

Economic transformation through sugar factories: A critical study of Kabirdham, Chhattisgarh

¹Ankita Gupta and ²Prof Prabhakar Pandey

¹Research Scholar, Department of Commerce and Management, Dr C V Raman University, Kargi Road Kota, Bilaspur, Chhattisgarh

²Professor, Department of Commerce and Management, Dr C V Raman University, Kargi Road Kota, Bilaspur, Chhattisgarh

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*Corresponding Author

Email: ankitagupta7276@gmail.com

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ABSTRACT

Indian sugar industry is a key player in the socio-economic development of rural areas and act as a major contributor to the India's economic growth. Reports have witnessed the rural transformation through the establishment of sugar factories. With the increase in the population of the world the demand of the sugar and its by-products have been increased. This led to the increase of sugar factories in the world. Keeping in the view the role of sugar factories in the rural development, the present study was conducted to examine the economic transformation through establishment of sugar factories in Kabirdham, Chhattisgarh. This study employs a quantitative approach. The current study builds on earlier research by employing empirical analysis and a quantitative investigation. The economic development in relation to establishment of sugar factories were calculated in terms of income, employment, livelihood and agriculture. Data was collected by applying closed-end-questions in a self-structured questionnaire. The data were tabulated and statistically analyzed by t-Test and analyses of variance (ANOVA) at ($p \leq 0.05$) level of significance. Results show that the income of farmers from the services, labour, pension, honorarium and subsidiary occupation has also been enhanced after the setup of sugar factories in Kabirdham, CG. Overall total income from land has been increased after the establishment of sugar factories. With the increase in the income the pattern of expenditure by the farmers of Kabirdham has been significantly ($p \leq 0.05$) changed like land development, land purchase, bank deposits, share purchase, agriculture machines/implements, furniture etc. The sugar factories have significantly ($p \leq 0.05$) increased the employment in Kabirdham, CG. A positive change in the cultivation of cash crop like sugarcane (from 0.10% to 12.60%), soyabean (from 33.8% to 40.2%), seasamun (from 2.9% to 5.4%) and mustard (from 3.1% to 6.8%) has been reported after the sugar factories were established in Kabirdham. The overall results of the present study suggest that the sugar factories of Kabirdham, CG has been a nucleus of economic development in the area, which has advanced the living standards of the rural people.

Introduction

The development of sugar industries network has been a backbone to the rural development of any nation (Shrivastava, et.al., 2015; Xu, et.al., 2014). Since, sugar has been an essential commodity and is utilized in our daily life. With the increase in the human population, the demand of sugar across the globe has been increased simultaneously. This increasing demand of sugar in world and India has directly increased the network of sugar mills. In India there are 732 operational sugar factories, in which 327 sugar factories are co-operative, 368 sugar factories are private and 43 sugar factories operates under public domain (GOI, 2022). The number of sugar factories and sugar production in India has been increased from 1930-31 (31 sugar factories) to 2020-21 (732 sugar factories). The sugar industry is reported to be second largest agro-based industry in India. These sugar industries not only produce sugar and its allied products, but are also involved in the socio-economic development of the region (Solomon and Swapna, 2022). The different byproducts of the sugar industry are also involved in promoting a number of supplementary industries.

Time to time various studies has been conducted on the role played by the sugar factories in the socio-economic development. Mathur, (2000) explained that the physical factors have a stronger influence on the cultivation pattern of sugarcane than socioeconomic factors. Kohak, (1982) found that the sugar factories has created a large number of job prospects, as a result, the economic situation of rural people has improved. In this regard, the farmers were choosing the sugarcane cultivation over the other crops to increase their income. Sheetal and Raj, (2019) reported that co-operatives sugar industry was an important aspect of the Government for rural development. Yasmeen et.al., (2016) has addressed various elements that restrict the growth of sugar industry in India. Sugarcane production has substantial obstacles such as late payments to farmers, old technology, a lack of high yielding varieties, and farmer's lack of access to agriculture loans and insurance (Pandey and Devkota, 2020).

Chhattisgarh has been known as the rice bowl of India. This newly formed state of central India has not a long history of sugar production. Till today, In Chhattisgarh there are

04 operational sugar factories viz; 1). Lauh Purush Sardar Vallabh Bhai Patel Shakkar Karkhana Maryadit, Kabirdham, C.G, 2). Boramdeo Sahakari Shakkar Utpadak Karkhana, Kabirdham,C.G, 3). Danteswari Maya Sahakari Shakkar Karkhana, Blod,CG, and 4). Maa Mahamaya Sahakari Shakkar Utpadak Karkhana,Ambikapur,CG. Among these four sugar factories 03 are co-operative and 01 sugar factory is run under private domain. These sugar industries are playing a vital role in the rural transformation of Chhattisgarh. But, still there doesn't exist any research report displaying the role played by particular sugar factories in the economic transformation (income, employment, livelihood and agriculture) of the state. In this context, the present study was conducted to examine the role of sugar factories in the economic transformation/development of Kabirdham Chhattisgarh.

Hypothesis of the study

From the past studies conducted in reference to the sugar factories involved in the rural development. The lack of research studies on particular sugar factories creates a gap of knowledge. Since we take references of the descriptive (review) researches in showing the role of sugar factories in economic development. Thus, the present study will fill the gap of knowledge and generate a baseline data that will describe how sugar factories enhance the socio-economic condition of rural people. To fulfill the objectives of the present study following hypothesis are being made to draw out conclusions;

- H1a:** Sugar factories of Kabirdham, Chhattisgarh have positive significant impact on Income of people.
- H1o:** Sugar factories of Kabirdham, Chhattisgarh have no significant impact on Income of people.
- H2a:** Sugar factories have played a positive role in employment generation of Kabirdham, Chhattisgarh.
- H2o:** Sugar factories have no significant impact on employment generation in Kabirdham, Chhattisgarh.
- H3a:** Sugar factories of Kabirdham have a positive impact on Agriculture of Kabirdham, Chhattisgarh.
- H3o:** Sugar factories of Kabirdham have no significant impact on Agriculture of Kabirdham, Chhattisgarh.

Research Methodology

In the present study an effort is been made to know the actual influence of sugar factories on the cropping pattern and economy in Kabirdham Chhattisgarh, Central India. In order to display the satisfactory results it's essential to adopt a proper way to collect the information from the selected study area. The tools and techniques which are used to identify select, process and analyze the information about a research problem area are called as research methodology.

Study Area

The district of Kabirdham is located in the western section of the state of Chhattisgarh,India. The district is defined by longitudes of 80°49' E and 81°34' E, as well as latitudes of 21°42' N and 22°32' N. It has a total size of 3416 km². Kabirdham town serves as the district headquarters. The district is divided into four blocks. The district has a total population of 1620632 people (census report 2011). Reserve woodlands occupy 127 sq kms of the entire geographical area

of 3416 sq kms. The total sown area is 1845 sq kms. The total cropped area is 475 sq kms. Paddy is the main crop grown in the research area. Rabi crops are predominantly paddy wherever they are harvested. Aside from paddy, a few legumes and oilseeds are grown, albeit only on a small scale.

The climate of Kawardha varies from tropical moist humid to tropical dry humid. The SW monsoon brings roughly 1232 mm of rain to the district. The monsoon season begins in the second week of June and lasts until mid-September. Geomorphologically, the central and southern parts of district exhibit landforms of structural hills, valleys and plains with denudational plateaux, pediment/pediplain and flood plains (including in-filled river beds).The northern half of the district has pediment/pediplain landforms with denudational plateaus. The western half is largely made up of hills and forests.

Sampling Design

The multistage mixed sampling technique was used in this investigation. Kabirdham of Chattisgarh was chosen for the first stage of sampling because the area under sugarcane has grown rapidly in recent years, and only two private sugar factories, (1) Boramdeo Sahakari Shakkar Utpadak Karkhana, Kabirdham,C.G. and (2) Lauh Purush Sardar Vallabh Bhai Patel Shakkar Karkhana Maryadit, Kabirdham,C.G., have been operating for a long time. As a result, both sugar factories were purposefully chosen for the in-depth investigation. At the second stage of sampling, out of four developmental blocks (Bodla, Kabirdham, Pandariya, Lohara) one developmental block viz Kabirdham was selected for the present study. At the third stage of sampling, two villages were chosen at random from each selected block based on the amount of sugarcane planted in the villages. At the fourth and last stage of sampling the selection of predominant sugarcane growers was done by farming the mainly three size groups small (below 2 ha), medium (2 to 4 ha) and large (4 ha and above).

Sample size

The overall sample size selected for the present study were 200 respondents (n=200). The sample size for the present study was calculated by the following formula;

$$n = N \times \frac{\frac{Z^2 \times p \times (1 - p)}{e^2}}{\left[N - 1 + \frac{Z^2 \times p \times (1 - p)}{e^2} \right]}$$

- Where,
- n = Sample size
- N = Population size,
- Z = Critical value of the normal distribution at the required confidence level,
- p = Sample proportion,
- e = Margin of error

Collection of primary data

The primary data was collected using the survey approach, which involved conducting direct personal interviews with selected sugarcane growers using pretested

questionnaires designed specifically for this study to address the objectives. In the present study we have collected quantitative data by applying closed-end-questions in a self structured questionnaire. A pilot study was conducted and then a self structured questionnaire was developed. An expert validity of the questionnaire was done then the questionnaire was tested with the help of pre-testing techniques. The data was collected from the respondents through an face to face interview and validated questionnaire. Once the responses of the respondents were collected from the online survey, then it was subjected to analysis by using different statistical methods.

Data Analysis

The collected data was fed up in the excel spreadsheet for further analysis. The data were tabulated and statistically analyzed by t-Test and analyses of variance (ANOVA) at ($p \leq 0.05$) level of significance. The data was analyzed using SPSS or XLSTAT software.

Results

The sugar industries are playing an important role in achieving socio-economic and agricultural development of the rural community in particular and of the region in general. The sugar factories have influenced the socioeconomic status of the rural people living in the adjoining areas of these units. In the present study two sugar factories viz 1) Lauh Purush Sardar Vallabh Bhai Patel Shakkar Karkhana Maryadit, Kabirdham, C.G, and 2) Bhoramdeo Sahakari Shakkar Utpadak Karkhana, Kabirdham, C.G, are operating in Kabirdham Chhattisgarh. These sugar factories have been playing a vital role in the development of Kabirdham.

The study showed that the respondents of the present study report a diverse land holding assists (ranging from small to large farmers). The sampled farmers were classified as small farmers (38%) and medium farmers (30%). While 18% of

the farmers have a land holding below 3 Acres thus they were classified as marginal farmers. Furthermore 14% of the farmers have reported their land holdings above 10Acre, which were classified as large farmers (Table-1).

The income of farmers from the services, labour, pension, honorarium and subsidiary occupation has also been enhanced after the setup of sugar factories in Kabirdham (Table-1). The total income have been increased from services (by 184.32 percent), labour (by 204.84 percent), pension & honorarium (by 213.76 percent), and subsidiary occupation (by 189.39 percent).

As earlier the farmers use to spend money on household purchase like food, utensils, clothes etc. But after the sugar factories were established the pattern of expenditure has been significantly changed like land development, land purchase, bank deposits, share purchase, agriculture machines/implements, furniture etc.

As the establishment of sugar factories have increased the income of farmers. The contact of farmers with the nearby cities increased rapidly. Some of the farmers use to buy land in towns and cities and build houses. Some farmers improved their household conditions. Furthermore the farmers show interest in purchase of cars, motorcycles, bicycles, televisions, refrigerators, radios, and furniture respectively.

From the survey we have found that the condition of the houses has been improved by the establishment of sugar factories across different farmer groups in Kabirdham. The houses from the average and bad condition were being converted into good conditions. The number of house in bad condition before establishment of sugar factories were more, but as the sugar factories were established in Kabirdham the conditions of houses was found good and average.

Table-1:- Income of Farmers (n=200) before and after establishment of Sugar factories in Khabirdham, Chhattisgarh

S.No	Size Group of Land Holding	Particulars	No Families in Groups	Different Sources of income (in Lakhs)					Total Yearly Income
				Lan d	Servi ce	Labo ur	Pension and Honorarium	Subsidiary Occupation	
1	Below 5 Acres (Marginal Farmer)	Before	36	1.27	2.00	2.20	0.98	0.52	3.27
		After		2.58	3.57	4.25	1.87	1.05	6.15
		Net increase(%)		203.14	178.5	193.18	190.81	201.92	188.07
2	5-10Acres (Small Farmers)	Before	76	2.34	2.15	1.80	1.10	0.68	4.49
		After		5.05	3.98	3.39	2.33	1.22	9.03
		Net increase(%)		215.81	185.11	188.34	202.72	179.41	201.12
3	10-15Acres (Medium Farmers)	Before	60	4.20	2.75	1.35	1.39	0.85	6.95
		After		7.66	4.25	2.97	3.20	1.69	11.91
		Net increase(%)		184.90	154.54	220.00	230.21	198.89	171.37
4	Above 15Acre	Before	28	5.99	3.05	1.05	1.98	1.25	9.04
		After		12.09	6.54	2.50	4.25	2.29	18.63
		Net increase (%)		201.83	214.45	238.09	214.64	183.20	206.08

5	Sig (One Way ANOVA)			**	**	**	**	*	*
		Before		13.8	9.95	6.4	5.45	3.3	38.9
6	Total	After	200	27.3	18.34	13.1	11.65	6.25	76.73
		Net increase (%)		8		1			
				198.40	184.32	204.84	213.76	189.39	197.24

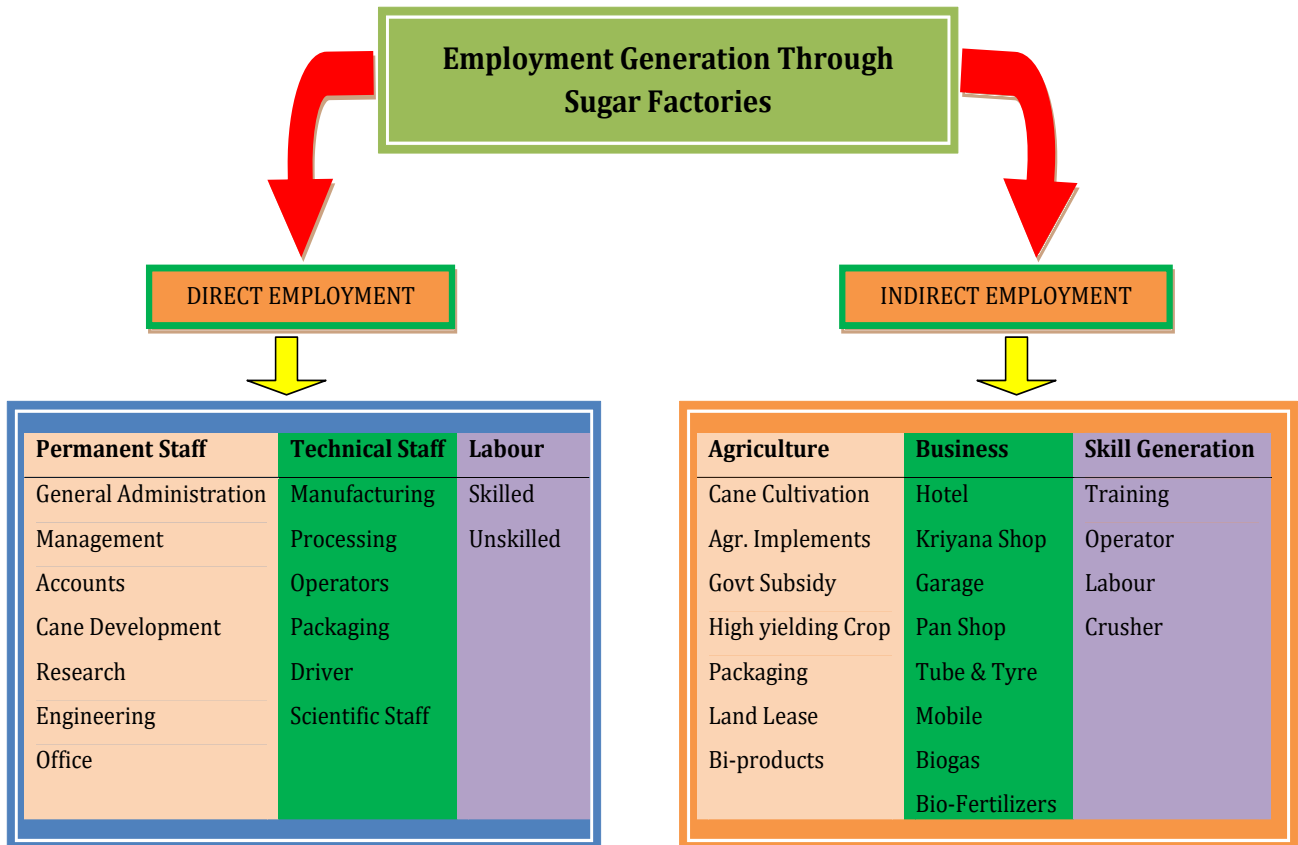


Fig-1: Flowchart of employment generation by establishment of sugar factories in Kabirdham, CG.

The results of present study indicate that the sugar factories in the Kabirdham, Chhattisgarh have played an important role in the generation of employment (Fig-1). The employment in the study area was generated in two different types i.e, direct employment and indirect employment. The direct employments were the people who were directly recruited in the sugar factories, in contrast the indirect employment was such that the sugar factories stressed the people to be self employed. Both type of these employments have stimulated the livelihood status of the rural people of Kawardha district. Since the sugar factories in India from a long time back are playing a vital role in orienting the social, economic and ecological status of the rural people.

In the study region, most of the farmers and the labourers are involved in the activities, which are directly or indirectly related with sugar production. Sugarcane crushing season is for six months in this period most of the people are employed through harvesting, loading and transportation

activity. The major departments are crushing, engineering, boiler, chemical, civil, etc. Thus diversification of production activities leads to a process of rural industrialization which is also employment generating.

We have observed that after the existence of sugar factories in Kabirdham, C.G. Thus, a new class of sugar factories workers came into existence. It has been observed that nearly 80.00 percent of the workers of the Sugar Factories belong to the local and nearby area. The agricultural labourers, small farmers and non-agriculturists of the region could get direct employment in the sugar factories.

Among the surveyed sugar factory workers 39.00 percent are permanent, 12.00 percent are temporary and 49.00 percent are seasonal (Table-2). This suggests that maximum portion of workers is seasonal. In addition maximum workers were from marginal land holders and land less families.

Table-2: Classification of Sugar Factory Workers (n=200) according to their family income in Kabirdham, Chhattisgarh

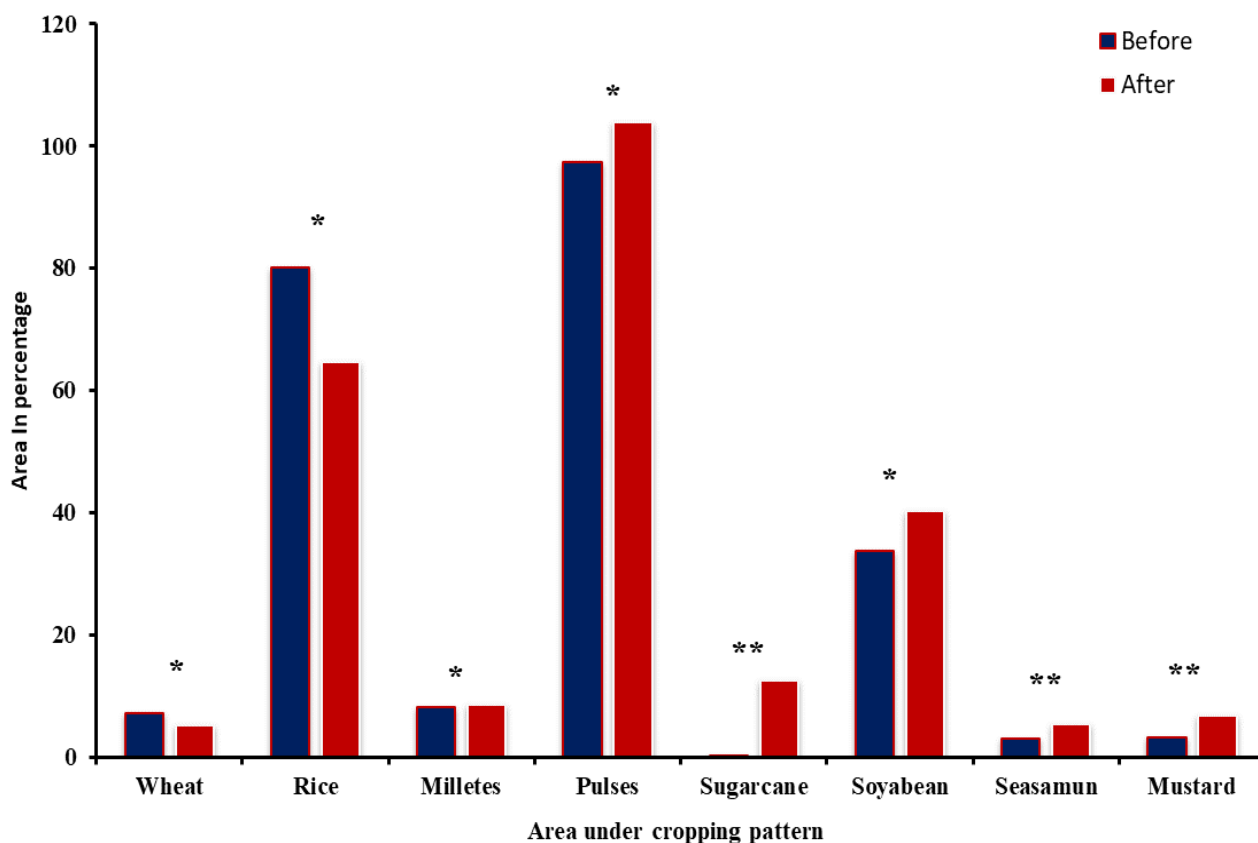
S.NO	Categories of Workers	Source of Income of Sugar Factory Workers (in Percentage)					Total
		Agriculture	Manual Labour	Services of other Family members	Traditional Occupation	Other Source of Income	
01	Permanent	25	--	02	03	09	39
02	Temporary	05	02	02	02	01	12
03	Seasonal	23	03	08	02	13	49
04	Total	53	05	12	07	23	100

Due to the establishment of sugar factories many small businesses came into existence in the adjoining areas of Kabirdham, CG. Many new businesses like hotels (05 Nos), garage (04 Nos), pan shop (03 Nos), mobile repairing (02 Nos), recharge shop (04 Nos), tyre and tube shop (03 Nos), welding shop (02 Nos), kiriyana shops (06 Nos) etc were reported in the adjoining areas of sugar factories.

A significant variation ($p \leq 0.05$) in the cultivation of sugarcane in Kabirdham before and after establishment of sugar factories was recorded (Fig-2). This suggests that the introduction of sugar factories in any area can transform the cropping pattern respectively (Fig-2). The people in the current

era focus on the crop which provides more cash but less care, under this criteria sugarcane fits the best option for cultivation.

The change in the cropping pattern also enhances the family income of farmers. The net income from the land after the establishment of sugar factories has been increased by 203.14 percent (marginal farmers), 215.81 percent (small farmers), 184.90 percent (medium farmers) and 201.83 percent (large farmers). Overall total income from land has been increased by 198.40 percent after the establishment of sugar factories. The total yearly income of the farmers was increased by 197.24 percent after the establishment of sugar factories.



*Statistically significant difference at $p \leq 0.05$.

**Statistically significant difference at $p \leq 0.01$.

Fig-2: Transformation of agriculture area under different crops before and after establishment of sugar factories in Kabirdham,CG

Table-3: Results of the one-way ANOVA Analysis showing impact of Sugar Factories on Economic Development of Kabirdham CG.

S.NO	Impact of Sugar Factories	Variable	Mean (S.D)	F-value	p-value	Hypothesis Acceptation or Rejection
			Respondents (n = 200)			
01	Impact of Sugar Factories	Income	4.220 (0.690)	26.330	0.002*	H1a-Accepted and H1 ₀ Rejected
02		Employment	4.375 (0.865)	24.36	0.001**	H2a-Accepted and H2 ₀ Rejected
03		Agriculture	3.820 (0.640)	28.910	0.034*	H3a-Accepted and H3 ₀ Rejected

*Statistically significant difference at $p \leq 0.05$

**Statistically significant difference at $p \leq 0.01$.

The hypotheses of the study were tested through Analysis of Variance (ANOVA) and the entire null hypothesis were rejected and all alternate hypotheses were accepted (Table-3).

The ANOVA tests have proved that;

- Sugar factories significantly ($p \leq 0.05$) improve the livelihood condition of farmers, workers and agriculturists of Kabirdham, Chhattisgarh.
- Sugar factories significantly ($p \leq 0.05$) increase the employment potential in Kabirdham, Chhattisgarh.
- Sugar factories of Kabirdham ($p \leq 0.05$) impact the agriculture of Kabirdham, Chhattisgarh.
- Sugar factories of Kabirdham, Chhattisgarh significantly ($p \leq 0.05$) enhance the income and living standards of farmers, workers and agriculturists.

Conclusion

The present study examined the role of two sugar factories i.e., Lauh Purush Sardar Vallabh Bhai Patel Shakkhar Karkhana Maryadit, Kabirdham, C.G, and Bhoramdeo Sahakari Shakkhar Utpadak Karkhana, Kabirdham, C.G, in the economic transformation/development of Kabirdham, Chhattisgarh. The overall results suggest that the sugar factories in the Kabirdham district of Chhattisgarh have played an important role in the socio-economic upliftment of farmers, workers and agriculturists. It was observed that the sugar factories in Kabirdham Chhattisgarh have significantly increased the

income of the people of adjacent areas, which has increased the living standards of these people. Due to the establishment of sugar factories many small businesses came into existence in the adjoining areas of Kabirdham, CG. The establishment of sugar factories in Kabirdham, Chhattisgarh has increased the employment potential in the area. The employment in the study area was generated in two different types i.e, direct employment and indirect employment. Both type of these employments have stimulated the livelihood status of the rural people of Kabirdham district. A significant variation ($p \leq 0.05$) in the cultivation of sugarcane in Kabirdham before and after establishment of sugar factories was recorded. This suggests that the introduction of sugar factories have transformed the cropping pattern in Kabirdham respectively. Since the sugar factories in India from a long time back are playing a vital role in orienting the social, economic and ecological status of the rural people. But since there is a gap of knowledge about the actual role played by these factories at local level. The present study can fulfill that gap and also provide a database for the same.

Conflict of Interest

The author would like to undertake that the above mentioned manuscript has not been published elsewhere, accepted for publication elsewhere or under editorial review for publication elsewhere. The authors declare that they do not have any conflict of interest with the submission of this manuscript.

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