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IMPACT OF COVID -19 ON LIVELIHOOD IN BRASS & BELL METAL AND CERAMIC INDUSTRY: A STUDY OF PURBA MEDINIPUR DISTRICT IN WEST BENGAL

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ABSTRACT

The present paper analyzed the impact of COVID -19 on livelihood in the Brass & Bell Metal and Ceramic industry in Purba Medinipur District of West Bengal. In this paper I have used primary data based on households in this industry. The status of Brass & Bell Metal and Ceramic industry measured through the factors such as employment, investment and turnover of capital. The status of livelihood is measured through factors such as income and employment between the (2017-18 to 2022-23) period. I have used Descriptive research methodology quantitative in nature. The changes of employment, income, investment and turnover of capital is statistically significant in Brass & Bell Metal and Ceramic industries between the year (2019-20) and (2020-21) due to the impact of COVID-19. The Employment and Turnover of capital are strong, significant predictors of income in Brass & Bell metal industry While Investment and time dummy are not statistically significant at 5 percent level. In Ceramic industry employment is the most impactful and significant predictor of income while, Investment and Turnover of capital have significant negative relationships with income.

KEYWORD: *Employment, Income, Investment, and turnover of capital.*

I. INTRODUCTION

The Micro, Small and Medium enterprises (MSMEs) are crucial to reducing poverty. When industrialization starts in villages, it has more sway. The Parliament Library and Reference research, Documentation (LARRDIS) (2014) [1] Report evaluates the performance and growth of medium and small-scale industries in India. The report state that the Micro, small and medium enterprises has emersed a highly vibrant and dynamic sector of Indian economy, this sector contributes large employments opportunity at competitive lower capital cost than large industries through rural industrialization. This paper particularly highlights Brass & Bell Metal (Micro industry) and Ceramic (Small industry) in Purba Medinipur District of West Bengal. Sajeevan (2020) [2] studied the diverse nature of India's MSME sector in terms of business size, products, services, and technology use. Despite these differences, the sector has great potential for growth. The National Manufacturing Policy aims to increase the sector's GDP contribution from 16 percent to 25 percent by 2022 to support MSME growth. As to the Ministry of Micro, Small, and Medium Enterprises (MSME) (2024) [3], the MSME sector is an essential component of the Indian economy. West Bengal Handicrafts Development Corporation (Manjusha) [4], Established in 1976, the corporation focused on developing, preserving, and promoting the rich tradition of craftsmanship in West Bengal. According to NSDC (National Skill Development Corporation's) report (2017-22), [5] Purba Medinipur district has a large industrial based in between (2008-09) and (2011-12) period on medium, small scale industries segment. According to the Directorate of MSMEs, Govt. of W.B (2020-21) [6], Purba Medinipur District had around 721 MSMEs and employed approximately 6,000 people in 2017-18, with a steady growth trend. However, after the Covid-19 pandemic, the number of MSMEs declined to 340 in (2021-22).

Review of literature

Lroluahpuia (2016) [7] used primary survey data and secondary data from various sources, applying descriptive statistics to analyze the information. He explained that MSMEs create jobs and employment at all levels of industrial development, it also contributed to economic growth at the district, state, and national levels. However, they faced various challenges. Government policies aim to support their growth and efficiency at all these levels. Kumar (2017) [8] used a unit level NSSO data, and a descriptive analysis conducted to assess the extent and nature of subcontracting within the unorganized manufacturing sector. He explained that the industrial agglomeration played an important role in providing scope for greater subcontracting which was required due to lack of an

appropriate channel for larger firms to outsource their activities to the better performing firms in the unorganised manufacturing sector.

Human development Report (2011) [9] stated that the Purba Medinipur district has many small organised industrial units in food processing, agricultural implements, handicrafts, cashew nuts processing etc. The employment generating capacity of these units is small but rural financial infrastructure depend on this units. Which was crucial for economic developments of this district. The report based on secondary data from different sources of this district.

Ghosh (2018) [10] conducted a study on the archaeological site of Arenda in East Medinipur district, and She used a comprehensive methodology to explore the technological aspects of BRW ceramics and their cultural significance in early coastal agriculture in coastal areas. She also highlighted that studying ceramic production provided valuable insights into various human societies and civilizations worldwide. The black and red ware ceramics found at Arenda were significant to Bengal's archaeology and align with the Chalcolithic phase of the subcontinent, persisting for a long time with minimal changes in surface treatment and shape.

Ganguly et.al (2016) [11] used primary survey data from 48 bell and brass metal workers, aged between 20 and 76 years by interview method through structured questioner and a convenient sampling technique. He used comprehensive research methods for analyzing socio-economic and nutritional status of bell and brass metal workers in Bankura. He analysed that the Metal (Bruss and Bell) handicraft products bear a long tradition of excellence and unique craftsmanship at district as well as states. The socio-economic status, nutritional status and occupational health hazards were the determining key indicators of standard living condition of Bell and Brass metal workers.

Sarma & Mahendra (2020) [12] used qualitative research method based on secondary data from various sources, and they analysed that India was the second most popular country of the world. Realizing that a fast spread of COVID-19 in India would be wiped out, the government imposed a lockdown as a precautionary measure to protect lives and livelihood. However, it has adverse effect on the economy so that it cut GDP growth from 5.3 percent to 2.5 percent for the cleaner year 2020 in ten days.

Adhikari et al. (2020) [13] used quantitative research methodology based on secondary data collected by the Stranded Workers Action Network (SWAN); a relief effort initiated in response to the lockdown, on 36,000 workers during this period in India. They revealed that the lockdown in India as a measure to contain the spread of the COVID-19 pandemic, during the lockdown the migrant worker crisis had revealed, destroyed livelihood and food insecurity coupled with a crippled public health system, so it was urgent needed for expansion of public spending on social security.

Sing et al. (2020) [14] used descriptive and quantitative research methodology based on primary and secondary data from various sources such as Government reports, articles etc. They investigated that the impact of COVID-19 complete lockdown and travel restriction in India was devastating both for human beings as well as economy. During the country wise lockdown announced the majority migrant workers, especially daily wage earners, were jobless, homeless pathetic situation. A survey conducted in mid-April 2020 among migrant workers from different states revealed that 90 percent had not been paid their wages, 70 percent did not get access to cooked food, and 96 percent did not receive ration supplies.

Objective of the Study

a. To analyse the status of Brass & Bell Metal (Micro) Industry and Ceramic (Small) industry in Purba Medinipur District.
b. To analyse the status of livelihood in Brass & Bell Metal and Ceramic industry of Purba Medinipur District.
c. To examine the impact of COVID-19 on livelihood in Brass & Bell Metal and Ceramic industry of the study area.

Hypothesis

Based on the objectives mentioned, the following research hypotheses were developed and examined: The status of Brass & Bell Metal and Ceramic industry was assessed by three factors:
(a) Employment, (b) Investment, and (c) Turnover of capital in the Brass & Bell Metal and Ceramic industry

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The determinants of livelihood were (a) Employment (b) Income. The measuring index assessed the impact of Brass & Bell Metal and Ceramic industry on livelihoods from the pre-COVID-19 period (2017, 2018, 2019) to the COVID-19 period (2020, 2021, 2022, 2023).

a) H_0: There is no significant impact of Employment, Investment and Turnover of capital in Brass & Bell Metal industry on livelihood determinants during COVID-19.
H_1: There is significant impact of Employment, Investment and Turnover of capital in Brass & Bell Metal industry on livelihood determinants during COVID-19.

b) H_0: There is no significant impact of Employment, Investment and Turnover of capital in Ceramic industry on livelihood determinants during COVID-19.
H_1: There is significant impact of Employment, Investment and Turnover of capital in Ceramic industry on livelihood determinants during COVID-19.

Data sources and Methodology of the study

Primary Data and Sampling Design:

I have collected primary data in two blocks (Panskura-I & Panskura-II) of Purba Medinipur in West Bengal from 60 sample households with the help of structured questionnaires through simple random sampling method for the period (2017-18 to 2022-23).

Methodology

The present paper is descriptive as well as exploratory research based on primary data

Units of study: Household

Identification of variables: The dependent variable is livelihood status (Y) and the factors that affected livelihood included, employment, income. The independent variable is the status of Toba Brass & Bell Metal (Micro) industry & Ceramic (Small) industry (x_i) and the measurement factors of the status of these industries are such as: Number of employees (x1), investment (x2), turnover of the capital (x3). The relationship has been assessed by formulating a composite index of livelihood and multiple regression analysis of a single dependent (Y) with three multiple independent variables (x1, x2, x3).

Analysis of data:**1. Descriptive statistics and Paired t-Test (for pre vs. during COVID-19 comparison)**

The paired sample t-test is applied to assess whether the mean CLI (Composite Livelihood Index) values (employment, income, investment, and turnover of capital) in Brass & Bell Metal and Ceramic industry significantly differed between the pre COVID-19 (2017 to 2020) and during COVID-19 (2020 to 2023) period.

II. REGRESSION ANALYSIS (MULTIPLE REGRESSION)

The multiple regression analysis is conducted to evaluate the impact of independent variables (employment, investment, and turnover of capital) on livelihood determinates, i.e. (Composite Livelihood Index) across the Brass & Bell Metal (Micro) industry and Ceramic (Small) industry

The analysis is applied separately for two periods: 1) pre-COVID (1017-18 to 2019-20)
2) During- COVID (2020-21 to 2022-23)

The T-test results on employment, income, investment, and turnover of capital are given below:

Table-1 Mean Test of Employment in Brass & Bell Metal and Ceramic industry, between Pre (2019-20) and During (2020-21) COVID.

Brass & Bell metal industry Employment	Mean	SD (σ1,σ2)	No. of observation	t - test	P-value	Test Result H0: μ1 = μ2 H1: μ1 > μ2
2019-20	2	1.886	30	2.56	0.007**	H0 is rejected
2020-21	2	1.284				
Ceramic industry employment						
2019-20	1	0.614	30	-1	0.16	H0 is accepted.
2020-21	1	0.723				

Sources: ***Authors' Calculation on basis of primary survey data***.

Notes: *** = at 1 % level significant. ** = at 5 % level significant.

In table 1, μ_1 & σ_1 are the mean & SD of Employment in the year (2019-20) within the Brass & Bell Metal and Ceramic industry, whereas μ_2 & σ_2 are the respective value of employment in the year (2020-21) within the Brass

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& Bell Metal and Ceramic, statistical tests have been done following the methodology of Goon, Gupta and Dasgupta (1968) pp, 396-404. SD = Standard Deviation, df = degrees of freedom, n = no of observations.
In this statistical test of employment in Brass & Bell Metal industry, t- test value is (2.56) and P value is (0.007) i.e. less than (0.05), this indicates a statistically significant change in employment between the year (2019-20) and (2020-21).

In this statistical test of employment in ceramic industry, t- test value is (-1) and P value is (0.16) i.e. greater than (0.05), this indicates that change of employment is not statistically significant between the year (2019-20) and (2020-21).

Table--2 Mean Test of Income from Brass & Bell Metal and Ceramic industry, between Pre (2019-20) and During (2020-21) COVID.

Brass & Bell metal industry income	Mean	SD (σ1,σ2)	No. of observation	t - test	P-value	Test Result H0: μ1 = μ2 H1: μ1 > μ2
2019-20	122166	93707.89	30	3.98	0.0002**	H0 is rejected
2020-21	102092	71334.96				
Ceramic industry income						
2019-20	395606	397622.68	30	5.02	0.00001**	H0 is rejected
2020-21	374205	397382.61				

Sources: *Authors' Calculation on basis of primary survey data*.
Notes: *** = at 1 % level significant. ** = at 5 % level significant.

In the table-2, μ_1 & σ_1 are the mean & SD of income in the year (2019-20) within the Brass & Bell Metal and Ceramic industry, whereas μ_2 & σ_2 are the respective value of income in the year (2020-21) within the Brass & Bell Metal and Ceramic industry, statistical tests have been done following the methodology of Goon, Gupta and Dasgupta (1968) pp, 396-404. SD = Standard Deviation, df = degrees of freedom, n = no of observations.

In this statistical test of income in Brass & Bell Metal industry, t- test value is (3.98) and P value is (0.0002) i.e. less than (0.05), this indicates a statistically significant change of income between the year (2019-20) and (2020-21).

In this statistical test of income in ceramic industry, t- test value is (5.02) and P value is (0.00001) i.e. less than (0.05), this indicates a statistically significant change of income between the year (2019-20) and (2020-21).

Table-3 Mean Test of investment in Brass & Bell Metal and Ceramic industry, between Pre (2019-20) and During (2020-21) COVID.

Brass & Bell metal industry Investment	Mean	SD (σ1, σ2)	No. of observation	t - test	P-value	Test Result H0: μ1 = μ2 H1: μ1 > μ2
2019-20	180782	247792.63	30	4.00	0.0002**	H0 is rejected.
2020-21	172173	235992.97				
Ceramic industry Investment						
2019-20	243353	252756.91	30	5.27	0.002**	H0 is rejected
2020-21	235708	244816.89				

Sources: *Authors' Calculation on basis of primary survey data*.
Notes: *** = at 1 % level significant. ** = at 5 % level significant.

In table 3, μ_1 & σ_1 are the mean & SD of investment in the year (2019-20) within the Brass & Bell Metal and Ceramic industry, whereas μ_2 & σ_2 are the respective value of investment in the year (2020-21) within the Brass & Bell Metal and Ceramic industry, statistical tests have been done following the methodology of Goon, Gupta and Dasgupta (1968) pp, 396-404. SD = Standard Deviation, df = degrees of freedom, n = no of observations.

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In this statistical test of investment in Brass & Bell Metal industry, t- test value is (4.00) and P value is (0.0002) i.e. less than (0.05), this indicates a statistically significant change in investment between the year (2019-20) and (2020-21).
In this statistical test of investment in ceramic industry, t- test value is (5.27) and P value is (0.002) i.e. less than (0.05), this indicates that change of investment is statistically significant between the year (2019-20) and (2020-21).

Table-4 Mean Test of Turnover of capital in Brass & Bell Metal and Ceramic industry, between Pre (2019-20) and During (2020-21) COVID.

Brass & Bell metal industry Turnover of capital	Mean	SD (σ1, σ2)	No. of observation	t - test	P-value	Test Result H0: μ1 = μ2 H1: μ1 > μ2
2019-20	344693	681058.14	30	2.77	0.004**	H0 is rejected.
2020-21	299733	592224.47				
Ceramic industry Turnover of capital						
2019-20	1647371	2283530.63	30	3.95	0.0002**	H0 is rejected
2020-21	1522705	2110722.90				

Sources: *Authors' Calculation on basis of primary survey data.*
Notes: *** = at 1 % level significant. ** = at 5 % level significant.

In table 4, μ_1 & σ_1 are the mean & SD of Turnover of capital in the year (2019-20) within the Brass & Bell Metal and Ceramic industry, whereas μ_2 & σ_2 are the respective value of Turnover of capital in the year (2020-21) within the Brass & Bell Metal and Ceramic industry, statistical tests have been done following the methodology of Goon, Gupta and Dasgupta (1968) pp, 396-404. SD = Standard Deviation, df = degrees of freedom, n = no of observations.

In this statistical test of Turnover of capital in Brass & Bell Metal industry, t- test value is (2.77) and P value is (0.004) i.e. less than (0.05), this indicates a statistically significant change in Turnover of capital between the year (2019-20) and (2020-21).

In this statistical test of Turnover of capital in ceramic industry, t- test value is (3.59) and P value is (0.0002) i.e. less than (0.05), this indicates that change of Turnover of capital is statistically significant between the year (2019-20) and (2020-21).

Findings

It was found from the above t-test table that the changes of employment, income, investment and turnover of capital is statistically significant in Brass & Bell Metal and Ceramic industries between the year (2019-20) and (2020-21), while only the change of employment in Ceramic industry was not significantly change during the same period.

In Brass & Bell Metal industry Regression Model:

1. Dependent Variable: income
2. Independent Variables: employment, investment, turnover of capital, time dummy
3. Observations: 180
4. R-squared = 0.7235
   The model explains that 72.35% of the variation in income.
5. Adjusted R-squared = 0.7171
   This indicates that slightly lower, adjusting for the number of predictors.
6. F (4, 175) = 114.45, Prob > F = 0.0000

   This indicates that the regression model is statistically significant.

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Table 5 Regression Model on Brass & Bell Metal industry during pre and post Covid period

Variable	Coefficient	P-value	Interpretation
employment	23,759.45	0.000	Highly significant. Each 1-unit increase in employment increases income by 23,759 units, ceteris paribus.
investment	0.0687051	0.057	Not statistically significant at the 5% level (p ≈ 0.057). It has a positive but weak effect on income.
Turnover of capital	0.0611091	0.000	Highly significant. Each 1-unit increase in turnover of capital increases income by ~0.061, holding others constant.
Time dummy	-15,372.37	0.101	Not statistically significant at the 5% level (p ≈ 0.101), although it has a negative coefficient suggesting a potential downward pressure on income.
_cons (Intercept)	76,294.16	0.000	Significant. This is the predicted income when all independent variables are zero.

Sources: *Authors' Calculation on basis of primary survey data*

Key findings

1. The Regression model is statistically significant and explains a good portion of income variability.
2. Employment and Turnover of capital are strong, significant predictors of income in Brass & Bell metal industry.
3. Investment and time dummy are not statistically significant at the 5% level.

In Ceramic industry Regression Model

1. Dependent variable: income
2. Independent variables: employment, investment, turnover of capital, time dummy
3. Observations: 180
4. R-squared = 0.9896
   The model explains that 98.96% of the variance in income.
5. Adjusted R-squared = 0.9893
   Also very high, adjusted for the number of predictors.
6. F (4, 175) = 4154.61, Prob > F = 0.0000
   This indicates that regression model is statistically significant.

Table 6 Regression Model on Ceramic industry during pre and post Covid period

Variable	Coefficient	P-value	Interpretation
employment	103,526.9	0.000	Statistically significant. A 1-unit increase in employment is associated with a 103,527 unit increase in income, holding other variables constant.
investment	-4.000968	0.009	Significant. A 1-unit increase in investment decreases income by ~4 units. This negative effect might be surprising and could suggest over-investment or inefficiencies.
Turnover of capital	-0.2082255	0.000	Highly significant and negative. Each unit increase in turnover of capital reduces income by ~0.21 units.
Time dummy	4938.983	0.483	Not statistically significant (p = 0.483). No strong evidence of an effect on income.
_cons (Intercept)	8199.821	0.569	Also, not significant; it represents the expected income when all predictors are zero.

Sources: *Authors' Calculation on basis of primary survey data*

Findings

1. The Regression model is statistically strong with very high explanatory power.
2. In Ceramic industry employment is the most impactful and significant predictor of income.
3. Investment and Turnover of capital have significant negative relationships with income.

III. OBSERVATION AND CONCLUSION

Thus, by observing the primary data on Brass & Bell Metal and Ceramic industry it was found that the status of Brass & Bell Metal and Ceramic industry measured by the factors such as employment, investment and turnover

of capital and the status of livelihood is measured by the factors such as income and employment between the period (2017-18 to 2022-23) which is significantly changed during the period. It was also observed that the Employment and Turnover of capital are strong, significant predictors of income in Brass & Bell metal industry and in the Ceramic industry employment is the most impactful and significant predictor of income while, Investment and Turnover of capital have significant negative relationships with income these changed occurred due to adverse impact of COVID-19.

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