An Analysis of Existing Condition & Potentiality of Mango Based Industries in Rajshahi Division

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Abstract

Mango is the main seasonal fruit in Bangladesh. Rajshahi Division is one of the most mango producing areas in Bangladesh where Chapai Nawabganj and Rajshahi districts are the most mangoes producing districts. This research is conducted to find the present mango production volume in this division and to find out a potential location for mango based industries. In this research, Location Quotient (LQ) value is calculated for each district of Rajshahi Division to find out the major mango production areas and a comparison is shown between Chapai Nawabganj District and Rajshahi District on the basis of the availability of Raw material (Mango) for the industry. Finally, the factor rating method is used to calculate the potential location of mango based industries on the basis of different major factors. The final result of this research concludes that Chapai Nawabganj is the most potential area for developing Mango Based Industries.

Keywords: *Mango production, Mango-based Industries, Potentiality*

1. Introduction

Mango is one of the most common, important and popular fruits in Bangladesh. It is considered as the king of fruits. Besides, having delicious taste, captivating flavor with multifarious colors, it is an excellent source of nutritive values. Bangladesh is one of the major mangos producing countries along with India, Pakistan, Mexico, Brazil the Philippines etc. The main mango growing regions are around Chapai Nawabgonj, Rajshahi, Dinajpur, Rangpur, and Kustia. But, in color, taste and flavor mangoes of Chapai Nawabgonj & Rajshahi are very excellent. It is now an increasing trend in the area and in production compared to previous years. According to the estimate of agriculture extension department, about 945,000 tons of mangoes were produced in the country (BBS, 2011). In 2012, the area of mango garden in Bangladesh was 37,000 hectares. In the year 2015, mango was cultivated in 42,000 hectares of land (Daily Sun, 2015). Mango is the leading seasonal cash crop of the northwestern region of Bangladesh and dominates the economy in Chapai Nawabganj and Rajshahi districts. This study is important to understand the existing production rate of mangoes in Rajshahi. This study will help to find out the market area of mangoes of Rajshahi. If a potential location of Mango industries can be found, then it will lead to great economic development of Rajshahi division.

2. Literature Review

Location Quotient: A Location Quotient (LQ) is an analytical statistic that measures a region's industrial specialization relative to a larger geographic unit (usually the nation). The location quotient is a ratio that compares a region to a larger reference region according to some characteristic or asset. Location Quotient (LQ) = (Percentage of Regional Total / Percentage of National Total).

For example, an LQ of 1 in education means that the region and the nation are equally specialized in education; while an LQ of greater than 1 means that the region has a higher concentration in education than the nation; while an LQ less than 1 means that the region has a lower concentration in education than the nation (Glasson, 1974).

Factor rating method: Factor rating method is useful for service and industrial location. This method merges quantitative and qualitative factors and factors are assigned weights based on relative importance and weight age

score for each site using a preference matrix. The site with the highest weighted score is selected as the best choice (Stock, 2014). Steps of factor rating method:

- List relevant factors.
- Assign importance weight to each factor.
- Develop a scale for each factor (0-1, etc.)
- Score each location using factor scale.
- Multiply scores by weights for each factor & total.
- Select location with the maximum total score.

3. Materials and Method

This study attempts to the analysis of potentiality mango based industries in Rajshahi Division by using a primary and secondary data source survey. After selecting study topic extensive literature was reviewed to find out the best way for data collection and then analyze the collected data to get the optimum result. The main mango growing region in Rajshahi division is Rajshahi and Chapai Nawabganj district. Rajshahi division is the main study area but the main focus is on these two districts as these two areas produce most amounts of mangoes in Bangladesh.

Figure 1. Map of Rajshahi Division (Google Image, 2017)

The study has been carried out with the aim to achieve the following objectives:

- To identify the existing production & market area of mangoes of Rajshahi Division.
- To find a potential location of mango industries in Rajshahi Division.

Two types of data from both primary and secondary sources were collected for this research. Primary data were collected through questionnaire survey & secondary data were collected from Regional Fruit Research Centre in Chapai Nawabganj, Producers, Sellers (Secondary & Tertiary), Food processing industries in Chapai Nawabganj, Mango processing industry (Pran Group), Natore. This study attempts to analyze the potentiality mango based industries in Rajshahi using primary data sources. The data collection process was based on a questionnaire survey. Primary data were collected through a questionnaire survey. Primary data collection procedure was time-consuming because it was off-season to mango production. All the data were collected through snowball sampling process with the key informants. Four key informant samples were collected from Chapai Nawabganj and another four key informants were from Rajshahi Baneshor. All the key informants were associated with 25-30 years to mango business which have justified the limited snowball sampling process. In this analysis, a Location Quotient was applied to show the variation in the concentration of mango production within Rajshahi division.

On the other hand, Factor rating method is the tone of the most widely used analytical techniques for its wide variety of factors that can be included in an analysis which is useful for service and industrial location (Stock, 2014). In this research, a preference matrix was calculated to determine the highest weighted scores. Availability of raw materials, Availability of Labor, Proximity to Markets, Transport Facilities were the major factors taken for identifying the potentiality of Mango-based industries location. Furthermore, these weights were assigned to each factor for their importance on industry location. Based on these criteria, the Alternative sites were scored between 0 and 100 points. Finally, by multiplying each score by its corresponding factor weight total weight for each site scores were calculated.

4. Results and Discussions

4.1 Existing production & market area of mangoes

The present mango production time is April to July. Every year approximate 200 mon mangoes are produced per bigha. Every mango tree produces 40 mon mango. Chapai Nawabganj is the primary market for the producer to sell their product and Rajshahi City is the secondary market area. Moreover, Dhaka, Chittagong, Comilla, Khulna, Sylhet are the tertiary market areas. Local labor is available in Chapai Nawganj where every labor cost 400 taka per day. Notwithstanding, labor cost is increasing every year. Mangoes are transported one place to another by truck where trucks carry 600-700 crate and mini trucks carry 150 crates (1 crate= 24 kg mango) mango. In 2017, the transportation cost of the truck was 22000-230000 taka to carry mangoes from Chapai Nawabganj to Dhaka. Farmers took a loan from mohajon and every mohajon gets 60% of the profit. They are not getting any government aid for mango production.

Figure 2. Mango Trade of Rajshahi & Chapai

As Chapai Nawabganj and Rajshahi are the most mango production area in Rajshahi Division, the mango produced trend from the 2009-2015 year is shown in figure 3. The trend shows that in Chapai Nawabganj mango production is higher than Rajshahi district in every year. So for the mango based industry, the raw material is more available in Chapai Nawabganj than Rajshahi.
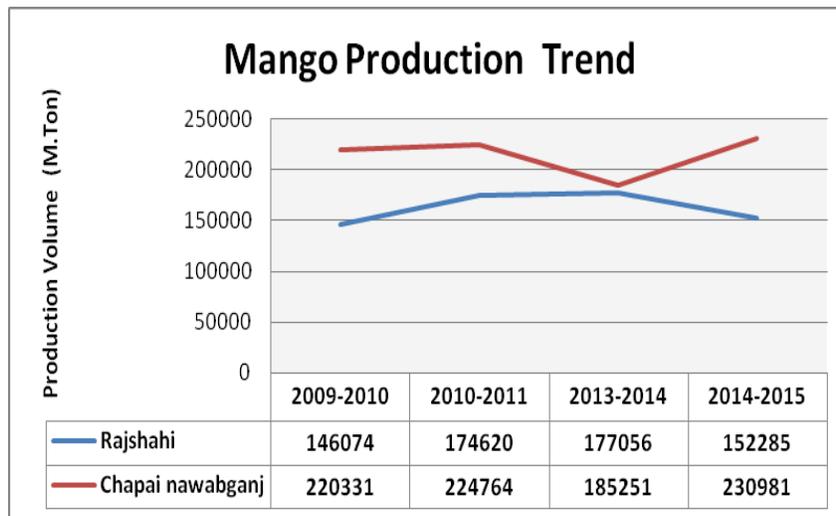

Mango Production Trend

Production Volume (M.Ton)

	2009-2010	2010-2011	2013-2014	2014-2015
Rajshahi	146074	174620	177056	152285
Chapai nawabganj	220331	224764	185251	230981

Figure 3. Mango Production Trend from the year 2009-2015

4.2 Potential Industrial Location Analysis

In this research, Location Quotient (LQ) has been applied to illustrate the variation in the concentration of mango production within Rajshahi division. Here, the analysis shows that mango production of Chapai Nawabganj is higher than other districts in Rajshahi Division. Most mango production districts are Chapai Nawabganj and Rajshahi.
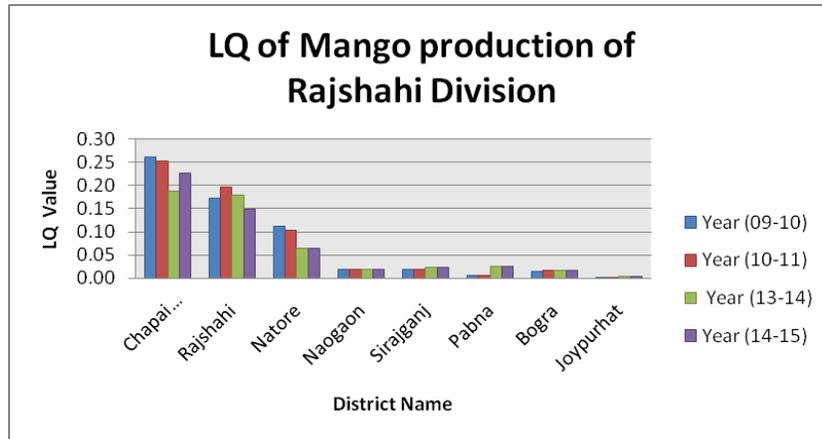
Figure 4. LQ of Mango production of Rajshahi Division

To determine the most probable industrial location of mango industry by the factor rating method, 8 samples were taken where four samples were taken from Rajshahi and others were taken from Chapai Nawabganj. At first, in this factor rating method, four major factors were considered to identify the probable location of mango based industry among Rajshahi and Chapai Nawabganj. The four considered factors are:

- Labor availability
- Transportation
- Raw materials
- Proximity to Markets

A weight was assigned on the basis of the importance of the factors. The weight was assigned with the suggestion of Dr. Md. Shafiqul Islam, Senior Scientific Officer, Bangladesh Agricultural Research Institute, Fruit Research Station, Rajshahi. The most important factor in selecting the site is labor availability, then raw material availability, then transport facilities and the proximity to the market. A matrix is formed on the basis of the expert opinion. Here, the matrix is given below:

$$
\begin{array}{c|cccc}
 & f1 & f2 & f3 & f4 \\
\hline
f1 & 1 & 2 & 3 & 4 \\
f2 & .5 & 1 & 1.5 & 2 \\
f3 & .33 & .67 & 1 & 1.33 \\
f4 & .25 & .5 & .75 & 1
\end{array}
\qquad (1)
$$

$$
\begin{array}{c|cccc}
 & f1 & f2 & f3 & f4 \\
\hline
f1 & 4 & 8 & 12 & 16 \\
f2 & 2 & 4 & 6 & 8 \\
f3 & 1.33 & 2.67 & 4 & 5.33 \\
f4 & 1 & 2 & 3 & 4
\end{array}
\qquad (2)
$$

Here,

$f1$ = Labor availability
$f2$ = Raw material availability
$f3$ = Transport facilities
$f4$ = Proximity to market

$r_1 + r_2 + r_3 \Rightarrow$

$$\begin{pmatrix} 40 \\ 20 \\ 13.33 \\ 10 \end{pmatrix}$$

(3)

Here, $\sum = 83.33$

By dividing each element of Equation (3) by 83.33 weights of each factor were found:

$$\begin{pmatrix} 0.48 \\ 0.24 \\ 0.16 \\ 0.12 \end{pmatrix}$$

Where, $\sum = 1$

By calculating preference matrix the weight of the four factors (labor availability, raw material availability, transport facilities and proximity to market) are 0.48, 0.24, 0.16, and 0.12 respectively. The summation of the weights is equal to 1. The calculation of factor rating for Rajshahi and Chapai Nawabganj is given below:

Table 1. Value of factor rating method for Rajshahi & Chapai Nawabganj Location

Factors	Weight	Score out of 100		Weighted score	
		Rajshahi	Chapai Nawabganj	Rajshahi	Chapai Nawabganj
Labor availability	0.48	50	100	24	48
Raw material	0.24	100	100	24	24
Transport	0.16	75	60	12	9.6
Proximity to Market	0.12	80	75	9.6	9
Sum =	1			69.6	90.6

The score (out of 100) of the factors were given by the key respondents while interviewing from both Rajshahi and Chapai Nawabganj. The geometric means of the given score is used in this analysis. From the analysis, the final weighted value of Rajshahi is 69.9 and Chapai Nawabganj is 90.6. The weighted value of Chapai Nawabganj is greater than Rajshahi. So, by considering the weighted value of the four factors it is found that the probable location of the industry should be in the Chapai Nawabganj district.

5. Conclusion

Chapai Nawabgonj is the most potential location for mango based industries in Bangladesh. On the other hand, mango transporter has to spend a lot of money on parking, storing facilities on road. If the mango-based industries grow in Chapai Nawabganj then the losses of money while transporting can be avoided and the farmers will be benefited. Though Chapai Nawabganj is the major Mango producing area and labor facilities are available at a cheaper rate, in Chapai Nawabganj BISIC area there exist only 2-3 mango processing mini industries where these industries are not enough to cope with the volume of the production of mangoes. Most of the area of BISIC of Chapai Nawabganj is still now vacant and land price is still low. Hence, power facilities, drainage facilities, waste disposal facilities are available, Govt. should take necessary steps to develop mango based industries in Chapai Nawabganj district. These necessary steps will provide employment opportunities to the local people as well as the Contribution of Rajshahi Division in National GDP.

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