

## Value Chain Management of Moringa (*Moringa oleifera*): A Case Study in Ratnapura District

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### Abstract

Moringa is potentially one of the planet's most valuable plants, at least in humanitarian terms but untouched for generations. The tree is raised for food rather than forestry and it yields at least four different edibles; pods, leaves, seeds, and roots. This research intended to understand the *Moringa oleifera* value chain from farm to fork while giving special attention to the governance and coordination of the value chain. Data collection was done using interviewer administered structured questionnaire with three categories of respondents, farmers, intermediaries and consumers. The sample was identified using a combination of multistage sampling and snowball sampling. Two distinct value chains were identified relating to pods and leaves respectively. Descriptive statistics shows that other than the male head of the household, traders are the key decision makers in production activities. The decision to grow Moringa has significant relationship with factor demand for Moringa pods in the market, tolerance to drought, low cost and high yield of Moringa. Sales decisions were influenced by the price, convenience of transport and transparency of the transactions. According to Mann-Whitney test (0.02) Moringa leaf value chain showed a significant level of coordination than the Moringa pod value chain. Consumer preferences lies with pods compared to leaves. RBQ test results (72.28%) confirmed that unavailability of leaves in the market made it less considered. Seasonality affects badly on the consumption patterns. Results revealed the year round demand for both pods and leaves and positive demand trend shows the future opportunities.

**Keywords:** Coordination, Decision making, Governance, *Moringa oleifera*, Value chain

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### Introduction

Moringa leaves and pods contain pack of nutrients and thus can be used to reduce malnutrition in the world (Mathur, 2005). In the developed world the potential market consists of the "health conscious, organic, and fair trade Moringa". Meanwhile, in the developing world, the potential market is primarily the millions of people who live on \$2/ day or less and that are in need of extremely affordable nutritional supplements (Kaput *et al.*, 2015). Moringa capsules, juice and Moringa tea and energy drink are manufactured from 100% pure Moringa leaves. These products are gaining popularity because of the fact that it is nutritious and 100% natural (Perera, 2011). The global market for Moringa products is considered substantial, with current estimates of over US\$4 billion a year (Jatrophaworld.org). By developing the Moringa value chain there is a potential to increase the revenue of farmers and also to find solutions to malnutrition in Sri Lanka. There is a need to generate information so that bottlenecks in the Moringa value chain can be identified and, recommendations and suggestions be made for future improvements.

Broad objective of this research was to understand the governance and coordination mechanisms of the "*Moringa oleifera*" value

chain in Sri Lanka. And specific objectives were to map the value chain of *Moringa oleifera* in Sri Lanka, to identify the key decision makers and factors effecting to decisions of the Moringa value chain, to find out to what extent gender is a factor in Moringa value chain and potential influence of governance in innovation.

### Materials and Methods

Deductive approach and survey strategy was used for the research study. Multistage sampling was used to select 50 farmers and 50 consumers as the sample and snowball sampling technique was used to identify 50 intermediaries of the Moringa value chain. Data collection was done from the *Moringa* farmers in Embilipitiya Divisional Secretariat and *Moringa* consumers in Balangoda Divisional Secretariat and snowball sampling technique was used to identify a sample of intermediaries which represented all of the value chain nodes between producers and consumers. Self-administered structured questionnaires were prepared for the primary data collection for both qualitative and quantitative variables. The questionnaires were tested in the pilot survey and necessary adjustments were made before commencement of the actual survey. A descriptive analysis was conducted to develop the profiles for the farmer and consumer demographic factors, find out key

decision makers and factors influencing decision making. Chi square and Spearman rank correlation test was used to find out relationships between variables. Multiple response data analysis was also done to identify key factors in sales decision making. To find out differences between development initiatives of Moringa leaf value chain and pod value chain Mann-Whitney U test was used. Ranking Based Quotient was used to analyze data generated using ranking scale. Data Analysis was done by Mini Tab 14, SPSS version 16 and Microsoft Excel Software 2010 package

### Results and Discussion

Regarding the involvement in Moringa value chain, 88% and 68% of the males were involved in planting and pruning, respectively where woman involvement was significantly low. Same pattern was seen in sales and financing functions where 86% and 82% of the males involved while women contribution was only 10%. Maintenance, harvesting, and value addition activities were headed by the females and their involvement was comparatively high (44%, 36% and 44% respectively). Further, accesses to resources, 34% of women engaged in maintaining contacts with financial institutions compared to involvement of men which was 24%.

Farmers and farm families made their own decisions on planting activities and sales, where buyer's influence on decision making was less. Majority (66%) of the framers agreed on the fact that Moringa cultivation was self-motivated activity. But some of the agronomic practices were influenced by the buyers, such as pruning and harvesting of *Moringa* plantations. 42% of the farmers were influenced to prune their plants because of the buyer requirement and instructions. High influence from the buyer was shown on decisions of harvesting. Harvesting process affected mostly by the buyers and their requirements (60%). Further, 64% of the value addition activities such as sorting out crushed leaves and damaged pods, sorting out discolored leaves, bundling of pods in to weight classes and aerating leaves were influenced according to the requirements of the buyer.

Factors effected for the decision to grow Moringa as an income generating crop was assessed through a series of Likert scale questions. Nine statements with possible factors were given and the agreement with the factors were scaled from "strongly disagree (1)" to "strongly agree (5)"

Results (Table 1) revealed that pod demand, tolerance to drought, low cost for fertilizer and high yield of Moringa showed relationship with expected income from Moringa when they decided to start the cultivation. Demand for leaves, export opportunities, and extension services were not correlated with expected income from Moringa. 64% of the respondents were maintaining a regular buyer to sell their products and 36% of farmers do not maintain a regular buyer. None of the farmers had formal relationship with buyers and 38% of the farmers were freely made marketing decisions. But majority, 62% maintain informal, ties with a particular seller and both parties receive the benefits from the relationship.

Table 1: Spearman rank correlation test

Spearman's rho Against	Expectations of income from Moringa		
	N	Correlation Coefficient	Sig. (2-tailed)
1. Moringa pod demand	50	0.338*	0.016
2. Moringa Leaf demand	50	-0.164	0.254
3. Export opportunities of Moringa	50	-0.156	0.278
4. Tolerance to drought	50	0.349*	0.013
5. Low cost of fertilizer	50	0.417**	0.003
6. Encouragement from extension	50	-0.022	0.881
7. High yield	50	0.424**	0.022

\* Significant at .05 level \*\*Significant at 0.001 level

Multiple response frequencies were used to identify the considerations in buyer selection process. Results revealed that 90% of the farmers have selected "Price" as their primary concerns when selecting a buyer. Convenience ranked the second, which linked with the availability of transport facilities. Trust worthiness and honesty ranked at third. Likert scale questions were used to generate answers from the farmers to find out the lead value chain members influence over the development of the value chains. Moringa pod value chain and Moringa leaf value chain were tested to find out the differences between the value chains special concern on development. Results of the Mann-Whitney U test showed that there was a significant difference between means of pod sellers and leaf seller considering following factors. With regard to the information they receive on demand of the products, new buyers, improving crop production and controlling the

quality of the product there were significant differences between two groups. Mean ranks of the test, the scores of leaf sellers were higher than the pod sellers. This shows that leaf sellers receive more support from the lead VC members on development of the VC on above discussed aspects.

Results of the consumer survey revealed that frequency of *Moringa* leaf consumption was less compared to pod consumption. Wilcoxon signed rank test showed that there was a significant reduction of *Moringa* pod consumption. Next consideration was awareness of households on benefits of *Moringa*, 58% and 54% respectively agreed that they were aware about the fact that *Moringa* leaves were good for children and is a remedy for malnutrition. But 80% disagreed with the fact that they recently started/increased consumption of *Moringa* leaves. According to Ranking Based Quotient values about the reasons that induce *Moringa* consumption, Preference of the family members, perception that *Moringa* is organically produced and awareness that *Moringa* is highly nutritious ranked in 1st, 2nd and 3rd places respectively. RBQ results revealed that seasonality of the pods, unavailability of leaves and fact that cooking difficulties were ranked in 1st, 2<sup>nd</sup> and 3rd constraints, respectively.

### Conclusions

The Survey results indicate that *Moringa* pod value chains in Sri Lanka are dominated by informal linkages which pose challenges and offer opportunities for innovation in terms of governance at nodes ranging from production through to marketing and end users. The survey found in particular that *Moringa* pods were not produced through well-defined value chains in which value chain members collaborated with others through formal relationships. In contrast to that *Moringa* leaf value chain was linked with more persistent relationships than *Moringa* pod value chain. The existence of these established though still often informal relationships meant that the influence of different VC members, and in particular buyers, on the development of the VC is significantly higher in the case of *Moringa* leaves than in the case of *Moringa* pod value chains.

Farmer's decision to start *Moringa* cultivation was not significantly related to *Moringa* leaf demand or export opportunities of *Moringa*. Indeed .Other than the farmer, buyer has a stronger influence over production decisions. *Moringa* pod value chains were yet to be developed in to established chains where chain members were collaborated with formal relationships.

In consumer component, females were much prominent decision makers on household consumption decisions than males in many occasions and food habits and culture made it more complex consumer behavior. Awareness of households on nutritional factors of *Moringa* was considerable but still need to be improved. Frequency of leaf consumption is significantly low compared to pod. Consumer preference, organic production of *Moringa* and nutritious values were the main factors that induce *Moringa* consumption. Seasonality of pods, difficulty of preparation and non-availability of leaves were the main reasons that negatively affected the consumption.

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