# Analysis of marketing efficiency of water chestnut (*Trapa natans* L.) in 24 – Parganas (North) of West Bengal

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## ABSTRACT

Water chestnut (Trapa natans) is one of the most important and popular minor aquatic fruit crops grown in India. It is mainly grown in the tropical and sub-tropical regions as submersed plant community. It is also grown in the soft nutrient freshwater wetlands, lakes, ponds and streams. In India, it is most commonly used as edible nuts. The kernel of water chestnut contains a large amount of protein (up to 20%), starch (52%), tannins (9.4%), fat (up to 1%), sugar (3%), minerals, etc. It is most popular and aquatic fruit crop and can easily be grown in neglected and marshy areas, where the other fruit plants cannot be grown successfully. But because of faulty marketing system, the production and technological improvement has not gain momentum. Its marketing system is not organized. Nadia and 24-Parganas (North) are two districts where water chestnut is cultivated in a large scale and the study is restricted to 24-Parganas (North) district of West Bengal and data relates to the agricultural year 2011-12. The study is mainly focused on to identify the marketing channels involved in the marketing of water chestnut and to analyse the price spread of water chestnut and marketing efficiency. Farmer – Secondary Wholesaler – Retailer – Consumer is found to be more dominant as 38% of the produce of the sample area are enrooted through this channel. In Barrackpur-1 block, channel-I is found to be most efficient channel (marketing efficiency-1.92) and in Rajarhat-1 block, channel-III is most efficient channel (marketing efficiency-2.01). Efficiency of marketing channels varies from block to block. Profits reaped by the traders determine the efficiency of the marketing channel.

*Keywords* **:** Marketing channel, marketing efficiency, marshy land

Agriculture is the backbone of the country's economy. It contributes nearly 24 percent of the gross domestic product, while about 65-70 per cent of the population depends on agriculture for their livelihood. The commercial production of underutilized and indigenous fruits is of utmost importance in this context. A large number of less known fruit species, which have immense potential for commercial exploitation, are yet to be utilized to their full potential. Indigenous fruits like water chestnut, jamun, wood-apple etc are highly valued for their nutritive value and also for their ability to grow successfully even under adverse agro-climatic conditions. Water chestnut is very rich in carbohydrate, protein and calcium. It is one of the most popular aquatic fruit crop and can easily be grown in neglected and marshy areas where other fruit plants cannot be grown successfully. Water chestnut is a non-conventional product and its marketing system may be different from the marketing of conventional commodities. Method of sell and market intermediaries involved may be different from marketing of other commodities. Marketing of agricultural commodity is as crucial as production itself. Until and unless the good is reached the ultimate consumer, it has no value. In order to remain in production, marketable surplus must arrive to the market and reach to consumer at consumable form.

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The produce has to undergo a number of steps to complete the chain. A number of agencies and services come in between to complete the process. The agricultural commodity is enrooted through a number of channels to reach the ultimate consumers. Ramdhani and Ramdhani (2002) have opined that there is no sophisticated product differentiation in marketing of indigenous fruits *e.g.* water chestnut. There is a lack of an adequate price information mechanism as prices are based on information from neighbours, knowledge of previous season and total cost incurred by traders. Therefore, the present study is undertaken with the objectives, to identify the marketing channels involved in the marketing of water chestnut and to analyze the price spread and marketing efficiency of water chestnut.

## MATERIALS AND METHODS:

The water chestnut is not cultivated throughout the state of West Bengal may be because of non-availability of ponds and skilled labour. Nadia and 24 – parganas (North) are two districts where the fruit is cultivated in a large scale. This study is restricted to North 24-Parganas district of West Bengal and data relates to the agricultural year 2011-12. Out of the 22 blocks namely Barrackpur-I and Rajarhat-I are selected purposively. Following the method of Probability Proportional to Area under water chestnut, 3 villages from each block

are selected. For each village water chestnut growers are identified and stratified into 3 groups, namely up to 0.50 ha, 0.51 to 1.00 ha and more than 1.01ha. A total of 100 growers have been selected, from the 6 sample villages. While selection of blocks and villages, priority is given on pond area under water chestnut, number of water chestnut growers and constraint to cultivation and marketing. As the study is restricted to 24-Parganas (North) district in West Bengal and blocks are selected purposively, some of the potential pond areas, markets may have remain untouched.

The marketing channels used by the water chestnut cultivators are identified and prepared from the schedule of sample cultivators. At least ten sample intermediaries from each stage of marketing and each of the existing marketing channels are selected randomly from each block. These sample intermediaries form the basis of the sampling of the study of marketing. While selecting the primary wholesale markets emphasis is given to those markets where sample growers sell their produce. Hence, Baraipara wholesale market from Barrackpur-I block and Raigachi wholesale market belonging to Rajarhat-I block are selected purposively. Barrabazar and Kole market in Kolkata are purposively selected as the secondary wholesale markets because a lion's share of fresh water chestnut produced in the sample area is marketed directly through these markets. The produced in North 24-Parganas are sold through Barrackpore retail market and two at Sealdah retail markets and hence selected for the study. It is found that 24 primary wholesalers, 28 secondary wholesalers and 8,8 and 24 retailers are operating in the Barrackpur and two at Sealdah markets respectively. 75 percent of these intermediaries, *i.e.* 18 primary wholesalers and 8, 8 and 24 retailers from 3 retail market are selected at randomly for the study.

To analyse the price spread simple tabular method is followed and examine the marketing efficiency, Shepherd's method is followed.

ME = (V/I -1) X100

where, ME = Marketing efficiency,

V= Value of goods sold (consumer's price) and

I= Total marketing cost

**RESULTS AND DISCUSSION:**

**Marketing channels**

The routes through which agricultural commodities are enrooted from the point of production to the ultimate consumers is known as marketing channel, a number and type of intermediaries help to move the product. In the marketing of water chestnut following channels are identified to exits

Channel-I: Farmer-Secondary Wholesaler- Retailer- Consumer

Channel-II: Farmer- Hawker- Consumer

Channel-III: Farmer –Primary Wholesaler- Secondary Wholesaler- Retailer- Consumer

Channel-IV: Farmer- Retailer- Consumer

Among the intermediaries, hawkers and retailers perform more or less same function. The only difference is that hawkers have no definite location but retailers have retail shops. Out of the above four channels, channel-I is found to be more dominant as about 38 percent of the produce of the sample area enrooted through this channel. About 28 percent and 25 percent of the produce is enrooted through channel-II and channel-III respectively. Hence these three channels are studied in the present work.

**Price-spread in the marketing of water chestnut.**

Block wise and channel wise cost incurred at different stages of marketing of water chestnut is exhibited in table 1. Transportation cost is the main cost item at the farmer's level in channel-I whereas in channel-II and Channel-III cleaning of harvested nut is the major cost item. Similarly at primary wholesaler's level the expenditure on transport is also the highest cost item in channel-III irrespective of blocks, followed by transport, loading–unloading and storage in Barrackpur-1 and loading-unloading, transport and storage in Rajarhat-I block. At secondary wholesaler's level the expenses on loading–unloading in channel-I&III irrespective of blocks holds topmost position followed by packaging in channel-1 of both the blocks. Transportation cost is noted to be the major cost item at the level of hawkers. Hawker is found as intermediary in channel-II only. On the other hand no retailer is found to function in channel-II. Transportation is observed to be the most expensive items. At the final stage of marketing where retailers are in operation, least variation in marketing cost irrespective of blocks, channel-III is noted to be the most expensive channel and channel-II is the least expensive channel. It is noted that number of intermediaries play a crucial role in determining the marketing cost of a channel. Increase in the number of intermediaries has increased the marketing cost of water chestnut.

After analyzing the channel wise and block wise price spread, *i.e.*, cost involved at each stage of marketing, a total item wise spread of marketing cost

and profit earned by the intermediaries or traders is presented in table-2. It is observed that total marketing cost and margins are higher irrespective of channels, in case of Rajarhat-I block in comparison Barrackpur-I block. It is also observed that in spite of higher profit reaped by traders *i.e.* hawker, the total expenditure is less in case of channel-II. It is also observed that the higher marketing cost is associated with the higher transportation cost. Miscellaneous cost (bucket, net, rope, *etc.*) is noted to be the next expensive item of expenditure. But in case of channel-II, loading-unloading cost which employs human labour is noted to be the most expensive cost items. This is mainly because of the fact that the produced has to be handled for a number of times as the channel covers more number of markets. This table shows that hawkers reap more than 85 percent of total marketing cost and margin. However, labour given by the hawkers has not been taken into account. Hence profit reaped by the hawkers may not be exorbitant. It is observed that traders handling the produce of Rajarhat-I have reaped higher profit in comparison to Barrackpur-I block. This has resulted higher cost of marketing and marketing margin. This may be due to the quality and size of the water chestnut.

Table 3 presents the channel wise and block wise efficiency of marketing of water chestnut. It is observed from the table that among the three channels studied, irrespective of blocks, channel-II is the least efficient channel. It is interestingly noted that this channel offers higher price to the producers and consumers also pays

**Table 1: Marketing cost of water chestnut in different channels. (Rs. kg$^{-1}$)**

| Items | | Barrackpur-I block | | | Rajarhat-I block | | |
|---|---|---|---|---|---|---|---|
| | | Channel-I | Channel-II | Channel-III | Channel-I | Channel-II | Channel-III |
| a. | Cost incurred by farmer | | | | | | |
| i. | cleaning | 0.32 | 0.34 | 0.34 | 0.30 | 0.32 | 0.34 |
| ii. | transport | 1.84 | 0.00 | 0.28 | 1.01 | 0.00 | 0.24 |
| iii. | miscellaneous | 0.85 | 0.15 | 0.12 | 0.85 | 0.20 | 0.17 |
| | **Sub-total** | **3.01** | **0.49** | **0.74** | **2.16** | **0.52** | **0.75** |
| b. | cost incurred by primary wholesaler | | | | | | |
| i. | transport | - | - | 1.07 | - | - | 0.92 |
| ii. | packaging | - | - | 1.20 | - | - | 1.25 |
| iii. | loading-unloading | - | - | 1.06 | - | - | 1.02 |
| iv. | storage | - | - | 0.74 | - | - | 0.72 |
| v. | miscellaneous | - | - | 0.33 | - | - | 0.38 |
| | **Sub-total** | **-** | **-** | **4.40** | **-** | **-** | **4.29** |
| c. | cost incurred by secondary wholesaler | | | | | | |
| i. | transport | 0.10 | - | 0.45 | 0.80 | - | 0.40 |
| ii. | packaging | 1.01 | - | 0.00 | 1.00 | - | 0.00 |
| iii. | loading-unloading | 1.04 | - | 0.85 | 1.00 | - | 0.95 |
| iv. | storage | 0.20 | - | 0.22 | 0.18 | - | 0.20 |
| v. | market fee | 0.10 | - | 0.10 | 0.10 | - | 0.10 |
| vi. | miscellaneous | 0.22 | - | 0.25 | 0.24 | - | 0.25 |
| | **Sub-total** | **2.67** | **-** | **1.87** | **3.32** | **-** | **1.90** |
| d. | cost incurred by hawkers | | | | | | |
| i. | transport | - | 0.42 | - | - | 0.42 | - |
| ii. | packaging | - | 0.20 | - | - | 0.22 | - |
| iii. | miscellaneous | - | 0.16 | - | - | 0.16 | - |
| | **Sub total** | **-** | **0.78** | **-** | **-** | **0.80** | **-** |
| e. | cost incurred by retailer | | | | | | |
| i. | transport | 0.25 | - | 0.28 | 0.30 | - | 0.35 |
| ii. | packaging | 0.18 | - | 0.18 | 0.17 | - | 0.17 |
| iii. | loading-unloading | 0.44 | - | 0.46 | 0.45 | - | 0.46 |
| iv. | storage | 0.14 | - | 0.15 | 0.10 | - | 0.12 |
| v. | market fee | 0.05 | - | 0.05 | 0.05 | - | 0.05 |
| vi. | miscellaneous | 0.10 | - | 0.10 | 0.12 | - | 0.12 |
| | **Subtotal** | **1.16** | **-** | **1.22** | **1.19** | **-** | **1.27** |
| | **Grand total** | **6.84** | **1.27** | **8.23** | **6.67** | **1.40** | **8.21** |

**Table 2: Channel-wise functional analysis of marketing cost and marketing margins of water chestnut (Rs. kg⁻¹)**

| Items | Barrackpur-I block | | | Rajarhat-I block | | |
|---|---|---|---|---|---|---|
| | Channel-I | Channel-II | Channel-III | Channel-I | Channel-II | Channel-III |
| 1. Cleaning | 0.32 (2.71) | 0.34 (3.79) | 0.34 (2.98) | 0.30 (1.95) | 0.32 (2.61) | 0.34 (2.18) |
| 2. Transport | 2.19 (18.54) | 0.42 (4.68) | 2.08 (18.25) | 2.11 (13.74) | 0.45 (3.67) | 1.91 (12.29) |
| 3. Packaging | 1.19 (10.08) | 0.20 (2.23) | 1.38 (12.11) | 1.17 (7.62) | 0.25 (2.04) | 1.42 (9.12) |
| 4. Loading-unloading | 1.48 (12.53) | 0.00 (0.00) | 2.37 (20.79) | 1.45 (9.44) | 0.00 (0.00) | 2.43 (15.61) |
| 5. Market fee | 0.15 (1.27) | 0.00 (0.00) | 0.89 (7.81) | 0.15 (1.98) | 0.00 (0.00) | 0.87 (5.59) |
| 6. Storage | 0.34 (2.88) | 0.00 (0.00) | 0.37 (3.25) | 0.28 (1.82) | 0.00 (0.00) | 0.32 (2.06) |
| 7. Miscellaneous | 1.17 (9.91) | 0.31 (3.46) | 0.80 (7.02) | 1.21 (7.88) | 0.38 (10.85) | 0.92 (5.90) |
| 8. Trader's profit | 4.97 (42.98) | 7.70 (85.84) | 3.17 (27.81) | 8.69 (56.58) | 10.85 (88.57) | 7.36 (47.27) |
| **Total** | **11.81 (100.00)** | **8.97 (100.00)** | **11.40 (100.00)** | **15.36 (100.00)** | **12.25 (100.00)** | **15.57 (100.00)** |

*Figures in parentheses indicate percentage to total*

**Table 3: Channel-wise marketing efficiency of water chestnut (Rs. Per kg)**

| Items | Barrackpur-I block | | | Rajarhat-I block | | |
|---|---|---|---|---|---|---|
| | Channel I | Channel II | Channel III | Channel I | Channel II | Channel III |
| 1. Net price received by farmers | 6.14 | 7.53 | 6.56 | 7.96 | 8.50 | 7.75 |
| 2. Marketing cost | 6.84 | 1.27 | 8.23 | 6.67 | 1.40 | 8.21 |
| 3. Marketing margin | 4.97 | 7.70 | 3.17 | 8.69 | 10.85 | 7.36 |
| 4. Price paid by consumer | 17.95 | 16.50 | 17.95 | 23.32 | 20.75 | 23.32 |
| 5. Marketing efficiency | 1.92 | 1.19 | 1.74 | 1.93 | 1.44 | 2.01 |

lesser price to the hawkers but still it is observed to be least efficient channel. This is only because of the fact that the hawkers have reaped higher profit than that of other traders.

In Barracpore-I block, channel-I is found to be the most efficient channel and Rajarhat-I block channel-III is found to be the most efficient channel. From the table it may concluded that the efficiency of a marketing channel not only depend on the marketing cost but also depends on profit reaped by the intermediaries. Price paid by the consumer and net price received by the producer has no effect on marketing efficiency.

Water chestnut is a aquatic non-conventional crop. Its marketing system is not organized. Primary wholesaler, secondary wholesaler, hawkers and retailers are the intermediaries operating between the producer and consumer. Transportation cost and miscellaneous cost are most expensive items of marketing cost. Shortest channel operating in the system is observed to be the least efficient channel. All the three channels

studied are found to be efficient as the efficiency indices are found to be more than unity. Profit reaped by the traders determines the efficiency of the marketing channel.

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