Vegan areca palm leather – waste to wealth generation through agri-start-up

Kiran Kumar R. Patil[1,*], K. C. Shashidara[1], H. S. Sowmya[1] and S. R. Suresh[2]

[1]Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga 577 204, India
[2]Bhoomi Agri Ventures, Corporate Office 75/76, Sri Nilaya behind KGP Hospital Kallahali, Vinobanagar, Shivamogga 577 204, India

Areca leaf sheath, a by-product which was earlier wasted by farmers in the field, has now found utility in agro-based industries. Several areca leaf plates and bowl manufacturing units have mushroomed in the hinterland, which escalated the demand for leaf sheaths. Due to the rapid growth of arecanut production, the state has a vast supply of raw materials. However, the existing areca leaf product industries cannot fully utilise this abundance. As a result, entrepreneurs can explore alternative uses for this valuable resource. Start-up India, a flagship scheme of the Government of India that encourages entrepreneurs, has resulted in an enterprise in Shivammogga, Karnataka that converts waste in the form of areca leaf sheath to wealth in the form of palm leather. The innovation lies in the manufacturing of palm leather without causing environmental pollution. The present study examined the economics, economic viability and SWOT factors of this start-up. Arecanut growers reaped net returns of Rs 38,000 from the sale of leaf sheaths. The 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 net present worth of Rs 7.2 crores, benefit : cost ratio of 1.49 and internal rate of returns of 134% revealed economic viability. Strengths and opportunities emerged as crucial SWOT elements. The challenge lies in scaling up the enterprise to encash the glaring demand for palm leather.

Keywords: Agri-start-up, arecanut, leaf sheath, palm leather, wealth generation.

ARECANUT is extensively cultivated in Karnataka, India, in an area of 5.00 lakh hectares with an annual production of 9.50 lakh tonnes (ref. 1). Arecanut provides employment in primary, secondary and tertiary sectors of the economy. Nearly three million farmers rely on arecanut for their livelihood. Earlier, the cultivation was restricted to traditional belts of Karnataka, but from the year 2000, it has expanded to non-traditional areas like Chitradurga, Davangere and Tumkuru in the state at an exponential rate, replacing annual crops. Dried and processed arecanut is marketable produce, while various by-products, such as areca leaf sheath, areca husk, trunk of areca palm, etc. can also be utilized for economic purposes. Areca leaf sheath is used in manufacturing bowls, plates, spoons, etc. The sheath, which was earlier wasted by farmers in the field, has now found utility in agro-based industries. Several areca leaf product manufacturing units have mushroomed in the hinterland[2]. The emergence of such industries has increased the demand for leaf sheaths. A huge supply of raw materials can be witnessed in Karnataka as the area under the areca crop is increasing exponentially[3]. The existing areca-based industries are unable to use the available raw materials. Hence, entrepreneurs have the opportunity to consider alternative uses of raw materials. The flagship scheme launched by the Government of India, viz. start-up India, has encouraged entrepreneurs in this direction. The present study aims at the economic evaluation of a start-up BhoomiAgri ventures located in Shivamogga, Karnataka involved in the 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 palm leather in a sustainable manner without the use of chemicals and not causing environmental pollution. This study evaluates the economics of form utility involved in the conversion of areca leaf sheath – a waste material – to wealth in the form of palm leather – a vegan product.

As mentioned earlier, the enterprise is involved in manufacturing palm leather from areca leaf sheaths in an organic manner, thus adding form utility to waste areca leaf sheaths. The procedure involved in converting the areca leaf sheath to palm leather and using palm leather to manufacture indoor slippers, vanity bags and diary covers is described here. The capital investment made in the enterprise was elicited from the entrepreneur, while input use pattern, costs incurred on human labour, raw material, electricity, biodegradable gum, biological solution, etc. were elicited using an interview schedule. The economics of manufacturing the above-mentioned products was estimated following the enterprise budgeting technique.

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

*For correspondence. (e-mail: kirankumarrpatil@uahs.edu.in)

covers was worked out for 12,000 pairs of indoor slippers, 3,600 vanity bags and 120,000 diary covers.

The economic viability of investment in the enterprise was analysed by 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 between 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 is that discount rate which makes net present worth (NPW) of the project zero. It indicates the earning capacity of the investment made on the project. The above measures were estimated assuming a discount rate of 12% and the length of cash-flow stream as 10 years[6,7].

SWOT is a multicriteria strategic decision-making process wherein an entrepreneur gauges the relative influence of internal and external factors on an enterprise. The analysis enables entrepreneurs to identify crucial components of SWOT. Analytical hierarchical process (AHP), a multicriteria strategic decision tool employed to identify crucial SWOT components, decomposes a complicated problem into a multilevel hierarchical structure of objectives, criteria and alternatives. The sole objective of entrepreneurs is to identify the relative importance of internal (strengths and weaknesses) and external (opportunities and threats) factors in the success of an enterprise[8]. Each SWOT group, viz. strengths, weaknesses, threats and opportunities possesses SWOT factors, viz. S1, S2, T1, T2, etc. Thus, an entrepreneur should identify from among SWOT which is crucial and from each SWOT group which SWOT factor will have significant bearing on prosperity of enterprise. AHP determines the relative importance of alternatives and criteria based on pairwise comparison at the multilevel in a hierarchical structure[9]. A pairwise comparison was performed using the scale developed by Saaty[10]. On the formulation of alternatives within the SWOT group in the form of a square and reciprocal matrix, the matrix was normalized to arrive at the eigen vector which reveals the relative importance of alternatives. The eigen vector arrived at may not be consistent. Inconsistency results in misinterpretation and judgement of the relative importance of the alternatives. Hence, consistency was examined using the consistency index and consistency ratio. The consistency index was obtained by multiplying the pairwise matrix of the alternatives with the eigen vector. The elements of the multiplied matrix were divided by the eigen vector to arrive at the eigen values. The average of the eigen values indicates the maximum lambda. Consistency index was estimated using the formula: consistency index = (maximum lambda – n)/n – 1, where n is the order of the matrix and maximum lambda is the average eigen value. The consistency ratio was estimated using the formula: consistency ratio = consistency index/random index. The consistency ratio is expected to be less than 0.1 to infer that the pairwise matrix is sufficiently consistent[11].

Arecanut palm, on average, sheds ten leaf sheaths per year. A total of 1600 palms are accommodated per hectare with a spacing of 8 × 8 ft. Thus, a total of 16,000 leaf sheaths are collected from 1 ha of an established garden[12]. Farmers incurred an expenditure of Rs 2,000 towards collection and reaped net returns of Rs 38,000 per hectare (Table 1).

Areca leaf sheaths have found utility in agri-entrepreneurs involved in manufacturing palm leather. The procured leaf sheaths are exposed to a washing gun operated using a 0.5 Hp motor for water wash to remove extraneous materials adhered to them. After washing, they were soaked in water for half an hour to soften the raw material. The softened raw material is placed in a cutting machine to trim 5–6 inch on both ends to obtain raw material of uniform thickness. The extreme ends are usually hard and of varied thickness, thus hindering the manufacturing process. The cut leaf sheaths are soaked in biological solution (patent). After soaking, the leaf sheaths are shade-dried for three days, which may be extended for an additional day or two during cloudy weather. The shade-dried leaf sheaths become palm leather. The height and width of the manufactured palm leather are 16–17 inch and 13–14 inch respectively. This palm leather is used in manufacturing vanity bags, indoor slippers and diary covers.

Indoor slippers: Palm leather is used to manufacture slippers of either two layers or three layers, depending on the customer's preference. Slippers of two layers require two numbers of palm leather, while those of three layers require three. The palm leather is exposed to a manual die-cutting machine to cut a suitable size properly. The cut palm leather

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

Particulars	Value
Areca palm/ha	1,600
Number of leaf sheaths shed per well-established palm	10
Total number of leaf sheaths shed/ha	16,000
Cost incurred on collection of leaf sheaths (Rs)	2,000
Selling price/leaf sheath at farm gate (Rs)	2.50
Gross returns/ha (Rs)	40,000
Net returns/ha (Rs)	38,000

Table 2. Capital investment on areca palm leather manufacturing units

Particular	Quantity	Value (Rs)
Manual die-cutting machine	1	48,000 (4.11)
Dyes	1	13,000 (1.11)
Electrical stitching machine	1	35,000 (2.99)
Buffing machine	1	18,000 (1.54)
Leather thinning machine	1	700,000 (59.89)
Paper-cutting machine	1	350,000 (29.94)
Cutter	1	2,500 (0.21)
Water storage drums	2	2,400 (0.21)
Total investment		1,168,900

is stitched using an electrical stitching machine. Later, it is exposed to a buffing machine to attain a proper shape. A strap is fastened on the stitched palm leather.

Vanity bags: Vanity bags of dimension 7 × 10 inch are prepared using one palm leather. Prior to manufacturing, the thinning of palm leather is indispensable, which is performed using a leather thinning machine. One labourer can thin 1000 numbers of palm leather per day. This is done to obtain leather of uniform thickness suitable for manufacturing vanity bags. The thinned leather is exposed to a paper-cutting machine to obtain leather strips of the desired size. These strips are stitched using a stitching machine. The weaving of vanity bags is done using jute material. Around one-fourth metre of jute material is required for one vanity bag. The vanity bags are fastened with 2 m sling material on both sides.

Diary covers: Thinned palm leather is required for diary covers. Around two numbers of palm leather are required for manufacturing covers for diaries of size A4½. The thinned palm leather is given a proper cut using a paper-cutting machine. The leather is adhered to the purchased diary using biodegradable gum. A satin cloth could be used for decorative purposes, and it is totally customized. Laser itching can also be performed on a custom basis.

The total investment on the palm leather manufacturing unit was Rs 1,168,900. The lion's share of investment (59.89%) was on the thinning machine to provide uniform thickness to palm leather, which is desirable for diary covers and vanity bags. Next was the paper-cutting machine (29.94%). This is essential to obtain strips of the desired size from thinned palm leather for vanity bags. Manual cutting and stitching machines accounted for 8.21% of the investment. A cutting machine was required to cut palm leather to the desired shape for slippers, while the stitching machine was necessary to stitch slippers and vanity bags (Table 2).

The enterprise is involved in the export of palm leather to the Netherlands. Efforts are to explore markets in the USA. Palm leather is in great demand in the Netherlands since it is used in manufacturing mats, bags, slippers, etc. Entrepreneur exports palm leather on the consignment up to Bengaluru at free on board price. Free on board indicates that supplier pays shipping cost from the point of production to a specified destination of the buyer. Corrugated boxes are used as packing material to pack 100 units of palm leather, incurring an expenditure of Rs 120 per box. To ship the boxes to the indicated local destination, Rs 100–150 is incurred. The expenditure incurred per unit of palm leather is Rs 17.05 inclusive of transportation and packing charges. Labour worth Rs 3.125, raw material Rs 2.80 and biological solution worth Rs 8.43 are incurred on producing a unit of palm leather. The transportation and packing charges are Rs 1.5 and 1.2 per unit of palm leather respectively. The packed palm leather is sold to the importer at a FoB price of Rs 45 per unit. The net returns accrued to the manufacturer is Rs 27.95 per unit. In the last three years, palm leather worth Rs 14 lakhs was exported to the Netherlands. To harness the export potential, entrepreneurs should explore new overseas markets.

The variable costs accounted for 77%, 87.82% and 85.57% of the total costs in the case of slippers, diary covers and vanity bags respectively. Human labour (59.84%) formed a major chunk in the case of vanity bags, as they are labour-intensive. Diary was a major chunk (53.81%) in the case of diary covers, and biological solution formed the lion's share in the case of slippers (20.12%). Marketing costs were substantial compared to other production costs, reflecting the promotional efforts made by the manufacturer to create awareness about their products among the customers. The average cost incurred on manufacturing a pair of slippers worked out to Rs 83.78, with a profit of Rs 116.22. The average cost of diary covers inclusive of diary was Rs 223.02, with net returns of Rs 76.98. From vanity bags, the owner realized net returns of Rs 253.52 per bag, incurring an average cost of Rs 346.48 per bag. From the preceding results, it can be inferred that palm leather products bring huge profits to the manufacturers (Table 3).

The economic viability of the enterprise was evaluated based on discounted and undiscounted measures. NPV was found to be positive and substantial, reflecting the potential of the project after duly accounting for inflation. Discounted BCR was 1.49 indicating that every rupee spent on the enterprise enabled the entrepreneur to reap gross returns of Rs 1.49 or net returns (profit) of Rs 0.49. IRR was 134%, reflecting the potential of the project in earning returns at the rate of 134% on the investment being made at the cost of credit of 15%. The pay-back period indicates the time period required for a project to recover the investment made on it. The time period required, in this case, is less than a year (Table 4). All the measures signal the economic viability of the start-up.

SWOT analysis was performed using AHP to identify the relative importance of SWOT components related to the areca palm leather-based product manufacturing unit. The results indicated that from among the SWOT components, the strength of the enterprise had a highest degree of importance at 0.49, followed by opportunity at 0.35, threats at 0.10 and weaknesses at 0.05 (Table 5).

Among the strengths, S1 had the highest degree of importance, followed by S2, S3 and S4 in the order of magnitude (Table 6). More impetus should be given to S1 and S2 to enable the entrepreneur to make higher profits. W2 and W1 emerged as important alternatives having a greater bearing on the success of the enterprise. Concerted efforts should be made by the entrepreneur to correct the above weaknesses for the enterprise to prosper. Unless the enterprise can reap the existing opportunities and counter the prevailing threats, it will not succeed. Hence, greater emphasis needs to be given to external factors as they are beyond the reach of the entrepreneur. The degree of importance revealed that opportunities O1 and O3 are relatively important, and accordingly, the entrepreneur should focus and

Table 5. Pairwise comparison of SWOT groups

SWOT group	Strengths	Weaknesses	Opportunities	Threats	Degree of importance
Strengths	1.00	7.00	2.00	5.00	0.49
Weaknesses	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 groups	Group priority	Overall priority of the factors
	S1	S2	S3	S4			
Strengths	1.00	3.00	5.00	7.00	0.55	0.49	0.27
Innovation coupled with risk-bearing ability (S1)	0.33	1.00	3.00	5.00	0.26		0.13
Technical expertise in production (S2)	0.20	0.33	1.00	7.00	0.15		0.07
Possibility of customized production (S3)	0.14	0.20	0.14	1.00	0.04		0.02
Presence of unit in the hinterland (S4)							
	W1	W2	W3	W4			
Weaknesses	1.00	0.14	5.00	4.00	0.19	0.05	0.01
Requirement of huge initial investment (W1)	7.00	1.00	9.00	7.00	0.68		0.04
Huge production costs due to inability in reaping scale economies (W2)							
	0.20	0.11	1.00	0.25	0.04		0.00
Huge promotion costs (W3)	0.25	0.14	4.00	1.00	0.09		0.00
Requirement of skilled labourers (W4)							
	O1	O2	O3	O4			
Opportunities	1.00	7.00	3.00	5.00	0.54	0.35	0.19
Rising customer preference for vegan products (O1)	0.14	1.00	0.17	4.00	0.10		0.04
Easy availability of raw materials (O2)	0.33	6.00	1.00	5.00	0.30		0.11
Impetus given by the Government in the form of flagship schemes and programmes (O3)							
	0.20	0.25	0.20	1.00	0.06		0.02
No restriction on its production and market as it is environment-friendly (O4)							
	T1	T2	T3	T4			
Threats	1.00	0.14	3.00	5.00	0.21	0.10	0.02
Supply of poor-quality raw materials (T1)	7.00	1.00	3.00	5.00	0.59		0.06
Competition from the close substitutes (T2)	0.33	0.33	1.00	5.00	0.14		0.01
Loyalty of customers for synthetic products produced using chemicals and animal leather (T3)							
	0.20	0.20	0.20	1.00	0.05		0.01
Rising demand for raw materials from other prospective industries (T4)							

potential in the overseas market. Decentralized manufacturing of palm leather and centralized manufacturing of finished products will hasten the viability of upscaling.

The studied start-up has added form utility to the 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 a handsome profit from value addition to palm leather through the production of indoor slippers, vanity bags and diary covers. Strengths and opportunities emerged as crucial factors in the success of the start-up. In future, the entrepreneur should concentrate on alternative product lines to reap scale economies, segment the market to reach target customers and upscale the enterprise to efficiently utilize the available raw material.

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