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Trade in Value Added and Employment in India's Manufacturing Sector: An Empirical Perspective

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Trade in Value Added and Employment in India's Manufacturing Sector: An Empirical Perspective

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Abstract

This perspective is an attempt at understanding the linkages between trade in value added and employment in India's manufacturing sector. The same uses the techniques of panel data and simple time series regression analyses. The main contention of this study is that trade in value added influences employment in the manufacturing sector positively.The potential impact of this research on India's future industrial policies is immense, especially considering the country's strong focus on the manufacturing sector in recent years. Initiatives such as Make in India and Production Linked Incentive schemes highlight this emphasis. The outcomes of this research would greatly assist the stakeholders in India's manufacturing in devising and executing pro-industrial policies, with a key focus on socio-economic factors, particularly employment, given the growing significance of Global Value Chains (GVCs) in the coming years.

JEL Codes: F16, F66, J21, L60

Keywords: Employment; Global Value Chains; Manufacturing; Trade in Value Added

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1. Introduction

India, after her Independence in 1947, witnessed various kinds of political incumbencies and revolutions, which led to different industrial and trade policies at different points of time. It was especially after the 1991 Liberalization, Privatization and Globalization (LPG) era that India became an open market economy and this had a profound impact on its exports, imports, Gross Value Added (GVA) and GDP growth rates. Another major structural change that occurred in the post-Independence period was the shifting of sectoral GDP from Agriculture to Services. In other words, the manufacturing sector remained a relative laggard in terms of its contribution to the country's economy. It is only since 2014 that the Government of India has adopted the core policy objective of Make in India in a national attempt to integrate itself productively into the global economy. Following this, greater emphasis is being placed on foreign and local investments to transform India into a global manufacturing hub. To improve employability and upgrade skills of workforce, this programme is considered a significant step towards integrating India's economy with the Global Value Chains (GVCs) (Banga, 2016).

Prior to proceeding with the discussion, it is crucial to elucidate the distinction between value added and gross trade. Trade related to Global Value Chains (GVCs) measures the value of goods and services exported by an industry or a country that traverse international borders. Conversely, gross trade, or traditional trade, predominantly focuses on the value of goods and services crossing a single border. Additionally, GVC-related trade exhibits two distinct characteristics. Firstly, when represented as a proportion of gross trade, GVC-related trade is constrained within the values of 0 and 1. Secondly, since GVC-related trade is cumulative at any level of trade flow aggregation or disaggregation, data can be aggregated or summed at different levels - be it total country exports, global exports, sector-specific exports, or exports at the country group level. Furthermore, GVC-related trade is always attributed to the exporting sector (Borin & Mancini, 2019).

In general, there are three distinct categories of GVC linkages. The first category is pure backward GVC related output, which involves output that crosses multiple international borders and can be traced in the sector that completes the final goods and services or the very end of the GVC link. This type of output can also be referred to as GVC related final output. The second category is pure forward GVC related trade, which encompasses domestic value added produced in a sector that crosses multiple international borders. This output can be traced back to the sector where the value originated in the GVC. It can also be labelled as GVC related value added. The third category is two-

sided GVC related output, which pertains to the domestic and foreign inputs purchased by the sector and sold to other domestic or foreign sectors as inputs. This type of output crosses multiple international borders and can be traced back to the sector where a simultaneous buying and selling of inputs has taken place. This type of output asserts its centrality in the value chain. These classifications of GVC linkages provide a framework for understanding the different types of connections between outputs and inputs within the GVC (Borin & Mancini, 2019).

Originating from the rise of Japan as an industrial and economic powerhouse and the Flying Geese pattern of development in East Asia during the 1950s, GVCs can be understood as the fragmentation and dispersion of economic activities, with different countries specializing in specific tasks for the production of a final product (Kuroiwa & Umezaki, 2024). Given the increasing complexity of production networks and the challenges faced by the developing countries in integrating and upgrading within existent GVCs, it is necessary to revisit the debate on trade-led development. Traditionally, the literature has examined the impact of value chain integration by analysing trade data from manufacturing industries to construct ratios for export and import penetration. However, these ratios suffer from the problem of double counting, where the value of an intermediate product is counted multiple times when it crosses international boundaries. The limitations of using such trade data are further highlighted in the current economic scenario, where the share of trade in total output is growing and services play a crucial role in GVCs (Deardorff, 2001).

The topic of trade in Value added and its relationship with employment has been a subject of ongoing discussion. Traditional studies suggest that the efficiency gains from international trade may not have a significant impact on employment in the long run. However, policymakers often argue that trade promotes job creation by opening up new export opportunities. In value-added trade, backward linkages often lead to job losses in the manufacturing sector (Banga, 2016). On the other hand, forward linkages can have a positive effect on employment generation, especially for the unskilled workers (Guha-Khasnobis, Aditya & Chandna, 2023).

Enhancing industrial employment has always posed a policy challenge for developing nations like India. While India’s employment shares in the manufacturing sector remained stagnant in the 1980s, they experienced growth in the 1990s after the trade liberalization reforms of 1991 (Goldar, 2000). However, manufacturing employment has shown sluggish growth in the past decade, leading to significant concerns. In contrast, the services sector has performed better, with an increasing sectoral

share in the gross domestic product and total employment. As India implements national initiatives of the likes of Make in India (2014) to boost its involvement in Global Value Chains (GVCs), it becomes crucial to comprehend how trade operates in GVCs and its overall impact on employment. Various studies, such as Chalil (2021), Mingyang et al. (2023) and Sasahara (2019), root for the positive impact of trade in value added on manufacturing sector employment. However, it is essential to recognize that the position of a specific industry in GVCs plays a vital role in determining the actual impact of GVC participation on employment and gross value added. An industry's improved relative position within GVCs is expected to enhance its economic situation. Furthermore, increased integration with GVCs, along with skill-intensive technological advancements, has the potential to raise the demand for skilled workers. Conversely, if labour and capital are substitutable rather than complementary, it is likely that unskilled labour will be replaced by more skilled counterparts. Overall, the impact of trade in value added and greater integration with GVCs is anticipated to have a mixed effect on employment conditions within a particular industry.

Ultimately, this study aims to provide empirical insights that can form the basis for future policy framework and academic discussions, promoting more inclusive and equitable development paradigms while catering to the socio-economic changes that transpire and are influenced by trade-induced value-added contributions to Global Value Chains (GVCs). As per ILO's *Decent Conditions of Work,* work opportunities should be provided in such a manner that they yield productive and fair outcomes in terms of income, social security, personal development, and personal freedoms. As India is fast industrializing, it becomes imperative for the country to assess the socio-economic condition of its industrial workforce. Given India's precarious performance with regard to the GVCs and trade in value added, it is all too imperative to unlock the true potential of the country's manufacturing sector so as to tap into the advantages offered by value added trade for the country. The same sits well within India's policy framework of the likes of *Make in India* and *Production Linked Incentive* schemes, which emphasize labour-intensive manufacturing coupled with export promotion as the twin objectives for the country's overall development. This serves as the major motivation for this study, with its focus on trade in value added- induced employment generation. Given that several studies have been undertaken on the link between gross exports and employment, it is pertinent to study the more granular question of impact of trade in value added upon India's manufacturing sector employment.

The primary research objective of this study is to assess the impact of trade in value added upon India's manufacturing sector employment. For the purpose, this study is organized into the following sections. *First*, an introduction to the theme is given. *Second*, existing relevant literature is studied on the topic. *Third*, data and methods employed for the study are discussed. The *fourth* section elicits the results of this study and analyses the same. *Last*, conclusion and future policy implications of this study are explicated.

2. Review of Literature

This section reviews existing literature on the theme. The segment is divided as follows. The first sub-section discusses the relation between trade and employment. The second explains the relationship between trade and growth. The third explains the impact of GVCs on employment. The fourth discusses the effect of GVCs on output/growth.

2.1 Trade and Employment

The discourse surrounding the employment effects of trade liberalization has endured for many years and is grounded in traditional trade theories. As per the Stolper-Samuelson theorem (as quoted in Deardorff, 1994), expanded trade benefits the abundant factor in a country, thus, a nation participating in international trade will experience advantages in its abundant factor. In most developing economies, labour is considered the abundant factor, indicating that higher exports should result in increased employment. Similarly, the Heckscher-Ohlin-Samuelson (HOS) framework suggests that employment will transition from the import sector to the more labour-intensive export sector. Research by Vashisht (2016) argues that trade contributes to employment growth in India's manufacturing sector. Despite the HOS theory's prediction that trade will enhance the labour-intensive portion of output, some trade theories propose that trade actually boosts the scarcity factor in developing countries. In Feenstra and Hanson's model (1996) of intra-industry trade, factors of production are segmented into skilled and unskilled labour, with findings indicating that trade escalates the demand for skilled labour.

There is a lack of consensus in numerous studies regarding the impact of trade on employment, indicating the need for further empirical investigation. Trade is said to influence employment through two main channels: the scale effect and the substitution effect. The scale effect involves using cheaper imported inputs in production, leading to increased output and exports. This, in turn, creates more job

opportunities through the scale effect. Exporting firms are generally larger and more productive than non-exporting firms, attributed to productivity-based self-selection and learning by exporting. Significant learning-by-exporting effects have been observed in various regions, such as Sub-Saharan Africa and Slovenia. Studies have shown that exporters in China tend to be larger than other firms. Research on developing economies has found that both exporters and importers tend to employ more workers compared to firms not engaged in international trade. Case studies have also suggested significant employment gains from trade. However, it is important to note that trade liberalization is believed to enhance competitiveness and economies of scale only under specific assumptions, such as perfect competition and constant returns to scale (Kabeer & Mahmud, 2004; Kien & Heo, 2009; Nadvi et al., 2004; Sen, 2009; Winters, 2002).

Contrary to the scale effect, the liberalization of trade can promote the importation of more affordable inputs, consequently boosting the elasticity of labour substitution. This occurrence, in which imported goods diminish the demand for labour, is referred to as the substitution effect. Various research studies (Hasan, Mitra & Ramaswamy, 2007; Rodrik, 1998) have highlighted this phenomenon. Some studies (Feenstra & Hanson, 1996; Onaran, 2012) conducted in the United States have shown that the penetration of imports has led to a decline in employment in developed nations. Nonetheless, Davis and Mishra (2007) have contended that the influence of imports on output is contingent on the type of imported inputs. If the imported intermediates act as substitutes for domestically manufactured products, then imports will have a negative impact on output and employment. Conversely, if the imports are complementary, the effect may not be adverse.

The assessment of trade liberalization has also varied across studies. Revenga (1997) and Harrison and Hanson (1999) considered tariff reductions as a measure of trade liberalization in their respective studies. Despite using similar measures, these studies have not reached a consensus on the employment effects of trade.

The varying results of studies underscore a key point. The impact of trade liberalization can vary significantly from one country to another (Sankaran, Abraham& Joseph, 2010). In India's context, notable research conducted by Goldberg et al. (2010) and Topalova and Khandelwal (2011) delved into the effects of trade liberalization on firm-level productivity. While these studies did not specifically focus on labour markets, the enhanced productivity of firms can have a substantial influence on labour demand. More efficient firms may choose to hire additional workers due to the scale effect on output, or they may opt to employ fewer workers overall if there is a growing reliance

on skilled labour in the production process. Hence, the impact of trade on employment may be ambiguous.

2.2 Impact of GVCs on Employment

GVCs have become increasingly important in both theoretical discussions and empirical studies. A nation's engagement in GVCs hinges on its contribution to distinct phases of manufacturing, including intermediary and final production of goods and services. Traditional methods of measuring trade often face issues of double counting. Focusing solely on trade in value-added within GVCs helps differentiate the trade effects of GVCs from those of traditional trade.

As highlighted by Jiang and Milberg (2013), the interaction between trade and employment has become more intricate with the introduction of value-added trade. The scope of labour aspects in international trade has expanded to include not only domestic labour involved in exports and foreign labour involved in imports, but also foreign labour integrated into exports, domestic labour within imports, and labour from third countries linked to a nation's imports. This complexity is driven by two primary factors: the more noticeable job losses in the labour market resulting from participation in global value chains, and the potential for offshoring to create new employment opportunities while significantly changing the composition of the workforce.

Importantly, integration into Global Value Chains (GVCs) can result in increased employment opportunities due to productivity and scale advantages. However, it has also caused a significant global redistribution of jobs. Labour-intensive manufacturing tasks have been moved to developing nations with abundant low-cost labour, notably in East and South-East Asian countries (Yang, 2016). Additionally, there have been notable shifts in the makeup of the workforce since the proliferation of GVCs (Yang, 2016). Jiang and Milberg (2013) utilized these tables and discovered that jobs created due to GVC trade predominantly benefit low- and medium-skilled workers rather than high-skilled labour. In 2009, only 13 per cent of the jobs generated globally by GVCs were for high-skilled workers, whereas 43 to 44 per cent were for medium- and low-skilled workers. The change in the labour force composition has resulted in a decrease in wages and a decline in the ability of workers to negotiate better working terms.

3. Data and Methodology

3.1 Data

To understand the influence of trade in value-added on employment, it is necessary to study the relation between them. At the firm level, the Annual Survey of Industries (ASI) database is used, collected by National Sample Survey Organization (NSSO) and processed by Central Statistical Office (CSO), Ministry of Statistics and Programme Implementation, Government of India. In the ASI frame, all industries are categorized into their respective National Industrial Classification (NIC) groups based on the principal product manufactured, which follows the structure of Standard Industrial Trade Classification (SITC) of the United Nations (UN). Generally, the sample period for this empirical study is from 2000-01 to 2020-21, given data obtainability issues for trade in value added variables, available only upto the year 2020.

To gain better insights into the contribution of Trade in Value Added towards employment, data are culled from the OECD-WTO TiVA database for Domestic Value Added content of Gross Exports (EXGR_DVA), Domestic value-added content of gross imports (IMGR_DVA), Domestic Value Added content in Foreign Final Demand (FFD_DVA) and Foreign Value Added content in Domestic Final Demand (DFD_FVA). Concordance of industrial classification given in the TiVA database with ASI NIC -2008 codes has been undertaken. The data range is from 2000 to 2020. Data for Total Factor Productivity (TFP) (Output to input ratio as a proxy for TFP) have been sourced from the Economic Outlook database of the CMIE for the period 2000-01 to 2020-21. Additionally, data for wages and salaries is sourced from the Economic Outlook database of the CMIE for the period 2000-01 to 2020-21.

As far as the dependent variable is concerned, data for employment in the manufacturing sector (total persons engaged) are sourced from the ASI database for the period 2000-01 to 2020-21.

3.2 Methodology

Table 1 Variables and their Units of Measurement

Variable of Interest	Type of Variable	Measurement
Employment	Dependent variable	Total persons engaged (value in numbers)
Domestic value-added content of gross exports (EXGR_DVA)	Explanatory variable	Million USD
Domestic value-added content of gross imports (IMGR_DVA)	Explanatory variable	Million USD
Domestic Value Added in Foreign Final Demand (FFD_DVA)	Explanatory variable	Million USD
Foreign Value Added in Domestic Final Demand (DFD_FVA)	Explanatory variable	Million USD
Wages and Salaries	Explanatory variable	Rupees Lakhs
Total Factor Productivity	Explanatory variable	Output to Input ratio

This study uses double log or log-log transformed equations for assessing the impact of trade in value added on India's formal manufacturing sector employment, so as to bring better uniformity across dataset/variables. The time period for this study is 21 years and the number of industries is 12. Total sample size for the panel data analysis is 252 (12 industries (cross-sectional units) multiplied by 21 years (time) or $N_X T$). Sample size for time series exploration is 21. This paper seeks to assess the following research questions/hypotheses.

Research Question:

What is the impact of trade in value added on employment in the manufacturing sector in India?

$$\mathbf{lnN_{it} = \beta_0 + \beta_1 lnEXGR\_DVA_{it} + \beta_2 lnIMGR\_DVA_{it} + \beta_3 lnWAGES_{it} + \beta_4 lnTFP_{it} + e_{it}}$$

Where, N represents Employment, EXGR_DVA is the Domestic value-added content of gross exports, IMGR_DVA is the Domestic value-added content of gross imports, WAGES are Wages and Salaries and TFP is Total Factor Productivity.

Research Hypothesis:

H_0 : Trade in value added has a positive effect on employment in the manufacturing sector in India.

H_1 : Trade in value added does not have a positive effect on employment in the manufacturing sector in India.

To answer this question/hypothesis, use of panel data techniques has been undertaken. Especially, with regard to fixed and random effects.

Prior to any further explanation, a short description of the technique of panel data is elicited. Panel data is a combination of cross- sectional and time series data, with the same units being observed over a period of time. These units could be individuals, states, countries or firms. It allows a researcher to control for variables and factors that cannot be measured or observed. It accounts for individual heterogeneity. However, the panel data analysis faces some drawbacks such as the design collection issues i.e. the sampling design and survey and non- response in the surveys (DSS, Princeton University, 2018).

In addition, time series analysis is undertaken to arrive at desired results. The following equation seeks to study the impact of Domestic Value Added in Gross Exports upon Employment in India's formal manufacturing sector.

$$\mathbf{lnNt = \beta 0 + \beta 1\ lnEXGR\_DVAt + e_t}$$

Where, N is Employment and EXGR_DVA is the Domestic Value Added content of Gross Exports.

The following equation seeks to study the impact of Domestic Value Added embodied in Foreign Final Demand and Foreign Value Added embodied in Domestic Final Demand upon Employment in the manufacturing sector.

$$\mathbf{lnN_t = \beta_0 + \beta_1 lnFFD\_DVA_t + \beta_2 lnDFD\_FVA_t + e_t}$$

Where, N is Employment, FFD_DVA is the Domestic Value Added content in Foreign Final Demand and DFD_FVA is the Foreign Value Added content in Domestic Final Demand.

4. Results and Discussion

Table 2 Panel Data Regression Results

Dependent Variable/Explanatory Variables EMPLOYMENT	**Fixed Effects**	**Random Effects**	**Pooled OLS**	**Diff-GMM**
lnEmployment(-1)	--	--	--	0.102**(0.040)
lnExgr_dva	0.157** (0.145)	0.249 **(0.127)	0.775***(0.087)	0.093(0.119)
lnImgr_dva	0.096 (0.09)	-0.006 (0.08)	-0.688***(0.066)	0.129(0.086)
lnWages and Salaries	0.103 ** (0.04)	0.160***(0.04)	0.710***(0.059)	0.179(0.163)
lnTotal Factor Productivity	0.118 (0.089)	0.081 (.087)	-0.353 **(0.121)	0.081**(0.033)
R^2	0.89	0.63	0.54	---
N	252	252	252	252
Prob (J-Statistic)	___	___	___	0.369

(Note on Significance codes: '*'represents 10 per cent level of significance '**'represents 5 per cent level of significance and '***'represents 1 per cent level of significance)

(Standard errors are in parentheses)

Table 3 Hausman Test for deciding between Fixed and Random Effects Models

Null Hypothesis:	The Random Effects model is appropriate
Chi-Sq Statistic	59.122
Probability	0.000

Thus, as per the Hausman test values as depicted in Table 3, the Fixed Effects model is more appropriate for this equation. The probability value is less than 0.05 at the 5 percent level of significance.

Table 4 Breusch Pagan LM Test for deciding between Random Effects and Pooled OLS Models

Null Hypothesis:	The Random Effects are not significant
Probability	0.000

Thus, as per Table 4, Random Effects model is more appropriate than the Pooled OLS model, given the probability value is less than 0.05 at the 5 percent level of significance.

All in all, the Fixed Effects model is deemed most appropriate for this equation.

As Table 2 depicts, for the Fixed Effects model, with a percentage increase in Exgr_dva, Employment increases by 0.157 percent. With a percentage increase in Imgr_dva, Employment increases by0.096 percent. With a percentage increase in Wages and Salaries, Employment increases by 0.103 percent. Additionally, Employment sees a 0.118 percent increase with every percentage increase in Total Factor Productivity. Clearly, Domestic Value Added content of Gross Exports influences Employment positively and significantly (Ahmad & Ribarsky, 2014; Banga, 2016; Chalil, 2021; Sasahara, 2019). So does Wages and Salaries. This implies that more people find employment if the domestic value added content of gross exports is higher. Also, labour supply (in other words, employment) goes up if wages and salaries increase as more people are willing to work at higher wages than before. This is especially true for low skilled jobs such as in the manufacturing sector. Efficiency wage theory provides a sound explanation for this association between wages and employment. If a firm/industry pays its workers an efficiency wage or wages/salaries above the market clearing wage(s), then this may induce the existing relatively better skilled and productive workforce to stay with their organization(s), rather than leaving for some other organization in search of higher wages. Apart from reducing labour turnover, the same also reduces frictional unemployment on account of job search, thereby, reducing overall unemployment (Shapiro & Stiglitz, 1984).

In addition, the Difference Generalized Method of Moments (Diff-GMM) model is also a good fit as revealed in the probability of its J-Statistic. Also, note that the GMM is estimating coefficients with the help of Arellano Bond method. The results reveal that Employment is positively and significantly influenced by its own lagged values and by Total Factor Productivity. Rest of the regressors are not influencing the results significantly (Arellano & Bond, 1991).

Ensuing Tables 5 and 6 portray results for simple time series regression analyses so as to supplement existing outcomes.

Table 5 Impact of Domestic Value Added in Gross Exports upon Employment in the manufacturing sector

Dependent Variable/Explanatory Variables lnEmployment	Estimate
lnExgr_dva	0.648** (0.446)
R^2	0.917
Adjusted R^2	0.913
N	21
F- Statistic	0.000

(Standard errors are in parentheses)

A percentage change in EXGR_DVA leads to a change of 0.65 percentage in the value of Employment. This coefficient value is also significant from the results at 5 percent level of significance (P- value).

In the realm of GVCs, the calculation of foreign value added content in exports or final demand is often labelled as 'backward linkages,' while the domestic value added content in partner countries' exports or foreign final demand is denoted as 'forward linkages' (Nguyen& Wu, 2018; OECDiLibrary, 2024). Consequently, additional analysis in this direction is undertaken.

Table 6 Impact of Domestic Value Added in Foreign Final Demand and Foreign Value Added in Domestic Final Demand upon Employment in the manufacturing sector

Dependent Variable/Explanatory Variables lnEmployment	Estimate
lnFFD_DVA	0.729 (0.181)
lnDFD_FVA	-0.305** (0.158)
R^2	0.963
Adjusted R^2	0.959
N	21
F- Statistic	0.000

(Standard errors are in parentheses)

As evident from Table 6, only the second coefficient is significant because the P-value is less than 0.05 i.e., 0.00. A percentage increase in DFD_FVA (Foreign Value Added in Domestic Final Demand) leads to a decrease in Employment by 0.30 percent. Also, a percentage increase in

FFD_DVA (Domestic Value Added in Foreign Final Demand) leads to an increase of 0.729 percent in Employment.

5. Conclusion and Future Policy Implications

While the findings of this study pertain to India, they hold relevance for other developing countries as well. Understanding the relationship between export performance and overall economic growth is essential for a country like India. This study adds to the existing body of literature on the subject, encompassing all sectors. The same covered India's formal manufacturing sector and sought to assess the effect of trade in value added on the country's manufacturing employment. Using methodologies of panel data regression and simple time series, the study analyses how trade in value added has impacted the country's manufacturing landscape over a period of time.

Given the nascent stage of empirical research on GVC integration, there is significant scope for further exploration. Future studies could delve into areas such as technological transfers, spill overs through GVCs, and the impact on labour markets in terms of composition, productivity, and wage differentials.

In essence, additional detailed studies are necessary on this theme. Such research has the potential to shape India's future industrial policies, considering the country's significant focus on the manufacturing sector in recent years, as evidenced by initiatives of the likes of Make in India and Production Linked Incentive schemes. The same would aid stakeholders in India's manufacturing sector to better plan and implement pro-industrial policies, with socio-economic (read: employment) concerns at their core, given the pre-eminence of GVCs in the coming future.

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