

Research And Development Intensity And Trade Performance with Reference To The Multinational Pharmaceutical Firms In India

S. Felix Sophia,

Ph.D. Research Scholar,

Department of Commerce And Financial Studies,
Bharathidasan University, Tiruchirapalli-620024, India.
E-mail : sophiambamphil@gmail.com

Dr. J. Gayathri

Assistant Professor,

Department of Commerce And Financial Studies,
Bharathidasan University, Tiruchirapalli- 620024, India.
E-mail : sayajayapal@gmail.com

ABSTRACT

The theme of international competitiveness is well researched in the context of both developed and developing countries. The study aims to examine the impact of firm-specific factors, especially technological determinations and size of the firm, in determining inter-firm differences in export activities of Indian Multinational firms. Data relating to the study was collected from CMIE Prowess Database from 2008-2017. The statistical tools specifically Correlation, Regression and Granger Causality were considered for the study. The study exposed that Advertising and Marketing Intensity and Import Intensity alone had their influence on the Export accomplishments of the firms throughout the study period.

Keywords: International Trade, Technology, Export, Multinational firms, Investments on Research and Development, Correlation, Regression and Granger Causality.

INTRODUCTION

Over the last few decades, multinational firms are putting in particular efforts to acquire technological capabilities through rigorous investments in numerous springs of technology such as capital goods imports, internal R&D, import of plans, depictions and blueprints, and import of raw materials. Over the past few years, the Pharmaceutical Industry has also been showing increased export activity. Henceforth, examining the relative significance of technological exertions in defining competitiveness of the firms in this important industry is needed. It is often perceived that firms in developing nations such as India primarily depend on imported technologies to have competitive gain over their rivals and the firms are likely to offer products that are in line with world standards. With the indication of knowledge-sharing gaining importance, technological factors are probable to become extremely important in determining the effectiveness of the firms in the global economy. Larger firms with their vast resources have an edge over smaller firms in catering to the needs of domestic as well as international markets. Additionally, in the process of creating brand names, firms are bound to maintain minimum quality standards. In a labour-abundant and relatively capital-scarce country such as India, adoption of a more labour-intensive technique of production can give a competitive edge to a firm over its rivals in the export market. Manufacturing and services firms frequently subcontract a part of their industrial processes to other firms. This not only gives the firm cost advantages but it also helps the firms to concentrate on their strengths. Hence, there is a requirement to explore the relative significance of technological exertions in defining competitiveness of the firms in the pharmaceutical industry.

REVIEW OF LITERATURE

Takehiko Isobe, Shige Makino and David B. Montgomery (2000) examined whether early movers and technology leaders accomplished superior performance in emerging economic regions. The study found that both high commitment and early entry had constructive impacts on the observed economic performance of the Joint Ventures. **Toby E. Stuart (2000)** investigated the relationship between intercorporate technology alliances and firm performance. The study found that establishments with large and innovative alliance partners perform healthier than firms that lack such partners. The findings also exhibit that young and small firms are benefited further from large and advanced strategic alliance partners than old and large organizations. **Ulf Andersson et.al. (2001)** found that a constructive, direct, influence on subsidiary market performance has been created by technology **embeddedness** and brings about indirect impression on the subsidiaries organizational performance. **Anthony Goren and Paul W. Beamish (2003)**, through an internalization theory, recommended that the outdated concept of geographic possibility should be split into two related, but more specific, elements of global asset dispersion and country environment diversity. Successively, relationship amongst economic performance and international asset dispersion is progressive, but that country location diversity is negatively linked with performance, with a positive collaboration between them. **Saradindu Bhaduri & Amit S. Ray (2004)** investigated how *Technological Capability enhances export competitiveness of Less Developed Countries enterprises by presenting quantifiable concepts of technological competency and assessing econometric models of firm-level export performance for two R&D-intensive manufacturing in India.* **Natasha I.E. and Yanthi R.I. Hutagaol (2009)** observed the association amongst R&D with concern's process and market performance. *The findings of the study show that all sample firms have conveyed their R&D activities consequently to the realistic accounting standard. Though, the hypothesis testing results shows that there is no association between R&D and firm's process and market performance.* **Savita Bhat & K. Narayanan (2009)** studied the role of technological efforts and firm size in defining the export behaviour of firms be appropriate to the basic chemical industry in India. The outcomes of the study authorize that technological efforts, firm size and other firm-specific features are important in explaining the export activities of the firms. **Chandan Sharma (2012)** tested the impact of Research and Development (R&D) activities on firms' performance for the Indian pharmaceutical industry. It was found that the performance of foreign firms functioning in the industry is more sensitive towards R&D compared to the local firms and provides further reinforcement and inducements for doing in-house innovative deeds in the Indian pharmaceutical industry. **Filip De Beule and Dieter Somers (2012)** inspected the impact of the aspects persuading the likelihood of foreign R&D; and the consequent impact of foreign R&D on the parent firms' innovativeness. The study found that firm-specific technological rewards are significant drivers of foreign R&D reserves and that technology-seeking foreign R&D positively influences the innovation performance of Indian parent companies. **Miguel Manjón Antolín, et.al., (2012)** analysed whether the efficiency gains linked with Learning-by-Exporting (LBE) depends on the amount of the firm's exporting activity. The results from a typical sample of Spanish manufacturing firms specify that the yearly average gains in productivity are larger for those firms that upsurge their export-to-sales ratio. **Pramod Kumar Naik (2014)** found that R&D investment have affirmative impact on the market value of firm at the beginning, however, after a point these investments lower the market performance of firms. **Savita Bhat (2015)** found that investment on information technology has a progressive effect on the export performance of the firms in this industry. Size and age of the firm also turn out to be important factors in determining export performance of firms in this industry.

The previous studies considered the R&D Intensity and performance of Multinational Firms. It was found that the study concerning the role of Technological Efforts on the Export Performance of Multinational firms' was not done. Thus the present study aims to fill the research gap.

STATEMENT OF THE PROBLEM

In present industrialized world, firms' venture in R&D and exports is a uncertain activity that may involve a lot of investment. Owing to liberalisation, firms would obligate no choice but to revolutionize their methods and reduce their costs in order to match with the overseas manufacturers. The results of R&D may be ambiguous in the export market. Subsequently, it is bit challenging to foresee how venture on such actions will influence firm's global trade performance.

OBJECTIVES OF THE STUDY

- To analyze the relationship between the Investments on Research and Development and Export Performance of the sample firms during the study period.
- To find the impact of Research and Development Investments on the Export Performance of the sample firms during the study period.
- To study the casual relationship between Research and Development Investments and Export Performance of the sample firms during the study period.

HYPOTHESIS OF THE STUDY

- H_{01} : There is no significant relationship between Research and Development Investments and Export Performance of the sample firms during the study period.
- H_{02} : There is no significant impact of Research and Development Investments on the Export Performance of the sample firms during the study period.
- H_{03} : There is no casual relationship between Research and Development Investments and Export Performance of the sample firms during the study period.

METHODOLOGY OF THE STUDY

● Selection of the Sample Size

The components of the BSE S&P Index are considered for sample selection. The Index constitutes 500 companies. Out of these 456 companies are multinational. The amount of companies in the manufacturing sector comes to 417. Among these 417 companies, the pharmaceutical firms are chosen as sample, which amounts to 35 firms and they are Multinational. Among these 35 companies, data was available only for 30 companies. Thus the sample companies are Abbott India Ltd., Ajanta Pharma Ltd., Astrazeneca Pharma India Ltd., Aurobindo Pharma Ltd., Cadila Healthcare Ltd., Cipla Ltd., Divi'S Laboratories Ltd., Dr. Reddy's Laboratories Ltd., F D C Ltd., Glaxosmithkline Pharmaceuticals Ltd., Glenmark Pharmaceuticals Ltd., Granules India Ltd., Indoco Remedies Ltd., Ipca Laboratories Ltd., J B Chemicals & Pharmaceuticals Ltd., Jubilant Life Sciences Ltd., Lupin Ltd., Marksans Pharma Ltd., Natco Pharma Ltd., Pfizer Ltd., Piramal Enterprises Ltd., Sanofi India Ltd., Shilpa Medicare Ltd., Strides Shasun Ltd., Sun Pharmaceutical Inds. Ltd., Sun Pharma Advanced Research Co. Ltd., Suven Life Sciences Ltd., Torrent Pharmaceuticals Ltd., Unichem Laboratories Ltd. and Wockhardt Ltd.

● **Period of the Study**

The study covers a period of 10 years from 2008 to 2017.

● **Source and Collection of the Data**

The secondary data relating to the study was collected from the CMIE “PROWESS” Database.

LIMITATIONS OF THE STUDY

This study suffers from the following limitations.

- All the limitations of secondary data are similarly relevant to this study.
- The period of study covers data only for 10 years.
- All the constraints of the tools are also applicable to this study.

ANALYSIS AND INTERPRETATION

Computation of the Variables

S. No	Variable	Formula
1.	Dependent Variable: Export Intensity	The ratio of exports to its sales.
	Independent Variables:	
2.	Research and Development Intensity	Research and Development Expenses/ Sales
3.	Import Intensity	The amount of Import of Capital Goods and Raw materials as a percentage of Sales.
4.	Size of the Firm	Logarithm of sales
5.	Advertisement and Marketing Intensity	Advertising and Marketing Expenses / Sales.
6.	Outsourcing Intensity	Amount of Outsourced Manufacturing Jobs as a percentage of sales.
7.	Choice of Technology	Expenditure on Wages and Salaries / Gross Fixed Assets.

OVERVIEW OF THE DATA:

The exports of the firm are an important determinant in the International Trade Performance of the Multinational firms, so the study has considered export intensity as the dependent variable and other determinants like Research and Development, Imports, Size of the Firm, Advertisement and Marketing Activities, Outsourcing and the Choice of Technology adopted by the firms influence the level of Exports, so they have been taken as independent variables in the study.

Table 1

Results Of Descriptive Statistics Of The Sample Firms During The Study Period

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
AMI	0.102812	0.180431	3.212314	11.95855	151.9144
COT	0.589438	0.499097	1.550398	5.758675	21.53152
EI	0.654875	1.256745	4.808302	25.37949	741.6507
II	0.181635	0.222166	3.527147	16.50158	290.0695
OI	0.046655	0.144183	4.788877	25.06871	723.4519
RDI	0.079563	0.220222	5.007911	26.73472	829.5669
SIZE	9.469699	0.8984	-0.65536	3.128207	2.168032

Source: Data collected from Prowess Database and computed using E-views 7.0

AMI = Advertising and Marketing Intensity, COT = Choice of Technology, EI= Export Intensity, II= Import Intensity, OI = Outsourcing Intensity, RDI = Research and Development Intensity.

Table 1 Indicates the results of Descriptive Statistics for the sample firms during the study period. The mean value was positive for all the variables such as Advertising and Marketing Intensity, Choice of Technology, Export Intensity, Import Intensity, Outsourcing Intensity, Research and Development Intensity and Size for all the sample firms during the study period. Size recorded the highest mean value 9.469699 and Outsourcing Intensity recorded the lowest mean value 0.046655. The volatilities (Standard Deviation) exhibited low volatility except Export Intensity exhibited high volatility. The skewness was positive and skewed towards right except for Size which was negatively skewed and moved towards left. The Kurtosis value was greater than the normal distribution value 3 and it indicates leptokurtic distribution. The Jarque-Bera value was greater than 5 which indicates normality except for Size it was lesser than 5 which indicates non normality of the distribution.

Table 2

Results Of Correlation Analysis Of The Sample Firms During The Study Period

		Size	RDI	AMI	II	COT	OI
EI	Pearson Correlation	0.205	-0.029	0.630	0.876	-0.169	0.112
	Sig. (2-tailed)	0.278	0.880	0.000	0.000	0.373	0.555

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Data collected from Prowess Database and computed using SPSS 16

AMI = Advertising and Marketing Intensity, COT = Choice of Technology, EI= Export Intensity, II= Import Intensity, OI = Outsourcing Intensity, RDI = Research and Development Intensity.

Table 2 shows the results of the correlation analysis of the sample firms during the study period. The variable Export Intensity witnessed significant 'p' value with the variables Advertising and Marketing Export Intensity and Import Intensity which reveals 63% and 87.6% relationship between the variables. Extensive market promotion of a product may help a firm in creating a niche market for that product. Furthermore, in the process of creating brand names, firms are compelled to maintain minimum quality standards. This can be important for the success of the firm in the overseas market. The imported machines, equipment and raw materials are likely to be based on relatively modern designs and technologies. By using these equipments and raw materials in the production process, the firms are likely to be able to offer products that are in line with world standards. Hence the null hypothesis H01: “There is no significant relationship between R & D Investments and Export Performance of the sample firms during the study period” is rejected.

Table 3
Model Summary Of Regression Result For
The Sample Firms During The Study Period

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.904	0.817	0.769	0.604

a. Predictors: (Constant), OI, RDI, AMI, COT, II, Size

b. Dependent Variable: EI

Source: Data collected from Prowess Database and computed using SPSS 16

AMI = Advertising and Marketing Intensity, COT = Choice of Technology, EI= Export Intensity, II= Import Intensity, OI = Outsourcing Intensity, RDI = Research and Development Intensity.

Table 3 shows the results of model fitness for the R & D Investments and Export Performance of the sample firms with Export Intensity as dependent and Advertising and Marketing Intensity, Choice of Technology, Export Intensity, Import Intensity and Size as independent variables. It is noted that 90.4% of relationship was noticed between Export Intensity and Advertising and Marketing Intensity, Choice of Technology, Export Intensity, Import Intensity and Size as independent variables. Further only 81.7% of variation in Export Intensity was explained jointly by the other independent variables. However the R square value is high which indicates the model is good.

Table 4
Anova Results Of The Sample Firms During The Study Period

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.412	6	6.235	17.092	0.000
	Residual	8.391	23	0.365		
	Total	45.803	29			

- a. Predictors: (Constant), OI, RDI, AMI, COT, II, Size
- b. Dependent Variable: EI

Source: Data collected from Prowess Database and computed using SPSS 16.0

AMI = Advertising and Marketing Intensity, COT = Choice of Technology, EI= Export Intensity, II= Import Intensity, OI = Outsourcing Intensity, RDI = Research and Development Intensity.

The results of Analysis of Variance for the R & D Investments and Export Performance of the sample firms with Export Intensity as dependent and Advertising and Marketing Intensity, Choice of Technology, Export Intensity, Import Intensity, Outsourcing Intensity, Research and Development Intensity and Size as independent variables are presented in **Table 4**. The F statistic value was found to be 17.092. The 'p' value was 0.000 which is lesser than 0.05 at 5% level. Hence the H02: “There is no significant impact of R & D Investments on the Export Performance of the sample firms during the study period” is rejected.

Table 5
Co-Efficient Result For The Sample Firms During The Study Period

Model		Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
1	(Constant)	-0.15	1.47		-0.10	0.919
	Size	-0.02	0.16	-0.01	-0.12	0.903
	RDI	0.13	0.58	0.02	0.22	0.824
	AMI	1.78	0.73	0.25	2.44	0.023
	II	4.25	0.62	0.75	6.91	0.000
	COT	0.03	0.25	0.01	0.12	0.907
	OI	0.25	0.83	0.03	0.30	0.766

- a. Dependent Variable: EI

Source: Data collected from Prowess Database and computed using SPSS 16.0

AMI = Advertising and Marketing Intensity, COT = Choice of Technology, EI= Export Intensity, II= Import Intensity, OI = Outsourcing Intensity, RDI = Research and Development Intensity.

Table 5 explains the co-efficients of R & D Investments and Export Performance of the sample firms during the study period. It is to be noted from the results that the 'p' value of the Advertising and Marketing Intensity and Import Intensity alone was less than 0.05. The various imports of capital goods and raw materials of the sample firms had their positive impact and increased the level of exports of the firms. The advertising and marketing activities evidence significant impact of the export activities of the firms. In the process of creating brand names, firms are compelled to maintain minimum quality standards. This can be important for the success of the firm in the overseas market. Hence it is clear that the variables Import Intensity and Advertising and Marketing Intensity alone had its impact on the Exports of the sample firms during the study period.

Table 6
Results Of Granger Causality Test Forthe Sample
Firms During The Study Period

Null Hypothesis:	F-Statistic	Prob.
EI does not Granger Cause AMI	0.445	0.647
AMI does not Granger Cause EI	0.603	0.556
EI does not Granger Cause COT	0.492	0.618
COT does not Granger Cause EI	0.561	0.579
II does not Granger Cause EI	0.074	0.929
EI does not Granger Cause II	0.076	0.927
OI does not Granger Cause EI	131.807	0.000
EI does not Granger Cause OI	0.061	0.941
RDI does not Granger Cause EI	0.049	0.952
EI does not Granger Cause RDI	0.049	0.952
SIZE does not Granger Cause EI	1.794	0.189
EI does not Granger Cause SIZE	0.157	0.856

Source: Data collected from Prowess Database and computed using E-views 7.0

AMI = Advertising and Marketing Intensity, COT = Choice of Technology, EI= Export Intensity, II= Import Intensity, OI = Outsourcing Intensity, RDI = Research and Development Intensity.

Table 6 exhibits the results of Granger Causality for R & D Investments and Export Performance of the sample firms during the study period. The results of F-statistics values for Outsourcing Intensity and Export Intensity, were greater than 3 and further, the probability values were less than the significant value of 0.05. These results indicate unidirectional causation between Outsourcing Intensity and Export Intensity during the study period. Hence the null hypothesis H03: "There is no casual relationship between R & D Investments and Export Performance of the sample firms during the study period." is rejected.

FINDINGS AND IMPLICATIONS

The study observed the impact of the selected variables on the Export Performance of the sample firms during the study period. Trade can affect innovation effort of multinational firms through import competition, Research and Development activities and export. The major findings of the study were: The results of correlation and regression analysis indicate that the variables Advertising and Marketing Intensity and Import Intensity alone witnessed significant relationship and impact with the Export Intensity. The Granger Causality results indicate unidirectional causation between Outsourcing Intensity and Import Intensity during the study period.

SUGGESTIONS OF THE STUDY

- The sample firms must focus on their Import activities, as they may help firms to enhance their ability to compete in the global market.
- The firms should have control over their choice of technology to ensure effective production.
- R&D expenditure may even bring negative impact to the firm, so the firms should regularly monitor the Research and Development activities and ensure that they are successfully implemented.

CONCLUSION OF THE STUDY

The study examined the impact of R & D Investments and Export Performance of the sample firms during the study period 2008 to 2017. The exports of the firms can be enlarged through their advertising and marketing activities and import of raw materials and capital goods. The study discovered that the variables Import Intensity and Advertising and Marketing Intensity alone had positive impact on the Export activities of the sample firms.

REFERENCES

1. Andrew B. Bernard and J. Bradford Jensen (2007). Firm Structure, Multinationals and Manufacturing Plant Deaths. *The Review of Economics and Statistics*. Volume 89 (2) p.193-204.
2. Anthony Goerzen and Paul W. Beamish (2003). Geographic Scope and Multinational Enterprise Performance. *Strategic Management Journal*. *Strat. Mgmt. J.*, 24: 1289– 1306.
3. Aspasia Vlachvei and Ourania Notta (2008). Firm Growth, Size and Age in Greek firms. *International Conference on Applied Economics – ICOAE 2008* 915.
4. Chandan Sharma & Ritesh Kumar Mishra (2011). Does export and productivity growth linkage exist? Evidence from the Indian manufacturing industry. *International Review of Applied Economics*. Vol. 25, No. 6, November 2011, 633–652.
5. Chandan Sharma, 2012. R&D and Firm Performance: evidence from the Indian Pharmaceutical Industry. *Journal of the Asia Pacific Economy*. Vol. 17, No. 2, 332–342.
6. Chitra Singla and Rejie George (2013). Internationalization and performance: A contextual analysis of Indian firms. *Journal of Business Research*, 66, 2500–2506.
7. M. Parameswaran. *International Trade and R&D Investment: Evidence from Manufacturing Firms in India*.

8. Natasha I.E. &Yanthi R.I. Hutagaol (2009) . The Analysis of R&D Impact on The Public Listed Companies' Performance in Indonesia.*Journal of Applied Finance and Accounting* Vol. 1 No.2, 339 – 350.
9. Paul W. Beamish, LambrosKaravis, Anthony Goerzen and Christopher Lane (1999). The Relationship Between Organizational Structure and Export Performance.*Management International Review*, Vol. 39, No. 1, pp. 37-54
10. RehanaKouser,TahiraBano,Muhammad Azeem and Masood-ul-Hassan (2012). Inter-Relationship between Profitability, Growth and Size: A Case of Non-Financial Companies from Pakistan. *Pak. J. Commer. Soc. Sci.* Vol. 6(2), 405-419.
11. SaradinduBhaduri& Amit S. Ray (2004). Exporting through Technological Capability: Econometric evidence from India's Pharmaceutical and Electrical/Electronics Firms. *Oxford Development Studies*, Vol. 32, No. 1, 87-100
12. TakehikoIsobe, Shige Makino and David B. Montgomery (2000). Resource Commitment, Entry Timing, and Market Performance of Foreign Direct Investments in Emerging Economies: The Case of Japanese International Joint Ventures in China. *Academy of Management Journal* , Vol. 43, No. 3, 468-484.