A STUDY ON INTERNAL DETERMINANTS OF EXPORT IN PHARMACEUTICAL INDUSTRY

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Abstract

Over the years, the Indian pharmaceutical sector has emerged as one of the world's prominent providers of affordable healthcare products. As per the Ministry of Chemicals and Fertilizers, the Indian pharmaceutical industry is the third largest producer in the world in terms of volume and the fourteenth in terms of value. During FY13, the total sales turnover of Indian pharmaceuticals products, which are largely generics, was about 1,200 billion. Indian pharmaceutical industry accounts for 9.3% of the global pharmaceutical production by volume and 1.5% of the global pharmaceutical production in terms of value. This industry has recorded a cumulative average growth rate of around 14% during the last 5 years. The study examines the Internal Determinants of export in Pharmaceutical industry.

Keywords: Pharmaceutical Industry, Export, Economies of Scale, Globalization

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1. Introduction

The pharmaceutical industry develops, produces, and markets drugs licensed for use as medications. The pharmaceutical industry is characterized by a highly risky and lengthy R&D process, intense competition for intellectual property, stringent government regulation and powerful purchaser pressures. The pharmaceutical industry in India is among the most highly organized sectors. This industry plays an important role in promoting and sustaining development in the field of global medicine. Due to the presence of low cost manufacturing facilities, educated and skilled manpower and cheap labour force among others, the industry is set to scale new heights in the fields of production, development, manufacturing and research.

The Indian pharmaceutical industry is the world's second-largest by volume and is likely to lead the manufacturing sector of India. During FY13, the total sales turnover of Indian pharmaceuticals products, which are largely generics, was about ` 1,200 billion. Indian pharmaceutical industry accounts for 9.3% of the global pharmaceutical production by volume and 1.5% of the global pharmaceutical production in terms of value. This industry has recorded a cumulative average growth rate of around 14% during the last 5 years.

The products manufactured by the Indian pharmaceutical industry can be broadly classified into bulk drugs (active pharmaceutical ingredients - API) and formulations. Of the total number of pharmaceutical manufacturers, about 77% produce formulations, while the remaining 23% manufacture bulk drugs. Bulk drug is an active constituent with medicinal properties, which acts as basic raw material for formulations. Formulations are specific dosage forms of a bulk drug or a combination of bulk drugs. Drugs are sold as syrups, injections, tablets and capsules.

Domestic demand has been showing significant growth; the rise in consumption being primarily attributed to the rising population, rise in income levels and increasing health awareness among people. New product launches by the Indian and multinational companies have also catalyzed market demand. Moreover, the favourable regulatory environment, increased expenditure on R&D and improved technical skills in the field of chemical synthesis has also played an important role. The increasing alliances and tie-ups of Indian companies with global players have further given a boost to Indian exports.

Pharmaceutical manufacturing units are largely concentrated in Maharashtra and Gujarat. These states account for about 45% of the total number of pharmaceutical manufacturing units in India. A highly fragmented industry, the Indian pharmaceutical industry is estimated to have over 10,000 manufacturing units, as given by the Organisation of Pharmaceutical Producers of India. The organized sector accounts for just 5% of the industry with around 300 players, while a huge 95% is in the unorganized sector. A large number of players in the unorganized segment are small and medium enterprises and this segment contributes 35% of the industry's turnover.

The key players in Indian pharmaceutical industry can be divided depending upon their turnover and market capital. Though for Ranbaxy there is huge presence in both market cap and turnover among top Indian companies, it doesn't infer that it has a better financial position.

1.3 Foreign trade in pharmaceutical products

During FY09 to FY13, exports of India's pharmaceutical products registered compound annual growth rate (CAGR) of 23.7%. The strength of the Indian pharmaceutical sector in the generic drugs segment primarily drove growth in the export market. Further, with many branded drugs scheduled to go off patent through 2015, there is a growing opportunity for manufacturers of Indian generic drugs. This is also supported by increasing alliances of Indian companies with global players.

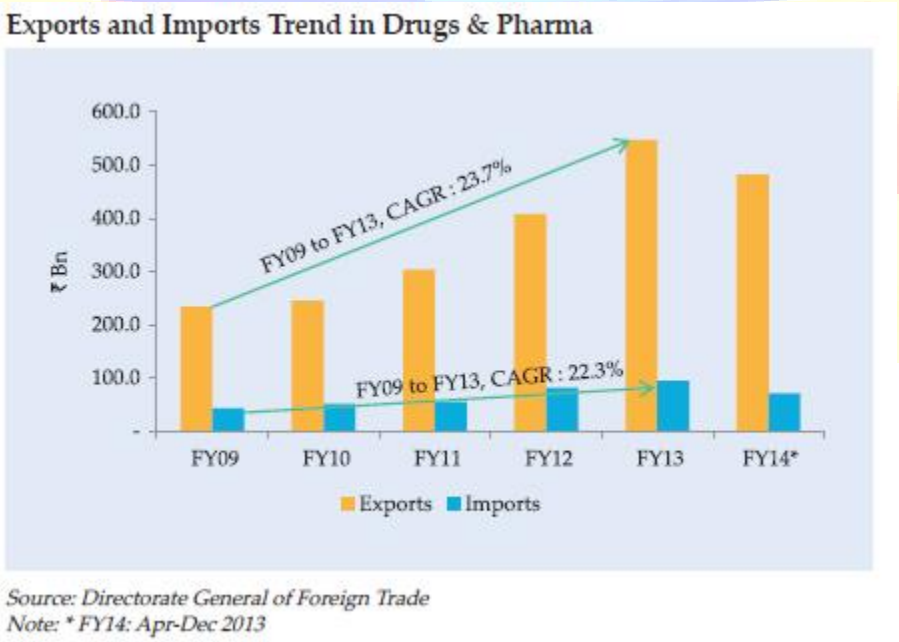

Figure 1

The increasing presence in high-value markets like the USA and Europe has strongly boosted the overall growth of the Indian pharmaceutical industry. However, with competition getting stiffer in the regulated markets and the consequent pressure on margins, Indian players are also expanding their geographical reach to high-growth regions such as the CIS and Latin American countries. Although considered as low-value markets, these markets are witnessing impressive growth and therefore it provides great opportunity for Indian players.

As observed exports is growing past the imports during the specified years leading to net trade surplus in Pharma sector. This demonstrate positive health the industry as well as growth prospects.

The US is the largest market for India's pharmaceutical exports. During FY10, the US accounted for 24.1% of India's pharmaceutical exports. Russia and Germany followed with 5% and 2.2% share respectively.

1.4 Internal Determinants of exports.

Exports have been the major growth enabler of the Indian pharmaceutical industry in recent years. India exports pharmaceutical products, APIs and intermediates to more than 200 countries across the world. Traditionally, Russia, Germany, Nigeria and India's neighbouring countries like Sri Lanka, Nepal, and the Middle East were the major markets for Indian pharmaceutical exports. Most of these markets are not highly regulated and are considered to be low-value markets.

Thus it is required to study the factors prevailing within an organisation which effects export, they can also be referred as factors influencing growth of the industry. The Indian pharmaceutical industry ranks 14th in the world by value of pharmaceutical products. With a well-established domestic manufacturing base and low-cost skilled manpower, India is emerging as a global hub for Pharma products and the industry continues to be on a growth trajectory. Moreover, India is significantly ahead in providing chemistry services such as analogue preparation, analytical chemistry and structural drug design, which will provide it ample scope in contract research and other emerging segments in the pharmaceutical industry.

Some of the major factors that would drive growth in the industry are size of the firm prevailing in the market, nature of drug, investment in R&D, profit and economies of scale.

2. Literature Survey:

"Internationalization of Indian Pharmaceutical Industry : A study on the determinants of export stimulation" by Srikant Panigrahy, P.Mishra & B.P.Patra. In this report analysed 21 factors divided in to two category i.e. reactive and proactive motives for exports and the results were, firstly the most important determinant for Indian pharma firms to move to overseas markets was found to be attractive profit and growth opportunities, secondly The other most important determinants found were managerial urge/ interest/ aspirations ,firm mission and vision , economies of scale , economies of scope , technological advantage , and lower costs of labour, production and energy.

A study by Mats Wilkman on **"Determinants of Swedish Pharmaceutical Exports"** implies that a relatively small subset of export destinations makes up almost 93 percent of the total export value. The empirical findings show that the GDP is one of the most important factors explaining export value of pharmaceuticals. The GDP/Capita where the population size is taken into account is also important. The physical distances to the export destinations are still of important explaining export pattern in this industry as there is an inverse relationship between distance and export. The price per kilo of the pharmaceuticals is positively related to GDP, GDP/Capita and the distance to the destination country.

Dinesh Abrol, Pramod Prajapati and Nidhi Singh conducted a study on **"Globalization of the Indian Pharmaceutical Industry: Implications for Innovation"** which discussed that with India facing the challenge of constituting pathways and strategies for accelerated learning, we also explore through whose actions, types of strategies and routes of growth have the limits of Indian pharmaceutical industry innovation been reached within one decade.

The study also suggests how and with what kind of policy design can the Indian state and society intervene to push the frontier of innovation further within this industry. Indian state and business have chosen globalization pathways with specific implications for innovation. We assess systemic connections of these implications, suggesting that for a significant change in domestic

and foreign pharmaceutical firms' orientation to disease, as reflected in outcomes of their R&D investment activity, there also has to be a major focus on pathways toward innovation for domestic markets. \

Kapil Kumar and Dr. M. K. Kulshreshtha performed **"Swot Analysis of Indian Pharmaceutical Industry"** which reviled that The global pharmaceutical market is undergoing rapid transformation. There has been a dramatic shift towards emerging markets as western markets slow down. Global Pharma multinational corporations are looking at new growth drivers such as the Indian domestic market to capitalize on the growing opportunity.

The huge potential of the Indian pharmaceutical industry is impossible for global Pharma companies to ignore, given that India will be one of the top 10 sales markets in the world by 2020. Some of the largest Pharma companies in the world have been in the Indian market since the 1970s, and 5 out of the top 10 domestic Pharma companies are already foreign owned, with a consolidated share of 22 – 23%. India‟ s domestic pharmaceutical market has recorded a CAGR of 13.5% over the past five years. With considerable expertise in manufacturing of generics and vaccines, Indian companies have now also started significant research and development (R&D).

Dinar Kale in his research on "**Internationalisation Strategies of Indian Pharmaceutical firms"** observed that overseas expansion of Indian firms is related to the need to improve global competitiveness, acquisition of assets (including research and contract manufacturing firms, in order to further boost their outsourcing capabilities), move up the value chain, and increase their product offering and consolidation of existing market shares. The pattern of internationalization suggests that the acquisition route is a more preferred strategy due to synergies available to Indian firms. However in the US generic market the organic route has emerged as a preferred way of internationalization.

The insights from this research suggest that globalisation is opening up a whole set of opportunities for firms in developing countries. These firms created linkages through internationalization and the learning experience resulting from these linkages and the leverages which these linkages provide to firms has emerged as one of the main motive for internationalization of firms.

3. Objective of the study:

- To explore the determinants of exports in pharmaceutical industry in India.
- To study the impact of various determinants on exports.
- To identify the factor which force the domestic companies to export their products.

4. Research Design and Methodology:

The research is Exploratory and descriptive in nature as it includes complete study of the sector and the determinants of its export. The research will be based on secondary data. A panel data analysis will be undertaken using convenient cum judgmental non-random sampling. Collected data will be analyzed using tools like Correlation and Regression Analysis with the help of SPSS. The variables taken can be classified as:

Table 1: List of Variables

Independent	Dependent
Size	Export
Profit	
Investment in R&D	
Nature of operations	
Economies of scale	

Independent variables:

An **independent variable** is that variable which is presumed to affect or determine a dependent variable. It can be changed as required, and its values do not represent a problem requiring explanation in an analysis. The independent variable is typically the variable representing the value being manipulated or changed and the dependent variable is the observed result of the independent variable being manipulated.

- **Size**:

The size of the firm is one of the important factor which is to be analysed so as to decide the factors responsible for exports. The size of the firm refers to the total assets and liability of the

company forcing growth in trade. As exports require huge investment, thus a company must have a high amount of assets. Larger size makes it possible for firms to extend their R&D and the geographical scope of their markets. Thus we expect size to have a positive effect on the export performance of firms. Another reason why large firms are expected to have higher export intensity is that many of these firms are becoming outward oriented. Since much of outward investment is undertaken by large firms in this industry, we expect large firms to have significantly higher export intensity.

- **Profit:**

Main motive of every business man behind its business is maximization of profits Firms move to international markets for better growth and profits. Profit refers to financial benefit that is realized when the amount of revenue gained from a business activity exceeds the expenses, costs and taxes needed to sustain the activity. Any profit that is gained goes to the business's owners, who may or may not decide to spend it on the business. Profit making firm's attempts to expand their business abroad as it requires a lot of initial investment to start export.

- **Investment in R&D:**

Research and Development is the backbone of the Indian pharmaceutical industry. The Indian players are increasing their R&D expenditure as they target to expand their generic portfolio, sustain in growing competition, file Abbreviated New Drug Applications (ANDA) in the US, and focus on major therapeutic segment such as cardiology, diabetes and cancer. Further, companies are gradually increasing focus towards development of new products and molecules. Several MNCs are also entering into partnerships with Indian companies due to India's low-cost production advantage.

R&D expenditure of the domestic pharmaceutical companies stood at ` 33.4 billion as on FY10, as compared with ` 18.5 billion during FY06, increasing at a CAGR of 15.9% during this period. However, R&D expenditure of foreign companies increased from ` 8.2 billion in FY06 to ` 9.3 billion in FY10, a CAGR of 3.4% during this period.

R&D by Indian pharmaceutical companies is backed by a favourable policy environment and availability of surplus skilled technical workers at low costs. This is to the advantage of the sector and will see a significant thrust in coming years.

- **Nature of operations:**

A firm involved in exports usually perform both or one of the operations i.e. manufacturing and selling. Firms targeting international market must ensure their competitiveness with the already established firms, thus to survive in the market they require to perform both the operations. The area covered by the firm largely depends on its working, a firm focusing only on selling will face difficulties in fulfilling the requirements of customers instantly where as if a firm focuses only on manufacturing than it can have problems in distribution of product to end consumers.

- **Economies of scale:**

Eonomies of scale, refers to the cost advantages that a business obtains due to expansion. There are factors that cause a producer's average cost per unit to fall as the scale of output is increased. "Economies of scale" is a long run concept and refers to reductions in unit cost as the size of a facility and the usage levels of other inputs increase. By moving to international markets, a company can achieve economies of scale and scope by spreading over more units and thereby reducing the fixed costs incurred in administration, facilities, equipments, staff work and R&D.

Indian pharma companies' drug prices are known to be one of the lowest prices in the world. Although they account for 13% of the volume market all over the world, they only have 1% sales turnover. So due to less profit margins, economies of scale gives the firms' more volume turnover although margins are low and thereby achieving capital efficiencies. So this indicator may act as major stimuli for most of the Indian pharma companies as these depend more on volume generated from unit sales due to low pricing of medicines.

Dependent variable:

A **dependent variable** is what you measure in the experiment and what is affected during the experiment. The dependent variable responds to the independent variable. It is called dependent

because it "depends" on the independent variable. In a scientific experiment, you cannot have a dependent variable without an independent variable.

- **Export:**

Exports have been the major growth enabler of the Indian pharmaceutical industry in recent years. India exports drugs to over 200 countries and vaccines and bio-pharma products to about 151 countries. The country is one of the largest exporters of pharmaceutical products in the US and Europe. The US and Europe accounted for 31% and 15% share respectively of pharmaceutical exports from India. Besides, exports of pharmaceutical products to the US increased by 38% during FY13, as compared to 30% during FY12.

In addition, about 67% of the medicine exports from India go to developing countries and over 55% of drugs are exported to highly regulated markets. Indian generic drugs are also sourced by several international procurement agencies for their health programmes in developing countries. Indian generic drugs constitute about 50% of the essential medicines that the United Nations Children's Fund (UNICEF) distributes in developing countries. The International Dispensary Association (IDA) sources around 75%-80% of all its medicines for distribution to developing countries from India.

5. Data Analysis

Table 2: Descriptive Statistics

Particulars	Mean	Standard deviation	N
Size	17208.392	4415.1185	5
Profit	3023.7820	2514.3289	5
Investment in R&D	2193.0920	218.0331	5
Nature of operations	3.0	0.00	5
Economies of scale(%)	77.7200	5.4293	5
Export	10563.748	2486.6231	5

To study the impact of various variables like size, profit, investment on R&D, nature of operations and economies of scale on export of Pharma industry correlation analysis is used. Exports was considered dependent variable, as it reflects the total quantity of good moved out of national boundary and reflect the competitiveness of Pharma industry in global market. The exports of the industry is effected by various factors, each of the independent factor play its role and is assumed to have a different impact on the profitability of the business. So, all the components of Pharma industry as a part of exports are considered as independent variables. This is represented in terms of independent variables no. 5 (**size, profit, investment on R&D, nature of operations and economies of scale**). Further, the independent variables were considered for correlation analysis so as to explore the better predicting variables for the purpose of further analysis. The results of correlation analysis have been shown in the table below and have been discussed there after.

Table 3: Correlation

Variable		Export
Size	Pearson correlation	.914*
	Sig. (2-tailed)	.030
	N	5
Profit	Pearson correlation	.485
	Sig. (2-tailed)	.407
	N	.5
Investment in R&D	Pearson correlation	.799
	Sig. (2-tailed)	.105
	N	5
Nature of operations	Pearson correlation	.□
	Sig. (2-tailed)	.
	N	5
Economies of scale(%)	Pearson correlation	-358
	Sig. (2-tailed)	554
	N	5
Export	Pearson correlation	1.000
	Sig. (2-tailed)	.
	N	5

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

□. Cannot be computed because at least one variables is constant.

Dependent Variable: Exports.

Independent variables: size, profit, investment in R&D, nature of operations, and economies of scale.

As seen from the correlation matrix above, out of 5 independent variables considered for the purpose of this study, only four variables, viz. Size, profit, investment in R&D and economies of scale are found to have effect on exports . While the fourth independent variable i.e. nature of operation do not affect the results as its constant for all the firms, every firm involved in export perform both the operation i.e. manufacturing and selling. Economies of scale is found to be negatively related whereas size, profit and investment in R&D are positively related. As far as the strength of relationship between these independent variables and dependent variable is concerned, size of the firm is found to be strongest with Pearson Correlation Coefficient of 0.914 at 0.05 significance level.

This implies that the bigger the company the larger its export will be. This is followed by investment in R&D with Pearson Correlation Coefficient of 0.799 at 0.05 significance level, thus a company entering in to exports must focus more on research and development. One crucial observation is related to profit which is found to be positively related with the exports of Pharma companies, with a Pearson Correlation Coefficient of0 .485 at 0.05 significance level but its significance is 0.407 which implies that profit being the most important factor of doing business stands back in case of exports. The fourth significantly correlated factor is economies of scale, which is negatively related with exports with Pearson Correlation Coefficient of -0.358 at 0.05 significance level. This implies that more this ratio is less is the capacity of company to export. To further analyze the impact of significantly correlated independent variables on export of Pharma industries, Multiple Regression was undertaken. The findings of the analysis and their implications are discussed hereinafter.

Table 4: Model Summary (Multiple Regression)

Model	R	R square	Adjusted R square	Std. Error of the Estimate
1	0.995□	0.990	0.961	488.2869

Dependent Variable: Exports

Predictors: (Constant), economies of scale, size and investment in R&D

As explained by the model above, the relation between the variables in not strong and viable. So, this model is estimated to be good. To further estimate the fitness of model for the, ANOVA values were calculated, which are exhibited below:

Table 5: ANOVA

Model		Sum of Squares	df	Mean Square	F	Significance
1	Regression	24494754	3	8164918.166		0.125

a. Predictors: (constant), economies of scale, size and investment in R&D.

b. Depandent variable: Export

The significance value of 0.125 confirms that the model is not a good fit for predicting the amount of export for Pharma industry on the basis of values of independent variables considered in the model. To further explore the relative importance of each of the independent variable considered in the model, coefficient values were calculated, which are exhibited below:

Table 6: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Significance
		B	Std. error	Beta		
1	(Constant)	13025.627	4458.753		2.921	0.210
	VAR00001	0.418	0.131	0.742	3.201	0.193
	VAR00003	2.336	2.683	0.205	0.871	0.544
	VAR00005	-190.121	47.656	-0.415	-3.989	0.156

a. Dependent Variable: Export

b. Predictors: (Constant), economies of scale, size and investment in R&D

A close study of the coefficient table above reveals that size and profit have a positive impact on dependent variable i.e. export. Economies of scale has appeared as most important predictor on negative side. Thus this cannot be taken as suitable for the study.

Thus to determine the best suitable factor for export single regression was carried out. The results are as follows

Regression:

Table 7: Model Summary (Regression)

Model	R	R^2	Adjusted R square	Standard error of estimate
1	0.914 □	0.835	0.780	1167.0702

□-predictors: (constant), size of the firm.

As explained by the model above, there is a strong correlation between observed and predicted values of exports in Pharma industries and the variation in value of export is considerably explained by the model. So, this model is estimated to be optimistically fit for Pharma industries. To further estimate the fitness of model for the purpose of respondent company, ANOVA values were calculated which are exhibited below:

Table 8: ANOVA□

Model		Sum of squares	df	Mean square	F	Significance
1	Regression	20647020	1	20647020.051	15.159	0.030□
	Residual	4086158.5	3	1362052.842		
	Constant	24733179	4			

a.-predictors :(constant), size of the firm

b.-dependent variable: export

The significance value **of 0.030** confirms that the model is a good fit for predicting the value of export for Pharma industries. On the basis of values of independent variables considered in the model. To further explore the relative importance of each of the independent variable considered in the model, coefficient values were calculated, which are exhibited below:

Table 9: Coefficients

Model		Unstandardized		Standardized	t	Significance
		B	Std. error	Beta		
1	(Constant)	1708.584	2333.508		0.732	0.517
	VAR00001	0.515	0.132	0.914	3.893	0.030

Dependent Variable: Export

Predictors: size

A close study of the coefficient table above reveals that size of the firm is most important factor determining export of a firm in Pharma industry. For this purpose, following regression equation can be used to predict the value of dependent variable, i.e. Exports:

Export of firm = 1708.584 + 0.515 * size + e

6. Conclusion

The Indian pharmaceuticals industry has grown from a mere Rs.1500 crore turnover in 1980 to approximately Rs.100611 crore in 2009-10 (upto Sept. 09). The country now ranks 3rd in terms of volume of production (10% of global share) and 4 th largest by value. Indian pharmaceutical industry growth has been propelled by exports which have grown from Rs.6256 crore in 1998-99 to Rs.39821 crore in 2008-09.

Pharma industry has grown in recent years due to increase in its exports and the major factor influencing export of the industry is the increasing size of the firms prevailing in the industry. The firms witnessing high export have a high capacity investment in the operations involved in export of the products. It is also affected by other factors like nature of drug, investment in R&D and economies of scale. The study reveals that size and profit have a positive impact on dependent variable i.e. export where as economies of scale has appeared as most important

predictor on negative side. Thus a firm with huge investment and high amount of assets will have great potential to export its product.

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