

Investigating the Orientation of Sugar Industries and Practice of Industrial Relocation for Sugar Industries in Kolhapur District

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Abstract- The location analysis helps us to describe the economic activities on space and the selection of a future location for an activity. The present investigation is very necessary to comprehend the benefits of existing industrial location of sugar industries in terms of Weber's Material Index and to compute and suggest some measures for the relocation of industries, which can give optimum returns. There is a need to apply relocation strategies for the sugar co-operatives in Kolhapur district. Because in last five years more than two factories were closed down due to the illness (low and non-profitable production) and later on converted into the private factory. At current situation, few factories are facing the problem of low recovery in the assessment year. Particularly, the Harali factory has 11.81 % recovery rate, consequently, their final instalment in last year is below Rs. 2600/-. Thus, farmers in these areas were facing the problems. It is not only the great recovery rate influences the sugar-cane purchase rate. But, if these factories are concentrated more on the production of by-products of sugar-cane such as Molasses, Bagasse, Phospo and Organic Fertilizers Production and Sales, Distillery, etc. then they are able to achieve benefits and offer good sugar-cane purchase rate.

Index Terms— Sugar-cane production, Sugar production, Orientation of industries, Material index, Optimal location, Relocation practices

1 INTRODUCTION

IN India, there are three main sweetening agents: plantation white sugar, khandsari and gur. They differ according to the degree of refining. Plantation white sugar is generally called 'sugar'. Sugar is produced in vacuum-pans using the double sulphitation method in large-scale processing mills with an average daily cane crushing capacity of 2,850 metric tons. In the process, molasses is obtained as a by-product. On average, as a percent of cane weight sugar factories in India recover 10.3 percent sugar, and 4.5 percent molasses [1]. Cane-sugar processing refers to the transformation of sugar-cane into raw sugar at mills or factories. The cane is first crushed to retrieve its juice. Then, the juice is cleaned to remove some impurities such as fibers or soil. Its water content is lowered through evaporation to produce ever thicker syrup until sugar crystallization begins. When the desired level of crystallization is achieved, centrifugal spin off the syrup and the crystals that remain are dried. The resulting product is a raw sugar between 96 and 99 percent sucrose with small quantities of glucose, fructose, ash, moisture and other organics. The percent of sucrose, the primary determinant of grade, is more commonly expressed by pol", where pol is short for polarization.

A 96° pol raw sugar, the standard grade, is 96 percent sucrose and 4 percent other substances. Raw sugar is generally stored or transported to refineries. The refineries take out most of the non-sucrose materials still in the sugar to make a pure white product [2].

Location analysis in economic geography involves not only an explanation of activities already present on the landscape but may also involve the selection of a future location for an activity [3]. The primary objective of location theory is to explain the influence of space on economic activity. Specifically, this approach is concerned with the impact of distance and direction on a profit-making firm's decisions. Traditional "Weberian theory assumes that the firm is attempting to maximize profits and is concentrating on minimizing costs [4].

The present investigation restricted to Kolhapur district, which is among the important districts on the fertile Deccan plateau. It is located in the South-Western part of Maharashtra State and is having a total of about 7,685 Sq km of geographical area. It lies between 15°43' 50" North to 17° 10' 55" North latitude and 73°40' 52" East to 74° 42' 57" East longitude. Generally, the western part of Maharashtra state is economically very developed due to fertile soil and its proper utilization. Kolhapur district is well drained by tributaries of the Krishna and Panchaganaga rivers. So, this western belt of the Maharashtra has very favorable climatic and soil conditions for the cultivation of sugar-cane. At current situation, there are considerable crises in sugar co-operative movements. Besides that diseases on sugar-cane, newly emerged locational problems are reducing the sugar production in

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the study area. In order to solve all above mentioned problems, the present investigation is helpful. Hence, present investigation is associated with the application of Weber's Material Index to find out the orientation of industries. According to the Weber's material index, if the raw material is gross (weight losing) then the factory will be located near to the source of raw material. For the surveyed sugar factories Material Index is calculated in order to find out that- whether the locations of selected industries are optimal or not. First of all total sugar production for surveyed samples was obtained by using recovery rate of the factories. The recovery rate is given by the sugar factories for 100 kilograms or 10 quintals. E.g. if the recovery rate is 13.11% then production of sugar from per ton sugar-cane is 0.1311 tons.

After the optimal location analysis, proper relocation options were suggested for sugar-cane factories in the study area. Thus, the present investigation is very necessary to comprehend the benefits of existing industrial location of sugar industries in terms of Weber's Material Index and to compute and suggest some measures for the relocation of industries, which can give optimum returns.

3 DATABASE AND METHODOLOGY

The present investigation is based on primary and secondary sources of data. The primary data was collected through structured questionnaire and interviews with workers in industry, officers who deal with industry, owners / managers of industry. The secondary data was collected from technical, harvesting, production departments of sugar industries, some reports published by Maharashtra State Co-operative Sugar Factories Federation Ltd., Annual Reports of Sugar Industries, District Census Handbook, News Papers, The Internet, Statistical Abstracts, Tehsil Offices, etc.

The purposive sampling method was employed for the present investigation. Based on the official records, at the first stage out of 17 major sugar co-operatives 7 sugar industries in Kolhapur district were selected for present investigation. The information related to study was also collected by conducting interviews with related persons, site visit and observations / surveys, etc. At the second stage, total cane growing area and sugar-cane growers were identified and from the influence area of selected seven sugar industries about 15 villages, 259 families and 1082 sugar-cane growers were surveyed. In order to comprehend the benefits of existing industrial location and look into the orientation of sugar industries Weber's material index was employed.

3.1 WEBER'S MATERIAL INDEX

For the determination of the orientation of sugar industries in study area Weber's material Index is employed. Least Cost Industrial Location theory dates back to 1909 with the publication of a book on the topic by Alfred Weber. Weber distinguished between weight losing (gross materials) and non-weight losing (pure materials) industries in order to determine minimum cost locations. A further distinction between localized material and ubiquitous materials also assisted in the determination of optimum location [3].

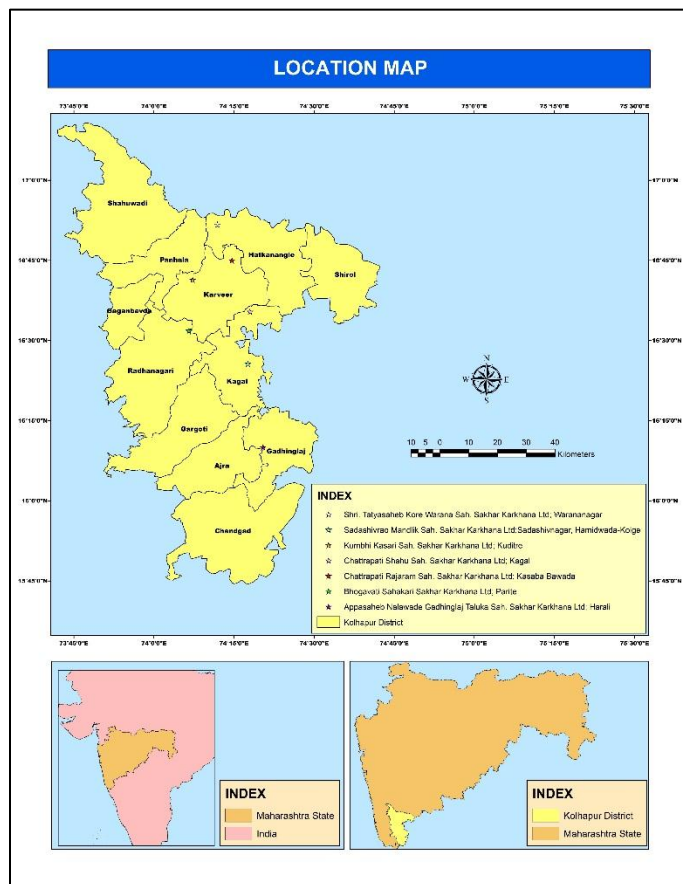


Fig. 1. Location of study area

2 HYPOTHESIS

Older the technological inputs and lesser the products and by-products of an industry higher would be chances of closure down of an industry

$$MI = \frac{\text{Weight of Raw Material}}{\text{Weight of Finished Material}}$$

Sugar-cane is the gross raw material for the sugar-cane factories. So, total seasonal sugar-cane production from surveyed sugar-cane growers was obtained then by using sugar factories individual recovery rates sugar production for each factory was acquired. Besides that various cartographic techniques were also used to analyze the data viz; Simple and multiple bars and column graphs, Trend Graphs, etc.

4 ANALYSIS

All the factories having good recovery rate in study area except the A.N.G.T.S.S.K.Ltd.,Harali. If recovery rate is good then it is directly affecting the sugar-cane purchase

rate given by sugar factories to the farmers. Accordingly, due to good average recovery rate (12.71 %) in the study area, most of the sugar factories in the study area are able to give more than Rs. 2500/- as a final instalment to the sugarcane growers (Table 1).

The average recovery rate for the study area is 12.71 %. As per the survey total, average seasonal production of sugar-cane in 2012-13 is 3088.86 Tons. Hence, from 3088.86 (average) of sugar-cane 394.58 (average) Tons of sugar is produced in 2012-13. So, this average recovery rate of factories in the study area is good enough to convert a maximum quantity of sugar-cane into sugar. But still some factories are facing the problems. Such as Harali factory has 11.81 % recovery rate, therefore, there final instalment in last year is below Rs. 2600/-. Besides that Bawada factory and Parite factory also gives sugar-cane purchase final instalment below Rs. 2600/- (Table 2).

TABLE 1
FACTORY-WISE RECOVERY RATE (2012-13)

Sr. No.	Name of Factory	Recovery Rate (%)
1	B.S.S.K.Ltd.,Parite, Tal-Karveer	13.2
2	C.R.S.S.K.Ltd.,Kasaba Bawada, Tal.-Karveer	12.39
3	A.N.G.T.S.S.K.Ltd.,Harali, Tal.-Gadhinglaj, S.M.S.S.K.Ltd.,Sadashivnagar, Hamidwada, Tal.-Kagal	11.81
4	Tal.-Kagal	13.01
5	K.K.S.S.K. Ltd, Kuditre Tal.-Karveer	13.43
6	Shri. T.K.W.S.S.K.Ltd.,Warananagar, Tal.-Panhala	12.01
7	Chh.S.S.S.K.Ltd., Kagal, Tal.-Kagal	13.11
Average		12.71

Source: Annual Sugar Factory Reports (2012-13) [5], [6], [7], [8], [9], [10], [11].

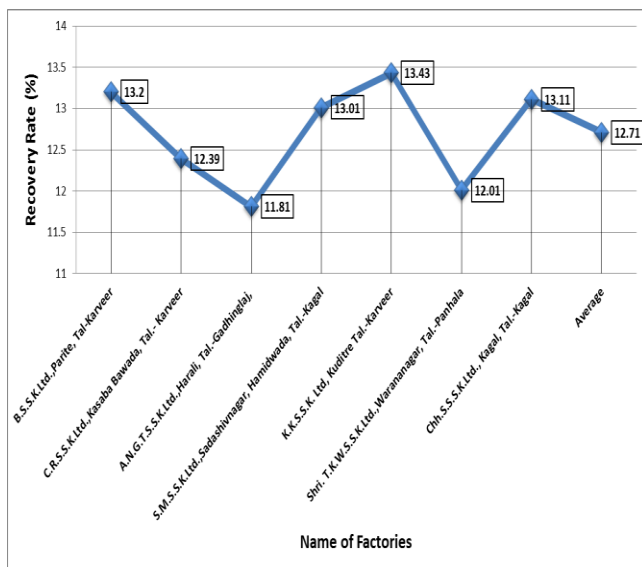


Fig.2. Factory-wise Recovery Rate (2012-13), Based on Table 1

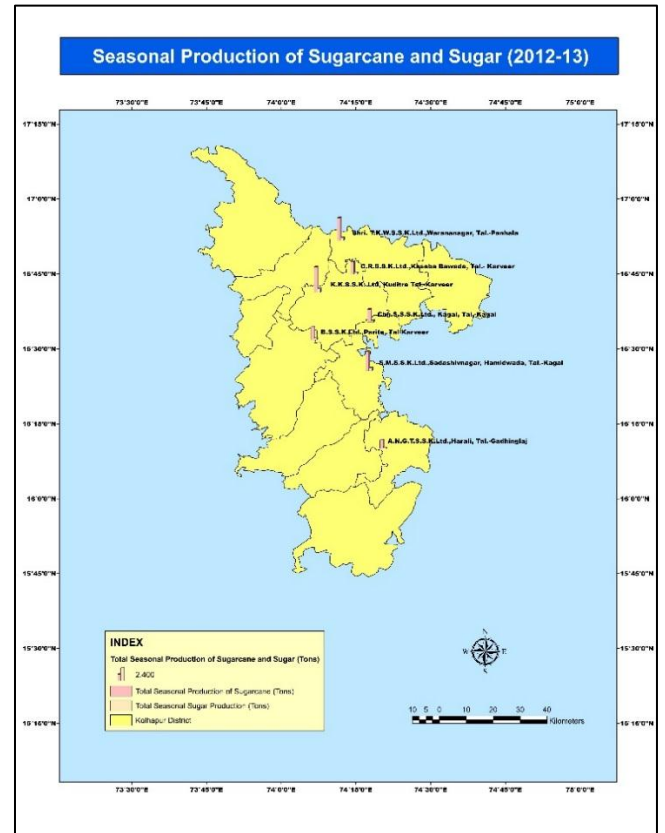


Fig. 3. Total Seasonal Production of Sugar-cane and Sugar (2012-13)

TABLE 2
TOTAL SEASONAL SUGAR PRODUCTION ACCORDING TO RECOVERY RATE (2012-13)

Sr. No	Name of Factory	Total Seasonal Production of Sugar-cane (Tons)	Total Seasonal Sugar Production (Tons)	Recovery Rate (%)
1	B.S.S.K.Ltd.,Parite, Tal-Karveer	2437	321.68	13.2
2	C.R.S.S.K.Ltd.,Kasaba Bawada, Tal.-Karveer	2381	295	12.39
3	A.N.G.T.S.S.K.Ltd., Harali, Tal.-Gadhinglaj, S.M.S.S.K.Ltd.,Sadashivnagar, Hamidwada, Tal.-Kagal	1662	196.28	11.81
4	Tal.-Kagal	3607	469.27	13.01
5	K.K.S.S.K. Ltd, Kuditre Tal.-Karveer	4785	642.63	13.43
6	Shri. T.K.W.S.S.K.Ltd., Warananagar, Tal.-Panhala	4340	521.23	12.01
7	Chh.S.S.S.K.Ltd., Kagal, Tal.-Kagal	2410	315.95	13.11
Average		3088.86	394.58	12.71

Source: Based on Field Survey and Annual Sugar Factory Reports (2012-13) [5], [6], [7], [8], [9], [10], [11].

Therefore, farmers in these areas were facing the problems. It is not only the great recovery rate influences the sugar-cane rate. But if these factories are concentrated more on the production of by-products of sugar-cane such as Molasses, Bagasse, Phospo and Organic Fertilizers Production and Sales, Distillery, etc. then are able to achieve benefits and offer good sugar can purchase rate.

4.1 DETERMINATION OF ORIENTATION OF INDUSTRIES

For the analysis total seasonal sugar-cane production in each individual factory area was divided by total seasonal sugar production in each factory area. Then by analyzing the index value it is determined that whether the sugar factory is market oriented or raw material source oriented. For Example-

- a. B.S.S.K.Ltd.,Parite, Karveer
Material Index = 2437/321.68
Material Index = 7.57
- b. C.R.S.S.K.Ltd.,Kasaba Bawada, Karveer
Material Index = 2381/295
Material Index = 8.07

TABLE 3

DETERMINATION OF ORIENTATION OF INDUSTRIES BY USING WEBER'S MATERIAL INDEX (2012-13)

Sr. No.	Name of Factory	Total Seasonal Production of Sugar-cane (Tons)	Total Seasonal Sugar Production (Tons)	Material Index
1	B.S.S.K.Ltd.,Parite, Tal-Karveer	2437	321.68	7.57
2	C.R.S.S.K.Ltd.,Kasaba Bawada, Tal.-Karveer	2381	295	8.07
3	A.N.G.T.S.S.K.Ltd., Harali, Tal.-Gadhinglaj,	1662	196.28	8.47
4	S.M.S.S.K.Ltd.,Sadas hivnagar, Hamidwada, Tal.-Kagal	3607	469.27	7.69
5	K.K.S.S.K. Ltd, Kuditre Tal.-Karveer	4785	642.63	7.45
6	Shri. T.K.W.S.S.K.Ltd.,Warananagar, Tal.-Panhala	4340	521.23	8.33
7	Chh.S.S.S.K.Ltd., Kagal, Tal.-Kagal	2410	315.95	7.63
Average		3088.86	394.58	7.83

Source: Based on Field Survey (2012-13).

According to the weber, when material index exceeds one then the orientation of factory is towards the raw material site. All above factories having Material Index more than one. The average material index for the study area is 7.83 (Table 3).Therefore; strictly all the surveyed

factories were located near to the raw material source (Near Sugar-cane Field).

TABLE 4
DISTANCE FROM SUGAR-CANE GROWER'S AGRICULTURAL LAND TO SUGAR FACTORY

Sr. No.	Name of Factories	Distance from Sugar-cane grower's Agricultural Land to Sugar Factory (Km)
1	B.S.S.K.Ltd.,Parite	5.27
2	C.R.S.S.K.Ltd.,Kasaba Bawada	6.38
3	A.N.G.T.S.S.K.Ltd.,Harali	4.17
4	S.M.S.S.K.Ltd.,Hamidwada	3.02
5	K.K.S.S.K. Ltd, Kuditre	3.02
6	Shri.T.K.W.S.S.K.Ltd.,Warananagar	10.8
7	Chh.S.S.S.K.Ltd; Kagal	5.54
Average Distance		5.46

Source: Based on Field Survey, 2012-13

Above table denotes the distance between sugar-cane field and sugar factory. Observation of table made it clear that all of the surveyed factories are oriented towards raw material producing field. In the case of the study area, the average distance between factory and sugar-cane field is 5.46 km, which is very minimum and time saving (Table 4). It is because sugar-cane loses its weight during production, besides that if there is a delay for crushing of sugar-cane in factories after the cutting then also sugar-cane loses its weight. And therefore, this weight losing is directly related to economic loss for both factory and sugar-cane grower. Most of the Sugar-cane growers in study area complaining that per ton output of raw material reduces due to delayed cutting and cursing of sugar-cane by the factory.

4.2 RELOCATION PRACTICES

A lot of work is carried out by giving much emphasizes on industrial location rather than to focus over the industrial relocation. Sometimes, due to some lacunas in industrial operations or management, industries become ill/sick or closed down. But a few steps can change these conditions if proper attention is also given towards relocation of industries. In the case of study area scholars only concentrated over the optimal locations, production increase, etc. and because of that few sugar co-operatives are transferred towards private companies. From last 4-5 years few sugar co-operatives are taken over by private companies viz; Panchaganga Sahakari Sakhar Karkhana, Ichalkaranji, Tal-Hatkanangle was taken over by Renuka Sugars Ltd., Dutt Sahakari Sakahar Karhana Datta Sahakari Sakhar Karakhana Limited Asurle Porle, Taluka Karveer was also now converted into private sugar factory. If in future proper attention is not given towards relocation of

factories then they will fall sick and then takeover by the private sector. This will be the biggest threat for co-operative movements in the study area. Therefore, proper attention should be given to relocation of industries.

At the beginning of the 1950s, some scholars in U.S.A., Britain, Japan and other Western countries started to use the term "Industrial Relocation" or "Redistribution". And in 1990 and 1991 Shi Qingwu, Shi Liqun and Wu Wei put forwarded the "Theory of Industrial Relocation". According to them, there are five types of industrial relocation in the field of location tracing research [12].

TABLE 5.5
INDUSTRIAL RELOCATION PRACTICES

Sr. No.	Industrial Relocation Practice	Description
1	Factory Expansion	In order to increase productive scale factories can be expanded once of many times by means of making additional fixed assets investment, extending factory buildings, adding equipment, increasing numbers of workers and so on.
2	Factory Converting and Renovating	Adopting advanced techniques and new equipment increasing labour productivity. It is not only for quality improvement of products but also for increase verities and specification of products.
3	Factory Removing or Migrating	If drastic changes of dominant locational factors and conditions come about, the location disadvantages have superseded location advantages then industrial migration to another nearby proper location is suitable.
4	Trace Reutilization	How to make full use of "trace" after the factories are closed down, suspended, merged with other factories. Other industries including the territory can be selected to utilize these factory traces.

Note- Based on Research Paper –The tracing Research of Industrial Location by Shi Qingwu, Shi Liqun and Wu Wei published in Chinese Geographical Science, volume 7, No.1, pp-59-67,1977, science press, Beijing, china

There is a need to apply such kind of relocation strategies for the sugar co-operatives in Kolhapur district. Because in last five years more than two factories were closed down due to the illness (low and non-profitable production) and later on converted into the private factory. At current situation, few factories are facing the problem of low recovery in the assessment year. Specifically, sugar factory in Harali, and Warananagar are having low recovery rate. Already at the time of assessment (2012-13) Harali factory was started to take over by Shri. Mahalaxmi Pvt. Ltd., Pune. Therefore, such kind of factories required some relocation practices like factory expansion, conversion and renovation. Few factories are easily adapted to the relocation practices like Shahu sugar factory kagal started electricity project by expanding the factory. Now they are also getting the profit by producing the electricity from

bagasse. Besides that Bhogavati sugar factory has water recycling plant, thus, their cost of water consumption for the production of sugar reduced to a certain extent.

5 CONCLUSION

It is concluded that Harali factory has 11.81 % recovery rate, consequently, their final instalment in last year is below Rs. 2600/-. Furthermore, Bawada factory and Parite factory also gives sugar-cane purchase final instalment below Rs. 2600/-. Hence, farmers in these areas were facing the problems. It is not only the great recovery rate influences the sugar-cane rate. But, if these factories are concentrated more on the production of by-products of sugar-cane such as Molasses, Bagasse, Phospo and Organic Fertilizers Production and Sales, Distillery, etc. then are able to achieve benefits and offer good sugar can purchase rate. The average material index for the study area is 7.83. Therefore; strictly all the surveyed factories were located near to the raw material source (Near Sugar-cane Field).

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ABBREVIATIONS

Sr. No.	Abbreviations	Full Form
1	B.S.S.K.Ltd., Parite, Tal-Karveer	Bhogavati Sahakari Sakhar Karkhana Ltd; Parite
2	C.R.S.S.K.Ltd., Kasaba Bawada, Tal.- Karveer	Chatrapati Rajaram Sah. Sakhar Karkhana Ltd; Kasaba Bawada
3	A.N.G.T.S.S.K.Ltd., Harali, Tal.-Gadhinglaj,	Appasaheb Nalawade Gadhinglaj Taluka Sah. Sakhar Karkhana Ltd; Harali
4	S.M.S.S.K.Ltd., Sadashivnagar, Hamidwada, Tal.-Kagal	Sadashivrao Mandlik Sah. Sakhar Karkhana Ltd; Sadashivnagar, Hamidwada-Kolge
5	K.K.S.S.K. Ltd, Kuditre Tal.-Karveer	Kumbhi Kasari Sah. Sakhar Karkhana Ltd; Kuditre
6	Shri. T.K.W.S.S.K.Ltd., Warananagar, Tal.-Panhala	Shri. Tatyasaheb Kore Warana Sah. Sakhar Karkhana Ltd; Warananagar
7	Chh.S.S.S.K.Ltd., Kagal, Tal.-Kagal	Chatrapati Shahu Sah. Sakhar Karkhana Ltd; Kagal