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Determinants of Labour Productivity in the Organised Textile Industry of India: A Panel Data Approach

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Abstract

The paper aims at identifying the major determinants of labour productivity in the organised textile sector of India using unit-level panel data drawn from ASI for the period 2007-08 to 2018-19. Based on the Hausman test results, the fixed effect model was more consistent, efficient and reliable than the random effect model for interpretation of results. The results obtained were consistent with economic theories and empirical literature. The skill, capital intensity, wages and capacity utilisation were the most significant determinants of labour productivity in the organised textile sector of India. This further substantiates the significance of all these variables in accelerating labour productivity. The conclusive relationship between wages and labour productivity recommends that textile firms should set up a productivity-based wages policy. Also, comprehensive skill development programs have to be developed for the entire value chain of the textile industry supported with technological advancement.

Key Words: ***Labour Productivity, Textile Sector, Panel Data, Skill, Capital Intensity, Wages, Capacity Utilisation***

1. Introduction

A sustained increase in productivity is a prime factor in economic growth. There is mounting theoretical and empirical evidence that productivity growth can accelerate economic growth and development. A developing country like India with surplus labour and a scarcity of capital is required to increase labour productivity for its rapid economic growth and development. However, developing countries have experienced negative growth in productivity for several decades due to inefficient utilisation of resources and poor labour productivity performance (Barik, 2009; Bhatia; 2018). Notwithstanding, an economy's ability to grow and develop is influenced by several factors that contribute to economic growth and development in the long run. Labour productivity deserves particular attention among these factors. One can attribute this to several reasons. Firstly, the percentage of labour input that makes up the labour cost of production is relatively high. Secondly, it provides a comparative analysis of the contribution of labour and capital in production. Thirdly, labour productivity is highly correlated with social welfare and standard of living. Fourthly, statistics on labour, including the number of people employed and hours worked are mostly available for conducting the research and analysis (Heshmati, 2009). Fifthly, per capita income in the economy is also determined by the rate of growth in labour productivity. Higher labour productivity also indicates better capital utilisation in the economy. Sixthly, the productivity of the labour force is a significant factor for determining competitiveness and providing better support for bargaining wage rates for workers.

Although labour productivity plays a multidimensional role, empirical literature shows that no concrete attempt was made to

estimate labour productivity in India. Sharma and Mishra (2009) and Kathuria (2010) point out that labour productivity issues are ordinarily underestimated in India. Receiving cognizance of this, we offer to fill this void by estimating and identifying determinants of labour productivity in the organised textile industry of India. Further, our study will be significant in getting inputs on determinants of labour productivity. Therefore, this study will help in identifying the factors determining labour productivity in the organised textile sector of India. Further, this paper will also be a potentially useful addition to the existing literature and policy debate for highlighting the issue of labour productivity.

The arrangement of the remaining paper is as follows. The review of previous studies is presented in section II. Section III highlights the details of the data used in the study. A brief description of the variables employed is provided in section IV. Section V provides the empirical framework of the study. Empirical results of the econometrics model are presented in section VI. Section VII discusses the major interpretation and inferences, while the last section VIII deals with the conclusion.

2. Review of Literature

Over the years, empirical literature and economic theory have explained that labour productivity is a critical variable for improving economic growth and living standards (Freeman, 2008). In a configuration with these, an effort was made by the researchers to identify the determinants of labour productivity. Ghosh and Neogi (1993) examined the influence of technology on the productivity of labour in the formal manufacturing sector of India. The study used data gathered by a CSO of Annual Survey of Industries for the period 1974-75 to 1986-87. According to the study, labour productivity is strongly correlated with capital-labour ratio and skill intensity. Also, statistically significant positive effects of labour productivity were found with firm size. Madden and Savage (1998) attempted to delve into the causes of change in labour productivity in Australia from 1950-51 to 1994-95. Their model measures both the short-run and long-run labour productivity using the multivariate cointegration method. Results of the study revealed that, in the short run, labour productivity is determined by the capital intensity, investment in information Technology, R & D and trade liberalisation in Australia. However, capital accumulation and investment in Information technology were the dominant sources of productivity of labour in the long run. A longitudinal sample of 3035 Greek manufacturing companies was utilised by Papadogonas and Voulgaris **(2005)** to estimate the factors affecting labour productivity. Regression results support the hypothesis that export orientation, net fixed assets per employee and research and development activity of the firm affect labour productivity positively. Further, the study reveals that technological advancements are associated with higher output per worker. Rath and Matheswarm (2005) examined the nexus between inflation, labour productivity and economic growth in the organised manufacturing sector of India for the period 1960-1961 to 1991-1992. The study found that economic growth and labour productivity has a significant and positive relationship. The relationship between inflation and labour productivity, however, was negative and insignificant. The influence of human capital on labour productivity and earnings in Kerala's unorganised coir yarn industry was examined by Raj and Duraisamy (2008). Primary surveys were conducted among 188 coir yarn manufacturing enterprises. According to the analysis, education and labour productivity were positively correlated. The results show workers with primary and secondary education were more productive than those without formal education. A Mankiw Earning Function revealed that labourers with higher education levels had higher earnings than their counterparts.Kumar (2002) applied multiple-regression analysis and found that man-days lost and growth of

capital intensity was the significant variables in determining the labour productivity. Sahoo (1995) audited the factors determining regional productivity and discovered that the size of the firms, skilled manpower and wage rate were positively related to labour productivity. A study by Kathuria et al. (2013) detected that paucity of capital per worker and impeded access to formal credit was the dominant reasons for depressed labour productivity in India.

3. Data

The study used the highly reliable Annual Survey of Industries data published by a Central Statistical Organisation. It provides quantitative data describing the economic characteristics of industries on various variables. Over the years, ASI has adopted different sampling designs. The new ASI sample design for 2015-16 consists of a central sample and a state sample. Furthermore, the central sample is divided into two patterns, namely census and sample.Since we have used the panel data methodology in the estimation of our result, we have used only census sector data of textile plants in our study. The raw data consisted of 36000 thousand observations over 10 year period for the 2007-08 to 2017-18. To streamline the data, two steps were taken. First to remove all the observations which had missing values and second, remove all the observations of plants those were not operating for more than 10 months in each year. Since the textile plant differs in the volume of output, sales, employment, fixed capital, etc, there were also certain extents the problems of outliers in data. However, we have followed Bollard et al (2013) to deal with the problems of outliers. Bollard et al. (2013) suggested that the influence of outliers can be reduced by "winsorized" methodology where for each year and each variable the outliers can be replaced by 5 % tail (bottom 1% tail) with the value of the 95th (1st) percentile of that variable. Another confrontation generally encountered by the researcher in ASI data is dealing with the complication of differentiating between entering and exiting firms. Since the two kinds of plants are expected to have contrasting dynamics. The new firms are believed to enjoy the edges of better technology while existing old firms are well-established firms who may have advantages in terms of apathetic learning and effective exploration. Under such circumstances, the probability of the outcome is expected to be different. However, in our data, such a problem is not encountered since we have only taken firms which are established before 1995.

Further, ASI provides data at current prices, therefore they do not account for price fluctuations. The data at constant prices is a more appropriate measure for comparing production patterns across time and industries. Thus, the data obtained at the current price is deflated using a suitable price index. The current study adjusts the data for price fluctuations by using several different price indices. Economic Advisors, Minister of Commerce and Industry, Government of India provide the wholesale price index for deflating the Gross Value-added data for the base year 1993-94=100. Total emoluments, salaries, wages were deflated using the consumer price index (General) for industrial workers published by the Labour Bureau, the Government of India (base year 1993-94=100). The RBI uses a similar deflator for fixed investment (base year 1993-94=100), which uses the WPI for machinery and tools. The splicing index numbering technique is used to construct arithmetical price index series. Splicing Index can make a huge impact when data over a long period is deflated with the base year (Prasad, 2006).

4. Description of the Variables

This section provides a summary of the key variables and their measurement.

Labour Productivity: Labour productivity is calculated by dividing a firm's real gross value added by the number of employees. Labour productivity is the dependent variable in the model.

Output: Nominal gross output is deflated by the wholesale price index to calculate the output.
Real wage: Inflation-adjusted gross wage for industrial workers, 1993/1994=100.
Capital Intensity: Capital intensity is measured as the proportion of fixed capital to employees in a firm.
Capacity Utilization: The ratio of gross output to productive capital, as quantified by Badrinarayan, (2008) and is interpreted as a proxy for technological adoption.
Skill Intensity: Skill intensity is considered as a proportion of skilled workers in total employment. The employment of the supervisory and managerial staff is deemed as a proxy for skill intensity.
Welfare Expenditure: The disbursement of the fringe benefit to the employees apart from their salary is ordinarily identified as staff welfare expenses.

5. Empirical Framework

Using five variables, the determinants of labour productivity have been examined in this study.Specifically, we propose estimating the following model:

$$lnLP_{it} = \beta_0 + \beta_1 lnWages_{it} + \beta_2 lnCI_{it} + \beta_3 lnCU_{it} + \beta_4 lnSkill_{it} + \beta_5 WelExp_{it} + U_{it}(1)$$

Where,
lnLP = Log of Labour Productivity, lnWages = Log of Wages per employee, lnCI = Log of Capital Intensity , lnCU = Log of Capacity Utilisation,lnSkill = Log of SkilllnWelExp = Log of welfare expenditure.

6. Empirical Results

In this part, we have presented the result and interpretation of the determinants of labour productivity.

Table 1 *Panel Regression Results of Fixed effect and Random effect Model*

Dependent Variable – Log of Labour Productivity		
Independent Variable	Fixed Effects Model (With-in)	Random Effects Model
$lnWages_{it}$	0.27***	0.12***
	(0.0065)	(0.0065)
$lnCI_{it}$	0.11***	0.09*
	(0.0020)	(0.0020)
$lnCU_{it}$	0.18***	-0.18*
	(0.0047)	(0.0047)
$lnSkill_{it}$	0.37***	0.25**
	(0.0094)	(0.0094)
$lnWelExp_{it}$	0.06**	0.19*
	(0.0035)	(0.0035)
Constant	0.11**	0.08**
	(0.0620)	(0.0620)
Number of Group	2854	2854
Observations	28540	28540
F-test(model)	8632.24 (0.002)	8632.24 (0.004)
R-squared	0.19	0.11
Hausman Test	17.67 (0.003)	

Source: Author's own calculation
Note: *(1)* Robust standard errors in parentheses below the coefficients (2) Parentheses around F-statistics represent probability values. (3)Hausman specification test contains parentheses that indicate the probability value. (4) *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent

The F-statistics for the model, shown in Table 1 is eminently significant at one percent, showing that the model is adequately defined. The fixed-effect model

does not differ much in terms of the coefficients from random effect, although significant levels differ in the two models. The Hausman test rejects the null hypothesis at a one percent significance level, that individual effects are not correlated with regressor and therefore we accept the fixed effect model. The robust standard errors are applied to deal with the problems of autocorrelation and heteroskedasticity.

The coefficient of the fixed-effect model reveals that all coefficients of the explanatory variables are positive at the 1 percent significance level. It means that all the variables included in our model significantly determine the labour productivity in the organised textile sector of India. Since the model is specified in the log-log form, coefficients are directly interpreted as elasticities. Skill intensity emerges as the most remarkable determinant of labour productivity where, ceteris paribus, if skill intensity is increased by 1 percent, the labour productivity will grow by 37 percent. As per our, a *priori* expectation, capacity utilisation has emerged as the effective coefficient. The responsiveness of labour productivity to capacity utilisation, *ceteris paribus*, is 18 percent when there is a 1 percent increase in capacity utilisation. Thus, we can conclude that the presence of skilled workers contributes to better capacity utilisation. Similarly, the capital intensity coefficient is positive and statistically significant at a 1 percent significance level. A change in 1 percent capital intensity, all other things being equal, increases labour productivity by 11 percent. Wages are also turn out to be the important factors in determining labour productivity. It is found that the increase in wage rate, by 1 percent, *ceteris paribus,* will increase the labour productivity by 27 percent. Lastly, the welfare expenditure coefficient is positive and significant at 1 percent, but it does not offer a substantial influence on labour productivity in the organised textile sector of India. With the increase in 1 percent of welfare expenditure, labour productivity rises only by 6 percent.

7. Inferences from Study

We can draw some inferences about labour productivity by looking at the empirical results.

- The study reinforces that the noticeable skill development programs such as scheme for capacity building, integrated skill development scheme for the textiles and apparel sector including jute and handicrafts, national skill development that are carried out by the government are yielding the positive outcome.
- Increment in wages contributes to a congenial accord between management and labourers. Wages galvanise the labours to established stronger relationships with management and provide impetus to boost their productivity.
- Capital intensity reflects the degree of mechanisation by contributing to labour productivity. This implies that the organised textile sector of India is getting more mechanised in recent years.
- By optimising capacity utilisation, overall costs can be minimised to produce textile products at the lowest possible price and to compete on the international market. Additionally, better capacity utilisation will allow surplus labour to be absorbed, which will boost employment.

8. Conclusions

In this paper, an attempt was made to investigate the determinants of labour productivity in the organised textile sector of India. By applying the methodology of the panel data for the period of 1998-99 to 2019-20, we were able to identify determinants of labour productivity. The finding will supplement the existing literature as mostly the determinants of labour productivity are neglected topics in India. A result provides high acceptance that all the variables included are important in determining the labour productivity in the organised textile sector of India. We would

like to conclude our paper with few suggestions. The conclusive relationship between wages and labour productivity recommends that textile firms should carry out the productivity-based set up of wages policy. The government should encourage the firms to award higher wages by promoting some preferential policies for textile firms. There is a need to make a massive investment in other segment of textile such as weaving, power loom and handlooms to boost the labour productivity. Modernisation programmers have to be undertaken to overcome the problem of obsolete types of machinery. It is recommended that a comprehensive skill development program have to be developed for the entire value chain of the textile industry supported with technology advancement. The existing training institutes should be modernised and the minimum industry-institute interface should be a priority at the national and international level. There should be a continuous process of skilling, re-skilling and multi-skilling and skill modulation

9. Reference:

[1] Bhatia, D.P. (1990). Productivity in Manufacturing Sectors of India, UK and US: Estimates and Comparisons. *The Indian Economic Journal*, 38(2), 100-120.

[2] Ghosh, B. & Neogi, C. (1993). Productivity Efficiency and New Technology: The Case of Indian Manufacturing Industries. *The Developing Economies*, 32 (3), 308-28.

[3] Heshmati, A. (2009). Productivity Growth, Efficiency and Outsourcing in Manufacturing and Services. *Journal of Economic Surveys*, 17(1), 79-112.

[4] Kathuria, R. R. (2010), Fluctuating Productivity Performance of Unorganised Manufacturing in the Post-1990s, the *Indian Journal of Labour Economics*, 47 (3), pp. 285-301.

[5] Kathuria, R. R. (2013). Organised Versus Unorganised Manufacturing Performance in the Post-Reforms Period. *Economic and Political Weekly* , 49 (1) 55-64.

[6] Kumar, Sunil (2002). Regional Variations in Labour Productivity Growth in Indian Manufacturing Sector. *Anvesak*, Vol. 32 (2), 111-136.

[7] Madden G. and Savage, S.J. (1998). Sources of Australian Labour Productivity Change, 1950-94. *Economic Record*, Vol. 74 (1), 362-83.

[8] Papadogonas.T. &Voulgaris, F (2005). Labor Productivity Growth in Greek Manufacturing Firms, *Operational Research*, 5(3): 459-472.

[9] Pradhan, G. and K. Barik (1998). Fluctuating Total Factor Productivity in India: Evidence from Selected Polluting Industries, *Economic and Political Weekly*, 33 (9), M25-M30.

[10] Prasad, A.C.H. (1997). India's Competitiveness in Export of Garments in the MFA Phase-out and Post-MFA Phase-out Periods. *Occasional Paper No. 10*, Indian Institute of Foreign Trade, New Delhi.

[11] Raj, R., Natarajan S,.Duraisamy D,. (2008). Efficiency and Productivity in Indian unorganized Manufacturing sector: did reforms matter?,*International Review of Economics* 55 (6) 373-379.

[12] Sharma, M. (2009), Infrastructure and Labour Productivity. *The Indian Journal of Labour Economics*, 45 (5), 315-323.

[13] Sahoo, S. (1995). Determinants of Regional Productivity Disparities in Organized Factory Sector in Orissa: An Econometric Analysis. *Indian Journal of Regional Science*, Vol. 27 (2), 171-181.

[14] Upender, M (1996). Elasticity of Labour Productivity in Indian Manufacturing. *Economic and Political Weekly,* 16 (1), 243-256.