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LABOUR EMPLOYMENT AND INPUT SUBSTITUTION IN THE NIGERIAN MANUFACTURING SECTOR

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SUMMARY

THIS paper investigates labour employment in the Nigerian manufacturing sector within the framework of input substitution possibilities. Labour is stratified into skilled and lowly skilled labour. Using a flexible functional form, the translog, in modelling the input demands (cost shares), it is discovered that weak substitution possibilities exist for all inputs used in the sector. Technological rigidities, which are reflected in low (generally less than unity) coefficients of elasticity of substitution, exist and inhibit the rapid factor substitution and technological transformation. Given the low own- and cross-price elasticity coefficients, increase in wage rates may be a good income policy for workers in the sector, but wage reduction will not significantly increase labour employment. The lowly skilled labour currently dominates the workforce in the sector and elasticity of substitution coefficients computed revealed that increase in factor prices would enhance the employment of more of lowly than highly skilled workers.

1. INTRODUCTION

DEMAND for production inputs is a derived demand that depends conditionally on the prices of inputs and output. Input demand can also be linked up with the prices of output of the input-using industry – a case of specification of unconditional demand for input – since ultimately, it is the profit situation (determined by output price mostly) that drives the decision to employ any input. The input and output prices notwithstanding, demand for inputs is also significantly influenced by the level of inter-factor substitution possibilities open to any producer. Thus, the fungibility of technology is also important in the determination of factor demand.

For sound pursuit of human resource development one must also consider the structure of demand for labour. It is only reasonable that labour demand should take into account both the market and technological variables that influence it. Although human capital is a very important component of economic resources, the actual contribution of human capital to economic growth and development is realized in the use (employment) of such human capital in production economic activities. The share of labour in the national income depends on the quality and quantity of labour force employed besides the institutional factor affecting the setting of wages and salaries within any economy. The size of labour employed in the economy is determined by among other things, the wage rate, and the level of output and input substitution possibilities.

There is need to analyse a typical labour demand function in Nigeria. This paper is an attempt in that direction. The choice of the manufacturing sector is predicated on the revolutionary role of manufacturing as engine of economic development, and partly on the availability of data that can guarantee the required analysis. The paper, therefore, provides answer to the question of what determines the employment of skilled and unskilled labour? Specifically, the answer to the question is sought within inter-factor substitution and the logical effect of such relationships for the demand for specific labour types.

The paper is subsequently subdivided into four sections. Section 2 is devoted to the theoretical framework and section 3 is concerned with discussion of method and model used for the analysis. The empirical results are presented and discussed in section 4. The last section, presents some concluding remarks on implications of the results on labour employment.

2. THEORETICAL ISSUES ON LABOUR INPUT DEMAND

ANALYSIS of labour demand is better done within a framework of general input demand so that the effect of relationships between labour and other inputs can be observed. There are many factors that determine labour demand (employment) in any organization. These include institutional factors such as wage rates (set in the market institution) and output prices, and technological factors, which include technological constraints that set limits to substitution among inputs. Since labour demand is derived from the demand for goods and services produced with the use of labour, its employment depends crucially on the profitability of production. But relating labour demand with the profit function actually implies the relationship between labour demand and wage rate. This is because profit maximisation rule can be partitioned into two stages, the first stage involves determining least cost of producing a set of output, and the second entails obtaining the profit-maximising output set. The profit maximising demand for any factor input, is by duality, the cost-minimising demand for such input required to produce the profit-maximising level of output (Chamber, 1988). Thus, information pertaining to input demand can be derived from the production function or, by duality, the cost function as well as profit function.

The inter-factor fungibility, that is the case of unimpaired possibilities of substitution among factor inputs in a production function, is also an important consideration in the determination of factor demands. Although the neo-classical production function assumes, for mathematical convenience, a smooth factor relationship with continuous substitution possibilities, the technical factor combination possibilities open to the firm are not necessarily smooth, or even nearly so. But then, factor combination is such that the firm's ability to substitute some factors for others and the constraints facing such substitution affect the level of employment of the inputs.

Employment of labour as affected by factor substitution has been at the centre of early neo-classical production models such as Cobb-Douglas (1928) and Arrow, et al (1961) which were particularly interested in tracing the effects of labour-capital substitution on employment. Following the impact of high prices of mineral resources, especially the energy input minerals, the scope of the study of the consequence of factor substitution on input demands has been expanded. Such researches, however, have devoted their efforts to energy and mineral demands in mostly developed economies whose economic performances were hard hit by the rise in prices of mineral energy, particularly petroleum fuels. These studies include, among others, Berndt and Wood (1975), Griffin and Gregory (1976), Pindyck (1979) and Halvorsen and Ford (1979). Humphrey and Moroney (1975) were

interested in the effects of substitution on the demand for capital, labour and natural resources.

Evaluation of factor demand under a general input demand model reveals some facts about the influence of other factors on the demand for a particular input. The knowledge of factor complementarity and substitution is very important in the prediction of input combination in the production process as the relative prices of factor change, with serious implications for employment (Brownson, 1989). However, despite the degree of substitution that may exist among factors, the use of any input is also influenced by the adjustment costs in the process of altering factor composition within the firm (Hamermesh and Pfann, 1996). Adjustment costs include production disruption due to reassignments, search costs, and training costs and the associated loss in productivity due to waste of time. In terms of labour demand, the additional costs of adjustment would include severance payments and increase in retirement overhead (Hamermesh and Pfann, 1996). Nevertheless, the willingness to bear the adjustment costs would depend on market performance of the firm's output which is measured by the prices of the products. For instance, professionalization of a production process may lead to substitution of highly skilled labour and modern machines such as computers for lowly skilled labour class and could be very profitable ultimately. However, consideration of such large-scale overhauling of the production process will include detailed evaluation of the costs and returns, waiting time for the adjustment, and community relations implications for the entire firm compared to the *status quo ante*.

3. MODELLING OF LABOUR DEMAND

ANALYSIS of labour demand can be done using many functional forms – from the simple Cobb-Douglas to constant elasticity of substitution (CES), on to the generalized Leontief and the transcendental logarithmic (translog) models. For this analysis, it is the translog which is used to model the demand for labour. Some of the strengths of the translog modelling that make for its use in this study include, its flexibility and its ability to provide direct estimates for input price elasticities and elasticity of substitution, allowing also for the test of their statistical significance.

The basic economic principle behind modelling is the existence of duality between the production and cost functions. Thus, given an admissible production function, a cost function dual can be derived from it and vice versa. In terms of ease of data collection, there is an advantage in working with cost function since information for its estimation can easily be extracted from accounting records of any organization or sector. This paper, therefore, uses the cost function approach of translog modelling to derive the input demand equations.

With the existence of duality, a total cost function, C, can be used to derive technological

characteristics of the production function dual. Hence with C the information concerning inputs used in the production process can be investigated.

Given the cost function, $C = C(P_i, Q)$, the translog form is represented as:

$$\ln C = \dot{\alpha}_Q + \sum_{i=1}^{n} \dot{\alpha}_i \ln P_i + \dot{\alpha}_q \ln Q + \tfrac{1}{2}\left[\sum_{i=1}^{n} \gamma_{ii} (\ln P_i)^2 + \gamma_{qq} (\ln Q)^2\right] +$$

$$\sum_{i=1}^{n} \sum_{j=1}^{n} \gamma_{iq} \ln P_i \ln P_j + \sum_{i=1}^{n} \gamma_{iq} \ln P_i \ln Q \quad \ldots \quad \ldots\ldots \quad \ldots(1)$$

$$\sum \dot{\alpha}_i = 1; \sum \gamma_{ij} = 0; \ \gamma_{ij} = \gamma_{ji}$$

Where P_i = price of input i [i = capital (k), Skilled labour (s), lowly skilled labour (u), energy (e), and materials (m)];

$\dot{\alpha}_i, \gamma_{ij}, \gamma_{iq}, \gamma_{qq}$ = estimable coefficients

The input demand can be technically derived from the cost function above with some economic assumptions. First we take the partial differential of the cost function with respect to the input prices. That is,

$$\frac{\partial \ln C}{\partial \ln P_i} = \frac{\partial C}{\partial P} \frac{P_i}{C} \quad \ldots \quad \ldots \quad \ldots \quad \ldots(2)$$

Applying the Shephard's Lemma, that is $\partial C/\partial P_i = X_i$ (X_i = physical input i used in the production process), then equation (2) can be rewritten as:

$$\frac{\partial \ln C}{\partial \ln P_i} = \frac{\partial C}{\partial P_i} \frac{P_i}{C} = \frac{P_i X_i}{C} = \frac{P_i X_i}{\sum P_i X_i} = S_i \quad \ldots \quad \ldots \quad \ldots \quad \ldots(3')$$

Equations (3') are the cost share of factor i in the total cost outlay and is usually a proper fraction. The input demand characterizations are estimated from this equation and the relations represented in equation (3') are sometime referred to as input demand function (Fuss, 1987). The sum of S_i is equal to one (*i.e.*, $\sum S_i = 1$). This has some implication on parameters to be estimated. The unity sum of S_i means that the coefficients of the *nth* equation among the S_i (i = the list of inputs) can be recovered directly because of the linear relationship. Thus, it is only necessary to estimate the coefficients for (n-1) equations. The set of equations (3') can be explicitly represented in translog form as:

$$S_i = a_i + \gamma_{ii} \ln P_i + \sum_{j=1}^{n} \gamma_{ij} \ln P_j + \gamma_{iq} \ln Q \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

In analysing input demand, like labour, the set of equations (3) are estimated. (As there are five separate inputs, there are also five cost share equations.) From there the input price elasticity and elasticity of substitution are estimated. For the price elasticity coefficients the following formulae are used:

$\eta_{ii} = (\gamma_{ii} + S_i^2 - S_i)/S_i$; for own price elasticity coefficients;

$\eta_{ij} = (\gamma_{ij} + S_iS_j)/\ S_i\ (i \neq j)$; for cross elasticity coefficients.

The elasticity of substitution coefficients are estimated using the formulae:

$\sigma_{ii} = (\gamma_{ii} + S_i^2 - S_i)/S_i^2$, or η_{ii}/S_i

$\sigma_{ij} = (\gamma_{ij} + S_iS_j)/\ S_iS_j$, or $\eta_{ij}/S_j \quad (i \neq j)$.

These formulae have been used by many studies – Halvorsen (1977), Pindyck (1979) and Berndt (1991), among others – in estimating factor demand and the associated economic effects.

Data Used in the Study

The data requirements are mostly met through the Federal Office of Statistics (FOS) data supply. The cross-section data on the manufacturing sector is used. Of about one thousand firms whose information were made available, only 377 had complete data required for the analysis. This was particularly due to the breaking down of labour into highly skilled and lowly skilled. For some firms, information on labour was not stratified and so they were left out of the analysis. However, the data used in final analysis were checked and ascertained to be quite representative of the entire sector.

Derivation of data on variables used in the estimation was done making use of some relevant economic principles. Wage rate was derived using the assumption that workers on average put in 8 hours daily or 2080 hours per year. The wage rate is quotient of total wages and labour expenditure to the total number of workers times average number of hours worked per year.

The price of capital is not wholly based on information given by the firms' data. The user's cost of capital (U_K) is extraneously derived with the method that Mlambo (1993) and Woodland (1993) adopted using the formula:

$$U_K = P_i(r + \sigma)$$

P_i = investment goods price index
r = interest rate
σ = depreciation rate

The nominal interest rate was used instead of real interest rate. This is because for some year's real interest computed turned out to be less than zero. Alameda and Mann (1989) used nominal prime lending rate for similar computation. The price of investment goods was proxied by index of producer's price for the respective sub-sectors in the manufacturing sector. Many firms did not report

depreciation so the sub-sectoral averages were used for those that did not give any information on depreciation.

For energy price, the calculation was done in naira for tons of oil equivalent. The average price was thus calculated. Pindyck (1979), Moroney and Toevs (1979) and Woodland (1973) have used the method. The price of materials was derived by considering the average of imported and local raw materials used by firms. Many firms did not report the ratio of domestic to imported raw materials that they used. So the estimate was guided by the Manufacturers Association of Nigeria and the Central Bank of Nigeria (CBN) assertions that small-scale firms use more domestic raw material than the large-scale firms. Hence, it is assumed here that small-scale firms, on the average, use 60 per cent domestic raw materials and 40 per cent imported materials, while this ratio is reversed for the large-scale manufacturers. The material price was then compiled using these ratios with the producer's price index representing the price of domestic raw materials and import price index, the price of imported raw materials. Nevertheless, because of the linearity of the sum of cost share, the cost share of materials was not estimated directly but its coefficients were recovered systematically.

The quantity (output) index was derived, as Woodland (1993) did, by deflating sales with price indices. But while Woodland used the consumer composite price index to uniformly deflate sales, this paper uses sub-sectoral price indices to derive the output index.

4. Stylized Facts and Empirical Analysis

Macro-economic information concerning labour employment is sparse and deficient in details. Most of the data published by the FOS and CBN is based on sectoral surveys. With various problems that have impaired a successful population census, labour analysis has been relying on the surveyed data. Nevertheless, some care was taken in making use of the manufacturing survey of labour employment by using the sectoral means or average values per manufacturing establishment.

Table 1 shows the trend of average employment per firm. From the data provided, labour employment per firm has been declining at an average rate of 4.2 per cent annually during the period 1980 – 1996.

Table 1 Labour Employment Indicator

Year	Average No. of Employees per Firm	Change in Employment	Average Earnings per Employee	Changes in Earnings	Labour Earnings to Value Added (%)	Interval Average of Labour Earnings to Value Added
1980	154		2498		20.19	21.07
1981	169	9.59	3265	30.71	21.48	
1982	172	1.84	3249	-0.50	20.90	
1983	168	-2.00	3346	3.00	22.77	
1984	160	-5.22	3401	1.63	20.42	
1985	153	-3.86	3673	8.01	20.68	
1986	111	-27.36	3571	-2.78	16.34	11.11
1987	87	-22.09	4007	12.20	11.42	
1988	69	-20.56	7000	74.68	9.01	
1989	72	4.35	7510	7.29	10.50	
1990	71	-1.39	9000	19.84	9.44	
1991	74	4.23	9156	1.73	12.12	
1992	77	4.05	10706	16.93	10.10	
1993	83	7.79	26666	149.08	9.94	
1994	76	-.43	28919	8.45	11.23	10.95
1995	73	-3.95	26666	-7.79	11.54	
1996	75	2.74	29685	11.32	10.09	
Average		-4.20		21.50		

Source: Calculated with data from: Federal Office of Statistics (various years) *Annual Abstract of Statistics*, Lagos.

Some of the reasons responsible for this are:

(a) High cost of imported raw and intermediate materials due to exchange rate deregulation combined with high inflow of imported manufactures have resulted in drastic reduction in domestic manufacturing capacity utililsation. This has had a negative effect on labour employment in the sector since labour lay-off is one of the immediate policies taken by any firm to contain a downturn in the business cycle.

(b) High costs of energy, communications and other infrastructural inputs due to inefficiency in publicly supplied sources have exacerbated the reduction in production capacity utilization. This has worsened the fallen level of labour employment in the sector.

(c) Besides the above reasons, rising wage rates for all categories of labour, especially since the dawn of 1990s (see Table 1) has also accentuated the fall in employment of labour in the sector.

Although nominal earning has been growing throughout the period covered in Table 1, it was spectacularly at increasing rate in the 1990s. In response, average number of employee per firm which

used to be above 100 workers before SAP fell to an average of about 76 workers. Another issue worthy of note is that although the nominal earnings per employee have been on the increase, the share of labour income in the manufacturing value-added has been falling. (See also Table 1 for the trend in the labour earnings to value-added.) This fall in labour share in the value-added in the sector is due to the general reduction in labour employment in manufacturing firms and also because manufacturing output prices are rising at faster rate than the rise in wages thus protecting the profits and eroding labour share in the value-added.

It is not only in the share of labour in the value-added that allocation of value to labour has been declining. The cost share of labour in the total cost outlay has also portrayed that labour on the average accounted for relatively lower share in the total costs compared to capital and materials. Although the cost share of labour has been consistently lower than those of capital and materials, there has been marginal increase in the cost share of labour between 1988 and 1995 from 10.4 per cent to 15.4 per cent, with an average of 1.8 percent during the period.

But the averages for capital and material during the period were 49.9 (50) per cent and 32.3 per cent, respectively (Akpan, 2001).

Another peculiarity concerning labour employment in the manufacturing sector is that both in numerical strength and the proportion in labour cost and total cost shares the lower skilled workers dominate the sector. For instance, in 1991 and 1992 the cost shares of low skilled labour were 8.74 and 8.71 per cent, as against 7.11 and 6.91 per cent for the skilled workers in the two years, respectively. The explanation for this may be that the sector's plants are mostly operated by lowly skill factory floor workers. For most manufacturing plants there are very few highly skilled workers whose operations are mostly to draw up broad objectives, set production goals for the firms and offer supervisory management services. The main physical operations of the manufacturing activities are in the hands of the lower skilled workers. This mode of staffing has serious negative implications on the development and sustenance of the Nigerian manufacturing sector and of the development of manufacturing manpower.

For the sector as a whole, the manpower employed presently is weak, in composition and lacking in technical know-how to research into better techniques of manufacturing. Also because the staffing tilts toward lowly skilled labour, there may not be any pressure for retraining and skill development along the

specific manpower need of the sector. Thus, the cost-saving method of staffing employed in the sector is also contributing factor to the technological crisis in the sector.

Labour employment in the manufacturing sector is seriously affected by the rigidities in the sector's technology. The manufacturing sector is observed not to be adjusting rapidly to changes in the prices of factors. This is demonstrated in the inelastic coefficients of both the own and the cross-price elasticities. Generally, change in the price of any factor including labour of all categories, leads to less than proportionate effect on factor hiring. The own-price elasticity coefficients all bear the correct sign, negative. The cross-price elasticity coefficients show that all inputs in the manufacturing sector are weak substitutes. This is possible given the fact that cross-sectional data used in the analysis usually capture the long-run effects. Thus in the long-run factor employment in the sector has a tendency for substitution although at limited scale given the low values (less than unity) of the price elasticity coefficient.

With particular reference to labour, the own-price elasticity coefficients for both the skilled and unskilled labour are about the same range 0.55 and 0.53 respectively. Compared to energy and materials, labour demand is more inelastic. Even though capital and the two categories of labour are weak substitutes, the effects of change in the user's cost of capital on labour employment are greater than the effects of change in wage rates on the demand for capital. (The values of η_{sk}, η_{uk} are greater than η_{ks}, η_{ku}, see Table 2.)

The reason for labour employment being a little more flexible compared to capital has to do with the adjustment costs associated with the use of such inputs. Generally, capital input acquisition takes many more things into consideration than does labour employment The extra cost associated with new capital acquisition include order cost, waiting period, employment and training of specialized workers to man such machines and equipment, and sometimes the search for suitable raw materials that the new capital stock can process. It is such costs that define the relative variability of factor inputs: the lower the adjustment cost the higher the own price elasticity of demand for an input, and the more variable the factor would be relative to others. Again, the more variable inputs will respond more to change in the prices of related and relatively fixed inputs than the latter set of inputs will respond to change in prices of the former. This means that cross price elasticity coefficients of input demand can be used to speak about the associated adjustment costs and relative variability of factor inputs

Table 2 Estimates of Regression Coefficients and Coefficients of Elasticities

Regression Coefficient Symbol	Regression Coefficient Estimate	t-value	Price Elasticity Coefficient Symbol	Coefficient of η_{ii}, η_{ij}	t-values for η_{ij}, σ_{ij}	Elasticity of Substitution Coefficient Symbol	Coefficient of σ_{ij}
a_k	0.2219	4.0175	η_{kk}	-0.4924	-	σ_{kk}	-1.0224
a_s	0.3011	18.8652	η_{ks}	0.0572	13.2944	σ_{ks}	0.8159
a_u	0.3662	21.2375	η_{ku}	0.0496	11.1809	σ_{ku}	0.7068
a_e	0.0745	7.7723	η_{ke}	0.0379	5.0004	σ_{ke}	1.0327
a_m	0.0363	2.4906	η_{km}	0.3477	6.9912	σ_{km}	1.0722
					77.5937		
γ_{kk}	0.0125	0.7032	η_{ss}	-0.5531	-	σ_{ss}	-7.8890
γ_{ks}	-0.0062	-2.5226	η_{su}	0.0691	16.0468	σ_{su}	0.7910
γ_{ku}	-0.0182	-3.8094	η_{se}	0.0068	2.4654	σ_{se}	0.1850
γ_{ke}	0.0006	0.2215	η_{sm}	0.3003	0.4604	σ_{sm}	0.9260

γ_{kq}	0.0242	4.9168	η_{es}	0.0130	0.4604	
γ_{sq}	-0.0244	-	η_{ms}	0.0649	33.6433	
γ_{uq}	-0.0235	16.4146	η_{eu}	0.0911	2.9943	
γ_{eq}	-0.0048	-	η_{mu}	0.0436	1.0409	
γ_{mq}	0.0285	15.4110	η_{me}	0.0360	9.4060	
		-5.2283				
		8.2556				

Note: . The t-value for the η_{ij} = t-value for the η_{ji} = t-value for σ_{ij} [the proof has been demonstrated in Akpan (2001)]; and $\sigma_{ij} = \sigma_{ji}$

Source: *Author's Computation*

γ_{km}	0.0113	5.2241	η_{uu}	-0.5291	33.6433 - 16.1934	σ_{uu}	-6.0604
γ_{ss}	0.0264	10.9319	η_{ue}	0.0383	2.9943	σ_{ue}	1.0438
γ_{su}	-0.0013	-0.6513	η_{um}	0.1620	1.0409	σ_{um}	0.4995
γ_{se}	-0.0021	-2.0280	η_{ee}	-0.9196	-	σ_{ee}	-25.0606
γ_{sm}	-0.0017	-2.6887	η_{em}	0.3182	38.5690	σ_{em}	0.9811
γ_{uu}	0.0335	11.7410	η_{mm}	-0.6609	9.4060 - 100.906	σ_{mm}	-2.0379
γ_{ue}	0.0001	0.1255	η_{sk}	0.3929	11.1809		
γ_{um}	-0.0142	-1.0431	η_{uk}	0.2733	5.0004		
γ_{ee}	0.0016	1.8321	η_{ek}	0.4973	6.9912		
γ_{em}	-0.0002	-0.1811	η_{mk}	0.5164	77.5937		
γ_{mm}	0.0048	2.2621	η_{us}	0.0555	2.4654		

The results also showed that if the wage rate of skilled labour increases by 100 per cent, the energy utilization will increase but less than proportionately by just 1.3 per cent. The same rate of increase in lowly skilled labour wage rate will cause 9.1 per cent increase in demand for energy input. Increase in the price of energy inputs has relatively lower effect on the demand for labour of both categories (see the cross price elasticity coefficients $\eta_{se} = 0.0068$ and $\eta_{ue} = 0.038$ in Table 2).

Considering the price elasticity coefficients, the change in prices of capital has greater influence on the labour employment than the prices of other inputs, $\eta_{sk} = 0.393$ and $\eta_{uk} = 0.273$. This means that increase in the price of capital will induce higher demand for labour but by less than proportionate the increase in the price of capital. Since the change in the price of materials affects capital as substitute as well as labour, it means that increase in the price of materials can induce increase in the demand for capital which will result in rising user's cost of capital and increase in the substitution of labour for both materials and capital.

The Coefficients of elasticity of substitution computed show that only energy and lowly skilled labour are somewhat strong substitutes. There is no other factor that relates with labour of any category as strong substitutes. The other inputs and labour relationships denote weak substitution possibilities. The elasticity of substitution coefficient of say energy and lowly skilled labour (which is the same as the one

between lowly-skilled labour and energy, since $\sigma_{eu} = \sigma_{ue}$) $\sigma_{eu} = 1.04$ means that if the relative prices of energy and lowly skilled labour (P_e/P_u) increase by say 100 percent (that is doubles), the relative technology coefficients for the two inputs, expressed as the their physical ratio (U/E), will increase by 104 per cent.

The statistical performance of the model is good, given that majority of the computed coefficients are statistically significant, many at 1 per cent level. For instance, of the 25 regression coefficients computed in the cost share equations, 18 are statistically significant, 14 at 1 percent level. Out of 25 price elasticity coefficients computed, 21 are significant. For the elasticity of substitution, all except two are statistically significant. The general performance of the model as indicated by the F statistic (F = 2694.32) also shows that the model estimates are good and most probable approximate the true coefficients of the estimated equations.

5. Concluding Remarks: Implications for Labour Employment

THE results of the analysis show that the manufacturing sector is not flexible in factor employment generally. Prices of factors of production are not very important determinants of factor employment in the manufacturing sector. There are, however, weak possibilities for factor substitutions in the production process. Skilled and lowly skilled labour are weak substitutes for other factors. Even between the two categories of labour some weak scale of substitution is a possibility. The implications of this are:

(1) Income policy via increase in wage rate will lead to some increase in unemployment because some other factors will be substituted for labour but the rate of growth in unemployment will be less than proportionate the increase in wage rate. On the other hand, if the intention is to increase labour employment, reduction in wage rate is not going to be an effective or a desirable policy (given the prevalence of poverty) because the employment induced by every wage reduction will be less than proportionate.

(2) Given that labour demand (as well as the demand for other inputs) is generally inelastic with respect to own-prices, increase in factor prices will have inflationary effect on the output price. This inflationary effect is reinforced by the weak substitution possibilities in the sector due to the rigidities in the technology that do not permit easy technological transformation through input substitution.

(3) Since all factors are substitutable for labour, though weakly, any increase in wage rates will reduce the employment of labour first by the normal law of demand and second by the continued substitutions of other factors for labour. Increase in the price of other factors will

ultimately lead to increase in labour employment in the sector.

(4) Increase in the price of energy inputs will make more of lowly skilled workers to be employed than the skilled counterpart. This may make the research and innovation capacity of the sector to fall as the lower-skilled workers lack such capacity. Normally, the technological ideas reside with the higher skilled workers with higher human capital. Therefore, increase in the prices of petroleum fuels and electricity price along with the declining efficiency of publicly supplied electricity, which can also be evaluated as increase in energy cost, will ultimately increase the composition of lowly skilled workers in the production process This will have a serious drawback on technological development in the manufacturing sector, which is usually the area of exploit by the higher skilled workers.

Generally, inputs prices have relatively low effects on employment. It suggests that factors outside market prices of inputs are more important in the determination of labour employment as well as in hiring other inputs. Technological rigidities, demonstrated by the low values of elasticity of substitution coefficients, constitute a serious constraint to employment of labour. The hope lies in research into and development of a more flexible production process in the sector. But this hope is only realizable if the labour intake in the sector is fine-tuned towards an increased share of employment for highly skilled labour in the sector which itself is a human resource development and employment policy problem.

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