spoons etc. The sheath which was wasted by farmers in the field found utility in agro based Industries. Umpteen number of areca leaf product manufacturing units have mushroomed in the hinter land [2]. The emergence of such industries has escalated demand for leaf sheaths. Enormous supply of raw material in the state could be witnessed as the area under crop is increasing at an exponential rate[3]. The existing areca based industries cannot be able to absorb the available raw materials. Hence, entrepreneurs have room to think over alternative uses of raw materials. The flagship scheme launched by the Government of India viz., Start-up India has provoked entrepreneurs in this direction. The present study aimed at economic evaluation of a start-up named Bhoomi Agri Venture involved in utilization of areca leaf sheaths in manufacturing palm leather. The obtained palm leather is further processed into diary covers, vanity bags, indoor slippers etc. The innovation lies in manufacturing of palm leather in a sustainable manner without use of chemicals and without causing environmental pollution. The present

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[1] https://www.dasd.gov.in/adminimage/Arecanut_area_and_production.pdf

study is a modest attempt to evaluate the economics of form utility involved in conversion of areca leaf sheath a waste material to wealth in the form of palm leather a vegan product.

Methodology

The present study focusses on Bhoomi Agri Venture involved in manufacturing of palm leather from areca leaf sheaths in an organic manner. The venture adds form utility to waste areca leaf sheaths. The procedure involved in conversion of areca leaf sheath into palm leather and usage of palm leather in manufacturing of indoor slippers, vanity bags and diary covers is narrated in the succeeding section. The capital investment made on the venture was elicited from the entrepreneur, input use pattern, costs incurred on human labour, raw material, electricity, biodegradable gum, biological solution etc., was also elicited using an interview schedule. The economics of manufacturing above mentioned products was estimated following enterprise budgeting technique.

Enterprise budget is the summary of costs, returns and profit associated with the enterprise. Costs incurred included variable and fixed costs[4]. Variable costs included expenditure on human labour, procurement of raw material (areca leaf sheath), biodegradable gum, biological solution, jute and decorative materials etc. The quantity of inputs and input services along with their market prices was elicited from the entrepreneur. Interest on working capital @ 12 percent was considered as variable cost. Fixed costs included rental value of processing unit, storage unit, depreciation of machineries/ equipments/ implements used in manufacturing of palm leather products and interest on fixed capital[5]. Depreciation on machineries was estimated following straight-line method assuming the economic life span of machineries as ten years. Interest on fixed capital was estimated at 12 percent rate of interest charged by the commercial banks. The economics of indoor slippers, vanity bags and diary covers were worked out for 12000 pairs of indoor slippers, 3600 vanity bags and 120000 diary covers.

The economic viability of the investment on the venture was examined estimating discounted cash flow techniques like Benefit cost ratio (BCR), Net present worth (NPW) and Modified internal rate of returns (MIRR). NPW was obtained by taking the difference of summated discounted returns and discounted costs associated with the enterprise. BCR was arrived at by taking the ratio of summated discounted costs and returns. MIRR was calculated by making the NPW associated with project zero. The above measures were estimated assuming the discount rate of 12 percent and length of cash flow stream as ten years[6&7].

SWOT is a multicriteria strategic decision-making process wherein entrepreneur gauges the relative influence of internal and external factors on the enterprise. The analysis enables entrepreneur to identify crucial component of SWOT. Analytical Hierarchical Process (AHP), a multi-criteria strategic decision tool employed to identify crucial SWOT components decomposes complicated problem into a multilevel hierarchical structure of objectives, criteria and alternatives. The sole objective of entrepreneur is to identify the relative importance of internal (Strengths and Weaknesses) and external (Opportunities and threats) factors in the success of enterprise[8]. In each SWOT group, several factors will be influencing are termed as alternatives. Thus, an entrepreneur should identify from among SWOT which is crucial and within each SWOT which alternative is relatively prime having significant bearing on the prosperity of the enterprise. AHP determines relative importance of alternatives and criteria

based on the pair wise comparison at multilevel in hierarchical structure[9]. Pairwise comparison was performed using the scale developed by Saaty[10]. On formulation of alternatives within the SWOT group in the form of square and reciprocal matrix, matrix was normalized to arrive at eigen vector. The eigen vector reveals the relative importance of alternatives. The eigen vector arrived at may not be consistent. Inconsistency results in misinterpretation and judgement of relative importance of the alternatives. Hence, consistency was examined using consistency index and consistency ratio. The consistency index was obtained by multiplying pairwise matrix of the alternatives with the eigen vector. The elements of multiplied matrix were divided by eigen vector to arrive at eigen values. The average of eigen value indicates the maximum lambda. Consistency index was estimated using the formula = (maximum lambda- n)/n-1, where n stands for order of the matrix, maximum lambda is the average eigen value. Later, consistency ratio was estimated using formula consistency index/random index. The consistency ratio is expected to be lesser than 0.1 to infer that pairwise matrix is sufficiently consistent[11].

Results and discussion

Arecanut palm on an average sheds 10 leaf sheaths per year. A total of 1600 palms are accommodated per hectare with the spacing of 8x8 feet. Thus, a total of 16000 leaf sheaths are collected from a hectare of an established garden [12]. Farmers incurred an expenditure of Rs. 2000 towards collection and reaped net returns of Rs. 38000 per hectare (Table 1).

Procedure involved in manufacturing of palm leather from areca leaf sheaths

Areca leaf sheaths have found utility in the hands of agri-entrepreneurs involved in manufacturing of palm leather. The procured leaf sheaths are subjected to washing gun operated using 0.5 hp motor for water wash to remove extraneous material adhered to it. After washing, it was soaked in water for half an hour to soften the material. The softened raw material was subjected to cutting machine to trim 5-6 inches on both the ends to get raw material of uniform thickness. The extreme ends are usually hard and of varied thickness coming in the way of manufacturing process. Later, the cut leaf sheaths are soaked in biological solution (Patent). After soaking, the leaf sheaths are shade dried for three days and may be extended for an additional day or two during cloudy seasons. The shade dried leaf sheath becomes palm leather. The height and width of prepared palm leather is 16-17 inch and 13-14 inch, respectively. Thus, prepared palm leather is used in manufacturing of vanity bags, indoor slippers and diary covers.

Indoor slippers: The palm leather is used to manufacture slippers of either two layers or three layers. Usage of two or three layers depends on the customer preference in terms of thickness. Slippers of two layers required two palm leathers while that of three layers required three. The palm leather was subjected to manual die cutting machine to provide proper cut and obtain suitable size. The cut palm leather was subjected to electrical stitching machine. Later, the stitched palm leather was subjected to buffing machine for attaining proper shape. On the stitched palm leather, a strap was fastened.

Vanity bags: Vanity bag of dimension 7x10 inches was prepared using one palm leather. Prior to manufacturing, thinning of palm leather is indispensable. It was performed using leather thinning machine. One labour could thin 1000 palm leather per day. It was performed to obtain leather of uniform thickness to make it suitable for manufacturing vanity bags. The thinned

leather was subjected for paper cutting machine to obtain leather strips of desired size. Later, strips were subjected for stitching machine. Weaving of vanity bags was performed using jute material. Around 1/4th metre of jute material was required per vanity bag. Later the vanity bag was fastened with sling of better quality material. A total of 2 metre of sling material was required on both the sides per vanity bag.

Diary cover: Thinned palm leather is required for diary cover. Around two palm leather are required for manufacturing diary cover for a diary of size A4 ½. The thinned palm leather was given proper cut using paper cutting machine. Later, leather was adhered to purchased diary using biodegradable gum. A satin cloth could be used for decorative purpose and it is totally customised. Laser itching can also be performed on custom basis.

Capital investment on the unit

The total investment on palm leather manufacturing unit came to Rs. 1168900. Lion share of investment (59.89%) was on thinning machine which was quintessential to provide uniform thickness to palm leather. Palm leather with uniform thickness is desirable for diary covers and vanity bags. Next in the order of magnitude was on paper cutting machine (29.94%). It was essential to obtain desired sized strips from thinned palm leather for vanity bags. Manual cutting and stitching machines formed investment of 8.21 percent. Cutting machine was required to cut palm leather for desired shape of slippers and stitching machine to stitch slippers and vanity bags (Table 2).

Export potential of vegan palm leather

Bhoomi Agri venture is involved in export of palm leather to Netherland. Efforts are even made to explore market in America. The palm leather is of great demand in Netherland since it is used in manufacturing of mats, bags, slippers etc. The entrepreneur exports palm leather based on the consignment upto Bangalore at Free on Board price. Corrugated boxes were used as packing material to pack 100 units of palm leather incurring an expenditure of Rs. 120 per box. To ship the box to the indicated local destination, Rs. 100-150 was incurred. The expenditure incurred per unit of palm leather came to Rs. 17.05 inclusive of transportation and packing charges. Labour worth of Rs. 3.125, raw material of Rs. 2.80 and biological solution worth Rs. 8.43 was incurred on producing a unit of palm leather. The transportation charges and packing charges came to Rs. 1.5 and Rs. 1.2 per palm leather, respectively. The packed palm leather was sold to the importer at FoB price of Rs. 45 per unit. The net returns accrued to the manufacturer was Rs. 27.95 per unit. In the last three years palm leather worth of Rs. 14 lakhs was exported to Netherland. To harness export potential, entrepreneur should explore new overseas market.

Economics of form utility accrued to manufacturer from palm leather based products

The variable costs cornered 77, 87.82 and 85.57 percent of the total costs in case of slippers, diary cover and vanity bags. Human labour (59.84%) formed the major chunk in case of vanity bag as it is labour intensive in nature, diary cornered major chunk (53.81%) in case of diary cover and biological solution formed the lion share in case of slippers (20.12%). Marketing costs was substantial compared to other production costs reflecting the promotional efforts put by the manufacturer in creating awareness about the product among the customers. The average cost incurred on manufacturing a pair of slipper worked out to Rs. 83.78 leaving

profit of Rs. 116.22. The average cost of diary cover inclusive of diary came to Rs. 223.02 leaving the net returns of Rs. 76.98. From vanity bags, owner realised net returns of Rs. 253.52 per bag incurring an average cost of Rs. 346.48 per bag. From the preceding results, it could be inferred that production of palm leather products brings huge profits to the manufactures (Table 3).

Economic feasibility of investment on areca palm leather-based products manufacturing unit

Economic viability of the enterprise was examined based on the discounted and undiscounted measures. Net present value (NPV) was found positive and substantial reflecting the worthwhileness of the project after duly accounting for inflation. Discounted benefit cost ratio appeared as 1.49 indicating that every rupee spent on the enterprise enabled entrepreneur to reap profit of 0.49. Internal rate of returns was 134 percent reflecting the potential of project in earning returns at the rate of 134 percent on the investment being made at the cost of credit of 15 percent. Pay Back Period indicates the time period required for the project to recover the investment made on it. The time period required was less than a year (Table 4). All the measures signal the economic viability of the start-up.

SWOT analysis

SWOT analysis was performed using Analytical Hierarchical process to identify the relative importance of SWOT components related to areca palm leather based product manufacturing unit. The results indicated that from among the SWOT components, Strength of the enterprise has got greater degree of importance at 0.49 followed by opportunity at 0.35, threats at 0.10 and weakness at 0.05 (Table 5).

Among the Strengths, S1 had highest degree of importance followed by S2, S3 and S4 in the order of magnitude. More impetus should be given to S1 and S2 to enable entrepreneur in making higher profits. W2 and W1 emerged as an important alternatives having greater bearing on success of the enterprise. Concerted efforts should be made by the entrepreneur in correcting above weaknesses for prospering the enterprise. How sound the enterprise may be internally but unless the enterprise has ability to reap the existing opportunity and counter the prevailing threats, it will not succeed. Hence, greater emphasis needs to be given for external factors as they are beyond the reach of entrepreneur. The degree of importance signalled that O1 and O3 are relatively important and accordingly entrepreneur should focus and put sincere efforts to tap the same. T2 and T1 in the order were found crucial and need to be countered through formulation of suitable strategies. Suitable strategies entrepreneur should formulate to encash the prospective opportunities and to combat the possible threats arising from the external environment. The existing strengths need to be further strengthened and weaknesses should be converted into strengths for the prosperity of enterprise (Table 6).

Up-scaling of the start-up

Scaling up of start-up depends on assured supply of raw material and institutional support. The raw material supply was estimated using exponential model using data of area under arecanut from 2016-17 to 2020-21. The model enables to arrive at compound rate of growth in the area. The models were found statistically significant at 1% alpha. The extrapolated area of 6.31 and 8.52 lakh

ha for Karnataka and India, respectively was obtained at the estimated growth rate of 4.73 and 2.75 percent for 2023-24. The area under garden with gestation period of seven years was deducted to arrive at area under established garden. The sheaths from drip gardens are of desirable quality for manufacturing leaf based products. The conservative estimate of 50 percent was assumed to arrive at area under drip irrigated farms. The availability of leaf sheath was obtained by multiplying established drip irrigated arecanut farm with leaf sheaths shed per hectare (16000). The estimate of potential supply came to 5505 million (India) and 3378 million leaf sheaths (Karnataka). After making provision for other leaf based industries (50%), the potential supply of 2753 and 1689 million leaf sheaths in India and Karnataka can be made available for manufacturing vegan palm leather. Plant based leather products are gaining importance because of their sustainable production, ethical values among consumers, biodegradable, eco-friendly and vegan nature. The vegan leather is expected to reach 97 million USD from present 68 million USD by 2027. In this connection, government of India should encourage prospective entrepreneurs and innovators to design alternative product lines using areca palm leather by providing production linked subsidies, green box subsidies for research and development and export subsidies for tapping the potential in overseas market. Decentralized manufacturing of palm leather and centralized manufacturing of finished products hastens viability of up-scaling.

Conclusion

Start-up has added form utility to Areca leaf sheath through its conversion into palm leather and its products. The enterprise was found economically viable in terms of NPW, BCR and IRR. The entrepreneur has made handsome profits from value addition to palm leather through production of indoor slippers, vanity bags and diary covers. Strengths and Opportunities emerged as crucial factors in the success of startup. In future, entrepreneur should concentrate on alternative product lines to reap scale economies, segment market to reach target customers and upscale enterprise to efficiently utilize the available raw materials.

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Table 1: Returns accrued to arecanut farmers from areca leaf sheaths

Particulars	Magnitude
Areca palm/ ha	1600
Number of leaf sheaths shed per well-established palm	10
Total number of leaf sheaths shed/ha	16000
Cost incurred on collection of leaf sheaths	2000
Selling price/ leaf sheath at farm gate	2.50
Gross returns/ ha	40000
Net returns/ ha	38000

Table 2: Capital investment on areca palm leather manufacturing units

Particulars	Qty	Value
Manual die cutting machine	1	48000 (4.11)
Dies	1	13000 (1.11)
Electrical stitching machine	1	35000 (2.99)
Buffing machine	1	18000 (1.54)
Leather thinning machine	1	700000 (59.89)
Paper cutting machine	1	350000 (29.94)
Cutter	1	2500 (0.21)
Water storage drums	2	2400 (0.21)
Total investment		**1168900**

Table 3: Economics of areca palm leather based products

Particulars/Products	Slippers (12000 pairs)	Diary covers (120000 no.)	Vanity bag (3600)	Unit cost of Slipper	Unit cost of diary cover	Unit cost of vanity bag
I. Variable cost						
Human labour	185400 (18.44)	1714000 (6.40)	746430 (59.84)	15.45	14.28	207.34
Areca leaf sheath	67200 (6.68)	672000 (2.51)	10080 (0.81)	5.60	5.60	2.80
Diary		14400000 (53.81)			120.00	
Biological solution	202286 (20.12)	2022857 (7.56)	30343 (2.43)	16.86	16.86	8.43
Strap for slippers	121500 (12.09)			10.13		
Decorative flower for slippers	84000 (8.36)			7.00		
Gum to adhere decorative flower	18000 (1.79)			1.50		
Biodegradable gum to adhere diary covers		2100000 (7.85)			17.50	
Jute material for vanity bag			72000 (5.77)			20.00
Sling for vanity bag			93000 (7.46)			25.83
Electricity charges	3874 (0.39)	38736 (0.14)	581 (0.05)	0.32	0.32	0.16
Repairs	8928 (0.89)	37680 (0.14)	565 (0.05)	0.74	0.31	0.16
Interest on working capital @ 12 % per annum	82943 (8.25)	2518233 (9.41)	114360 (9.17)	6.91	20.99	31.77
Total variable cost	**774131 (77.00)**	**23503506 (87.82)**	**1067359 (85.57)**	64.51	195.86	296.49
II. Fixed cost						
Rental value of building/processing unit	15067 (1.50)	150672 (0.56)	2260 (0.18)	1.26	1.26	0.63
Depreciation	10985 (1.09)	103682 (0.39)	2486 (0.20)	0.92	0.86	0.69
Interest on fixed capital @12% per annum	13134 (1.31)	124081 (0.46)	2410 (0.19)	1.09	1.03	0.67
Total fixed cost	**39186 (3.90)**	**378435 (1.41)**	**7156 (0.57)**	3.27	3.15	1.99
Marketing costs	192000 (19.10)	2880000 (10.76)	172800 (13.85)	16.00	24.00	48.00
Total costs	**1005317**	**26761941**	**1247315**	83.78	223.02	346.48
Price	200	300	600	200.00	300.00	600.00
Quantity (no.)	12000	120000	3600			
Gross returns	**2400000**	**36000000**	**2160000**			

Net returns		**1394683**	**9238059**	**912685**	116.22	76.98	253.52

Table 4: Economic feasibility of areca palm leather based products manufacturing unit

Measures	Value
Discounted measures	
Net present value (NPV)	₹ 7,20,65,205.42
Benefit cost ratio (BCR)	1.49
Internal rate of returns (IRR)	134%
Undiscounted measure	
Pay Back Period (PBP)	0.10 year

Table 5: Pairwise comparison of SWOT groups

SWOT groups	Strength	Weakness	Opportunities	Threats	Degree of Importance
Strength	1.00	7.00	2.00	5.00	0.49
Weakness	0.14	1.00	0.20	0.33	0.05
Opportunities	0.50	5.00	1.00	6.00	0.35
Threats	0.20	3.00	0.17	1.00	0.10

Table 6: Degree of importance of SWOT factors

SWOT groups	SWOT factors				Factor priority within the group	Group priority	Overall priority of the factor
Strengths	**S1**	**S2**	**S3**	**S4**			
Innovation coupled with risk bearing ability (S1)	1.00	3.00	5.00	7.00	0.55		0.27
Technical expertise in production (S2)	0.33	1.00	3.00	5.00	0.26		0.13
Possibility of customised production (S3)	0.20	0.33	1.00	7.00	0.15	0.49	0.07
Presence of unit in the hinter land (S4)	0.14	0.20	0.14	1.00	0.04		0.02
Weaknesses	**W1**	**W2**	**W3**	**W4**			
Requirement of huge initial investment (W1)	1.00	0.14	5.00	4.00	0.19		0.01
Huge production costs due to Inability in reaping scale economies (W2)	7.00	1.00	9.00	7.00	0.68		0.04
Huge promotion costs (W3)	0.20	0.11	1.00	0.25	0.04	0.05	0.00
Requirement of skilled labourers (W4)	0.25	0.14	4.00	1.00	0.09		0.00
Opportunities	**O1**	**O2**	**O3**	**O4**			
Rising Customer preference for vegan products (O1)	1.00	7.00	3.00	5.00	0.54		0.19
Easy Availability of raw material (O2)	0.14	1.00	0.17	4.00	0.10		0.04
Impetus given by Government in the form of flagship schemes and programmes(O3)	0.33	6.00	1.00	5.00	0.30	0.35	0.11
No restriction on its production and market as it is Environmental friendly (O4)	0.20	0.25	0.20	1.00	0.06		0.02
Threats	**T1**	**T2**	**T3**	**T4**			
Supply of poor quality raw materials (T1)	1.00	0.14	3.00	5.00	0.21		0.02
Competition from the close substitutes (T2)	7.00	1.00	3.00	5.00	0.59		0.06
Loyalty of customers for synthetic products produced using chemicals and animal leather (T3)	0.33	0.33	1.00	5.00	0.14	0.10	0.01
Rising demand for raw materials from other prospective industries (T4)	0.20	0.20	0.20	1.00	0.05		0.01