

## Wage-Labour Productivity Relationship in Manufacturing Sector of Odisha: An Observed Analysis

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**ABSTRACT:** We use a time series data of 1998-99 to 2008-09 from Odisha manufacturing Sector to describe the Wage-Labour Productivity Relationship. A unique feature of our analysis is the use of nationally representative establishment-level data from the registered (formal) segments of the Odisha manufacturing sector. To measure the relationship between wages and productivity of labourers, we have used the Stastical tool like coefficient correlation. The prescribed two variables taken are net value added (NVA) per worker and wages per worker. Here, we find positive correlation coefficient between the two said variables. Moreover, Net Value Added per worker(x) and wages per worker (y) are increasing and positively related but the growth rate of Net Value Added per worker is faster than the growth rate of wages per worker.

**Keywords:** Net value added, labour productivity, monetary incentives.

### I. INTRODUCTION

Odisha occupies an important position both in terms of deposit and production of many minerals. Vast and diverse mineral deposits of iron ore, coal and aluminium make Orissa one of the largest minerals bearing States in India. In fact the state boasts of 16.92% of the total reserves of the country. Mineral reserve of Orissa in respect of Chromite, Nickel ore, Graphite, Bauxite, Iron ore, Manganese and Coal is about 97.37%, 95.10%, 76.67%, 49.74%, 33.91%, 28.56% and 27.59% respectively of the total deposits in India. The large scale heavy industry segment include the industrial units that need massive capital investment and include iron and steel industry, aluminum, cement, ferromanganese, Ferro-chrome, galvanized pipe units, steel rolling mills, fertilizer plants and thermal and power projects. The manufacturing sector plays a greater role in the field of industrialisation of Odisha. But the important factor is to measure and verify the labour productivity in this manufacturing sector. This present study is an honest attempt to verify the relationship between wages and labour productivity in these said industries.

In our view, there are at least five theoretical arguments in favour of the view that causality may run not only from productivity to wages, but also in the opposite direction: from wage growth to labour productivity growth. These arguments are the following:

1. According to the theory of induced technological change, a higher relative wage rate increases the labour-saving bias of newly developed technology (Hicks, 1932; Kennedy, 1964; Ruttan, 1997).
2. According to Schmookler's (1966) 'demand-pull' theory, higher effective demand enhances innovative activity. In analogy, *Verdoorn's Law* suggests output growth to have a positive impact on labour productivity growth. All this implies that a strategy of wage cost reduction might impede innovation and labour productivity growth in the case that it leads to a reduction of effective demand.
3. Using vintage models, it is easy to demonstrate that more aggressive wage policies by trade unions will lead to a quicker replacement of old (and more labour intensive) vintages of capital by new and more productive ones. A policy of modest wage claims allows firms to longer profitably exploit old vintages of capital. This can result in a growing age of capital stock (which has been shown being one of the reasons behind the Dutch productivity crisis; see Naastepad & Kleinknecht 2004).
4. In the Schumpeterian theory of creative destruction, one can argue that innovating firms (compared to their non-innovative counterparts) can better live with aggressive wage claims by trade unions. Innovators have market power due to monopoly rents from unique product and process knowledge that act as entry barriers to their markets. Higher real-wage growth enhances the Schumpeterian process of creative destruction in which innovators push out non-innovators. Conversely, modest wage growth and flexible labour relations enhance the likelihood of survival of low quality entrepreneurs. While their survival is favourable for employment in the short-run, it leads to a loss of innovative dynamism in the end (Kleinknecht, 1998).

5. In standard neo-classical theory, an increase in the relative price of labour leads profit-maximizing firms to substitute capital for labour, shifting along a given production function, until the marginal productivity of labour equals the given real wage. Causality in this argument runs from relative factor prices to choice of technique and hence productivity of labour.

## **II. REVIEW OF LITERATURE**

A study made by Sugata Marjit and Saibal Kar (2007) in “Labour Productivity Growth, Informal Wage and Capital Mobility ,A General Equilibrium Analysis” tried to look at the impact of a growth in productivity of workers in the formal and informal sectors on the informal wage and employment. More productive skilled workers depress informal wage in the short-run, but do not affect it in the long run, when capital is fully mobile across sectors. If the productivity of unskilled workers in the formal sector improves, it may have drastically different impact on the informal wage in the short and the long run. Secular labour productivity growth in the informal sector may lead to lower wage for informal workers if capital mobility is restricted between the formal and the informal. They proved that higher productivity of skilled workers should not affect informal wage. More productive unskilled workers in the formal segment may help the informal workers in the short- run but definitely not in the long- run. Capital mobility plays a crucial role in our analysis.

Ashok Mathur and Sunil Kumar Mishra (2008) in a study of “Inter-Temporal Wage and Productivity Variations across Regions and Industries in India” studied regional wage differentials, wage variations across industries at the national level and interface of wage variations across regions and across industries. These differentials have been examined over time across the states and national level which are captured by the coefficient of variation of wages per worker and emolument per employee across states for different years. Correlation between wage per worker and productivity per worker was also calculated to have a better idea of concord between wage and productivity.

A study by Hina Sidhu (2008) in “Wage Disparities and Determinants of Wages in The Indian Industry” focused that wage disparities among different categories of workers have widened substantially within and across the industry groups. By establishing the linkages between labour productivity and wage rate, she argued that labour productivity is an important determinant of the wage rate. Arithmetic of wage and labour productivity relationship and the share of wages in the value-added were analyzed. To find out the relocation between the wage rate and labour productivity and to see the impact of technology on the wage rate; different regression equations were also examined. Lastly, she found from the comparative analysis of the coefficients of correlation between technology and wage rate vis-à-vis labour productivity and wage rate which revealed that in most of the industry groups, technology has a relatively greater influence on the wage rate. Thus it may be concluded that technology is a key determinant of wage rate in the industrial sector in India.

Lentz and Mortensen (2003) argued that productivity differences between firms are closely linked to wage dispersion, and the association between measured labor productivity and individual wages is by now also well documented. Gupta (1975) in his study of ‘Labour Incentive in Indian Iron and Steel Industry’ found that monetary incentives are best motivators which lead to better motivation and a higher labour productivity. Matthew (1983) stated, direct monetary benefits coupled with greater responsibility and autonomy in decision making is good motivators than other perks. However, the nonmonetary incentives are perhaps more important in the case of executives, particularly those in higher position.

## **III. ANALYSIS AND DISCUSSION**

For analysis of the relationship between wages and labour productivity in the manufacturing sector of Odisha, a time series data has been taken from 1998-99 to 2008-09. Most important Variables which have been taken for the observation are number of workers, wages to workers and net value added in particular year.

### **3.1 Steps in Measurement of Wage- Labour Productivity Relationships**

- i. From the source data, to get Net Value Added (NVA) per worker has been computed through dividing the Total Net Value Added with the total number of workers for a particular year.
- ii. To get wages per worker has been calculated through dividing total wages to workers with no. of workers for a particular year.
- iii. Then ,Correlation coefficient value (r) has been calculated from two variables as : Net Value Added per worker(x) and wages per worker (y)
- iv. When  $r = +1$  , it means there is a positive relationship between the variables but if  $r = -1$ , then there is negative relationship. When  $r = 0$  it means there is no relationship. The value of ‘r’ has been calculated from the following data source i.e. Table -1

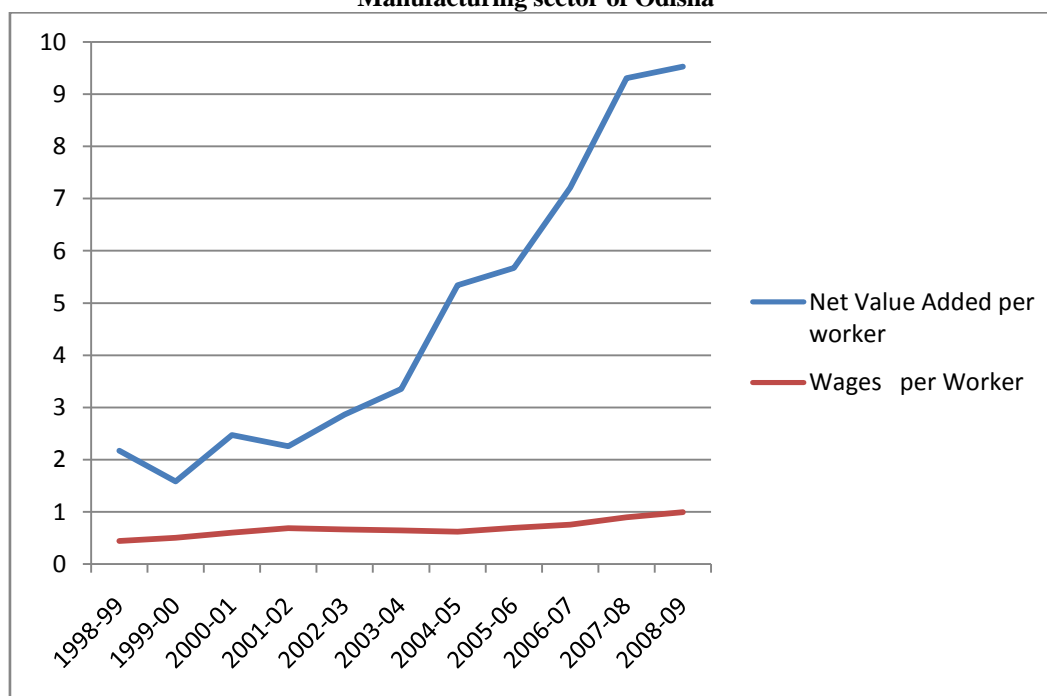
**Table – 1 Net Value Added Per Worker & Wages per Workers in Manufacturing Sector of Odisha (Values in Lakhs.)**

Year	No. of Units	Total Employees (no.)	Emolument to Employees	No. of Workers	Wages to Workers	Net Value Added (NVA)	NVA per worker	Wages per Worker
1998-99	1539	142053	76232.35	95669	42348	207581.52	2.1697	0.4426
1999-00	1616	125348	104353.58	94621	47395	149821.69	1.5833	0.5008
2000-01	1531	122955	115387.94	95211	57463	235441.38	2.4728	0.6035
2001-02	1623	112636	121874.39	86608	59397	195693.26	2.2595	0.6858
2002-03	1679	118187	100881.27	92686	61541	265625.64	2.8658	0.6639
2003-04	1536	121788	163914.51	96176	62194	322636.91	3.3546	0.6466
2004-05	1652	142834	159843.61	113410	70131	605784.53	5.3415	0.6183
2005-06	1743	149170	172977.54	112799	77834	639588.31	5.6701	0.6901
2006-07	1829	162558	214557.42	125195	94124	902270.94	7.2069	0.7518
2007-08	1745	184886	301565.36	145276	129957	1351149.69	9.3005	0.8945
2008-09	1848	213534	326453.33	175093	173653	1667405.71	9.5229	0.9917

Source: Annual Survey of Industries, 2008-09

To observe the trend of Net Value Added per worker(x) and wages per worker (y), the following Figure - 1 has been taken into account.

**Fig.-1 Trend of Net Value Added per worker(x) and wages per worker (y) in Manufacturing sector of Odisha**



From the above table it has been followed that both Net Value Added per worker(x) and wages per worker (y) are increasing and positively related but the growth rate of Net Value Added per worker is faster than the growth rate of wages per worker. According to the efficiency wage theory, high wage rate leads to more efficiency which in turn increases the productivity. A relationship between productivity and wage rate may arise through two routes, *firstly*, where a wage increase raises efficiency of workers and *secondly*, a wage increase improves efficiency of management. Though in conventional labour markets, reward depends on absolute performance in other markets it is said that it is relative and not absolute, performance which is rewarded. The relative contribution of each unit of labour differs from the other to the extent the human capital is embodied in the labour. This is similar to the neo-classical approach which links reward with productivity because a worker with more capital embodiment will be paid higher due to his higher productivity and contribution. Therefore to measure the relationship between wages and labour productivity as discussed, the following table -2 has been formulated.

**Table -2 Calculation of correlation co-efficient between Net Values Added per worker(x) and wages per worker (y)**

Year	(X)	(Y)	XY	X <sup>2</sup>	Y <sup>2</sup>
1998-99	2.17	0.443	0.96131	4.7089	0.196249
1999-00	1.584	0.501	0.793584	2.509056	0.251001
2000-01	2.473	0.604	1.493692	6.115729	0.364816
2001-02	2.26	0.686	1.55036	5.1076	0.470596
2002-03	2.866	0.664	1.903024	8.213956	0.440896
2003-04	3.355	0.647	2.170685	11.25603	0.418609
2004-05	5.342	0.619	3.306698	28.53696	0.383161
2005-06	5.671	0.691	3.918661	32.16024	0.477481
2006-07	7.207	0.752	5.419664	51.94085	0.565504
2007-08	9.301	0.895	8.324395	86.5086	0.801025
2008-09	9.522	0.992	9.445824	90.66848	0.984064
<b>TOTAL</b>	<b>51.751</b>	<b>7.494</b>	<b>39.2879</b>	<b>327.7264</b>	<b>5.353402</b>
<b>Correlation value = 0.883</b>					

**Source: Authors' Calculation**

It is observed from the above table -2 that the correlation co-efficient value is 0.883 which signifies in industries of Odisha wages to workers and labour productivity are positively correlated.

#### IV. CONCLUSION

It is concluded from the above study that in manufacturing sector Odisha, net value added has been increased with increase of wages or in another way wages to workers and labour productivity are positively correlated. On the basis of these findings, it can be said with reasonable degree of confidence that a well planned monetary and non monetary incentive schemes could be perceived positively and likely to increase motivation among the labourers and it leads to improving their productivity. As a result, employees remain more jobs satisfied and thus the schemes are able to increase the overall organisational success leading to reduction in employee absenteeism and percentage wastage. It is recommended that an emphasis should be given in formulating and percolating good non-monetary incentives like rewards, appreciation letters, and display names on notice board.

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