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The Role of Services in Enhancing Indian Manufacturing Exports: A Firm Level Analysis, 2000-01 to 2011-12

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Abstract:

In this paper, we try to examine and assess the contribution of services towards India's manufacturing exports at the firm level. In other words, the role of services in shaping the international competiveness of the Indian Manufacturing Sector at the firm level is examined. Services are instrumental in connecting to the world market and can help firms to differentiate their products. However, only bits and pieces of the relation between services and exports have been analyzed in the earlier literature. Most of the earlier studies relating to services have explored the link between services and Total Factor Productivity. The relation between services and exports has not been explored at the firm level in case of India. This also gives a justification for conducting the present study. With now firm level databases available, it allows us to explore this part in details. For exploring this link, the firm level data was collected from the Centre for Monitoring of The Indian Economy (Prowess Database) for the years 2000-01 to 2011-12. The Manufacturing firms had used different types of services according to their needs and the expenditure for the all the different services were not the same. The expenses incurred by the manufacturing firms for services like business services, repairs and maintenance, Professional services, Research & Development and others etc. were added together to get total expenses on the services variable. Two alternative econometric methods (Panel Regression method and Tobit model) were used in our study. The findings confirm that services have contributed to enhanced export competitiveness of the Indian manufacturing firms. The paper looks at the firm specific factors like firm size, age, previous years export performance, group versus non-group, labor productivity and services that affected the export performance of the Indian manufacturing firms. The overall results show that the firm specific factors such as firm size, extent of use of services, group versus non-group firms, and previous years export performance played a positive role in improving the Indian manufacturing exports.

Key words: Services, Exports, Manufacturing, Firms

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1. Introduction:

According to *The World Economic Forum (WEF)* the term 'competitiveness' is defined as 'the set of institutions, policies and factors that determine the level of productivity of a country'. The level of productivity in turn sets the maintainable level of prosperity that can be made by an economy. In other words, the more competitive economies tend to produce higher levels of income for the inhabitants of their country. A competitiveness-supporting economic environment can help the national economies to weather business cycle downturns and ensure that mechanisms enabling solid economic performance going into the future are in place.

For the economy to be competitive enough in the global market, it has to maintain its *export performance* in terms of exchange earnings, increase in sales and constant innovation. If a manufacturing firm becomes successful in innovating its products, then the customer can easily differentiate their products from the other available products and henceforth increase in the sales of the innovating products.

Keeping this picture in mind, exporting is an essential type of economic activity that many consider to be a vital aspect to the growth of productivity. The East Asian Tigers were the first to provide this knowledge and experience that 'exporting' is a significant component of the development strategy in case of the emerging markets (The World Bank, 1996). And for that, a favorable and conducive environment is very much needed. Apart from this, there are other crucial determinants or factors that lead to a successful export performance. Many of these factors are seen to be under the firm's control. But there may be situations where factors called 'external factors' may influence the firm's export behavior. In the academic literature, both the cases have been studied but these studies have not analyzed the role played by the services as an external factor influencing the firm's export competitiveness or performance.

In the recent times (since 2000 onwards), services have expanded its share in the GDP and this expansion in services is bound to have a spillover effect on the other two sectors, manufacturing and agriculture. Studies have shown that services are playing an important role in boosting the productivity (Arnold, Javorick and Mattoo, 2011; Arnold, Mattoo & Narisco, 2006; and others). However, the role of services as an 'external factor' in enhancing the export competitiveness at the firm level is yet to be studied. This area remains unexplored. Against this backdrop, in this paper, we extend the existing research by exploring the link and relationship between the use of

services as input and export performance of the Indian manufacturing sector (at the firm level). In particular, the objective of this study is to examine the role of services in improving the export performance of manufacturing firms in case of India.

Conceptually, one may think of two major routes through which services can enhance the export performance of the manufacturing firms. First, the services tangled to and associated with the production process of the manufacturing products may improve the labor productivity and have a cost minimizing effect. Secondly, services may assume a 'product assistant role'. For example services may be used in the form of marketing, distribution, transportation, maintenance and repair, business services, banking and insurance, advertising and training for customers and other forms for further product differentiation in the market. The second role is the focus of our study and we test as to how the intensive use of services have improved on the export performance in terms of improvement in the export sales in the market.

2. Literature Review

The connection between in-house services and exports had been touched upon by Bernard and Jensen (1995 & 1999) and Bernard et al (2007). Using a micro-level data for the United States (US) manufacturing, they validate an export premium in terms of non-production workers over total employment. However, the findings show that the share of non-production workers has no statistically imperative effect on the possibility to start exporting (Bernard & Jensen, 1999).

With respect to innovation and exports, Hirch & Bijaou (1985) find a positive correlation between Research & Development and Exports, and most subsequent studies find a relationship between the innovation inputs or outputs, on the one hand and exports, on the other (Cassiman and Martinez-Ros, 2007).

Cassiman et al. (2010) contribute to the existing literature by analyzing the innovation-productivity-export link, using Spanish firm level data. Their results suggested that innovation contributes to the noted productivity of exporters. This study is also with line of Baldwin & Gu (2004). The study by Baldwin and Gu mainly find that the exporters are more innovative and productive and their productivity grows faster already before they have entered the foreign market.

Jauhari (2007) has examined the export intensity of the select electronics firm in India. The findings clearly showed that the important determinants in boosting the exports are size, foreign

direct investment and capital employed. The findings by Chevassus-Lozza and Galliano's (2003) study of the export behavior of French agribusiness firms provide positive evidence on the positive link between firm size, advertising expenditure and export performance. Innovation and R&D was found to be significant factors of firms' export performance in a numerous studies (Ito and Pucik, 1993; Aw et al., 2007).

The intensity of the usage of knowledge intensive business services has been found to be clearly correlated with the comparative advantage at the industry level, when the viscosity of the market is taken into account (Bottini and Tajoli, 2010). Importing business services is also associated with improved exports, value-added and employment, for skill and technology intensive manufacturing (Francois and Woerz, 2008).

Windrum and Tomlinson (1999) examined the impact of knowledge intensive services on productivity. In particular, they measured the impact of material and knowledge inputs on productivity specifying a labor based production function. The relationship was estimated for countries like United Kingdom (UK), the Netherlands, Germany and Japan. The results indicated that while UK experienced the strongest growth in the services as compared to the other countries, the spillover effect of knowledge intensive industries on output and productivity is greater and substantial in all the other countries especially Japan. But the study did not analyze the use of these knowledge based intensive services on the export performance.

The business literature provides many instances of the linkages between the goods and services. A recent contribution is Marsh (2012) who compares the modern manufacturers of differentiated goods with the consultants who spend a lot of time discussing with the customers of the products before creating, and delivering the products as per the customer needs. In many of the cases, the discussions with the customers of the products are made through social networking sites.

Studies from Sweden provide further evidence of the growing importance of services for manufacturing firms. Not only do services contribute to a higher share of intermediate inputs in manufacturing, they also account for a rising share of manufacturing firms' revenue and are positively associated with exports (Lodefalk, 2012a and 2012b). For example, a Swedish machine tool manufacturer uses 40 different services to its customers (Rentzhog, 2010). Firm level analysis from the United Kingdom and Germany finds that services account for a significant share of

manufacturers' revenue including export revenue (Breinlich and Criscuolo, 2011; Kelle and Kleinert, 2010).

Services can assist the manufacturing firms' in lowering the input requirements and in using labor more resourcefully. This may be the outcome of engineering supply chain management or other management services (Nordas, 2010 and Bloom and Van Reenen, 2010). Adding the services as an input also distinguishes the firms' offer from its competitors 'and thereby raises the foreign demand of its product' (Chamberlin, 1933). Usage of the services may increase the costs of the manufacturing firms' initially and involve a rise in the prices of the good, but nevertheless it can also raise the demand for the products if the improved offer appeals more to its customers. After a while, the manufacturing firm will start to gain competitive advantage. The customers basically do not know what their wants are and in maximum cases they wants to be influenced through the firms' approach, for example, advertising, promotional offers & discounts etc. More advertisement for a product may create a curiosity in the mind of the customers and it also helps the firms 'to differentiate its manufactured products from the other firms' goods.' Firms' advantages in the industrialized country in this regard are its closeness to customer demanding quality (Linder, 1961).

Melitz (2003) assumed that there is a fixed cost in selling its commodities in the export market and only the more productive firms will choose to export and the less productive firms will serve the domestic market. In this stream of research, high productivity of firms that self-select into export markets is considered as an outcome of firm's deliberate strategy. However the productivity of the firm may be caused by some external factors which are outside its control. Balchin and Edwards (2008) finds that the business climate is closely associated with the firm-level manufacturing export performance in Asia.

Landesmann and Pfaffermayr (1997) argued that the research and development (R&D) assists a country to reach an improved position in the quality range of products offered in the global markets. Other works by Brooks (2006), Verhoogen (2008), Manova & Zhang (2009) or Crozet at al. (2009) which are all based on the firm level studies, establish a clear link between the product quality and the export performance; higher quality producers trade to more markets, charge higher prices, and sell more in separate market. Overall, these research works focus on the quality

specialization within sectors. Again none of the above studies considered the role of services as a quality shifter.

3. Theoretical Background:

The econometric analysis in this paper is based on a specification of the export demand model that was originally inspired by Fagerberg (1988) and further derived by the others such as Amable and Verspagen, 1995, etc. The model is also derived along the lines of the monopolistic competition models of the new trade theory models of Krugman (1983, 1989). It also builds on more recent academic work by Hallak (2006), Baldwin and Harrigan (2007), and Crozet et al., (2009) which undoubtedly takes into account the goods' quality as a factor of export performance.

The theoretical framework considered here is built on the monopolistic competition model, with a Dixit-Stieglitz edifice of preferences and quality is included as a utility shifter.

Globally consumer's preference for varieties (i) within a differentiated goods sector (j) are described by the following CES sub utility index:

$$U_j = \left[\sum_{i \in I_j} (\theta_i^{\gamma} q_i)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \quad \text{.. (1)}$$

I_j is the set of varieties available in sector j and the terms q_i and θ_i denote the quantity and quality of variety i in sector j.

γ is a parameter which reveals the desire of consumer preferences for quality, and $\sigma>1$ is the elasticity of substitution between varieties.

Under consumer utility maximization, the total value of world exports of variety i within a specific manufacturing sector j is given by:

$$x_{ij} = \frac{(p_i / \theta_i^{\gamma})^{1-\sigma}}{\sum_{i \in I_j} (p_i / \theta_i^{\gamma})^{1-\sigma}} E_j \quad \text{......... .... (2)}$$

Where, p_i denotes the price of variety i.

If we denote the CES aggregate price index in the denominator in equation (2) with P_j we have:

$$x_{ij} = \theta_i^{\gamma(\sigma-1)} \left(\frac{p_i}{P_j} \right)^{1-\sigma} E_j$$

…… (3)

The production side of the model is based on the assumption of monopolistic competition among the manufacturers. Producers are heterogeneous in nature with respect to physical productivity z_i in producing variety i. Moreover it is assumed that the marginal cost of production depends on the class of the good produced; marginal cost is given by $MC_i(z_i, \theta_i)$. Profit maximization within the framework of the assumed Dixit-Stiglitz CES preferences leads to prices for each variety that are a constant mark-up on marginal cost:

$$p_i = \frac{\sigma}{\sigma - 1} MC_i(z_i, \theta_i)$$

…… (4)

Thus, with the constant mark-up pricing, quality influences prices only indirectly via its influence on the costs. If we denote the factor price index as w_i, unit costs of production are given by w_i/z_i. As in Johnson (2009), we assume the functional form of marginal cost function:

$$MC_i = \frac{w_i}{z_i} \theta_i^{\beta}$$

…….. (5)

Where β is the elasticity of costs with respect to quality.

Combining (4) and (5) and inserting them into the export demand equation (3) gives the export values for variety i within sector j as:

$$x_{ij} = (\frac{w_i}{z_i})^{1-\sigma} \theta_i^{\alpha} P_j^{\sigma-1} E_j$$

…… (6)

Where $\alpha = (\alpha-1)/(\gamma-\beta)$ and is the elasticity of export values with respect to quality.

We assume that $\alpha>0$, and, since $\sigma>1$, it implies that the marginal valuation of quality by consumers (γ) exceeds the marginal cost of quality to producers (β) and is a prerequisite that investment into quality pays off.

Keeping this theoretical framework in mind, we use the following model. The model in the functional form is as follows:

$Ex_{it} = f(S_{i,t-1}, Y/L_{i,t-1}, SI_{it}, BGr_{it}, Ex_{it-1})$…….(7)

Where, Ex_{it} is the export of the manufacturing firm i in year t,

$S_{i,t-1}$ is the total services used by the manufacturing firm,

$Y/L_{i,t-1}$ is the labor productivity (lagged by one year),

SI_{it} is the size of the firm,

BGr_{it} is a dummy variable for the firms belonging to business groups,

Ex_{it-1} is the export performance of the manufacturing firms in the previous years.

4. Description of Data and Econometric Model

4.1 Data and Variables

The unbalanced panel data set used in the study was taken from the CMIE's Prowess Database. The data set contained data on labor, capital, exports, sales, service expenditure, size, Business group status and other information for all Indian manufacturing firms (companies) that were active from the years 2000 to 2012. However, only those manufacturing firms were included in the study that had reliable information about the services expenditure. In total, the sample of firms consisted of about 7,500 firms and 38,467 observations. All the data came from the CMIE Prowess database.

In the FY 2011-12, the sample covered is around 2,231 manufacturing firms. Most of the manufacturing firms consisted of mainly medium size. The majority of the firms trade in the global market. The figure stands around 63.54 percent firms who are involved in exports. Petrochemicals, lubricants, chemicals, pesticides, fertilizers and man-made filaments products are the ones which has the highest share in the total manufacturing exports. This is followed by textiles, leather & footwear and Transport products. Wood, Paper & Printing and Gems & Jewellery have a very small share in the manufacturing exports (in the sample). This is clear from the table below (Table 1). The low share of gems and jewellery in the number of exporting firms is probably explained by the fact that the majority of firms engaged in gems and jewellery exports are relatively small is size which are not covered by Prowess. Lastly, the majority of the Indian manufacturing firms fall under the category of group firms like Tata group, Mahindra & Mahindra etc.

Table 1: Exports by Indian manufacturing firms, 2011-12

Indian Manufacturing Firms	**Total firms**	**Percent of firms that exports (within each Industry)**	**Percent of firms that exports in aggregate manufacturing**
Food, Beverages and Tobacco	219	42	4.12
Textile, leather & Footwear	294	68	8.96
Wood, paper &Printing	87	48.27	1.88
Petroleum, Chemicals and Lubricants & Man-made Filaments	327	66.66	9.77
Rubber and Plastic Products	168	56	4.25
Drugs & Pharmaceuticals Products	163	71.16	5.19
Glass & Cement Products	128	53	3.04
Metals Products	295	61.35	8.11
Electronics Products	189	65.60	5.55
Machinery products	141	77	4.88
Transport products	172	78	6.05
Gems & Jewellery products	48	81	1.74
Total	2231		63.54

Source: CMIE (prowess database)

Description of variables:

The main key variables that are used in the study are exports and services.

Export performance was measured as the share of merchandise exports in total sales. In other words, called export intensity.

With respect to the service variable, a measure was constructed on the relative importance of services in the manufacturing firms' total activities. We categorized the expenditure incurred by the Indian Manufacturing firms on services in various forms such as accounting, marketing, and distribution and advertising, legal services, Information Technology enabled services, financial services, knowledge intensive services, Insurance, consultancy, professional services, maintenance and repair, R&D services and business services and others etc. All the firms' expenses for these services were added to show the service expenditure incurred by the firm. Thereafter, the services were divided with the total sales of the manufacturing firms for the purpose of normalization. This is referred to as service input intensity.

The other variables used in the study were firm size, labor productivity, business group status and previous years export performance.

Size: The size variable was calculated by taking logarithm of sales.

Labor Productivity: Labor productivity was calculated by dividing the real output to labor.

Group status: Here, the Indian manufacturing firms were classified as group firms and non-group firms. Group firms were classified as firms having affiliation to various business groups or business houses such as Tata, Mahindra, Reliance and others etc. Non-group firms were classified as private firms (domestic and foreign) operating in the manufacturing sector. For group firms, a dummy variable taking value of 1 was used and for non-group firms, the dummy value was assigned value 0.

Previous Year Export Performance: The previous year export performance was calculated by taking a lag of one time-period. For example, for the year 2001, the export intensity of the year 2000 was taken as the previous year's export performance.

4.2. Methodology

To examine the impact of services use intensity on the manufacturing firms towards the export competitiveness, a simple regression equation is formulated which is estimated through both panel regression (fixed effects and random effects) and Tobit regression for all the aggregate manufacturing groups together and also for the subgroups separately like Food, Beverages & Tobacco, Textiles, and Leather & Footwear etc.

The estimated equation is as follows:

$$\mathbf{E\ (y_{it} / X_{it-n}, Z_{it-n}, c_i) = X_{it-n}\beta_X + Z_{it-n}\beta_Z + Q_{it-n}\ \beta_Q + \beta_S S_{it} + T\beta_T + \mu_{it}} \text{ ..... (8)}$$

Where, i is the firm; t is the year; n is the lag, which is taken to be one for all service and control variables, y is the export intensity scalar, X is a 1x K_1 vector of services-intensity variables that includes brought in external services in the total output, Z is a 1xK_2 vector of covariates and industry classification at the three digit level, Q is a 1xk_3 vector of covariates and firm level classification; T is a 1x k_4 vector of year dummies; and c is an unobserved firm-specific effect and d is the unobserved industry specific effect.

Lastly, in this study, different industrial group were estimated separately to show the role of services in improving the export performance.

5. Empirical Results:

The role of conventional export predictors is estimated in Table 2. All the variables have the expected positive sign expect for the labor productivity variable which is positive only in one case (using fixed effects). Export intensity is found to be positively related to the firm size, services, group status, and its previous export experience according to a panel regression using both fixed and random effects and also according to the results of Tobit regression. The results indicate that other things remaining the same, a firm belonging to a business group is likely to export more. Also, the export intensity achieved by a firm in the previous year has a positive effect of export performance in the current year.

Table 2: Determinants of Manufacturing Exports: Regression Results of All Manufacturing Firms

Variables	Random Effects	Fixed Effects	Tobit Regression
Export intensity (EX_{it})			
Labor Productivity(LP_{it-1})	-.001 (-0.30)	.00005 (0.01)	-.0106 (-2.09)
Service/Sales ($S_{it-1.}$)	2.12 (5.00)**	2.55 (4.79)**	8.17 (14.10)**
Size(SI)	.390 (11.22)**	1.03 (14.96)**	1.87 (44.94)**
Group status (BGr)	.039 (0.12)	-	2.26 (7.57)**
Previous export performance(EX_{it-1})	.83 (298.45)**	.457 (94.87)**	1.03 (350.44)**
Constant	-.41 (-1.71)	.486 (1.08)	-18.98 (-58.99)
Overall R^2	0.84	0.82	-

** Significant at 1% level, t values in the parenthesis

Similar kinds of results were also found for the sub industry groups Firms like Food and Tobacco, textiles, leather and shoes, Rubber and Plastics, Machinery and Equipment's, textiles, and the others groups taken for the study.

We begin with the sub-group industry, Food, Beverages and Tobacco Manufacturing group. The results obtained from the random effects suggest that services had played a positive role in improving the Food & Tobacco exports. But, the coefficient is not statistically significant. As compared to this, the Tobit regression shows that services have contributed positively as well as significantly to the exports of Food, Beverages and Tobacco group of firms. The other variables playing a positive role are size, group affiliation and previous export performance. The results are given in the following table (Table 3).

Table: 3: Determinants of Manufacturing Exports: Regression Results in case of Food, Beverages & Tobacco firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(EX_{it})**		
Labor Productivity(LP_{it-1})	-.029 (-2.15)	-.072 (-4.66)	-.040 (-1.54)
Service/Sales ($S_{it-1.}$)	.556 (0.45)	-2.23 (-1.52)	18.69 (7.54)**
Size(SI)	.25 (2.37)*	.75 (3.68)**	3.50 (17.57)**
Group status (BGr)	-.013 (-0.01)	-	5.30 (3.35)*
Previous export performance(EX_{it-1})	.757 (85.52)**	.27 (19.43)**	1.11 (88.22)**
Constant	.494 (0.67)	2.16 (1.66)	-40.59 (-24.35)
Overall R^2	0.80	0.75	

** Significant at 1% level, * significant at 5% level, t values in the parenthesis

The next industry group consists of textiles, leather and footwear group of firms. The overall results show that the variables exerting a positive influence on the exports are services used, previous year export performance and firm size. The 't' value of all the three variables are positive and statistically significant. The Services coefficient clearly shows that the expenditure incurred by the firms in procuring external services have contributed positively in enhancing the exports of the Textile, leather and the Footwear Firms. Lastly, the group affiliation variable (BGr) have played a positive if not significant role in enhancing the exports further. That is, the group firms have played a positive role in boosting exports. The results are given in Table 4.

Table 4: Determinants of Manufacturing Exports: Regression Results in case of Textiles, Leather and Footwear Industries

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(**EX_{it}**)**		
Labor Productivity(LP_{it-1}**)**	-.015 (-1.11)	-.020 (-1.40)	-.023 (-1.18)
Service/Sales($S_{it-1.}$**)**	3.02 (2.22)*	3.61 (2.16)*	9.27 (5.11)**
Size(SI)	.89 (6.89)**	1.54 (6.59)**	2.68 (18.11)**
Group status (BGr)	.73 (0.33)	-	3.04 (1.64)
Previous export performance(EX_{it-1}**)**	.83 (115.28)**	.50 (40.04)**	1.03 (142.85)**
Constant	-1.99 (-2.37)	2.34 (1.61)	-24.39 (-22.52)
Overall R^2	0.86	0.85	

**significant at 1 % Level, * significant at 5% level, t values in the parenthesis

The next manufacturing group consists of Wood, Paper & Printing group of firms'. The results obtained from the Tobit regression show that the service variable had played an important role in enhancing the exports of Wood, paper & printing group of firms'. The other variables positively and significantly influencing the exports are size and previous year export performance. In this group, the BGr variable has failed to play a positive role in improving the exports. Rather, a negative effect is indicated by the results. This fact is clearly shown in the following table (Table 5).

Table 5: Determinants of Manufacturing Exports: Regression Results in case of Wood, paper & Printing Firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(**EX_{it}**)**		
Labor Productivity(LP_{it-1}**)**	-.066 (-1.50)	-.075 (-1.35)	-.181 (-1.81)
Service/Sales ($S_{it-1.}$**)**	-.390 (-0.31)	-.55 (-0.33)	5.60 (2.28)*
Size(SI)	.343 (3.16)*	.49 (2.39)*	2.36 (11.64)**
Group status (BGr)	-.259 (-0.19)	-	-2.98 (-1.58)
Previous export performance(EX_{it-1}**)**	.703 (39.20)**	.598 (28.91)**	1.12 (37.23)**
Constant	-.69 (-1.01)	-1.29 (-0.99)	-21.77 (-14.52)
Overall R^2	0.65	0.65	

*significant at 5% level, ** significant at 1% levels, t values in the parenthesis

In case of the manufacturing industries belonging to Chemicals, Lubricants and Refinery group, the services variable have not played a positive role in enhancing the manufacturing exports in case of this group. Only factors such as size, business group status and previous year export performance have played an important role in enhancing the manufacturing exports. The fact is clear from the following table (Table 6).

Table 6: Determinants of Manufacturing Exports: Regression Results in case of Chemicals, lubricants and refinery firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(EX_{it})**		
Labor Productivity(LP_{it-1})	-.0005 (-0.05)	.002 (0.22)	-.018 (-1.46)
Service/Sales ($S_{it-1.}$)	-.47 (-0.35)	1.23 (0.81)	-2.54 (-1.56)
Size(SI)	.43 (4.07)**	1.51 (7.60)**	1.240 (13.01)**
Group status (BGr)	-1.25 (-1.29)	-	1.27 (1.91)
Previous export performance(EX_{it-1})	.775 (82.74)**	.450 (31.73)**	1.01 (127.84)**
Constant	.874 (1.15)	-2.08 (-1.55)	-11.15 (-15.14)
Overall R^2	0.84	0.76	

**significant at 1% levels, t values in the parenthesis

The next group of firms comprises the manmade filament and polyester manufacturing firms. For this group of manufacturing firms, services have played a positive and significant role. Apart from the services variable, the other variables such as size and previous years export performance had played a significant and positive role in improving the exports. Lastly, the BGr variable had played a positive role if not a significant role. The results are shown in the following table (Table 7).

Table 7: **Determinants of Manufacturing Exports: Regression Results in case of the Man-made filaments and polyester Firms**

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity (**EX_{it}**)**		
Labor Productivity(LP_{it-1}**)**	-.010 (-0.58)	-.017 (-0.81)	-.026 (-0.96)
Service/Sales ($S_{it-1.}$**)**	8.79 (3.08)*	-2.08 (-0.65)	13.31 (3.26)*
Size(SI)	.431 (2.03)*	.641 (1.93)	1.87 (7.76)**
Group status (BGr)	15.21 (2.56)*	-	12.35 (1.89)
Previous export performance(EX_{it-1}**)**	.75 (29.88)**	.50 (14.98)**	1.04 (39.96)**
Constant	-1.50 (-1.02)	.39 (0.17)	-17.95 (-9.63)
Overall R^2	0.78	0.76	

** Significant at 1% level, * significant at 5% level, t values in the parentheses.

For the Drugs & Pharmaceutical group of manufacturing firms, the services variable has played an important role in boosting and enhancing exports in the international market. The variables size and previous years export performance had also played a positive role in boosting the exports too. The results are shown in the following table (Table 8).

Table 8: Determinants of Manufacturing Exports: Regression Results in case of the Drugs and pharmaceuticals Firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(**EX_{it}**)**		
Labor Productivity(LP_{it-1}**)**	**-.**017 (-0.50)	-.029 (-0.61)	-.094 (-1.66)
Service/Sales ($S_{it-1.}$**)**	2.38 (1.64)	7.17 (3.40)*	4.51 (2.21)*
Size(SI)	.615 (5.97)**	1.85 (6.50)**	2.16 (14.54)**
Group status (BGr)	-1.27 (-1.38)	-	-1.41 (-1.19)
Previous export performance(EX_{it-1}**)**	.918 (110.31)**	.490 (28.80)**	.987 (92.74)**
Constant	-1.635635 (-2.39)	-1.49 (-0.85)	-16.23 (-15.52)
Overall R^2	0.85	0.81	

** Significant at 1% level, * significant at 5% level, t values in the parentheses

The group of manufacturing firms comprising of Rubber and Plastic product manufacturers have also improved its exports by using services in an effective manner. The service coefficient obtained is positive and significant which indicates a positive role in boosting exports in the global market. The other variables that had also influenced exports are size, BGr, and previous years export performance. The results are clearly shown in the following table (Table 9).

Table 9: Determinants of Manufacturing Exports: Regression Results in case of Rubber and Plastics Firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(EX_{it})**		
Labor Productivity(LP_{it-1})	-.010 (-0.34)	-.026 (-0.71)	-.072 (-1.63)
Service/Sales ($S_{it-1.}$)	3.06 (2.18)*	5.15 (2.95)*	3.51 (1.76)
Size(SI)	.580 (4.19)**	1.18 (4.73)**	2.14 (13.63)**
Group status (BGr)	.60 (0.45)	-	2.45 (2.31)*
Previous export performance(EX_{it-1})	.79 (66.08)**	.52 (30.81)**	1.04 (86.68)**
Constant	-1.09 (-1.26)	-1.66 (-1.10)	-18.33 (-16.57)
Overall R^2	0.83	0.81	

** Significant at 1% level, * significant at 5% level, t values in the parentheses.

The next table shows the results of the Glass and Cement Industry. The results obtained for the random and fixed effects models show that service had played a positive role (if not significant) and the results from the Tobit Model show that the service coefficient is positive and significant indicating a prominent role of services in the manufacturing exports. The other variables exerting a positive influence are BGr , size and previous year export performance. The results are shown in the table below (Table 10)

Table 10: Determinants of Manufacturing Exports: Regression Results in case of the Glass & Cement Firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity**(EX_{it})		
Labor Productivity(LP_{it-1})	.092 (1.76)	.074 (0.86)	.030 (0.34)
Service/Sales ($S_{it-1.}$)	2.06 (1.81)	1.79 (1.01)	5.35 (2.71)*
Size(SI)	.033 (0.45)	.135 (0.51)	1.20 (8.90)**
Group status (BGr)	.33 (0.70)	-	2.20 (3.00)*
Previous export performance(EX_{it-1})	.92 (93.23)**	.614 (26.43)**	1.03 (70.50)**
Constant	-.37 (-0.69)	1.14 (0.63)	-13.62 (-12.66)
Overall R^2	0.84	0.84	

** Significant at 1% level, * significant at 5% level, t values in the parentheses.

The next table comprises of the Indian metal firms. The results obtained show that services, size, BGr and previous year export performance have contributed positively and significantly in improving exports in the global market. In other words, the export intensity and the services coefficient share a positive and significant link. The results are shown in Table 11.

Table 11: Determinants of Manufacturing Exports: Regression Results in case of the Metal Firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity (EX_{it})**		
Labor Productivity(LP_{it-1})	.0007 (0.22)	.001 (0.31)	-.001 (-0.29)
Service/Sales ($S_{it-1.}$)	2.69 (2.78)*	-.24 (-0.20)	12.58 (8.03)**
Size(SI)	.253 (3.69)**	.64 (4.80)**	1.71 (16.21)**
Group status (BGr)	2.23 (2.31)*	-	3.40 (2.73)*
Previous export performance(EX_{it-1})	.874 (128.20)**	.51 (42.76)**	1.046 (113.11)**
Constant	-.57 (-1.20)	.571 (0.63)	-18.73 (-23.02)
Overall R^2	0.82	0.81	

** Significant at 1% level, * significant at 5% level, t values in the parentheses.

In case of the electronic group of firms taken together, the results show that services, size, previous years export performance and multinational status have played a positive and significant role. This is evident from results obtained from the Tobit model. The results are shown in Table 12.

Table12: Determinants of Manufacturing Exports: Regression Results in case of the Electronics Firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(**EX_{it}**)**		
Labor Productivity(LP_{it-1}**)**	.001 (0.06)	-.013 (0.49)	-.02 (-0.87)
Service/Sales ($S_{it-1.}$**)**	.023 (0.02)	3.71 (1.88)	5.71 (2.69)*
Size(SI)	.10 (1.03)	.48 (2.03)	1.95 (13.02)**
Group status (BGr)	1.35 (1.97)	-	2.48 (2.98)*
Previous export performance(EX_{it-1}**)**	.872 (97.80)**	.268 (14.07)**	.992 (87.86)**
Constant	.732 (1.03)	4.47 (2.89)*	-17.93 (-9.49)
Overall R^2	0.81	0.77	

** Significant at 1% level, * significant at 5% level, t values in the parentheses

For the machinery group (comprising of agricultural, industrial, machinery, machine tools and equipment), the results obtained from both the models show that services had played a positive role in enhancing the exports. The other variables exerting a positive as well as significant effect are BGr, previous years export performance, size etc. This is shown in the Table 13.

Table 13: Determinants of Manufacturing Exports: Regression Results in case of the Machinery and Equipment's Firms

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(**EX_{it}**)**		
Labor Productivity(LP_{it-1}**)**	.035 (0.55)	-.288 (-3.63)	-.013 (-0.16)
Service/Sales ($S_{it-1.}$**)**	2.05 (1.13)	4.76 (1.87)	4.26 (1.85)
Size(SI)	.05 (0.45)	1.73 (4.82)*	1.01 (6.82)**
Group status (BGr)	1.51 (2.48)	-	2.18 (3.01)*
Previous export performance(EX_{it-1}**)**	.83 (70.35)**	.352 (17.89)**	.90 (64.12)**
Constant	1.22 (1.34)	-2.34 (-1.01)	-8.15 (-6.81)
Overall R^2	0.68	0.55	

** Significant at 1% level, * significant at 5% level, t values in the parentheses

For the transport group of firms comprising of passenger cars, automobile parts and others etc. the services coefficient are found to be both positive and significant in both the models. The other variables exerting a positive and significant role are variables like labor productivity, size and previous year export performance. The results are shown in Table 14.

Table 14: Determinants of Manufacturing Exports: Regression Results in case of the Transport and Vehicles Firms'

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(**EX_{it}**)**		
Labor Productivity(LP_{it-1}**)**	.0716 (3.71)*	.092 (4.56)**	.026 (1.07)
Service/Sales ($S_{it-1.}$**)**	4.87 (2.81)*	5.76 (2.81)*	6.76 (3.41)*
Size(SI)	.065 (0.50)	.398 (1.75)	.95 (7.89)**
Group status (BGr)	-1.16 (-1.22)	-	-.213 (-0.33)
Previous export performance(EX_{it-1}**)**	.77 (58.88)**	.585 (32.93)**	.995 (87.29)**
Constant	1.04 (1.06)	.29 (0.18)	-9.94 (-10.14)
Overall R^2	0.81	0.80	

** Significant at 1% level, * significant at 5% level, t values in the parentheses

For the last group of industries comprising of gems and jewellery, variables such as labor productivity, size and previous year's export performance had played a prominent role in enhancing the exports of the Gems and Jewellery Group of firms. The service variable are not found to be playing a very active role for this group of firms. The results are shown in Table 15.

Table 15: Determinants of Manufacturing Exports: Regression Results in case of the Gems and Jewellery Exports

Variables	Random Effects	Fixed Effects	Tobit regression
Dependent variable	**Export Intensity(EX_{it})**		
Labor Productivity(LP_{it-1})	.058 (1.60)	.162 (3.76)*	.035 (0.95)
Service/Sales ($S_{it-1.}$)	-3.28 (-0.53)	-5.45 (-0.73)	4.74 (0.64)
Size(SI)	1.63 (3.78)*	2.30 (2.54)*	3.28 (7.30)**
Group status (BGr)	-1.68 (-0.25)	-	4.142 (0.80)
Previous export performance(EX_{it-1})	.834 (37.07)**	.452 (9.37)**	.97 (47.40)**
Constant	-4.37 (-1.38)	10.03 (1.60)	-26.03 (-7.26)
Overall R^2	.88	.84	

** Significant at 1% level, * significant at 5% level, t values in the parentheses

6. Conclusion:

In this paper, we examined the role and contribution of services on the Indian manufacturing sector's export performance. We see that the Manufacturing firms are increasingly focusing on the use of services as inputs and they may do so for entering the global export market and for expanding their exports. Services can assist and help them to bear the extra costs associated with their exports; manage more competition from the foreign competitors and help them to differentiate their product from the others. It is therefore clearly expected that the firm's use of services will benefit the manufacturing firms in the long run.

The overall aggregate Indian manufacturing firms have been able to take the benefit of the rise in services. This is evident from the positive and significant relationship of services use in manufacturing firms with the rising Indian exports of manufactured products. More or less for the

sub-sectors, the results are similar to that of the aggregate level results. Only some manufacturing group of firms like those engaged in Gems & Jewellery and Petrochemicals, Lubricants & Chemicals have not been able to use services for their export expansion. The other group of firms have been able to reap the benefit from the intensive use of services.

The increased focus on the services in the manufacturing firms may have been partly due to the growing competition from the other countries. Another reason for the more intense usage of the services is likely to be change in the firms' demand side. Customers increasingly demand better quality products and they are also concerned with the environmental and social aspects. Hence, services are becomes essential for all these purposes.

The paper also looks at the other determinants of exports like Size, business group affiliation and previous year's export performance. The two factors, firm size and business group affiliation had significantly and positively affected the firms' export performance. Large and medium sized firms have greater advantages as compare to the smaller firms in accessing of finance, which is very much essential to establish distribution networks in the foreign markets. Normally, they have more resources and capital required for improving their competitiveness in the global market. Group firms in turn facilitate transfer of advanced and up-to date managerial skills and expertise which makes the firm more competitive globally as compared to non-group firms.

The study result suggests that reducing constraints and bottlenecks in the services will help in boosting manufacturing exports further. Moreover, the Government of India should create favorable conditions in order to attract foreign direct investment in the manufacturing sector. More innovation and Research & Development (R&D) will stimulate the manufacturing exports further in the long run. A reduction of trade related costs through trade and customs procedures and improvement of infrastructure can also enhance the manufacturing exports.

The study leaves open some of the important issues. The role of FDI is very important. But the limiting factor is that adequate FDI data at the disaggregated level is not available. Hence, the role of foreign or multinational firms and group firms should be seen closely to examine the linkage between the two.

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