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Original Research Article

Moringaoleifera: Production and Marketing in Tiruppur District

ABSTRACT

Aim: The study aimed at analyzing both the production and marketing aspects of *Moringaoleifera*.

Methodology: Tiruppur district of Tamil Nadu was selected for the study based on Moringa area and production statistics. Non- probability sampling technique was used to select the sample respondents. The sample consisted of 40 Moringa farmers and 35 market intermediaries (10 Local traders / Commission agents, 10 Wholesalers, 5 Processors and 10 Retailers). Conventional analysis using percentage; Price Spread along the chain was estimated by calculating Farmer's Net Price, Marketing Margin and Farmer's Share in Consumer's Rupee; Technical efficiency of the farmers were measured using Data Envelopment Analysis (DEAP software version 2.1).

Results: Moringa was the most cultivated crop as it was drought tolerantand generated higher profits.About 50%~~per cent~~ of farmers operated in a technical efficiency range greater than 0.90 and technical efficiency varied substantially between 0.67 and 1.00, with a mean technical efficiency of 0.89. Majority of the farmers preferred selling their produce to local traders and the reason for preferring that channel was that it saved their time. Marketing Margin of the Processors were the highest.

Conclusion: Farmers can sell their produce directly to the retailers, as it was found to be the most efficient channel.Farmers could be better educated through government aided consultancy services and these consultancy firms and farmer~~s~~ associations could work together. The intra year price fluctuation presents a favorable climate for value addition processes in the study area and processors can expand the existing small-scale activities to meet out the demand.

Keywords: Intermediaries, Moringa, Marketing, Price spread, Production, Technical efficiency.

1. INTRODUCTION

Over the years, horticulture has emerged as one of the potential agricultural enterprises in accelerating the growth of economy. There has been a technology driven, steady expansion in cultivation area, total production and consumer utilization of horticultural crops in India, facilitated by enhanced scientific support through concerted research activities. Its role in the country's nutritional security and poverty alleviation is becoming increasingly important. India is endowed with a remarkably heterogeneous area characterized by great diversity of agro climatic zones, allowing production of a variety of horticultural crops.

Moringaoleifera, popularly known as *the Miracle tree*, is grown for its nutritious leafy greens, flower buds, and mineral-rich green fruit pods. It has its origin in North West India and now has become a popular vegetable in South Indian states. The crop is widely distributed in India, Sri Lanka, Pakistan, Singapore, Malaysia, Cuba, Jamaica and Egypt. In India, both area and production of Moringa is highest in the states of Andhra Pradesh, followed by Karnataka and Tamil Nadu. Production and processing of the plant can generate employment and boost the economy.Moringa Fund, Trees for Life and Global Moringa Network are some of the international initiatives that has been established to improve the production and to develop the marketing processes. Many countries have National Association of Moringa, which aim to organize producers, consumers, processors and researchers to speak on the issues of Moringa thereby influencing policy on promotions, production, consumption and marketing of the products. Despite the great economic importance, *Moringaoleifera* is still under exploited and underutilized (Pandey et al., 2011)[10].

The study aimed to analyze the different marketing channels that existed and the price and cost along the channel, to find the most efficient channel. Marketing channels are a set of interdependent organizations involved in the process of making a product or service available for use or consumption (Coughlan *et al*., 2005)[5]. Marketing cost has been identified as the major constraint in the wholesale marketing channel since it brought down

costs, particularly the commission charges as demonstrated in the co-operative channel, it helped in reducing the price spread and increased producers' margin (Murthy *et al*., 2007)[9]. In this study, marketing cost is referred to the cost incurred by Moringa farmers and the intermediaries in the movement of Moringa from producer to consumer. It includes transportation costs, processing costs and labour wages incurred by the producers and the intermediaries along the chain.

2. METHODOLOGY

2.1Study Area: Tiruppur district of Tamil Nadu was selected for the study based on Moringa area and production statistics.

2.2 Sampling Procedure and Sample size: Non- probability sampling technique was used to select the sample respondents. The sample consisted of 40 Moringa farmers and 35 market intermediaries (10 Local traders / Commission agents, 10 Wholesalers, 5 Processors and 10 Retailers).

2.3 Data: Primary data were collected from the sample respondents using a detailed structured questionnaire. Secondary data related to the study were collected from the records available in the Department of Economics and Statistics at Tiruppur, from the Government Departments of Agriculture and Horticulture at Tiruppur district, and also from official websites of the district.

2.4 Tools for analysis: Conventional analysis using percentage; Price Spread along the chain was estimated by calculating Farmer's Net Price, Marketing Margin and Farmer's Share in Consumer's Rupee; Technical efficiency of the farmers were measured using Data Envelopment Analysis (DEAP software version 2.1).

2.4.1 Farmers' Net Price

$$NP_F = GP_F - \{C_F + (L_F * GP_F)\}$$

Where,

NP_F=Net price received by the farmers (Rs/kg)

GP_F = Gross price received by farmers or wholesale price received by the farmer (Rs/kg)

C_F = Cost incurred by the farmers during marketing (Rs/kg), and

L_F = Physical loss in produce from harvest till it reaches the market (kg).

2.4.2 Marketing Margin:

Intermediary's margin = {Gross price - Purchase price - Cost of marketing - Loss in value during wholesaling}

2.4.3 Farmer's Share in Consumer's Rupee

$$F_S = (F_P/C_P) * 100$$

Where,

F_S = Farmer's share in consumer's rupee (Percentage)

F_P = Price received by the farmer (Rs/unit)

C_P = Price paid by the consumer (Rs/unit)

2.4.4 Data Envelopment Analysis (DEA)

In this study, DEA- CRS model (*Constant Returns to Scale*) was used to measure ~~to~~ the production efficiency of the Moringa farmers by comparing the input- output transformation with the help of DEAP software version 2.1. Technically efficient farmer is the one who produced the maximum output from the minimum quantity of inputs. Calculating technical efficiency helped in identifying the efficient Moringa farmers among the sample famers. The efficiency scores (θ_o) for a group of peer DMUs (j=1,…,n) were computed for the selected outputs (y_{rj}, r=1,…,s) and inputs (x_{ij}, i=1,…,m) using the following fractional programming formula:

$$\frac{\sum_{r=1}^{s} u_r y_{ro}}{\sum_{i=1}^{m} v_i x_{io}}$$

$$Maximize\ \theta_o = \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}}$$

$$Subject\ to\ \ u_r,\ v_{i \geq} 0\ for\ all\ r\ and\ i.$$

In this formula ~~formulation~~, the weights for the outputs and inputs, respectively, were u_r and v_i, and "o" denotes a focal DMU (i.e., each farm, in turn, becomes a focal farm when the efficiency score is being computed relative to others). Note that the input and output values, as well as all weights, were assumed by the formulation to be greater than zero. The weights u_r and v_i for each DMU were determined entirely from the output and input data of all DMUs in the peer group of data. Therefore, the weights used for each DMU were those that maximize the focal DMU's efficiency score. In summary, DEA identifies a group of optimally performing farms that were defined as efficient and assigns them a score of one. These efficient farms were then used to create an "efficiency frontier" or "data envelope" against which all other farms were compared. In sum, farms that require relatively more weighted inputs to produce weighted outputs or, alternatively, produce less weighted output per weighted inputs than do farms on the efficiency frontier, were considered technically inefficient. They were given efficiency scores of strictly less than 1, but greater than zero.

3. RESULTS AND DISCUSSION

Data pertaining to production and marketing aspects of Moringa were collected, analyzed, presented and discussed in the following section.

3.1 Moringa production

Three different varieties of Moringa were majorly cultivated in the selected study area, of which ChediMurungai was the local annual Moringa; MaramMurungai was perennial Moringa and PKM 1 was an annual Moringa variety.Chedi and MaramMurungaivarieties were planted during the months November-December and PKM 1 was planted during the months of July-October and November-December. Among the three varieties, PKM 1 had the highest yield.

Table 1. Planting and harvesting period of Moringa

Varieties	Planting season	Average yield	Harvesting period
ChediMurungai	Nov-Dec	180 Pods /Tree/Year	Every 45th day from planting
MaramMurungai	Nov-Dec	80Pods/Tree/Year	
PKM 1	Jul-Oct, Nov-Dec	200 Pods /Tree/Year	

It was important to trace each and every actor along the chain right from the input suppliers. The results revealed that around 77.50 per cent of the sample farmers used their own seeds for cultivation, whereas 12.50 per cent purchased seeds from agricultural university and 2.50 per cent purchased seeds from retail outlets (Table 2- i).

Among the three varieties grown in the study area, 52.20 per cent cultivated ChediMurungai, 25 per cent cultivated MaramMurungai and PKM 1 was cultivated by 12.50 per cent of the sample farmers. Also, around 10 per cent of the sample farmers cultivated a combination of both Chedi and MaramMurungai (Table 2- ii).Apart from climate and soil suitability, it was important to study the reasons for cultivating Moringa. Farmers stated different reasons such as Moringa was drought tolerant, less labour intensive, yielded higher profits, generated regular income and a combination of these (Table 2- iii).

Advisory services provideinformation to farmers like crops on demand, prices offered, the varieties preferred by buyers, the right production methods for the crop, where exactly the crop is to be sold and other such information. Farmers can get information from various sources, including agriculture extension offices, research institutions, universities, farmer associations, non-governmental organizations, input supply companies and others. It was observed that only 2.50 percent of the farmers in the study area received such advisory services and the rest 97.50 per cent of the sample farmers had not received any such services.

Farmers associations represent farmers in order to ensure their participation in the formulation and implementation of policies and agricultural development actions.Only 2.50 per cent of the sample farmers were members of farmers association, whereas 97.50 per cent of the sample farmers did not hold any membership in such associations.

Agricultural produce are bound to pre-harvest losses and it was important to study the factors responsible for pre harvest losses in Moringa. The major losses were because of flower drop due to rainfall and pests like pod fly (*Gitoniadistigma*), bud worms (*Noordamoringae*) and leaf cutter bees (*Megachilesp*). Relevant data collected from the sample farmers was analyzed and the results are furnished in (Table 2- iv).

Table 2. Moringa cultivation

Particulars	Number of Farmers	Percentage to Total
(i) Source of seeds		
Own	31	77.50
Retail outlets	01	2.50
Agricultural Universities	05	12.50
Neighbours and Friends	03	7.50
(ii) Varieties of Moringa cultivated		
ChediMurungai	21	52.50

MaramMurungai	10	25.00
PKM 1	5	12.50
Both Chedi and Maram	4	10.00
(iii) Reasons for cultivation of Moringa		
Drought tolerant	06	15.00
Regular income	02	5.00
Less labour	02	5.00
Drought tolerant and Regular income	09	22.50
Higher profit and Drought tolerant	07	17.50
Drought tolerant and Less labour	09	22.50
Less labour and Regular income	05	12.50
(iv) Pre harvest losses in Moringa		
Flower drop	12	30.00
Pod fly infestation*(Gitoniadistigma)*	07	17.50
Bud worms*(Noordamoringae)*	04	10.00
Leaf cutter bees*(Megachile sp.)*	03	7.50
Flower drop and Pod fly infestation	03	7.50
Flower drop and Bud worms	05	12.50
Pod fly infestation and Bud worms	05	12.50
Pod fly infestation and Leaf cutter bees	01	2.50

**Total number of farmers, n=40.*

3.1.1 Technical efficiency of Moringa production

The efficiency scores under constant returns to scale (CRS) was computed using the input-oriented DEA (Data Envelopment Analysis) methodology and with the help of DEAP Version 2.1 Software. The results showed that in CRS assumption about 50 per cent of farmers operated in a technical efficiency range greater than 0.90, about 2.50 per cent were below the efficiency level of 0.70, followed by 12.50 per cent were between the levels

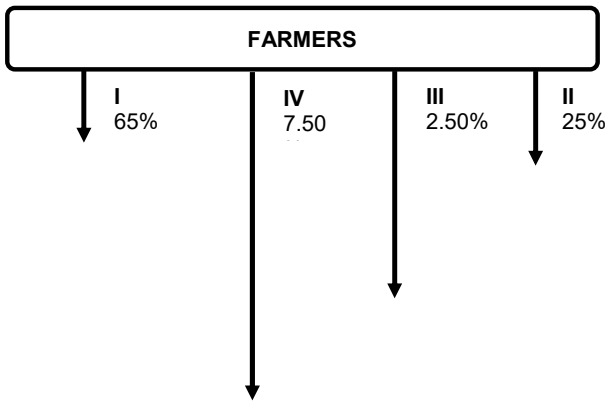
0.70 - 0.80 and 35 per cent between 0.81 - 0.90. Furthermore, technical efficiency varied substantially between 0.67 and 1.00, with a mean technical efficiency of 0.89.

Table 3. Technical efficiency in Moringa production

Particulars	Values	
Efficiency levels	**Frequency (CRS)**	**Percentage**
< 0.70	1	2.50
0.70 - 0.80	5	12.50
0.81 - 0.90	14	35.00
> 0.90	20	50.00
Mean	0.89	
Minimum efficiency	0.67	
Maximum efficiency	1.00	

3.2 Marketing channel preferred by farmers

Most producers used market intermediaries to sell their produce in the market and these intermediaries made up the marketing channel. The flow of produce from farmers to the marketing agents in the channel is depicted in figure 1. The results revealed that 65 per cent, 25 per cent, 2.50 per cent and 7.50 per cent of the sample farmers sold their produce through channel- I, II,III and IV respectively.



Local Traders

Wholesalers

Wholesalers

Processors

Retailers

Consumers

Figure 1. Marketing channel preferred by sample farmers

Also, preferring a particular market channel (Figure 2) was dependent upon various factors like time saving (35%~~per cent~~ of the sample farmers), transportation charges being comparatively less (30%~~per cent~~), quantity variations and transportation difficulties (15 per cent), and labour was scanty for loading and unloading (5%~~ per cent~~).

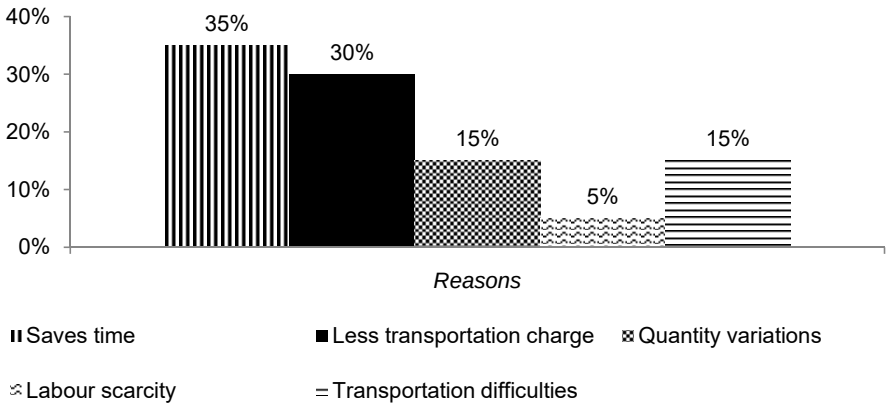
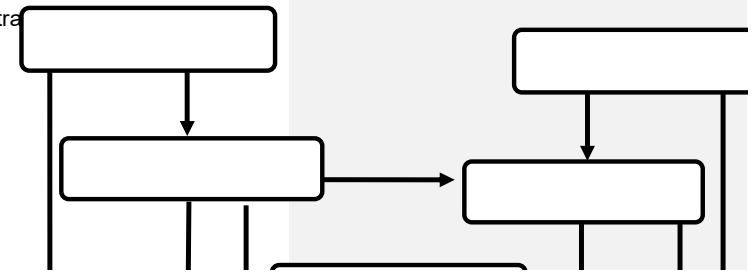


Figure 2. Reasons for a particular preferring marketing channel

Marketing plays an important role in all enterprises, regardless of size. When it comes to selling farm produce it is always immediacy and tra



considered in selling the produce. In this study, the produce was sold in the nearby markets as it reduced transportation difficulties, saved their time and the rapport they had with traders and consumers in those markets. About 42.50 per cent of the produce was marketed at Oddanchathiram vegetable market, followed by 25 per cent at Mulanur local market, 22.50 per cent at Vadugapatti market and 4 per cent of the produce being sold at daily markets in Paramathi, Vellakovil, Koodalur and Kannivaadi.

As the chain involved various intermediaries, it was important to cognize to whom the individual intermediary sold the procured produce further (Figure 3). It was apparent that, majority (60 per cent) of the local traders sold the commodity to wholesalers.About 40 per cent of the sample wholesalers directly sold the commodity in other states, 30 per cent sold their produce to the processors, 20 per cent sold it to the retailers and only 10 percent of the wholesalers sold it to the consumers.60 per cent of the sample processors exported their commodity, 20 per cent sold their produce to the retailers and another 20 per cent sold to the consumers.

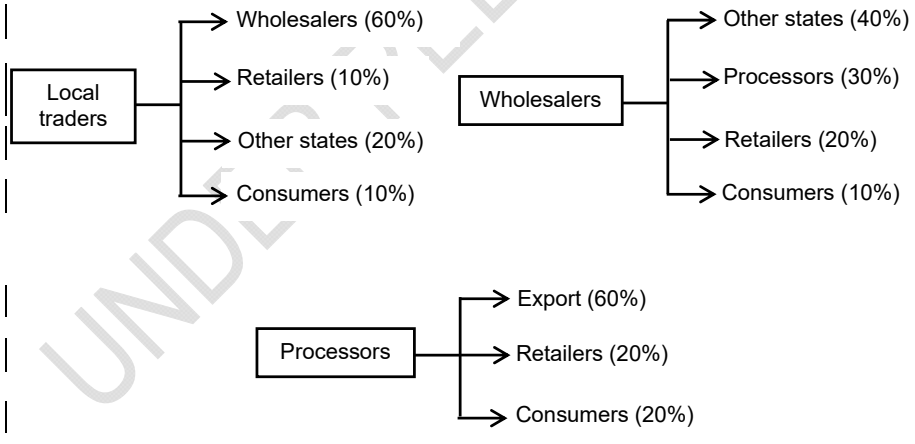


Figure 3. Selling pattern of the intermediaries

The sample market intermediaries were asked to rank their procurement preferences of the produce from I to V, where the most important criteria was ranked I and the least was ranked V (Table 4).

Table 4. Procurement preferences of market intermediaries

Factors	Mean Score	Rank
Bulk quantity in single place	52.63	I
Colour (Light / Dark green)	51.29	II
Freshness	50.06	III
Thickness	50.03	IV
Variety	44.00	V

Availability of storage facility with the market intermediaries were studied and it was observed that majority (56 per cent) of the sample intermediaries did not own or hire any storage facilities, whereas 36 per cent of them owned storage facilities and 8 per cent of the sample intermediaries hired storage facilities to store the produce.

Table 5. Availability of storage facility with market intermediaries

Storage facility	Market intermediaries			Overall
	Local traders	Wholesalers	Processors	
Owned	0	5	4	9 (36.00)
Hired	0	1	1	2 (8.00)
No storage facility	10	4	0	14 (56.00)
Total	10	10	5	25 (100.00)

**Figures in parentheses indicate percentage to total*

3.3 Price spread along the chain of Moringa Pods

Price-spread explains in detail the actual price received by the producers, price paid by the consumers, costs incurred and margins earned by the various market intermediaries in the process of marketing Moringa.

3.3.1 Marketing Margin

Market intermediaries incurred expenses for the services rendered by them in the process of moving fresh produce from the farmers to ultimate consumers. While doing so, they made profits to sustain in the business. Marketing margin was calculated with the help of sale price, purchase price, cost incurred during marketing and loss. The margins threw light on the efficiency with which Moringa market was functioning in the study area. The details of marketing margin of each intermediary are furnished in Table 6. Local traders purchased the produce at Rs. 22.70 per kg, whereas wholesalers purchased it at Rs. 24 per kg. Processors and retailers purchased the produce at Rs. 25.50 and Rs. 27 per kg on an average. The sale price of the produce ranged between Rs. 26.80 to Rs. 35.50 per kg. Cost of Marketing incurred by the local traders, wholesalers, processors and retailers were Rs. 2.25 per kg, Re. 1 per kg, Rs. 3 per kg and Rs. 2 per kg respectively. Loss of the produce ranged between Rs. 0.17 to Rs. 2.50perkg. Marketing Margin of the Processors was the highest, followed by wholesalers, retailers and local traders.

Table 6. Marketing margin of the intermediaries

Market Intermediary	Average Price (Rs./ kg)				
	Sale price	Purchase Price	Cost of Marketing	Loss	Marketing Margin
Local traders	26.80	22.70	2.25	0.56	1.29
Wholesalers	29.20	24.00	1.00	1.50	2.70
Processors	35.50	25.50	3.00	2.50	4.50
Retailers	31.00	27.00	2.00	0.17	1.83

3.3.2 Farmer's share in Consumer's rupee

Farmer's share in consumer's rupee does not remain constant. Higher the grower's share, higher is the marketing efficiency and vice versa. It refers to the price received by the Moringa farmer and is expressed as percentage of the ultimate consumer's price. Farmer's share in consumer's rupee was calculated using the formula (Price received by the farmer/ Price paid by the consumer)*100. Farmer's share in consumer rupee was estimated as 66.12 percent (Table 7). When the produce reached the final consumer, farmer's share in consumer's rupee was very minimal as it involved a number of intermediaries and high marketing costs. Hence, by reducing the number of intermediaries, farmers could gain more in terms of their share of rupee paid by the end user.

Table 7.Farmer's share in Consumer's rupee

Particulars	Price (Rs)
Farmer's price (Selling price/ kg)	20.50
Consumer's price (Purchase price/ kg)	31.00
Farmer's share in Consumer's rupee (Percentage)	66.12

3.3.3 Farmer's Net Price

Price received by the farmer at the time of first sale is the farmer's net price or producer's price. Net price received by the farmers were calculated and was estimated as Rs. 17.45 per kg, where the gross price received by the farmers by selling the produce was Rs. 18.05 per kg, Cost of Marketing was Re. 1 per kg and physical loss of the produce was 0.49 kg on an average.

4. CONCLUSION

Most of the farmers preferred selling their produce to local traders as it saved their time. But it was found to be the longest channel and farmers did not gain much by selling their produce in that channel. Instead they can sell their produce directly to the retailers,

where that was found to be the most efficient channel. Majority of the farmers were not members in any farmer association. Hence awareness should be created among the farmers and farmer associations for effective exchange of information on price, technology and other advancements. Farmers could be better educated through government aided consultancy services and these consultancy firms and farmers associationscould work together. The intra year price fluctuation presents a favorable climate for value addition processes in the study area and processors can expand the existing small-scale activities to meet out the demand.

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