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LINK BETWEEN EXPORT, FEMALE EMPLOYMENT AND PRODUCTIVITY: EMPIRICAL EVIDENCE FROM BHUTAN

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Abstract: *Influence of export orientation on overall employment level is a fairly well-established fact but its impact on female employment and gender wise differences in productivity is not yet very well established. Using a Cross-sectional data of 164 Bhutanese manufacturing units, this study finds that female employment intensity in export-oriented Bhutanese manufacturing industry is not only low as compared to domestic market-oriented firms but it also declines as the share exports rises. Case wise, standard Cobb-Douglas production function establishes that productivity of female labour is only marginally higher in export-oriented units. Female labour in Bhutan is trapped in a catch 22 situation- lower employment intensity combined with lower productivity in export-oriented units as well as in the domestic market-oriented firms.*

Keywords: *export intensity, female employment intensity, productivity, FDI, manufacturing.*

1. Introduction

Women empowerment is a defining feature of the development agenda of the 21st century designed by the United Nations in form of Millennium Development Goals and Sustainable Development Goals (United Nations , 2015). This initiative for women empowerment should be seen at the backdrop of rampant discrimination and neglect faced by women in past[i] (Sen, 1990). Arguably, the most important element of women empowerment is economic empowerment- providing opportunities for productive employment in the expanding sectors of the economy which employ advanced technology. Economic empowerment of women helps to enhance their prestige and self-esteem and help to overcome barriers imposed by the socio-religious-cultural stereotyping. Women empowerment also have a multiplier effect on welfare gains through various channels- reduced fertility rate, more equitable intra-household allocation of resources, higher education achievement for girl child and improved health outcomes.

Ideological and institutional adjustment in expanding sectors of the economy determines the final impact on the use of labour as well as human skills (Kuznets, 1971) Unique feature of development across the countries since 1950 has been undeniable progress towards convergence of gender wise achievements in the knowledge and health-based indicators. While much progress has been made to bridge the gender gaps in knowledge attainment, wider gender gaps still persist in the labour market. Women face discrimination to take paid work and at a global level they receive only three-fourth of what male receive from the work (United Nations , 2015). In the context of recent changes, Sen's concept of missing women needs to be interpreted in a different context- missing women from the labour market.

How does international trade impact employment opportunities for female? This question is of great import, especially, in the wake of rapid globalisation. International trade has emerged as an engine of economic growth[ii]. World GDP has tripled from US$ 23 trillion in 1990 to US$ 75 trillion in 2016 and this feat is achieved in the shortest duration in the history of mankind. Higher growth in global GDP since 1990 was driven by two significant factors- international trade and technological transformation (World Trade Organisation, 2017). Despite such stupendous expansion in the volume of international trade and global GDP, employment to population ratio has remained virtually constant

(International Labour Organization, 2017). Yet, country specific factors have played a pivotal role in shaping the country specific labour market response to international trade and gender related issues therein. Impact of export orientation on female employment intensity depends on interplay between three broad factors- pattern of comparative cost advantages, level of competition and influence of foreign culture in management. Interplay of these factors brings about diverse gender differentiated impact on employment across types of activities within a country. In section 3, these factors are discussed in detail.

Does the rising female employment intensity (FEI) in export-oriented industries address gender gaps in the labour productivity? It is a significant question by itself. Alongside the impact of export orientation on feminisation of the labour force, corresponding changes in the gender discriminated productivity also needs to be examined to assess the overall welfare outcome. Gender based labour productivity differences provide analytical tools to explain gender-based wage differences. Although the share of female in employment has received greater attention from the researchers, the issue of gender-based productivity differences has largely been ignored. Greater concentration of women in low skill- less capital-intensive technology activities is an indication of lower productivity of female labour and consequent lower female wages. At a global level, female wages are 77% of the male wages, further it might take 70 years to bridge the gap (International Labour Organization, 2017). So profound and universal is the issue of gender disparities in wages that it can be clubbed along with death and taxes as universal events, if not inevitable events (Seguino & Grown, 2006).

1.1. Gender distinguished labour market trends in Bhutan

Since the1990s, Bhutan has steadily established greater linkages with the outside world by undertaking a series of measures, mainly through bilateral agreements, liberal trade and FDI policy and export promotion measures. It is worth investigating that how the labour market in Bhutan responded to the liberalisation and globalisation efforts. Major gender differentiated trends/facts in Bhutan's labour market are:

- In the last 15 years, employment elasticity of growth declined. It was a period of jobless growth in Bhutan.
- Overall LFPR increased from 56.5% in 2001 to 68.5% in 2009 and declined consistently thereafter to 63.1% in 2015. Corresponding changes in female LFPR is sharper- it jumped from 38.1% in 2001 to 67.4% in 2011 and declined very sharply thereafter to 55.9% in 2015. Sharp fall in female LFPR is a natural outcome of improved access to education for females and greater opportunities to enter tertiary education. Strikingly in contrast to female LFPR, the male LFPR remained almost stable over this period.
- In 2015, only 23% of the total labour force in Bhutan was engaged in regularly paid jobs in the non-agriculture sector and female labour accounted only 27% of it. Female labour share was far more predominant (54%) in the employment as family workers and own account producers. This trend is indicative of the fact that female labour is largely engaged in low productive activities. However, the share of female in regularly paid jobs in non-agriculture sector has increased by 4 percentage points since 2000.
- The female unemployment rate has remained higher than the male unemployment rate. In the last 6 years female unemployment rate has fallen from 4.1% to 3.2% whereas male unemployment rate has remained unchanged at around 1.8%.
- The female labour force also experiences a higher incidence of underemployment. About 67% of the labour force in Bhutan, which works for less than 30 hours a week, is female. For higher working hours in a week, the share of male labour rises.

2. Objective

This paper seeks to link two dominant issues, especially in context of Bhutan- the impact of increased export orientation on the intensity of female employment and underlying gender discriminated productivity differences. This paper aims to discern the heterogeneous patterns across industries in term of female employment intensity and productivity. Major research objectives are-

i) Examine differences in the female employment intensity across industries
ii) Determine major predictors of female employment intensity
iii) Examine gender-based productivity differences in Bhutanese industries

3. Conceptual Framework

Female employment intensity of an export-oriented firm can be mainly explained by three factors- pattern of comparative cost advantages, level of competition in the industry and impact of foreign culture.

Notion, that a country specialises in and exports a product which intensively uses its abundant factor endowments, forms the analytical backbone of the Hecksher-Ohlin theory, in terms of the source of comparative advantage. Availability of cheap female labour in low and middle-income countries is the major source of comparative cost advantage for them. Unlimited supplies of cheap female labour offer an opportunity for unskilled labour-intensive industries to harness comparative advantages- almost in line with the Lewis model (Lewis, 1954). Low skill intensive export-oriented industries are more likely to have higher female employment intensity. A large volume of research indicates that export orientation of a firm tends to positively influence female employment intensity. Export oriented industries, such as readymade garments, tend to use abundant female labour. Since female labour embodies less skill, it is used intensively in the products that do not require higher skills (Bhalla & Kaur, 2011), (Fontana, 2009). In higher skill intensive service sectors, such as IT, female employment intensity is lower.

It is logical to assume that trade liberalisation offers greater scope for export promotion. Empirical studies highlight that the impact of trade liberalisation (hence export orientation), on female employment intensity is not uniform but firm specific. The trade liberalisation process that promotes unskilled labour-intensive activities and integrates domestic firms into the global value chains tends to have a more favourable effect on female employment intensity, while the growth of capital-intensive activity that uses new technology tends to work against female employment intensity (Banerjee & Veeramani, 2017). Higher female employment intensity is only one side of the picture of gender equity. It is important to note that trade also tends to exacerbate wage inequality by depressing the wages of less skilled female labour [iii] (Black & Brainerd, 2004), (Korinek, 2005).

The second factor that affects female employment intensity is the prevailing level of competition in that industry. Gary Becker's seminal work on the economics of discrimination used the argument rooted in the dynamics of competitive forces which tend to reduce discrimination in employment. He asserted that firms can continue with their "taste for discrimination" only at the expense of profit. Firms with greater monopoly power are more likely to practice employment-based discrimination (Becker, 1957). Export orientation exposes a firm to intensive competition in the foreign market and they respond by breaking away from traditionally held gender discriminatory practices. Emerging competition in the market forces the firms to jump over inherent gender biases in employment and replace expensive male labour with cheap female labour. Constructs of Business and entrepreneurship are firmly rooted in the profit orientation. Despite growing emphasis on emerging business terminology like Corporate Social Responsibility (CSR), green and social entrepreneurship, the profit orientation still remains the main driver of economic activities. Profit orientation of business is also socially beneficial as pointed out by Adam Smith (Hunt & Lautzenheiser, 2011) "In a competitive, laissez faire, capitalist economy, the free market channelled all self-seeking, acquisitive, profit oriented into a socially beneficial and harmonious, obvious and simple system of natural liberty". In the face of global efforts to bridge the gender gaps, the businesses have to take a lead role by creating more productive employment opportunities for female labour.

The third factor is the effect of foreign culture. Foreign firms bring not only foreign capital and foreign technology, but they also bring foreign culture. Foreign culture gets manifested in the ways management makes decisions, such as, decamping of prevalent gender biases in employment. Empirical evidence from Japan reflects that foreign firms tend to employ more female labour than their domestic counterparts and such changes become more pronounced after some years of their operation (Kodama et al., 2016). Even Gary Becker's analysis helps to fathom the impact of FDI on female employment. The impact of foreign firms on female employment will depend on how their entry affects the level of competition in the market. Entry of a foreign firm through merger and acquisition may lead to continuation of gender biases, while a Greenfield investment may positively stimulate female employment intensity (Buckley & Artisien, 1987).

Empirical evidence is divided over the impact of export orientation on female employment intensity. Empirical evidence drawn from (Cagatay & Berik, 1990), (Wood, 1991), (Joekes, 1995), (Korinek, 2005), (Chen et al., 2013) , (Juhn et al., 2014), (United Nations, 2009), (Abraham & Sasikumar, 2011) suggest that share of female in employment rises with the rising share of exports. Export oriented manufacturing sectors in developing countries tends to have higher female intensity in employment than their counterparts in developed countries (United Nations, 1995) (Wood, 1991)[iv]. Contrasting claims are made by other work (Gray et al., 2006), (Cooray et al., 2012), (Wamboye & Seguino, 2014), (Meyer, 2006) that share of female in the employment declines with rising export intensity. Differential gender discriminated labour market outcomes of rising export intensity can be explained by sector specific competitive forces, choice of technology and influence of foreign culture. Findings of these empirical works should be understood in the context of the inherent methodological framework applied.

Female labour being kept away from the capital-intensive processes and their limited access to productive resources explains gender-based productivity differences (Lichtenstein, 2016). Empiricists have paid relatively limited attention to the issue of gender differences in productivity and wages. Welfare gains arising from increasing female employment intensity in export-oriented sectors can be significantly diluted if gender productivity and wage gaps get accentuated in the process. Most of the empirical studies that have investigated this issue point towards a declining share of female in the wage bill despite rising female employment intensity. There are two possible explanations for such asymmetrical changes in the male-female wages.

One, horizontal discrimination- female labour is discriminated against and is paid less for a similar job as compared to their male counterpart. Horizontal discrimination is also defined as occupational gender wage gap. Since horizontal discrimination goes against the principle of same pay for same work, it is the worst form of gender discrimination.

The second source is vertical discrimination- female labour is more intensively employed in the low skill-low paid jobs and male labour is more intensively employed in high skilled-high wage jobs. Evidence from the readymade garment (RMG) industry in Bangladesh reflects that productivity and resultant gender wage disparities is not due to horizontal discrimination (gender discrimination, per se), but, due to greater concentration of female labour in low skill jobs (Bhattacharya & Rahman, 1999). Some empirical work indicates that women are concentrated in unstable and low paid manufacturing jobs (Barrientos, 2001) and women engaged in export-oriented sectors lack features to achieve wage equity (Seguino & Grown, 2006). Productivity growth of female labour can help to bridge gender wage gaps but firms will have little incentives to do so.

A similar issue was raised by (Kucera, 2001) that gender wage disparity is highly concentrated in the industries with dominant vertical FDI. A very comprehensive study based on cross-country data drawn from wage surveys found that trade liberalisation in low-income countries has contrasting effects- significant narrowing down of occupational gender wage gaps in low skills occupations, at one hand, and, at another, widening of gender wage gaps in high skills occupations (Oostendorp, 2004). On similar lines (Gupta, 2002) found that the gender wage gap tends to rise with industrialisation and emergence of the market.

A large number of these studies are based on two types of data: first, macro level cross sectional multi country data and micro level firm specific data drawn from a given country. A major limitation of the macro level data, which is drawn from household surveys, is its implicit assumption of homogeneity among firms. Homogeneity assumption fails to capture firm specific differences, such as, pattern of comparative advantages, level of competition faced, impact of foreign culture, age and size of the firm and ownership pattern that play a dominant role in creating employment for women. This study is based on micro level single period, firm specific data from a wide array of Bhutanese industries.

4. Data and Model

This study is based on cross-sectional data covering 164 large, medium and small-scale Bhutanese manufacturing firms. The data was obtained through a questionnaire based random stratified sample survey undertaken between December 2018 and February 2019. List of registered industrial units in Bhutan as on June 1, 2017 provided by the Department of trade, Ministry of Economic Affairs, Royal Government of Bhutan, served as the sample frame. Stratification based on the scale of industries and share large, medium and small units in total units was used as weight. Industrial units are classified on the basis of ISIC two-digit classification for manufacturing firms. For the purpose of this study, firms are clubbed into following groups:

Group 1 (ISIC code 16): Manufacture of wood and wood-based products and furniture
Group 2 (ISIC code 23, 24 and 25): Manufacture of chemical, metal and non-metallic products
Group 3 (ISIC code 19): Manufacture of coke and refined petroleum products
Group 4 (ISIC code 10, 11 and 12): Manufacture of food, beverages and tobacco products
Group 5 (ISIC code 13 and 14): Manufacturing of textile, apparel and related products
Group 6 (ISIC code 17): Manufacturing of paper and paper products
Group 7: Other manufacturing

Table 1 shows the sample distribution across industrial groups.

Table 1. *Samples Size*

Name of the Industrial Group	Sample Size	Share in Sample (in %)
Wood and wood-based products and furniture	20	12.2
Chemical, metal and non-metallic products	64	39
Coke and refined petroleum products	8	4.9
Food, beverages and tobacco products	40	24.4
Textile, apparel and related products	4	2.4
Paper and paper products	4	2.4
Others	24	14.6
Total	164	

4.1. Predictors of female employment intensity

A Multiple linear OLS regression model is used to determine the predictors of female employment intensity. It is termed as regression model 1 and is specified as-

$$FEI = \beta 1 + \ \beta 2EI + \beta 3\, TC + \ \beta 4FDI + \beta 5\, age + \alpha 1D1 + \alpha 2D2 + u$$

Dependent variable: *Female employment intensity* (FEI) enters as the dependent variable in the regression model. Female employment intensity is defined as the ratio of female labour (FL) to the total labour (TL) employed in the firm. $FEI = \frac{FL}{TL}$

Independent variables: The independent variables chosen for this regression model are based on the inferences drawn from the survey of empirical works. The independent variables and their expected effect on FEI –

a) *Technological coefficient* (TC) reflects the technological choices made by the firm's gender distinguished labour hiring behaviour. Technological coefficient is measured as a ratio of labour to the current value of fixed capital installed.

$$\mathrm{TC} = \frac{\mathrm{L}}{\mathrm{K}}$$

In this study, technological coefficient (L/K) is used as an indicator of technology. Higher L/K ratio means relatively higher labour-intensive technology and vice versa. It is expected that a firm using more labour-intensive technology is more likely to employ female labour.

b) Export Intensity (EI): Export intensity is defined as the ratio of exports to turnover.

$EI = \frac{Ex}{TO}$, where Ex means value of exports and TO stands for turnover.

If EI >0.5, the firm is defined as an export-oriented unit, and if EI<0.5, the firm is defined as a domestic market-oriented firm.

Higher export intensity reflects greater competitiveness of the firm. Since export-oriented units are more competitive, it is expected that they would not have taste for discrimination.

c) *Share of FDI in fixed investment* (FDI): FDI tends to bring a new culture which helps to overcome gender biases and allows domestic subsidiaries to hire more female labour. FDI share is defined as the share of foreign capital (K_f) in total fixed investment (K_t). $FDI = \frac{K_f}{K_t}$

d) *Age of the firm* (age): empirical findings discussed in previous sections indicate that older firms tend to hire more female labour than the newer firms.

e) *Dummy for ownership* (D1): State owned firms tend to practice less gender discrimination than the privately owned firms because they are willing to compromise productivity gains at the expense of social gains.

f) *Dummy for female CEO* (D2): Empirical evidence also suggests that a female chief executive officer (CEO) of any firm may help to overcome gender biases in employment.

4.2. Gender distinguished productivity differences

Cobb Douglas production function is used to discern gender-based productivity differences in employment, which is termed as regression model 2. In the absence of data on gender discriminated wages bills, gender wage gaps cannot be established. Data on the productivity of female and male labour can be used as a proxy for wage gaps. Productivity of female and male labour is measured using modified Cobb-Douglas production function (CDPF) - $Y = A\, Lm^{\alpha} Lf^{\beta}\, KS^{\gamma}\, e^{u}$

Where Y= value of the firm's annual output. A, Lm, Lf, KS are total factor productivity, number male labour employees, number of female employees and stock of fixed capital respectively. Whereas α, β and γ are partial elasticity coefficients for male labour, female labour respectively. It is assumed that the sum of these coefficients should be positive. The regression function takes the form of a double log model for estimating parameters of CDPF. For this, logarithmic transformation of both the dependent and independent variables is undertaken. The regression model 2 is constructed as –

$lnY = lnA + \alpha \ln LM + \beta\, lnLf + \gamma\, lnKS + u$

This model is also used for a case wise analysis, to distinguish between the estimates for cases of export-oriented units and domestic market-oriented firms.

The model is run twice, once with selecting cases where EI>0.5 and next with cases with EI<0.5. Case wise diagnosis helps in distinguishing the productivity differences in the two sectors.

5. Discussion on Findings

Gender distinguished published baseline data on manufacturing employment in Bhutan is very limited. Labour force surveys and establishment census /surveys are two major sources of such data. The number of manufacturing units in Bhutan expanded from 390 in 2009 to 457 in 2016 (RGoB, 2016) (RGoB, 2009), compounding at a rate of 2.3%[v]. During the same period, gross value added of the manufacturing sector compounded at 6.2% (RGoB, 2017). Total employment in the manufacturing

sector declined from 3700 in 2009 to 3659 in 2016[vi]. It is quite obvious that growth in the manufacturing sector between 2009 and 2016 can be characterised as a period of jobless growth. Decline in total employment in the manufacturing sector hides highly contrasting gender distinguished outcomes. At one hand, male employment compounded at an annual rate of 6.8%, growing from 1700 in 2009 to 2694 in 2016. During this period female employment declined from 2000 in 2009 to 785 in 2016. The female employment intensity has declined by a half from 54% in 2009 to 22% in 2016. Steep decline in the absolute number of female-employment in the manufacturing sector in Bhutan is an indicator of changing dynamics of the economy, which provides limited incentives to hire female labour. In the absence of disaggregated data nothing more can be analysed. There exists a data gap which prevents us from undertaking a deeper analysis of the problem. This study helps to bridge some of these gaps.

A quick analysis of table 2 reflects that overall FEI in the manufacturing industries of Bhutan is 0.28- only 28% of the employees are female. Within the manufacturing sector, the FEI varies significantly across sub sectors, from a high of 56.3% in group 6 to a low of 13.4% in group 2. (Refer table 2). As identified in the literature review section manufacturing group specific characteristics play an important role in explaining the group-based differences in FEI.

Table 2. *Values across Industrial Groups*

	Name of the Industrial Group	L/K Ratio	FEI (in %)	Export intensity (in %)	FDI share (in %)
	Wood, Wood Based Products and Furniture	.00000169	25.6	26.2	0
	Chemical, Metal and Non-Metallic Products	.00000042	16.8	67.4	8.8
	Coke and Refined Petroleum products	.00000014	13.4	20.2	0
	Food Beverages and Tobacco Products	.00000389	46.3	25.2	11.9
	Textile, Apparels and Related Products	.00000375	53.3	26	0
	Paper and Paper Products	.00000235	56.3	40	0
	Others	.00000251	25.4	50.8	60
	Total	.00000184	28	45.7	15.1

Source: Researcher's Survey

The FEI in the export-oriented industries is 0.25, while that in domestic market-oriented firms is 0.31. Although overall FEI is negatively associated with the export orientations of the firms, sector specific exceptions can be observed- from lower EI and lower FEI in group 3 to higher EI and higher FEI in group 6. Group 2 has the highest export intensity but second lowest FEI. Group 4 and 5 reflects lower export intensity but relatively high FEI. What explains these diverse trends? The answer probably lies in a complex and combined impact of technological choices and FDI share, besides other factors. Group 2 largely consists of the natural resource-based power intensive industrial units in Bhutan. Lower power tariff in Bhutan in relation to India is the major source of comparative cost advantage to the manufacturing industries in group 2, mainly consisting of the Ferro-alloys industry which has vertical linkages with the steel industry in India. In this case, Bhutanese exports from this sector does not compete with the cheap labour-intensive products, hence these firms have limited incentive to hire cheaper female labour. Technology used in group 2 is also relatively more capital intensive in nature (as reflected by a lower L/K ratio). The L/K ratio in group 2 is almost 9 times lower than that in group 4. Besides, activities in this group require strong manual labour, for which female labour is not considered suitable.

Significant rise in the share of group 2 industries in total exports from Bhutan from 24% in 2008 (RGoB, 2009) to 53% in 2016 (RGoB, 2017) explains the steep decline in female employment in the manufacturing sector. It represents a shift of manufacturing activities from high FEI activities to low FEI activities. A large part of the FDI has also gone to group 2, mainly sourced from India, also explains why the desired effect of the FDI on FEI has not taken place.

Exports from group 4 compete with labour intensive products in the export market, mainly India. In this case, firms aim to maintain comparative advantage by hiring cheaper female labour.

In section 3, it was pointed out that FDI brings a new culture that helps to overcome gender barriers and discrimination in business. However, initial evidence emanating from this study does not support this proposition. Female employment intensity in FDI based industries in Bhutan is not very much different from domestically owned firms. FEI in domestically owned firms is 27%, while that for the FDI based firms is 32.4%, which seems to support the hypothesis that FDI based industry bring a new culture of a less gender bias. FEI in the state-owned enterprises is 37% as compared to 27% in privately owned firms. This reflects state owned firms that tend to create more opportunities for female employment.

5.1. Predictors of Female Employment Intensity

SPSS output of regression model 1(Refer table 3) reflects that model is a good fit model ($P< 0.05$, $F= 14.02$) and it explains almost 49% of the variation in the FEI. Multicollinearity and heteroscedasticity problems are not observed in the data. All the predictors are found to be statistically significant, however the age of the firm has a minuscule impact on female employment intensity. Technological choice (TC) measured in terms of labour to capital ratio is found to be the most effective predictor of FEI. Its unstandardized beta coefficient suggests that 1% increase in labour to capital ratio causes female employment intensity to rise by 23033 percent. This implies that application of labour-intensive technologies would generate more employment opportunities for female labour.

Regression findings also convey that there exists a trade-off between export intensity and FEI. Regression estimates suggest that 1% increase in the exports intensity of a firm causes FEI to fall by 0.09 percent. Rising export intensity will marginally reduce FEI in manufacturing industries. Group 2 industries have the highest export intensity in Bhutan largely because of the power intensive nature of technology. Since Bhutan has substantial cost advantage in terms of cost of electricity over India and other South Asian Countries, It is the main source of comparative cost advantage to Group 2 industries.

The FDI based industries tend to positively influence the FEI. One percent change in FDI inflows will cause FEI to rise by 0.282% percent. Foreign firms tend to favour more females in jobs. Findings also reflect that age of the firms also positively affects FEI, albeit by a small magnitude. It is probably because the older firms in Bhutan do not draw the comparative cost advantage from the cheap electricity but from cutting down costs. In this case, they prefer more labour-intensive techniques and cut costs by hiring cheaper female labour. This finding is significant to understand that trade-off between exports and FEI can be addressed by shifting to non-power intensive industries which will work under competitive pressure to cut down other costs.

FEI in publicly owned enterprises is 0.109 points higher than in privately owned enterprises. Female headed firms tend to promote FEI as reflected by differential intercept coefficient for D2. FEI in Female headed firms is 0.149 points higher than male headed firms. Promotion of women enterprises will also promote the cause of gender parity in employment.

Table 3. *SPSS output of the regression model 1*

Dependent variable: female employment intensity (FEI)	
Independent variables	**Coefficients**
EI	-0.091 (0.043)**
TC	23033 (3191.5)***
age	0.007 (0.01)***

FDI	0.282 (0.057)***
D1	0.109 (0.049)**
D2	0.149 (0.047)***
Constant	0.099 (0.045)*
Adjusted R squared	0.494***

Standards errors are in parenthesis. Significance is denoted by *** (1%), ** (5%) and * (10%).

The FEI can be predicted using the derived function

$$FEI = 0.099 + 23033\,TC - 0.0.091EI + 0.007age + 0.282\,FDI + 0.109\,D1 + 0.149D2$$

A low FEI by itself does not mean that females are engaged in low paid jobs. It only means that females get fewer jobs. To explore whether fewer jobs translate into low wages, the gender-based productivity differences of labour need to be analysed.

5.2. Gender Distinguished Productivity Differences

This analysis helps us to get the complete picture of the nature of female employment in terms of gender-based productivity differences. After having established that FEI is low in Bhutan, we investigate whether there exist any gender distinguished productivity differences in Bhutanese industries, as well as, to examine whether export intensity tends to affect gender distinguished productivity. Cobb Douglas production function is applied to answer these questions.

This model is found to be a good fit model (refer table 4), where P<0.001, F= 48.1, adjusted R square is 0.671- 67% of the variation in the output is explained by changes in all the quantities of male labour, female labour and capital stock. Total factor productivity (TFP) is found to be 1101.32. Partial output elasticity coefficient of female labour (β) is 0.049, and that for male labour (α) is 0.772, while and that for capital stock (γ) is 0.448. It has a significant implication- females contribute very less to output- 1% increase in female employment causes output to rise only by 0.049%. This is largely due to the concentration of women in low skill jobs and also a very low share of females in technical and top managerial positions. On the contrary, 1% rise in the male employment causes output to rise by 0.772%, while 1% increase in the stock of capital causes output to rise by 0.448%. The sum of three elasticities is 1.27, which means that the given production function is subject to increasing returns to scale. Applicable Cobb-Douglas production function can be written as-

$$Y = 1101.3\,Lf^{0.049}\,LM^{0.772}\;\;KS^{0.448}$$

A very low partial elasticity coefficient tends to reflects very marginal contribution of the female labour to the output. In this low female productivity scenario, it is realistic to expect that there might exist large gender wage gaps in the manufacturing sector in Bhutan. These wage gaps may not reflect absence of horizontal equity (they must be paid the same for the same job) but higher concentration of men at more productive jobs means higher wages to men as compared to women. Based on the calculated partial coefficients, it can be inferred that gender wage gaps are very high in the manufacturing sector in Bhutan.

Table 4. *SPSS output of the regression model 2*

Cobb Douglas production function Dependent variable: lnY , Given EI≤0.5	
Constant (TFP)	7.005 (2.303)***
ln Lf	0.049 (0.132)*
ln Lm	0.772 (0.23)***
ln KS	0.448 (0.15)***
Adjusted R squared	0.671***
F static	48.1

Standard errors are in parenthesis. Significance is denoted by *** (1%), ** (5%) and * (10%).

5.3. Case wise diagnostics

The findings (refer table 5) reflect that for the export-oriented units (EI>0.5) regression model is statistically significant at 95% (p<0.001). Adjusted R squared value suggests that independent variables in the model accounts for 67% of variance in turnover of the firm. TFP for this case is 3905.5, partial output elasticity coefficient of male labour (α) is 0.896, that for female labour (β) is converted as 0.078, and for capital stock the coefficient (γ) is 0.363. Since the α+ β+ γ>1, there are increasing returns to scale. Applicable Cobb-Douglas production function for the export-oriented firms can be written as-

$$Y = 3905\, Lf^{0.078} Lm^{0.896}\, KS^{0.363}$$

For the domestic market-oriented units (EI<0.5) regression model is statistically significant at 95% (p<0.001). Adjusted R squared for the export-oriented units is 0.621, which means the model accounts for 62.1% of variance in turnover of the firm. TFP for this case is 1235.5 and partial elasticity coefficient of male labour (α) to the total turnover is 0.696 and that for female labour (β) is 0.048, and for capital stock the coefficient (γ) is 0.453. Since the α+ β+ γ>1, there are increasing returns to scale. Applicable Cobb-Douglas production function for the domestic market-oriented firms can be written:

$$Y = 3905.5\, Lm^{0.896} Lf^{0.078} KS^{0.363}$$

Table 5. *SPSS output for case wise regression*

Cobb Douglas production function Dependent variable: ln Y, given EI >0.5		
	Case EI <0.5 (domestic market oriented firms)	Case EI >0.5 (export oriented firms)
Constant (TFP)	7.12 (2.941)***	8.271 (4.881)***
ln Lf	0.048 (0..203)	0.078 (0.197)*
ln Lm	0.696(0.327)***	0.896 (0.404)**
ln KS	0.453(0.091)***	0.363(0.184)***
Adjusted R squared	0.621***	0.607***

Standards errors are in parenthesis. Significance is denoted by *** (1%), ** (5%) and * (10%).

Case wise diagnostics reflect that export-oriented firms are more productive than domestic market-oriented firms. The partial elasticity coefficient of the female labour in the export-oriented firms is 0.079 as compared to 0.048 for the domestic market-oriented firms. Although the productivity of female labour remains far below male labour in all the manufacturing units, the gap is reduced, albeit marginally, in the export-oriented units. In export-oriented units, female labour productivity gains exceed that of male labour. Partial elasticity coefficients for male and female labour are higher in export-oriented units as compared to domestic market-oriented firms. Despite lower female employment intensity, the export orientation among the Bhutanese firms tends to work only marginally in raising female productivity.

6. Conclusion

Export orientation of the Bhutanese manufacturing sector is based on reaping comparative cost advantage derived from cheaper power. The power intensive industries depend less upon cheap labour and consequently most of the jobs in this sector bypass female labour. Female employment intensity in the manufacturing sector in Bhutan varies in a wide band of 13-56%. Size of exports, technological choices, and their market orientation, existence of foreign capital and age of the firm are found to be significant firm specific determinants of the FEI. Productivity coefficients of male and female labour derived from the Cobb Douglas production function reflects that the productivity of female labour is very low, both absolutely, and also in relation to male labour. Female productivity, although remains lower than male, rises marginally in the export-oriented units. The findings strongly indicate that the issue of gender bias in the manufacturing sector cannot be left to the forces of the market.

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End Notes

[i] Amartya Sen made a very forceful argument on the centuries of neglect and discrimination has led to more than 100 million women are missing from the population. He used country specific male female ratio to estimate poetical loss of women in the population.

[ii] Static gains, also known as allocative efficiency gains, are obtained through increased specialisation and consequent transfer of resources to more productive activities. According to the World Trade Report 2017, static efficiency gains itself are very large- almost 30% of GDP under autarchy.

[iii] Female labour is usually less skilled, due to large gaps in literacy rates, greater hurdles in accessing higher and technical education and limited working experience. Despite significant as well as universal progress in recent times, female labour still lags behind male labour in developing world.

[iv] Empirical evidence suggests that that women constitute a high proportion of the labour force in some conspicuous parts of developing-country export-oriented manufacturing (clothing and electronic products, and export processing zones). In developed countries, women are over represented in the sectors on which manufactured imports have been concentrated, and under-represented in the manufacturing sectors which export to developing countries (Wood, 1991).

[v] According to the Establishment Survey report 2016, about 85% of the total manufacturing units were small scale units, while only 5% of these units were large scale units and the rest were medium scale units. Size of employment size and fixed investment is used as a criteria to classify these units, as shown in the table below (RGoB, 2016).

Size of unit	Employment size (in number)	Fixed Investment (in BTN million)
Small	5-19	1-10
Medium	20-99	10-100
Large	100+	100+

[vi] The data collected from the researcher's survey reflects that there were 6069 employees in 41industrial units, of which 1768 were female.