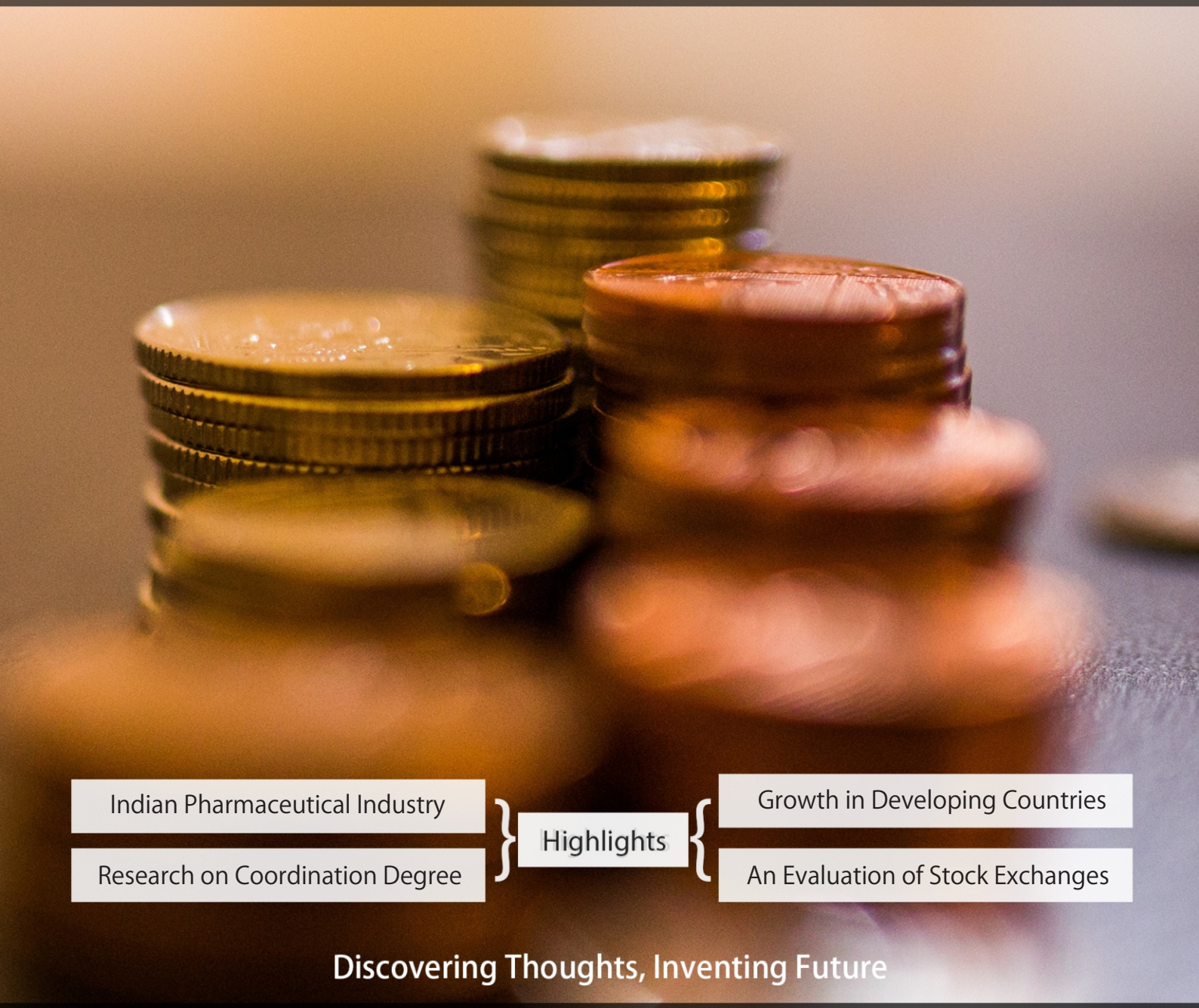
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Growth in Developing Countries

An Evaluation of Stock Exchanges

Discovering Thoughts, Inventing Future

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Female Labor Force Participation and Economic Growth in Developing Countries

By Elizabeth N. Appiah
Pentecost University

Abstract- This paper examines the relationship between female labor force participation and its impact on economic growth. The paper further explores whether the impact of the female labor force participation on economic growth is different for developing countries as a whole compared with countries in sub-Saharan Africa (SSA). I hypothesize, that female labor force participation will have a positive effect on economic progress in developing countries including countries in SSA. I use a panel data from the World Development Indicators (WDI) from 1975-2015, and employ a neoclassical growth model to examine how the female labor force participation, affect economic growth. Using the 'system' GMM estimator, my findings reveal that the female labor participation has a positive impact on economic growth, in developing countries, and that of SSA countries only. This paper contributes to the literature analyzing the importance of female labor force participation on economic growth. By examining, the impact on 139 countries that make up the developing world analysis from this further strengthens the link between female labor force participation and economic growth.

Keywords: developing countries, female labor force participation; economic growth.

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Female Labor Force Participation and Economic Growth in Developing Countries

Elizabeth N. Appiah

Abstract- This paper examines the relationship between female labor force participation and its impact on economic growth. The paper further explores whether the impact of the female labor force participation on economic growth is different for developing countries as a whole compared with countries in sub-Saharan Africa (SSA). I hypothesize, that female labor force participation will have a positive effect on economic progress in developing countries including countries in SSA. I use a panel data from the World Development Indicators (WDI) from 1975-2015, and employ a neoclassical growth model to examine how the female labor force participation, affect economic growth. Using the 'system' GMM estimator, my findings reveal that the female labor participation has a positive impact on economic growth, in developing countries, and that of SSA countries only. This paper contributes to the literature analyzing the importance of female labor force participation on economic growth. By examining, the impact on 139 countries that make up the developing world analysis from this further strengthens the link between female labor force participation and economic growth.

Keywords: developing countries, female labor force participation; economic growth.

I. Introduction

The importance of the female labor force participation has been acknowledged for decades (Boserup, 1970, 2013; Durand, 1975; Pampel and Tanaka, 1986; King and Hill, 1997; Mamnen and Pazason, 2000; Juhn and Ureta, 2003 and Lincove, 2008; Lechman and Kauer, 2015). Drawing from empirical studies, economic empowerment has also been recognized as a prerequisite for Sustainable Development Goals (SDGs). As female labor force participation is an important aspect of economic empowerment, some have specifically addressed these two variables. This paper thus contributes to this major field by extending studies that examine how female labor force participation affect economic growth, in developing countries, in general. By utilizing analysis of countries in SSA, this paper aims at providing a comparative perspective on the association between female labor force participation and economic development.

Having noted the goals and objectives of the study, as well as some significant contributions, this paper provides the theoretical framework to discuss the impact of female labor force participation on per capita GDP growth. I employ the 'system' General Method of Moments (GMM) proposed by Blundell and Bond (1998) to estimate a linear dynamic data of 139 countries over the period 1975 to 2015. The importance of using the system GMM estimator is that it is a more efficient estimator. My findings indicate that female labor force participation has positive and statistically significant effects on the economic growth in all developing countries, and in SSA as a separate region, after controlling for other factors that affect economic growth. I find no difference between the marginal effects in SSA and developing countries as a whole. The rest of the paper is as follows: Section 2 provides a brief background, and Section 3 describes the data. In Section 4, I discuss the method used in analyzing the data, and Section 5 presents the results. Section 6 concludes.

II. Background

The existing literature examines how changes in the economies in specific countries result in changes in the female labor force participation as well. As economies remain, primarily agricultural research reveals that female labor force participation remains high as found in many developing countries. Since 1970s female labor force participation in developing countries mostly, in SSA, Latin America (LAC), and the Middle East have been rising (World Bank data, 2017). Contrary, female labor force participation in the other regions is characterized by cyclical periods in which labor is either plenteous or scarce. Çağatay and Özler (1995); Gaddis and Klasen, (2014) note the decline of female labor force participation as an economy moves from mainly an agricultural sector to an industrial one. Cavalcanti and Tavares (2011) show how female labor force participation, then increases as economies move to a more service- centered one. It is, however, crucial to note that cultural factors, including religious values and ethnic attitudes also affect the female labor force. Duflo (2012) reveals that women's labor force presence on economic development can be bidirectional, in the sense that economic development can lead to an increase in female labor force participation. Research by Berniell and Sánchez-Páramo (2011) reveal how household labor can have a negative effect on the female labor force. As women spend more time and energy on household labor, they have little time to

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participate in the formal labor force. Developing countries, on the other hand, the informal labor force affords women the opportunity to combine both, but also limit the most productive use of their time. In this case, as economies develop, women tend to spend less time on household chores and are therefore free to participate in the labor force (Greenwood, Seshadri et. al., 2005; Dinkelman, 2010). At the same time, women's high presence in the labor force can be seen as a prerequisite for economic development. In some developing countries, where female labor force participation is low, society views girls' education as insignificant because of the potential lack of economic contributions to households. An expansion in the female labor force participation may also result in the empowerment of women decision-making processes in the family, regarding decisions about fertility, education for daughters, etc. as women are empowered economically (Thomas, 1993).

III. Data

I use a panel data from the World Development Indicators (WDI) data from the World Bank covering 139 developing countries, from 1975 to 2015. My dependent variable is per capita GDP growth (in 2010 US$), and my explanatory variables are female labor force participation, which is the variable of interest, capital, and female primary school enrollment. These variables have been proven to influence economic growth as found in studies by Shashid (2014), Lechman and Kauer (2015) among others. I use the gross primary school enrollment, rather than primary school educational attainment because of missing cells for most of the developing countries. Again, I use the primary school because not all developing countries, have reached universal secondary school education, but the majority of them has somewhat attained primary school education. I also include a dummy variable for sub-Saharan Africa in my regression. The table below is the summary of my datasets. Column 3 shows the mean and standard deviation for all developing nations. Columns 4 and 5 depict the mean and standard deviation for developing states, excluding SSA, and for only SSA countries respectively.

Table 1: Summary statistics of the data

Variable	Label	All developing Countries		Developing countries excluding SSA		Only Sub-Saharan African countries	
		Mean	Std. dev	Mean	Std. dev.	Mean	Std. dev.
Per capita GDP growth	gdppcr	17988	15785.2	22069	15320.3	10547	13785.1
Female labor force participation	Lft	39.89.6		37	9.8	44	7.1
Capital	k	23.010.4		25	9.0	21	12.3
Female primary school enrollment (gross)	ger1f	97.0 22.6		10215.0		86	29.3

Source, WDI, The World Bank databank: No. of countries, all developing countries: 139; No. of obs., 406 Developing countries excluding SSA: 91; No. of obs., 301; Only SSA countries: 48; No. of obs. 105 Time: 1975- 2015. Per capita GDP data are in constant 2010 U.S. dollars. Female labor force participation proportion of female population ages 15 and older that is economically active, who supply labor to produce goods and services during a given period (both formal & informal sectors). Capital is gross capital formation (% of GDP). School enrollment, primary, female (% gross).

I present the summary statistics of the data are in Table 1. Column 3 shows the statistics for all developing countries. Column 4 depicts data for developing countries excluding SSA, and column 5 exhibits the data for only SSA countries. Though the mean for female labor force participation in SSA is higher than that of developing countries as a whole, their per capita GDP growth is lower than the rest of developing countries. The data buttress the existing literature that large stocks of physical capital and the accumulation of human capital positively correlate with per capita GDP growth. This can partly explain the low levels of investment in education in SSA; an element considered one of the key factors of human capital, which is a major, contributor to economic growth.

IV. Estimation Procedure

I employ the neoclassical growth model to examine the impact of female labor force on per capita GDP growth. I use the 'system' General Method of Moments (GMM) estimator proposed by Blundell and Bond (1998) to analyze a panel data of 139 countries over the period 1975 to 2015. I find this approach, appropriate estimator for estimating growth equation in my study. Earlier researchers attested that the most crucial factor in determining economic growth is human capital (Barro, 1991; Romer, 1990). In developing countries, females constitute a majority of the labor force, particularly, in the agriculture sector and the informal sector. However, my study focuses on the impact of the female labor force (comprising formal & informal) on per capita GDP growth. The basic production function is the following:

$$Y = F(K, L) \quad (1)$$

where Y represents per capita GDP, K is the capital stock, and L denotes labor. I expand the above production function model to include the variables shown below:

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$$Y = f(k, lft, ger1f) \quad (2)$$

Y and k are as defined above, and lft = female labor force. I hypothesize that female labor force (lft) participation improves economic growth; thus, I expect a positive sign. I also hypothesize that human capital improves the productivity of capital stock, so I include education ger 1f (female gross primary school enrollment) as an argument in the growth of per capita GDP; thus, the expected sign is positive. Finally, I expect no difference between the impact of female labor force participation on economic growth in SSA and that of the developing countries as a whole. The explanatory variables are control variables that previous researchers have found to influence economic growth. I include Y_{t-1} to test the convergence hypothesis. Also, I introduce female labor force participation in a quadratic form to test the hypothesis proposed by Schultz (1999) that the marginal impact of the growth of per capita GDP declines as the female labor force participation increases all other things equal. Next, I include a dummy variable sub-Saharan Africa (ssa) to determine if the impact of female labor force participation on per capita GDP growth in SSA countries differs from that of other developing countries. From the above discussion, I estimate the following equation to examine the effects of female labor force participation on per capita GDP growth:

$$LY_{it} = \alpha LY_{it-1} + \delta_1 lft_{it-1} + \delta_2 lft^2_{it-1} + \prod k_{it} + \beta ger1f_{it} + \lambda ssa + \varepsilon_{it} \quad (3)$$

$$\varepsilon_{it} = \mu_{it} + v_{it}$$

where i refers to countries and t indexes time. Y_{it} is per capita GDP as a percent of GDP and Y_{it-1} is the lag of per capita GDP, and ε is the error term. I define the rest of the variables as shown above. I assume that female labor force (lft_{it}) is endogenous with per capita GDP (Y_{it}) in the model because improved female labor force participation causes per capita GDP growth to increase and vice versa. The explanatory variables may be correlated with the disturbance term (ε_{it}). To measure the impact of the independent variable of interest, on the dependent variable, I lagged the female labor force (lft) in the estimation model by one period.

Now, with a panel data, there might be a problem of fixed impacts contained in the error term in equation 3. To deal with this problem, I apply Arellano – Bond (1991) two-step difference GMM estimator, which uses the first-step residuals to estimate the covariance matrix of moment conditions, making the endogenous variables pre-determined; therefore, not correlated with the error in equation (3). Again, the presence of the lagged dependent variable, Y_{it-1} step up auto-correlation. To correct this problem, Arellano – Bond applied first differencing to transform the regressors in Equation (3) as shown below:

$$\Delta Lgdppc_{it} = \alpha \Delta Lgdppc_{i\,t-1} + \delta_1 \Delta lft_{it} + \delta_2 \Delta lft^2_{it-1} + \prod \Delta k_{it} + \beta \Delta ger_{it} + \lambda \Delta ssa + \Delta \varepsilon_{it} \quad (4)$$

$$\Delta \varepsilon_{it} = \Delta \mu_{it} + \Delta v_i$$

According to Arellano – Bover (1995), Arellano – Bond difference GMM estimator makes the variables to be predetermined; thereby, making the lagged levels of the explanatory variables, weak instruments for the first-difference. Blundell – Bond (1998) proposed the 'system' GMM estimator as a better alternative. This approach presumes to alleviate the weak instruments problem by using additional moment conditions and free it from serial correlation, thus considered more efficient. The disadvantage of the 'system' GMM estimator approach, is that it uses 'too many' instruments Hayakawa (2007). The 'system' GMM estimator, however, is suitable for dynamic panel-data, hence provides useful background for my study. Therefore, I use the two-step 'system' GMM estimator to estimate a linear panel data to first calculate the effect of the female labor force participation on per capita GDP growth in developing countries in Equation (4) without the dummy variable (ssa). Next, I estimate Equation (4) with the dummy variable (ssa) to test if the marginal effect of female labor force participation in SSA on per capita GDP growth is significantly different from the marginal effect of female labor force participation in developing countries as a whole.

V. Empirical Results

I use the 'system' GMM estimator over the difference GMM estimator to estimate the impact to female labor force on economic growth because it provides relatively better results. I analyze the parameters δ_1, δ_2 in a linear form followed by the marginal impact of female labor force participation on per capita GDP growth based on the following questions:

a) Does female labor force participation affect developing countries economic growth?

I estimate equation 4 without the dummy variable. The coefficients α, δ_1, δ_2, β, $\prod$ and λ are shown in Table 5. The test statistics lead me to reject the null hypothesis, h_0 that variation in the dependent variable cannot explain the variation in all the explanatory

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variables. The test also shows no serial correlation. I estimate the marginal impact of the coefficients δ_1, and δ_2 as shown below.

By partially differentiating equation (4), $\frac{\partial \text{Lgdppc}}{\partial \text{lft}}$ in the linear form for all emerging countries, the parameter δ_1 is positive and statistically significant at $\rho = 0.01$, suggesting that an increase in the female labor force participation influences per capita GDP positively. However, the coefficient of δ_2 is negative and significantly different from zero at $\rho = 0.01$. Now, I calculate the marginal impact of an increase in female labor force participation on per capita GDP as shown below. The estimated value is positive, but at a diminishing rate. Therefore, I cannot use this result to predict what will happen to per capita GDP as female labor force participation continues to grow.

$$\frac{\partial gdppcr}{\partial lft} \; 10.81 + 2(-0.086)x \; 39.76$$

$$= 10.81 - 6.85$$

$$= 3.96 > 0$$

My results suggest that increased higher female labor force participation may encourage economic growth in developing countries, while the low rate of female labor force participation may lower economic growth. My findings are consistent with those found in similar studies (Tsani et al., 2013; Mujahid and Zafar, 2012). Other studies found a U-shaped relationship between female labor force participation and economic growth. However, for low-income countries, their U-shaped hypothesis of positive impact was not proven (Lechman and Kauer, 2015).

b) Is the impact of an increase in female labor force participation on economic growth in developing countries different for SSA countries?

I repeat equation (4), with the dummy variable (ssa) to examine the impact of female labor force participation in SSA countries on economic growth. I also investigate if the impact on per capita GDP growth in SSA countries is different from that of developing countries as a whole. The estimated coefficients are as reported in the last column of Table 2. Again, as addressed above, I use the parameters δ_1 and δ_2 to examine the impact of an increase in female labor force participation on per capita GDP growth. The parameter δ_1 is positive and significant, suggesting that h_0 be rejected on the grounds that the dependent variable cannot be explained by the variation in the explanatory variables at $\rho = 0.01$. Also, there was no indication of autocorrelation. Here too, the parameter δ_2 is negative and significant. The estimated marginal impact is positive, but at a decreasing rate, suggesting a diminishing return to economic growth as female labor force participation continues to expand.

$$\frac{\partial gdppcr}{\partial lft} \; 10.57 + 2(-0.083)x \; 39.76$$

$$= 10.57 - 6.61$$

$$= 3.96 > 0$$

Concerning the marginal impacts of female labor force participation on economic growth, my results show no significant differences between developing countries and SSA countries.

The estimated coefficient of the dummy variable (ssa) is negative and significant at $\rho = 0.01$, suggesting that SSA undermines the positive impact of female labor force participation on economic growth. Data not shown here indicates that female labor force participation in SSA countries continues to grow, particularly, in the agricultural sector. It could plausibly be the significant proportion of female labor force participation in the informal sector, where most of the labor force is semi-literate or illiterate (data are not shown).

I now turn my attention to the other variables; capital and female primary school enrollment. As expected, an increase in capital stock along with an improvement in female labor force participation affects per capita GDP growth positively. As hypothesized, an improvement in female primary school enrollment has a positive impact on economic growth; therefore, I reject h0. This suggests that educated labor force is more productive on the job as found in Petrakis and Stamatakis (2002), Keller (2006), and Appiah and McMahon (2002) among others, whose findings attribute the elevated level of per capita GDP growth in developed and developing countries to all levels of education. Educated labor force can afford to purchase health services, thus improve their human capital, suggests that government policies aimed towards the expansion of education for females have the potential to improve total labor force needed to improve human capital, hence, affect economic growth positively. Therefore, if developing countries want to increase their countries' economic growth, governments must embark on policies intended to improve the female labor force participation, by increasing female educational attainment necessary to boost their human capital that can help to enhance their economic growth.

VI. Conclusion

This paper examines the effect of female labor force participation on economic growth in emerging countries. Furthermore, I investigated if the impact on per capita GDP growth in developing countries is different for SSA. By using a panel data of 139 countries that make up the developing world, and by employing the two-step 'system' GMM estimator, the study finds a positive marginal impact of an increase in female labor force participation on per capita GDP growth. The

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estimated marginal impact is positive, but at a decreasing rate. Therefore, I cannot use my results to predict what will happen to per capita GDP growth as female labor force participation continues to expand. I did not find any difference in the impact of female labor force participation on economic growth in SSA and developing countries, as a whole. The findings in this study further strengthen the link between female labor force participation and economic growth in developing countries. Considering that this study lumped countries with different social, cultural and institutional contexts together, the strength of the findings may be called into question.

Table 2: 'System' GMM estimates of female labor force participation and economic growth

	(1)	(2)
Variables	System GMM	System GMM
L.gdpper	0.9869***	0.9869***
	(0.000)	(0.000)
Lft	-1,093.9539***	-1,068.6758***
	(0.000)	(0.000)
L.lft	1,081.0443***	1,057.1240***
	(0.000)	(0.000)
lft2	8.7293***	8.4375***
	(0.000)	(0.000)
L.lft2	-8.5685***	-8.2788***
	(0.000)	(0.000)
K	41.4281***	41.3770***
	(0.000)	(0.000)
ger1f	4.9198***	4.3217***
	(0.000)	(0.000)
Ssa		-731.6118***
		(0.001)
Observations	2,211	2,211
Number of id	120	120

Note: p-values in parenthesis. ∗ Significance at β=0.10. ∗∗ Significance at β=0.05. ∗∗∗ Significance at β =0.01.

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An Evaluation of Stock Exchanges in India with Special Reference to National Stock Exchange (NSE)

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Abstract- Young age people are very much excited about having an investment in various kinds of shares and securities of company but we all don't know about where to invest? How to invest? Where these companies are listed? What is a stock exchange? What are the major stock exchanges? What are the indices /indexes? What are the basic criteria for listing the companies? On what basis companies are listed on these stock exchanges? The answer is no because not everyone knows about it except the professional ones. So to provide the basic knowledge regarding stock exchanges especially about NSE in India this paper will be helpful for them.

Keywords: *NSE, listing process in NSE, membership of NSE, NSE clearing and settlement.*

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I. Introduction

a) Meaning of Stock Exchange

Stock Exchange is a market where the various kinds of companies are listed for the purpose of issuing their shares and other financial instruments to the general public.

b) World's First Stock Exchange

Ulrike Malmendier is an economist at the University of California At Berkeley, who argues that the share market actually exists in the world from an ancient Roman time. The Frankfurt Stock Exchange is one of the European oldest stock exchanges which were established in 1585 in Frankfurt am Main.

c) The Indian First Stock Exchanges

It was time back to the 18th century when trading in securities was started in our India for the first time by East India Company, where the stock trading was unorganized at that time. The scene was same until the end of 19thcentury. There were only two chief trading centers in India these are Calcutta and Bombay stock exchanges. At that time Bombay was considered the main trading port where essential commodities were traded in 1860 (A time of American civil war). At that time, it was just the concept, thought, and Idea about stock exchanges. The market was actually situated under the banyan tree with only 12-15 brokers in front of town hall in Bombay. These brokers organized an association in an informal way only in 1875. It was known by the "Native shares and stock brokers Association". Actually, it was considered the starting of the best history of our Indian stock exchanges.

d) NSE (National Stock Exchange)

NSE was established in 1992 and itis located in Mumbai. It is considered as the leading stock exchange of India. It was the first one which provided the facilities of securities in the electronic form where all the process of buying and selling of all the kinds of securities are done in the computerized manner so that it is helpful to make available all the facilities of shares and other securities to every investor of each corner of the country. When P. V. Narasimha Rao was the Prime minister of India and Manmohan Singh was the finance minister of India then NSE was incorporated in 1992 as the Tax-paying company and it came to be known by everyone in 1993 under the Securities Contract (Regulation) Act, 1956. The operations in the Wholesale Debt Market (WDM) and the Capital Market segment were commenced by NSE in 1994 whereas the operation in Derivative segment was commenced in 2000. In March 2016 NSE is considered as the 12th largest stock exchange in the world as it has total market capitalization more than the US $ 1.41 trillion.

e) Types of Products Traded in NSE

NSE deals in various kinds of products such as:- Shares, Debentures, Bonds, Future and Options, Forward and Swaps, Indices, Mutual funds, Exchange traded funds, Initial public offerings, Securities lending and borrowing funds, Equity derivatives, Currency derivatives, Interest rates futures and Corporate bonds.

f) Meaning of Index

An Index is the barometer of Indian stock market where stocks of various companies are used by the investors in India. An Index is a statistical tool which is used to measure the relative price of stocks. This is also known as the stock market index. NSE has one of the most popular indexes known as NIFTY50 where top fifty company's stock prices are measured on their total market capitalization.

II. Literature Review

L. C. Gupta & J. K. Rohtagi (1972) in his book he suggested about the working condition of stock

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exchanges in India and as well as suggested about the important information regarding the cost of issuing the shares and other securities which must be low in order to protect the small investor as their larger proportion of savings is invested in issuing share and securities.

L. C. Gupta (1992) he has done an extensive study regarding return on new equity issues which describes that there should be a separate analysis about having an investment on new issues of equity shares where the most preference is given to the new companies who must require having a separate analysis. The most important factor which influences the rates of return on new issues is the 'fixed price' they are issued to its original buyers. The return on equity must include dividends and as well as its capital appreciation. This is considered as having the sound estimation of rates of return on equities and estimates the variability of such return over time. Also, since high speculation leads to the high concentration in the market then there should be a short -term speculation in the market, so that it will leads to the artificial price.

Nabhi Kumar Jain (1992):- he specified certain kinds of tips for buying the shares, for holding the shares and also for selling shares. He suggested that the investors must buy the shares of growing company of growing industry where he also suggested buying the shares of growth companies but in a diversifying ways where the number of the companies are dealing in equally fast growing sectors of the economy. He also suggested about the time of selling the shares where the actual timing of selling the shares of these company must be the time when the company reached to the peak of its growth. Also, it was advised to have an immediate sells of shares at the moment when we realized that we had made a mistake in purchasing of these shares. The most important decision is to decide the option to buy or sell the shares i.e. when to buy and sell high priced shares only by identifying the individual merit or demerit of each of the shares in the portfolio and arrives at a certain level of decision.

National Stock Exchange of India Limited (2001) in its publication made a pioneer effort to develop a pertinent literature on National Stock Exchange. It studies the regulatory frameworks, policies Programmes of primary and secondary market, trades in stock exchange, settlements of trade, broker's role and dematerialized procedures etc

III. Objectives of the Study

1. To make the people aware of the products in which the NSE deals.
2. To make the people know the listing criteria of NSE.
3. To make aware of the membership of NSE and the eligibility criteria of taking membership in NSE.
4. To make aware how to get registered in NSE (For corporate regions).

IV. Research Hypothesis

1. H_0 *:* It deals only in issuing the Equity Capitals in Capital markets.
2. H_0 *:* It does not take care of investor's problem. Let them leave in the hands of SEBI only.

V. Research Methodology

Here I have used the secondary source of data. I have gathered various information on NSE from various sources such as websites, Journals etc.

VI. Data Analysis

a) The Listing

i. *Meaning the listing of the companies under the stock exchange*

Here, listing means to get registered the various companies under the stock exchange is known as listing.

ii. *Importance of Listing*

1. It helps to make the people aware of the company that the company is not fake.
2. It helps to know the market capitalization of various companies very easily.
3. It helps to file complaints against any fraudulent companies to SEBI (Securities and Exchange Board of India).
4. It also helps to find out that whether the company is existing or not.

iii. *Benefits of Listing*

1. *Comprehensive Marketplace:*- NSE offers the large coverage of the capital market where it covers every area of capital market such as equity market, derivative market, future and option market.
2. *Sales of operations:*- NSE's product has larger scales of classes which help to attract various investors.
3. *Visibility:*- It displays all the best five orders which are available to the investors for buying and selling of securities and also display the total number of securities available to them, as well as the corporate information is get displayed by NSE.
4. *Unprecedented Reach:*- NSE has high speed network and it supports more than 1,81,524 terminals through VSAT (across the countries).
5. *Settlement Guarantee:*- It provides the guarantee of settlements of various problems of investors.
6. *Broadcast facility for corporate announcement:*- It helps to provide all the important information related to the company to every investor across the world through the Broadcast mode on the NEAT system.
7. *Trade statistics for listed companies:*- It provides the statistical report of all the securities of all the listed companies every month.

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8. Investor service center:- The trading service center is opened for 24x7 hours for the purpose of providing the help to the investors by NSE

iv. *Listing criteria/procedure followed by NSE*

1) A company should have the track records of undistributed profit for the last three years out of immediate five preceding years as per section 205.
2) Before pre issue a company should have net worth of one crore in the last three years.
3) The issue size does not exceed five times its pre issue net worth as per the last available audited accounts. If its issue size more than five times then at least 50% issue size should be allotted to the qualified institutional buyers (QIBs), falling which full subscriptions monies should be refunded.
4) 20% at least is held by promoters at the time of issue where the lack in period three years of the date of allotment of securities (OTCEI).
5) The company has net tangible assets of at least three Crore each of the preceding three full years of which not more than 50% is held in monetary assets. However, if more than 50% of the net tangible assets are held in monetary assets the company must have made firm commitments to display such excess monetary assets in its business project

b) Trading Mechanism

Earlier it was founded that all the trading were done on the manually which, was very difficult to maintain a record and also founded very much time consuming factors. Therefore, NSE was the one which brought-up the online trading facilities so that it becomes very easy to trade the securities and also it is considered less time consuming than earlier. NSE introduced SBTS(Screen Based Trading System) where a member of NSE can fix the quantity of securities and the price at one place which automatically transect the trading (by matching the buying and selling order requirement at a right time) then the transaction gets executed as soon as it finds the right buying and selling match.

c) Function of Trading through SBTS

- SBTS helps to fix the price and the quantity of shares and securities according to the choice of investors
- It allows the faster incorporation of price sensitive information to the prevailing price which helps to increase market efficiency due to efficient flow of information in the market.
- It helps the market participants to trade with each other in the market simultaneously even from the various geographical location.
- It helps to improve the depth and liquidity in the market.
- It provides the full anonymity by accepting order big or small from numbers without revealing identity, providing equal access to everybody..

d) Process of Trading through SBTS

- Technology is used to carry out the trading platform from the hall of the stock exchange to the premises of brokers.
- NSE carried the further platform to PCs at the residence of investors through the internet and to handheld devices through Wireless Application Protocol (WAP) for the convenience of mobile investors.

NSE has the main computer which is connected to Very Small Apertures Terminal (VSAT) installed at its office. Broker has terminal which is connected through VSAT/Leased line/modem. After getting information through investor's brokers place the order through his PCs which runs under NT and send the signals through VSAT/Leased line/modems which is directed to NSE. Through this way the broker have a trading of securities.

VII. Membership Procedure

a) Meaning of Membership of NSE

It means to be a part of NSE or have the belongingness to NSE.

b) Who can take the membership in NSE

Anyone can take the membership in the NSE according to the rules and regulations, notifications, and guidelines of SEBI 1956.

c) Eligibility Criteria for Taking Membership in NSE

According to the regulatory norms and provisions of SEBI and as per the rules and regulations of Exchange. The following clauses are eligible to apply for membership.

- Individuals (Sole Proprietor)
- Partnership Firm as per the Partnership act, 1932
- Limited Liabilities of Partnership (LLP)
- Corporations, Companies and Institutions
- Professional Clearing Member (PCM)
- Banks for Currency Derivative Segment
- Other Eligibility Criteria
- Base Minimum Capital Requirement

i. *In case of Individual (Sole Proprietor)*

1) He must be an Indian citizen.
2) His minimum age limit is at least twenty one years old.
3) He must be at least having HSC or must have an equivalent qualification.
4) He must have an at least two year's experience as a partner with others, as an authorized assistant, as an authorized clerk, or apprentice to, or a member.

ii. *Partnership Firm as per the Partnership act, 1932*

According to the rules and regulation of an Exchange, an applicant can identify Dominant Promoter

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Group at the time of making the application, where a partnership firm is an applicant.

Followings are the eligibility criteria of membership:-

1) It must be registered under an Indian Partnership Act, 1932
2) There should be at least any two designated partners who would be responsible for day to day management.
3) The designated partner must have an age limit of at least twenty one years.
4) He must have educational qualification of at least HSC (Higher Secondary Certificate) or equivalent to it.
5) He must have a minimum two year's experience as a portfolio manager or as an investment consultant or as a merchant bankers or financial service provider or as an authorized agent etc.
6) The partner sharing interest rates must be clear according to DGP rules and regulations.

iii. *Limited Liabilities of Partnership (LLP)*

According to the Limited Liability Partnership Act, 2008 (6 of 2009):- As per the rules and regulation which may be prescribed by the Securities and Exchange Board of India.

1) It must be registered under Limited Liability Partnership Act, 2008.
2) There should be at least any two designated partners who would be responsible for day to day management of LLP.
3) The designated partner must have an age limit of at least twenty one years.
4) He must have an educational qualification of at least HSC or equivalent to it.
5) He must have a minimum two year's experience as a portfolio manager or as an investment consultant.
6) The partner sharing interest rates must be clear according to DGP rules and regulations.

iv. *Corporations, Companies and Institutions*

According to the companies act, 1956:-

1) It must be registered under the companies act, 1956.
2) It must have its minimum paid-up Equity capital up to rupees thirty lacs.
3) There should be at least any two designated partners who would be responsible for day to day management of the company.
4) The designated partner must have an age limit of at least twenty one years.
5) He must have an educational qualification of at least HSC or equivalent to it.
6) He must have a minimum two year's experience as a portfolio manager or as an investment consultant.
7) The partner sharing interest rates must be clear according to DGP (Dominant Promoter Group) rules and regulations

v. *Professional Clearing Member (PCM)*

1) SEBI registered custodian; or,
2) Banks recognized by NSEIL / NSCCL for issuance of bank guarantees.

These are the only one who is eligible to be PCMs of NSCCL (National Securities Clearing Corporation Limited).

vi. *Banks for Currency Derivative Segment*

The eligibility membership criterion for banks in the Currency Derivatives segment is as follows:

1) Bank must be authorized by Reserve Bank of India.
2) Must be authorized under sec (10) of Foreign Exchange Management act 1999 AD Category - I bank'.
3) It must have its Minimum net worth of Rs. 500 Crores.
4) It must have a Minimum Capital to Risky Assets of 10%.
5) Its net NPA (Non-Performing Asset) should not more than 3 %.
6) It must gain its net profit for last three years.

vii. *Other Eligibility Criteria*

An applicant who is successfully certified either one of the following Modules is eligible to take a membership in stock exchanges. Such kinds of Modules are as follows:-

- Capital Market (Dealers) Module.
- Derivatives Market (Dealers) Module.
- National Institute of Securities Markets (NISM) Series I – Currency.
- Derivatives Certification Examination.

viii. *BMC (Base Minimum Capital) Requirement*

1) Only for those proprietary trading which is traded without any Algorithmic trading must require to deposit rupees ten lacks BMC.
2) When the trading is on the behalf of clients then it must be required to deposit rupees fifteen lacks BMC.
3) When there are proprietary trading and trading is on the behalf of the client but without Algo then its BMC is about rupees twenty-five lacks.
4) All Trading Members/Brokers with algo of rupees fifty lacks BMC.

ix. *Who Cannot become a Member*

The person who can't be a member/partner or director when:-

1. He is declared as an insolvent person.
2. He has been considered as fraudulent or dishonest person;
3. He has been declared as the defaulter of stock exchanges at any time.
4. He has been banned /rejected from having trading in securities by a Regulatory Authorities like SEBI, RBI etc.

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5. When NSE found him involving in any such kind of activity which is not right for the interest of investors then NSE has a power to disqualify him from the membership of NSE.

VIII. Clearing and Settlements

a) Clearing and settlements of various problems/ complaints by NSE

All the kinds of problems which arise on the trading of NSE are clearing and settling by NSCCL (A legal Counter Party).

As we all know that there are various kinds of changes which get introduced from time to time such as the changes are in the technology system, compression of settlement cycle, dematerialization and electronic transfer of the securities, securities lending and borrowing, professionalization of clearing member, fined-tune risk management system, emergence of clearing corporation to assume the counterparty risk etc.

It follows the system of account period of cash market transaction and then they implement the T+2 rolling settlement.

Due to the time gap between the trading and their settlements then this leads to the rise in the settlement risks. So to get rid of these kinds of problems the exchange and clearing corporation introduced the risk management practices so that there should be timely settlements of trade and also tried to set the margin and capital adequacy standards for the protection of the interest of the investors.

As we all knows that there are two types of depositories in India. They are:-

NSDL (National Securities and Depository Limited) and CSDL (Central Securities Depository Limited) which help to transfer the securities and to settlement in the dematerialized form.

All the kinds of problems were settled in the demat forms. Here, there are two important depository participants known as

- Member/custodian and
- Clearing agency

Played the important role in the transfer of pooled securities to each other's account to whom it required the most. Member has their pool accounts where a lot of securities are gathered together and the clearing agency has their settlements accounts. The pay in and pay out effect the accounts in the same days where the fund's requirement were met by the banks (with whom they were connected).

b) In the pay-in days

The members are informed electronically where the required funds were made available to the clearing bank within the prescribed pay in days. When clearing agency forward the obligation funds with the help of clearing bank then the clearing bank debit the member's account and just credit the clearing agency's account. Sometimes clearing agency debits the member's accounts and credits their accounts by their own.

c) On the pay-out day

Clearing banks transfer the available funds from the accounts of the clearing agency to the accounts of members as per the member's obligation.

d) In the T+2 rolling settlements

The pay-in and pay out funds as well as securities take place within two working days after the trading date.

e) Transaction Cycle

1. As we all know that every person is unaware of how to have the trade of securities? Due to this reason hetries to find out broker for trading his securities.
2. He first decides what kind of securities is to be best for him to purchase according to his estimation regarding its risk and return.
3. Then he decides the quantity of shares (i.e. The Number of Shares) to be purchase.
4. After that he tries to find out his broker, as people may not have the exact knowledge of trading or maybe they are so busy in his/her life that he/she does not have a much time to look out for his/her trading.
5. After finding out his broker he tries to place his order for buying and selling his shares.
6. And then that order is converted into its real and exact trade as soon as it finds the right match of buy or sells of securities.
7. This trade is so clear and so determined to have fair trading which helps to deliver the securities/funds.

IX. Conclusion

National Stock Exchange of India Limited is the one of the most popular stock exchange of India. This deal in issuing all kinds of securities in the dematerialized manners i.e., in the electronic form. It not only deals with having an investment in the capital market but also deals in solving various problems which help to protect the interest of investors.NSE also includes clearing and settlement mechanism through which various problems are solved on trading time so that there should not be much delay in its settlement. So it is the present time in India's most modernized stock exchange.

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Research on Coordination Degree between Regional Marine Scientific and Technological Innovation and Blue Economic Development

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Abstract- There is a strong interactive coordination relationship between scientific and technological innovation and economic development and the coordinated development between the two has become a key factor in the healthy and sustainable development of regional economy. This paper constructs the index system of regional marine scientific and technological innovation capability and blue economic development level, and takes the data of blue economic zone of Shandong peninsula for 2005-2014 years as the sample to establish the coordination degree model. The results show that the overall trend of coordination degree between marine scientific and technological innovation and blue economic development in Shandong blue economic zone is increasing year by year. The coordination degree between regional marine scientific and technological innovation and blue economic development depends on the joint efforts of marine scientific and technological innovation and blue economic development, and the lagging development of either side will hinder the promotion of coordination degree.

Keywords: coordination degree; marine scientific and technological innovation; blue economic development; blue economic zone of shandong peninsula.

GJHSS-E Classification: FOR Code: 140202



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Research on Coordination Degree between Regional Marine Scientific and Technological Innovation and Blue Economic Development

Wang Dongmei [α], Shi Hongbo [σ] & Wang Miyao [ρ]

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I. Introduction

Practices of the domestic and international economic and social development show that, there is a strong coordination relationship between scientific and technological innovation and economic development, scientific and technological innovation has become the leading force in the economic development of a country or region, economic development brings capital nurture scientific and technological innovation. As the blue economy based on the concept of sustainable development is increasing in the national strategic system, the coordinated development between marine scientific and technological innovation and the blue economy has also attracted widespread attention.

With the rapid development of marine economy in the world, the status of marine development and utilization in the world's development strategy has gradually improved. Since 1960s, the tide of marine development has risen in the world, and the marine economy has become an important component of the global coastal countries or regional economic system. The rapid development of marine economy and the constant rising of marine development and utilization level cannot do without progress and innovation in the field of marine science and technology, the level of marine economic development in a country or region basically depends on the level of marine scientific and technological innovation capability. Marine scientific and technological innovation supports and guides the transformation and upgrading of traditional marine industries, and promotes the optimization and development of the emerging strategic marine industry. It plays a powerful dynamic role in the development of regional marine economy.

However, in the joy of the achievements in the rapid development of marine economy, the great damage of the global marine ecological environment cannot be ignore dof the same. In order to protect marine ecology and realize rational utilization of resources, people advocate the development of blue economy. Different from the pure economic growth, the blue economy needs more scientific and technological innovation to achieve the coordination and sustainability of resources and environment development and utilization in economic development, the status of scientific and technological innovation in the blue economic development are more prominent. Blue economic development needs to rely on marine scientific and technological innovation, and establish a close and harmonious development relationship with marine scientific and technological innovation, and achieve a positive interaction with marine science and technology.

Shandong province is a big marine economic province in China. It also has great advantages in marine scientific and technological innovation, becoming a strong marine province. Shandong Peninsula marine economic development has a long history. Many ports, perfect infrastructure, with strong marine scientific research strength and professional marine talents; it plays a very important role in the overall pattern of the development of China's marine economy. Although the Shandong Peninsula has a dominant position in the development of the blue economy and marine scientific and technological innovation, this does not mean that the two have formed a good coordinated development relationship. In the

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process of speeding up the construction of Blue Economic Zone of Shandong Peninsula and realizing the transformation of Shandong province into a strong marine province, measuring the coordination degree between the marine scientific and technological innovation and development of blue economy has great significance for rationally evaluating the construction of Blue Economic Zone of Shandong Peninsula and promoting the healthy and sustainable development of the blue economy.

II. Literature Review

The related literatures at home and abroad mainly focus on the interactive coordination relationship between scientific and technological progress and economic development, as well as the blue economy. Now briefly summarized as follows:

a) Research on the relationship between scientific and technological innovation and economic development

Foreign scholars' research on the relationship between technological innovation and economic development is mainly embodied in the study of the relationship between technological progress, technological innovation and economic growth. Many scholars have discussed the key role of technological progress in promoting sustained economic growth. Adam Smith (Smith, 1776) pointed out that the accumulation of a nation's wealth depended mainly on technological progress. He pointed out that scientific and technological progress was one of the main reasons for economic growth [1]. The growth model put forward by Thoreau (Solow, 1956) reflects the role of technological progress, the estimation of the rate that technological progress contributed on economic growth was as high as 90%, and put forward the main factor to promote economic growth is technological progress, the second is the capital accumulation [2]. This is the first time that technological progress has been introduced into the economic system independently. Since then, scholars have begun to add variables to the equation to better distinguish the role of science and technology [3]. Although the traditional theory that Solow represented admitted the important role of technological progress, he placed the elements of technological progress into the external variables, and thought that technological progress was outside the economic system. In addition, many scholars have demonstrated the important assertion that technological progress plays a decisive role in promoting economic growth from a variety of perspectives (A. Antoci, 2013; T. Nicholas, 2014; M. Adak, 2015) [4-7].

With the increasingly close relationship between scientific and technological innovation and economic development, more and more scholars in China have studied the coordinated development relationship between the two. Yang Wu (2016) established a coupling model of the coordinated development of 1991-2012 Chinese technological innovation and economic development system, and found that achieving good coordination between technological innovation and economic development is an important condition for the successful implementation of China's innovation driven strategy [8]. Based on system collaboration theory, Zhao Min (2017) constructed the composite system of R & D investment, scientific and technological innovation and economic factors in China, and found under the condition of higher in the overall system coordination degree; R&D investment can promote the development of scientific and technological innovation and economic [9].

In recent years, with the development of marine economy, many domestic scholars begin to shift their research attention to the relationship between scientific and technological innovation and marine economic development, focusing on the role of scientific and technological innovation in marine economy. By establishing the coordination degree model, Ma Renfeng (2017) evaluated the coordinated development in the Yangtze River Delta region in 2006-2013 of China, put forward the development path of optimizing marine science and technology policy, integrating technology resources to speed up marine regional construction [10].

b) Blue Economy Research

Blue economy, as a new economic development theory, has been the focus of discussion in the industry and academic circles since it was first introduced in twentieth Century. The concept of "blue economy" was first proposed at the forum on the theme of the blue economy held in Canada in 1999 [11]. At this forum, the participants focused on the important role played by the blue economy in the sustainable development and utilization of the St. Lawrence estuary. Since then, in the "blue economy" hearing that held in 2009 in America and the introduction to the American marine and coastal economic situation (2009), the United States explained the specific meaning of the blue economy, and emphasized the important position that marine economic in the national development strategy system [12-14]. This was the first time that the concept of the blue economy appeared in government documents.

Since the blue economy was put forward, its connotation has not been clearly defined. Early scholars thought that the concept of "blue economy" and "marine economy" could be replaced by each other, and their connotations were not different. They believed that the blue economy included the related production activities of marine exploitation and utilization. Later, different opinions came into being, which thought that the scope and connotation of the blue economy should be different from the marine economy and larger than

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that of the marine economy. Sun Jiting (2011) thought that China's current blue economy formed in the practice mainly refers to the economy with land and sea coordinated, common coupling development. And he put forward the concept of the blue economy should include marine water economy, coastal area and sea related economy [15]. The third view was that the blue economy was sustainable marine economy, and it was an economic development model combining marine economy and marine ecological protection. This is also the blue economic connotation that majority of scholars agree with. The International Ocean Institute president Bergnan (Behnam, 2012) thought that in the background of blue economy, human beings coexisted with the ocean, the development of human society cannot do without the sea, and the core of blue economy was harmonious coexistence of man and ocean [16-17]. Through systematically expounding the research of the blue economy by scholars from all over the world, Guangshun (2013) proposed that blue economy is on the premise of strengthening the ecological environment construction, a comprehensive of all marine economic activities to achieve rapid development and utilization of natural resources. [18].

In general, all over the world, scholars' research on the relationship between technological innovation and economic development mainly focus on the study of the promotion that scientific and technological innovation to economic development unilaterally, and less involved in science and technology support and nurtures the economy. The foreign study on scientific and technological innovation and economic development coordination relationship is less, domestic researches in this area are more abundant, but the study on the mechanism of coordinating role in scientific and technological innovation and economic development is still in a relatively weak state. The domestic empirical research in this field mainly uses the mathematical tool model to calculate the quantitative relationship between science and technology and economy coordination, but less deeply discusses the uncoordinated reasons and the factors that affect the coordination degree. In recent years, some domestic literatures have begun to discuss the coordination relationship between scientific and technological innovation and economic development in the marine field, but still focus on the one-way role of scientific and technological innovation in the development of marine economy. The research status at home and abroad shows that the coordination problem between scientific and technological innovation and economic development has not attracted enough attention from scholars.

At present, the domestic and foreign literature about the blue economy problem is still more stay in the theoretical research stage, the analysis is relatively simple. The conception of blue economy has not formed a conclusion yet, and the evaluation index system and evaluation method of the blue economic development level need to be further expanded and improved.

To sum up, in the field of marine scientific and technological innovation and the coordinated development of the blue economy, scholars at home and abroad have done little research on this aspect, and lack of specialized research. Therefore, in the current age, blue economy leads the rapid development of regional economy, marine scientific and technological innovation leads blue economic development, the study of the coordination degree between the two is particularly important. In this case, this paper uses the Blue Economic Zone of Shandong Peninsula as an example, study the coordination degree problems of marine scientific and technological innovation and development of the blue economy, explore Peninsula coordination degree development and changes from the empirical view, in order to enrich the theoretical results of this filed and thus better guide practice activities.

III. Evaluation Index System and Model Construction

a) Establishment of evaluation index system

This paper constructs the index system of regional marine scientific and technological innovation capability and blue economic development level, and establishes the coordination degree model of the two, which lays the foundation for the after empirical research. This paper divides the index system of scientific and technological innovation capability into 3 first level indexes: marine science and technology foundation, science and technology input and output. Under is divided into 14 second level indexes, as shown in Table 1, and interpretations for each index.

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Table 1: Evaluation index system of regional marine scientific and technological innovation capability

Total index	First level index	Second level index
Regional marine scientific and technological innovation capability	Marine Science and Technology Foundation	Number of marine scientific research institutions (units)X_1
		Marine scientific research employees (person)X_2
		Marine Scientific and technological personnel (person)X_3
		Proportion of senior titles（%）X_4
	Marine Science and technology input	Marine scientific research regular expenses and income (10000 yuan)X_5
		Number of subjects of marine scientific research institutions (item)X_6
	Marine Science and technology output	Number of published papers about marine science and Technology (chapters)X_7
		Number of papers published in foreign countries（%）X_8
		Scientific and technical books (species)X_9
		Number of patent applications for marine scientific and technological inventions (pieces)X_{10}
		Number of authorized patents for marine scientific and technological inventions (pieces)X_{11}
		Number of invention patents per person (person)X_{12}
		Total number of invention patents (pieces)X_{13}
		Proportion of results to applications（%）X_{14}

(1) Basic index of marine science and technology the basic level of marine scientific and technological innovation is the prerequisite for marine research and development, reflecting the capability of a country or region to support marine science and technology research. The number of regional marine scientific research institutions reflects marine research and development infrastructure construction and other hardware conditions, the number of marine scientific research employees and marine scientific and technological personnel reflect the status of marine science and technology talents and other soft conditions for marine scientific and technological innovation. In addition, proportion of senior titles reflects the proportion of high-level and highly educated scientific and technical personnel.

(2) Marine Science and technology input index the input factors of marine science and technology mainly include the various funds involved in marine scientific and technological innovation activities. Marine scientific research regular expenses and income reflect the capital input of R&D of marine science and technology. In addition, the number of subjects of marine scientific research institutions can reflect the knowledge investment in marine science and technology, and it is also an important index of marine science and technology input.

(3) Marine Science and technology output index Marine science and technology output is the most direct embodiment of regional marine scientific and technological innovation capability. The output of marine scientific and technological achievements is reflected by the output of papers, the number of books, the total amount of patent inventions in marine science and technology, the amount of applications, the amount of authorization and the number of inventions patents per person. The proportion of papers published abroad reflects the impact of our papers on the international community. The proportion of results to applications reflects the technical achievements transformation capability.

From the five aspects of economic scale, economic structure, ecological environment, marine resources and regional economy, this paper constructs the index system of regional blue economic development level, shown in Table 2, and explains the indexes.

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Table 2: Evaluation index system of regional blue economic development level

Total index	First level index	Second level index
Regional blue economic development level	Economic scale	Regional marine GDP (billion yuan) Y_1
		Per capita regional marine GDP(10000 yuan / person) Y_2
		Sea area utilization efficiency (100 million yuan / square kilometer) Y_3
		Port international standard container throughput (10000 TEU) Y_4
		Passenger throughput of coastal ports (10000 passengers) Y_5
		Cargo throughput of coastal ports (10000 tons) Y_6
	Economic structure	Blue economy third industry proportion (%) Y_7
		Blue economy second industry proportion (%) Y_8
		Percentage of marine GDP in coastal areas (%) Y_9
		Marine industry location quotient Y_{10}
	Ecological environment	Total area of marine type reserve (sq km) Y_{11}
		The proportion of the sea area of the two types of standards over the whole sea area (%) Y_{12}
		Total discharge of industrial wastewater (10000 tons) Y_{13}
		Year completion of wastewater treatment projects (unit) Y_{14}
		Year completion of the control of solid wastes projects(unit) Y_{15}
		Occurrence frequency of red tide (times) Y_{16}
	Marine resources	Per capita water resources (cubic meter / person) Y_{17}
		Per capita output of marine mineral industry (ton / person) Y_{18}
		Per capita sea salt resource(ton / person) Y_{19}
		Output area of aquatic product per unit sea area (ton / HA) Y_{20}
	Regional economy	Number of persons engaged in sea employment (10000 persons) Y_{21}
		Gross Regional Product (100 million yuan) Y_{22}
		Regional Engel coefficient (%) Y_{23}
		Per capita regional income level (yuan) Y_{24}

(1) Economic scale index Regional marine GDP and per capita regional marine GDP reflects the scale of regional blue economic development. The Sea area utilization efficiency is used to reflect the economic output efficiency of the sea area, which is indicated by the ratio of regional marine GDP to that of the right area of unit sea area (that is, the sea area of the project approved by the government). Port international standard container throughput is the sum of the total number of containers imported and exported within a year in the main coastal ports of the region. The passenger throughput of coastal ports is the number of tourists entering and leaving ports through waterways in the region. The cargo throughput of the coastal ports is the weight of the goods loaded, unloaded and transported through waterways into and out of the port.

(2) Economic structure index the proportion of blue economy second industry and third industry can reflect the rationalized and advanced degree of the blue economy industrial structure. The Percentage of marine GDP in coastal areas reflects the contribution of marine economic development in regional economic development and the driving force of economic development. The marine industry location quotient reflects the degree of specialization of the blue economic industry in the region, which is showed by the Shandong's coastal region's marine output accounts for the proportion of the total marine output value of China's coastal areas, divided by the value of GDP in Shandong's coastal areas as the proportion of GDP.

(3) Ecological environment index the total area of marine type reserve and the proportion of sea areas of the two types of standards over the whole sea area reflect the efforts of local governments to protect marine ecological environment and governing effects. Year completion of wastewater treatment projects and year completion of the control of solid wastes projects reflect the governing situation of wastewater pollution and solid waste by local governments. The total discharge of industrial wastewater is a negative index, which is one of the main indexes of environmental statistics. The occurrence frequency of red tide belongs to negative index, which reflects the frequency of occurrence of marine disasters in the near coastal area.

(4) Marine resources index Per capita water resources is the ratio of total water resources to the number of population at the end of the year, reflecting the basic situation of water resources. Per capita output of marine mineral industry is the ratio of regional seabed mineral production to the total population at the end of the year, which reflects the basic situation of marine energy resources. Per capita sea salt resource is the

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ratio of sea salt production to the total population at the end of the year, reflecting the situation of sea salt resources. Output area of aquatic product per unit sea area reflects the output of aquatic products in the sea, which is showed by the ratio of the output of water products to the mariculture area.

(5) Regional economy index the number of persons engaged in sea employment refers to the amount of labor engaged in sea related activities and reflects the capability of the sea industry to absorb the labor force. Gross Regional Product is the most important index of the level of economic development in an area. The regional Engel coefficient reflects the affluence of living in a region, that is, the ratio of food expenditure in coastal areas to personal consumption expenditure. The per capita income level is expressed by the sum of the average annual household income of the urban residents in the region and that of the rural households.

Before measuring the coordination degree between marine scientific and technological innovation and the blue economic development, it is necessary to choose the appropriate evaluation method to obtain the standardized data and weights of indexes, and then establish the coordination degree model between the two.

b) Construction of coordination model

(1) Data standardization the raw data is processed by the deviation normalization (Min-max normalization) method. The positive correlation index can improve the development level or capability score, the greater the better; negative correlation index will reduce the score; the larger the value is, the greater the obstacle to the improvement of the score will be. Aimed at the positive correlation index and the negative correlation index, we use the formula (3-1) and the formula (3-2) to carry on the standardized processing:

$$Z_{ij} = \frac{X_{ij} - X_{\min}}{X_{\max} - X_{\min}} \tag{3-1}$$

$$Z_{ij} = \frac{X_{\max} - X_{ij}}{X_{\max} - X_{\min}} \tag{3-2}$$

In the formula, Z_{ij} is the value after normalization treatment to the range of [0, 1] value, X_{ij} is the value of the statistical indexes, X_{max} and X_{min} represent the maximum value and the minimum value of the same index. i for the number of the selected samples, the j for the number of indexes.

(2) Index weighting in this paper, the objective weight method is used to determine the weight of the index. The concrete calculation process is as the follow: First, calculate the mean variable mean p_j, see formula (3-3). See each evaluation index as a random variable, Z_{ij} is the standardized value, and the average value of each index is obtained.

$$p_j = \frac{1}{n}\sum_{i=1}^{n} z_{ij} \tag{3-3}$$

Second, calculate the mean square deviation of σ_j, see formula (3-4).

$$\sigma_j = \sqrt{\sum_{i=1}^{n}\left(z_{ij} - p_j\right)^2} \tag{3-4}$$

Third, get the index weight w_j, see formula (3-5).

$$w_j = \frac{\sigma_j}{\sum_{j=1}^{m}\sigma_j} \tag{3-5}$$

(3) Construction of coordination degree model Set the marine scientific and technological innovation capability index system indexes for $x_1, x_2, x_3, \ldots, x_m$, the various indexes under the blue economic development level index system for $y_1, y_2, y_3, \ldots, y_n$, then the two composite score:

$$u(x) = \sum_{i=1}^{m} a_i x_i \tag{3-6}$$

$$e(y) = \sum_{i=1}^{n} b_i y_i \tag{3-7}$$

In the formula, u(x) and e(y) respectively indicate the comprehensive scores of regional marine scientific and technological innovation capability and regional blue economic development level; a_i and b_i respectively indicate the weight of each index.

Then, the coordination coefficient between regional marine scientific and technological innovation capability and blue economic development level is calculated as follows:

$$C = \left\{ \frac{u(x)e(y)}{\left[\frac{u(x)+e(y)}{2}\right]^2} \right\}^k \tag{3-8}$$

In the formula, C is the coordination coefficient, and the value of C is in the [0, 1] range. K is the adjustment coefficient, k≥2.

The coordinated development degree (D), while measuring the coordination degree between regional marine scientific and technological innovation and regional blue economic development, embodies the overall synergy or contribution of the two. The calculation formula is as follows:

$$T = \alpha u(x) + \beta e(y) \tag{3-9}$$

$$D = \sqrt{CT} \tag{3-10}$$

In formula (3-9) and (3-10), D score for the coordinated development degree, T score for the regional marine scientific and technological innovation

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and blue economic development composite score index, to measure the whole benefit of the marine scientific and technological innovation and development of blue economy. α and β are undetermined weight coefficient, the contribution degree of marine scientific and technological innovation and blue economic development on the coordination degree are the same, so take α=0.5, β=0.5.

(4) Sample selection and data sources this paper chooses Blue Economic Zone of Shandong Peninsula as the research object, established data sample on the Peninsula Blue Economic Zone marine scientific and technological innovation capability and the blue economic development level index system of indexes from 2005 to 2014 a total of ten years of data sample. According to the administrative division of the statistical yearbook, the Peninsula Blue Economic Zone contains Qingdao, Yantai, Weihai, Weifang, Rizhao, Dongying and Wudi county and Zhanhua County of Binzhou. The related data of marine scientific and technological innovation mainly comes from the "Chinese Marine Statistical Yearbook", most data of the blue economic development comes from the "China Marine Statistical Yearbook", "Shandong Statistical Yearbook" and "Shandong Province Environment Bulletin", other data comes from Shandong statistical information network and other government statistics department websites. The entire index data collected in this paper is authoritative statistical data, and some data which cannot be directly obtained are obtained by processing and calculating. After obtaining the data, use Excel to sort, calculate with Excel and SPSS 20.

(5) Grade Classification of coordination degree in this paper, the coordinated development of regional marine scientific and technological innovation and blue economic development is divided into 5 major categories and 15 small categories, which are shown in table 3.

Table 3: Grade classification of regional marine scientific and technological innovation and blue economic development

D	Type	First level	Second level
0.8~1.0	Good coordinated development	u(x)>e(y)	Good coordinated development, blue economy lags behind
		u(x)=e(y)	Good coordinated development, marine scientific and technological innovation and blue economy synchronization
		u(x)<e(y)	Good coordinated development, marine scientific and technological innovation lags behind
0.6~0.8	Moderate coordinated development	u(x)>e(y)	Moderate coordinated development, blue economy lags behind
		u(x)=e(y)	Moderate coordinated development, marine scientific and technological innovation and blue economy synchronization
		u(x)<e(y)	Moderate coordinated development, marine scientific and technological innovation lags behind
0.4~0.6	Barely coordinated development	u(x)>e(y)	Reluctantly coordinated development, blue economy lags behind
		u(x)=e(y)	Reluctantly coordinated development, marine scientific and technological innovation and blue economy synchronization
		u(x)<e(y)	Reluctantly coordinated development, marine scientific and technological innovation lags behind
0.2~0.4	Moderately maladjusted	u(x)>e(y)	Moderate maladjusted, blue economy lags behind
		u(x)=e(y)	Moderate maladjusted, marine scientific and technological innovation and blue economy synchronization
		u(x)<e(y)	Moderately maladjusted, marine scientific and technological innovation lags behind
0~0.2	Severe dysregulation	u(x)>e(y)	Severe dysregulation, blue economy lags behind
		u(x)=e(y)	Severe dysregulation, marine scientific and technological innovation and blue economy synchronization
		u(x)<e(y)	Severe dysregulation, marine scientific and technological innovation lag

IV. An Empirical Study on the Coordination Degree between Regional Marine Scientific and Technological Innovation and Blue Economic Development

a) Coordination degree calculation between regional marine scientific and technological innovation and blue economic development

Firstly, the extreme value and mean value of each index are calculated by using SPSS 20 software. Standardization of data was carried out by using deviation normalization method. After calculating the weight of each index of regional marine scientific and technological innovation capability, according to formula (3-6), the score of marine scientific and technological innovation capability of Blue Economic Zone of Shandong Peninsula is calculated by u(x), and the calculation results are shown in table 4.

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Table 4: Marine scientific and technological innovation capability score of Blue Economic Zone of Shandong Peninsula

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
u(x)	0.1192	0.2367	0.2305	0.2859	0.4298	0.5116	0.5978	0.7185	0.8845	0.9317

Similarly, the economic development level of the Blue Economic Zone of Shandong Peninsula is calculated by e(y), and the results are shown in table 5.

Table 5: Economic development level of Blue Economic Zone of Shandong Peninsula

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
e(y)	0.1855	0.3736	0.4264	0.4801	0.4701	0.5156	0.6217	0.5873	0.5695	0.6670

The coordination degree is calculated according to formula (3-10). This paper holds the viewpoint that regional marine scientific and technological innovation capability is as important as the level of blue economic development. Therefore, we should take $\alpha = 0.5$, $\beta = 0.5$, and $k=2$. Then use formula (3-8) and (3-9) to calculate the coordination coefficient and the comprehensive evaluation index of regional marine scientific and technological innovation capability and blue economic development level, and according to the formula (3-10) to calculate the coordination degree, according to the table 3 to classify, the specific results are shown in table 6.

Table 6: 2005-2014 coordination degree of marine scientific and technological innovation and blue economy development in Shandong Blue Economic Zone

Year	u(x)	e(y)	C	T	D	Coordination type
2005	0.1192	0.1855	0.9076	0.1524	0.3719	Moderately maladjusted, marine scientific and technological innovation lags behind
2006	0.2367	0.3736	0.9020	0.3052	0.5246	Reluctantly coordinated development, marine scientific and technological innovation lags behind
2007	0.2305	0.4264	0.8300	0.3285	0.5221	Reluctantly coordinated development, marine scientific and technological innovation lags behind
2008	0.2859	0.4801	0.8756	0.3830	0.5791	Reluctantly coordinated development, marine scientific and technological innovation lags behind
2009	0.4298	0.4701	0.9960	0.4500	0.6694	Moderate coordinated development, marine scientific and technological innovation lags behind
2010	0.5116	0.5156	1.0000	0.5136	0.7167	Moderate coordinated development, marine scientific and technological innovation lags behind
2011	0.5978	0.6217	0.9992	0.6097	0.7806	Moderate coordinated development, marine scientific and technological innovation lags behind
2012	0.7185	0.5873	0.9799	0.6529	0.7998	Moderate coordinated development, blue economy lags behind
2013	0.8845	0.5695	0.9084	0.7270	0.8126	Good coordinated development, blue economy lags behind
2014	0.9317	0.6670	0.9459	0.7993	0.8695	Good coordinated development, blue economy lags behind

b) Result Analysis

According to the calculation results of table 6 and the coordination degree grade classification of table 3-3, this paper analyzes the coordination degree of marine scientific and technological innovation capability and the blue economic development in the Blue Economic Zone of Shandong Peninsula respectively according to the year. From Figure 1, first, on the whole, the scores of marine scientific and technological innovation capability and the coordination degree of marine scientific and technological innovation and blue economic development in Peninsula Blue Economic Zone always showed an increasing trend, the growth of marine scientific and technological innovation capability was rapid, and the scores of blue economic development level showed a zigzag growth, experienced three small amplitude decline. Regional marine scientific and technological innovation capability score increased from 0.1192 to 0.9317, an increase of 0.8125. Blue economic development level increased from 0.1855 to 0.667, an increase of 0.4815. Coordinated development degree increased from the initial 0.3719 to 0.8695, an increase of 0.4976.

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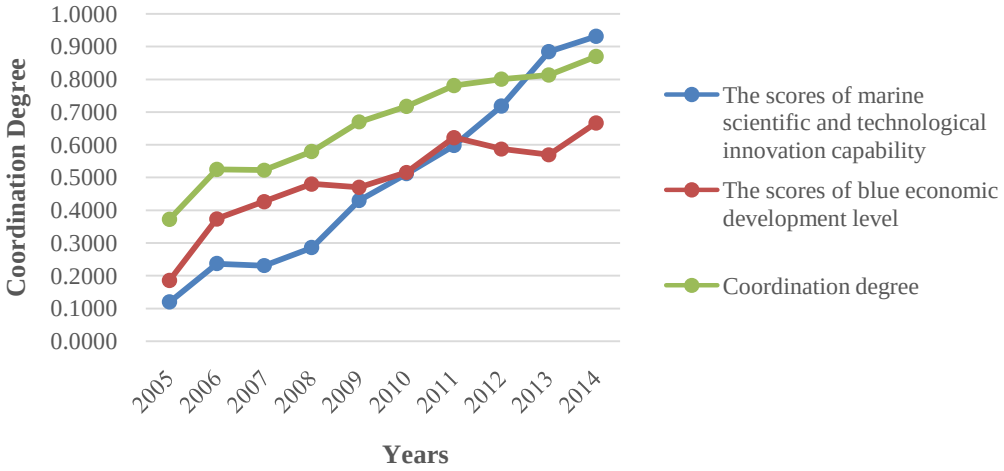


Figure 1: Coordination index chart of Blue Economic Zone of Shandong Peninsula in 2005-2014

Take 2011 as the boundary, it can be seen from Figure 1 that from 2005 to 2011, the development of marine scientific and technological innovation has always lagged behind the blue economic development level, the score of regional marine scientific and technological innovation capability in 2012 was 0.7185, which exceeded the score of blue economic development level, 0.5873,for the first time, and the coordination type transformed from marine scientific and technological innovation lags behind into blue economy lags behind. This is mainly because the establishment of the Blue Economic Zone of Shandong Peninsula in 2011 was formally proposed, marine scientific and technological innovation input increased significantly. During the period from 2005 to 2011, the income of research funding increased from 450 million yuan to 25 billion 460 million yuan, the number of subjects of marine scientific research institutions increased from 836 up to 1477. In addition, marine scientific research and innovation output increased significantly, the number of marine science and technology invention patent increased from 36 to 142, the proportion of the number of papers published in foreign countries increased from 13.9% to 30.2%.Thetransformation rate of results to applications of was increased by 2.17%. After the establishment of the Blue Economic Zone from 2011 to 2014, marine scientific and technological innovation continues to maintain rapid growth, while the blue economic development level declined for two consecutive years in 2012 and 2013.The main reason is the first economic growth still relies on consumption of marine natural resources to drive too much, while ignoring the protection of the marine ecological environment. In recent years, with the rise of the conception of sustainable development, economic development pays more and more attention to the ecological harmony and sustainable development, the blue economic development level gradually rises.

Overall, the marine scientific and technological innovation capability and the blue economic development level of the peninsula Blue Economic Zone continue to increase, the coordination degree of the two are increasing year by year. The coordination type transformed from the initial moderately maladjusted, marine scientific and technological innovation lags behind into good coordinated development, blue economy lags behind.

To sum up, the coordination degree of regional marine scientific and technological innovation and blue economic development depends on the common development of both, and the lagging development of either side will hinder the improvement of coordination. According to the changes of coordination type from 2005 to 2014 of, the peninsula Blue Economic Zone marine scientific and technological innovation capability and blue economic development coordination degree change is divided into three stages, and analyzed respectively.

(1) The first stage (2005 - 2008)

It can be seen from Figure 2, from 2005 to 2008, the score of the blue economic development level of the peninsula Blue Economic Zone has always been on the rise, from 0.1855 in 2005 to 0.4801 in 2008, an increase of 0.2946. The score of marine scientific and technological innovation increased from 0.1192 in 2005 to0.2859in 2008, an increase of 0.1667. The coordinated development degree of the two has increased from 0.3719 to 0.5791, with an increase of 0.2072. Marine scientific and technological innovation capability and blue economic development level increased significantly from 2005 to 2006, the main reason is the number of marine scientific research institutions and employees increased, and the funds income of scientific research institutions and the output of scientific research achievements have significant growth. The score of marine scientific and technological innovation capability

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declined slightly in 2007, the main reason was on the scientific output, due to the decrease in the amount of scientific and technological publications and the total number of patented inventions. Since then, from 2007 to 2008, marine scientific and technological innovation and blue economic development continued to achieve small growth.

In 2005, the coordination type of the marine scientific and technological innovation and the blue economic development in the peninsula Blue Economic Zone was moderately maladjusted, marine scientific and technological innovation lags behind. The coordination degree increased from 0.3719 to 0.5246 in 2006, the coordination type of it was reluctantly coordinated development, and marine scientific and technological innovation lags behind. From then on to 2008, it has kept this type. The development of marine scientific and technological innovation capability has lagged behind, and the output rate of marine science and technology investment and scientific research innovation achievements was low, which has not played a significant role in promoting the blue economic development.

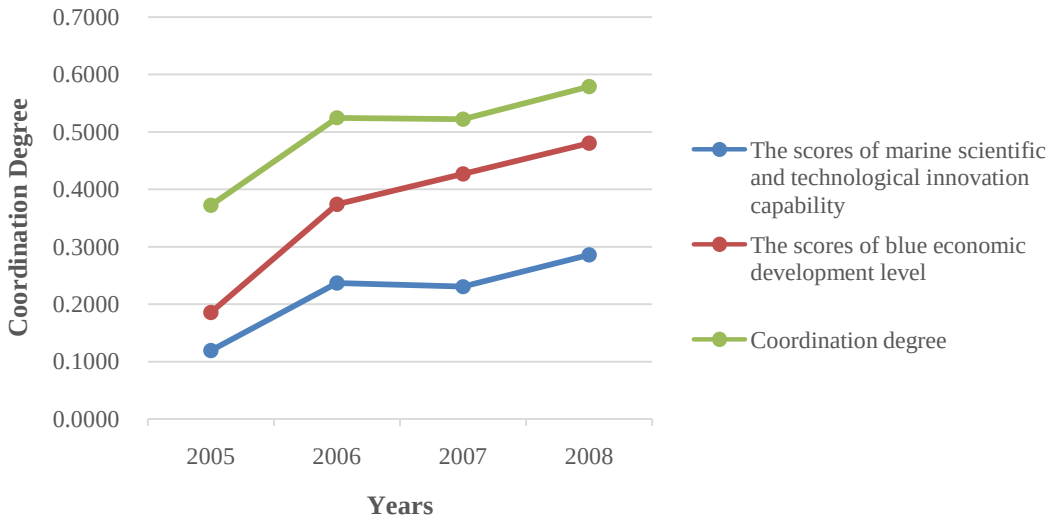


Figure 2: Coordination index chart of Blue Economic Zone of Shandong Peninsula in 2005-2008

(2) The second stage (2008 to 2012)

From 2008 to 2012, see Figure 3, marine scientific and technological innovation capability of the Peninsula Blue Economic Zone showed a substantial growth, an increase from 0.2859 to 0.7185, an increase of 0.4326, and the score of blue economic development level from 0.4801 in 2008 to0.5873 in 2012, the growth rate was 0.1072, and in 2009 and 2012 went through two smaller decline, a decline of 0.01 and 0.0344. Marine scientific and technological innovation capability was growing rapidly, mainly because of the number of technical staff, the input of marine science and technology and the output of scientific achievement were significantly increased, and there was a fast growth in the funds income of scientific research institutions and the total number of paper output and invention patents. The score of blue economic development level decreased in 2009, the main reason is the index data in the ecological environment, the number of year completion of wastewater treatment projects and the control of solid wastes projects has decreased, and then the number of red tide increased that year. Then in 2012the blue economic development level slightly reduced once again, the main reason is that the sea use efficiency decreased significantly in 2012, and in the index of marine resources, per capita water resources and per capita sea salt resources were lower than that in 2011.

In 2008, the coordination type of marine scientific and technological innovation and blue economic development in Peninsula Blue Economic Zone is reluctantly coordinated development; marine scientific and technological innovation lags behind.

Since the beginning of 2009, the coordination type transformed to moderate coordinated development, marine scientific and technological innovation lags behind. Then to 2012,the coordination type has been maintained in the moderate coordinated development, coordination degree increased from 0.5791 in 2008 to 0.7998, the growth rate was 0.2207. It is worth noting that, in 2012, the score of marine scientific and technological innovation capability, which was 0.7185, exceeded the score of blue economic development level, which was 0.5873, for the first time, and the coordination type also transformed from the marine scientific and technological innovation lag into blue economic lag. This is because the marine scientific and technological innovation capability has been

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increased greatly all the way, while the blue economic development speed was relatively slow, and has been influenced by the index data of ecological environment and marine resources, has experienced two down in the comprehensive score.

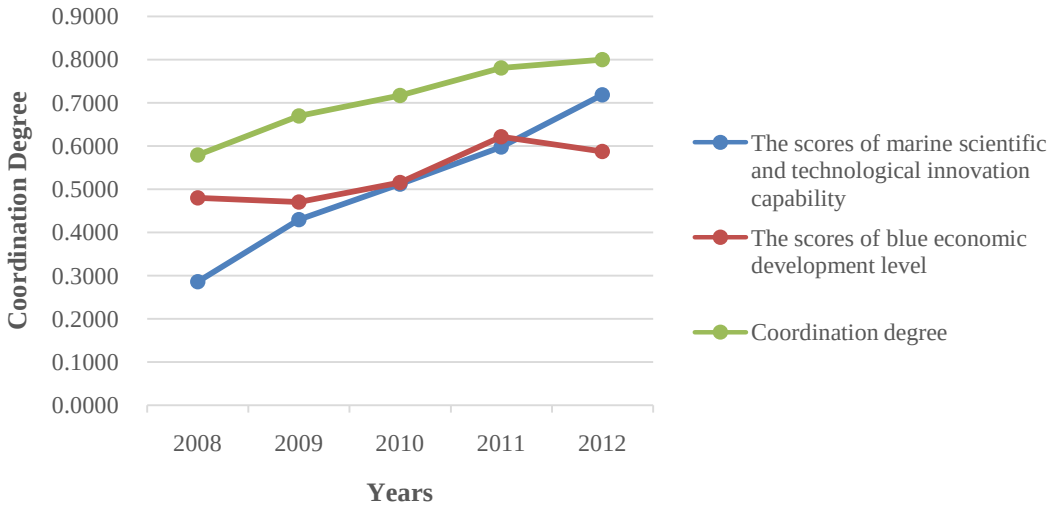


Figure 3: Coordination index chart of Blue Economic Zone of Shandong Peninsula in 2008-2012

(3) The third stage (2012 to 2014)

From 2012 to 2014, from Figure 4 we can see that marine scientific and technological innovation capability of Peninsula Blue Economic Zone continued to show rapid growth speed, an increase from 0.7185 in 2012 to 0.9317 in 2014, the growth rate was 0.2132, while the blue economic development level decreased by 0.0178in 2013, which is the second consecutive decline of blue economy since 2011. Marine scientific and technological innovation capability sustained and rapidly growed, and the main reason is that with the formally approval about the establishment of the Blue Economic Zone in 2011, marine scientific and technological innovation investment continued to increase, the marine research institutions funds income increased from 25 billion 460 million yuan in 2011 to 38 billion 180 million yuan, and the output rate of technological innovation achievement is greatly improved, the number of papers published at home and abroad, the per capita patents and other aspects all have significantly growth. But the score of the blue economic development level since the establishment of Peninsula Blue Economic Zone has declined for two years. The main reason is that although the blue economic output and the regional productivity level increased, the ecological environment and marine resources index data partly reduced, such as the year completion of wastewater treatment projects, the per capita water resources and the per capita marine resources, has declined. Obviously, in the pursuit of the rapid development of regional economy, we should also pay attention to the sustainable development of marine economy. On the basic of the development and utilization of marine resources we should also pay attention to the protection of the ecological environment, sacrificing the environment for economic growth is not a healthy growth.

In 2012, the coordination degree of marine scientific and technological innovation and blue economic development in the Peninsula Blue Economic Zone was 0.7998. The coordination type was moderate coordinated development, blue economy lags behind. Since 2013 it changed to good coordinated development, blue economy lags behind, and then kept this type until 2014. The coordination degree increased from 0.7998 to 0.8695, the growth rate was 0.0697. The coordination degree raised less from 2012 to 2013, which was mainly affected by the fall of blue economic development level, then with the rising of marine scientific and technological innovation capability and the blue economic development level, coordination degree increased steadily in 2014.

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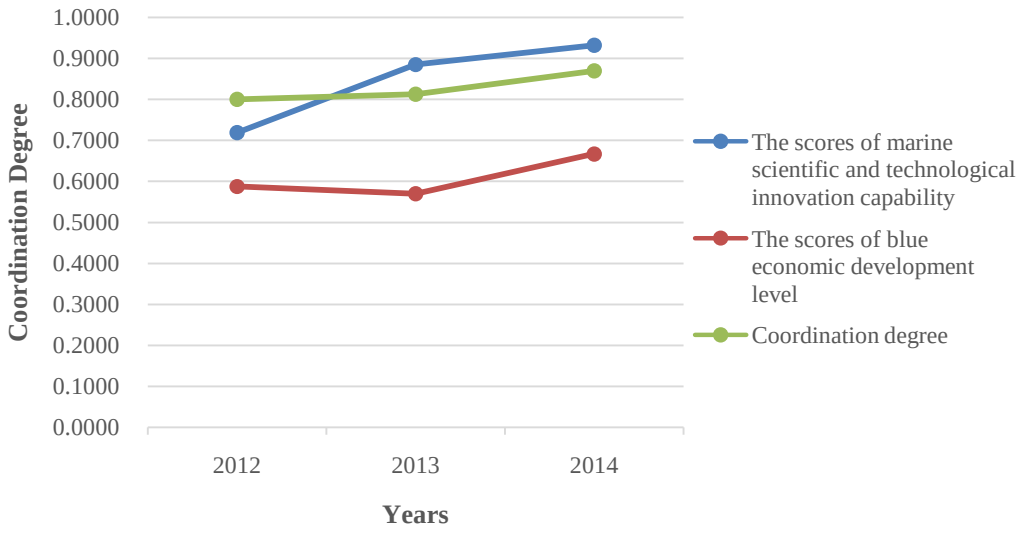


Figure 4: Coordination index chart of Blue Economic Zone of Shandong Peninsula in 2012-2014

V. Conclusion

This paper discussed around the problem about the coordination degree of regional marine scientific and technological innovation and the blue economic development, and based on the basic theory analysis, using the Blue Economic Zone of Shandong Peninsula as the object, constructed the index system of regional marine scientific and technological innovation and blue economic development, according to the coordination degree model, estimated the coordination degree of the Blue Economic Zone of Shandong Peninsula from 2005 to 2014. Through the empirical study, we found that the coordination degree of marine scientific and technological innovation and the blue economic development in peninsula increased from 0.3719 to 0.8695 in ten years. The coordination type changed from moderately maladjusted, marine scientific and technological innovation lags behind into good coordinated development, blue economy lags behind. The results show that the coordination degree of regional marine scientific and technological innovation and blue economic development level depends on the common development of the both, and the lagging development of either side will hinder the improvement of the coordination degree.

In the process of speeding up the construction of the Peninsula Blue Economic Zone, realizing the transformation of Shandong province to a strong marine province, this paper measures the coordination degree of the marine scientific and technological innovation and blue economic development in Blue Economic Zone of Shandong Peninsula, gives a reasonable evaluation on the construction of the Peninsula Blue Economic Zone, and put forward suggestions for its development, which has important significance to promoting the healthy and sustainable development of blue economy.

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Internationalization of Indian Pharmaceutical Industry

By Dr. Amisha Gupta
Delhi University

Abstract- Entry strategies are one of the important decisions in the process of internationalization. Decision on entry mode is one of the most critical decisions having significant and far-reaching consequences on a firm's performance and survival in the target foreign market. This study focuses on the path of internationalization of Indian Pharmaceutical industry and makes an attempt to identify the major determinants influencing entry mode decision. The study concludes that both firm specific as well as the policy changes at the country levels, host country's as well as domestic policies together influences the decision of the firm on entry mode.

Keywords: *entry modes, internationalization, mergers, acquisitions.*

GJHSS-E Classification: *FOR Code: 349999*



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Internationalization of Indian Pharmaceutical Industry

Dr. Amisha Gupta

Abstract- **Entry strategies are one of the important decisions in the process of internationalization. Decision on entry mode is one of the most critical decisions having significant and far-reaching consequences on a firm's performance and survival in the target foreign market. This study focuses on the path of internationalization of Indian Pharmaceutical industry and makes an attempt to identify the major determinants influencing entry mode decision. The study concludes that both firm specific as well as the policy changes at the country levels, host country's as well as domestic policies together influences the decision of the firm on entry mode.**

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I. Introduction

Indian economy is currently booming. More and more Indian industries and companies are expanding their activities in foreign markets. It is seen that the destination, mode of internationalization and motivations for global expansion are changing. Literature has established the factors that are most influential in deciding the modes of internationalization for Indian pharmaceutical companies. It was considered important to validate the results by evaluating the current scenario and trends for modes of internationalization in the industry. Therefore, a detailed analysis of five leading pharmaceutical companies of India is conducted. These companies have extensive experience in both domestic as well as foreign markets and therefore warranted a detailed study on their approach and experience in various modes of internationalization.

This paper lays out the detailed internationalization efforts of top 5 Indian pharmaceutical companies. These companies were ranked based on their revenue (2013-14). Top 5 companies by revenue were selected from the big size category. These companies are Sun Pharma, Dr. Reddy's laboratories, Cipla, Lupin and Aurobindo Pharmaceuticals. This category is the most active in internationalization efforts and have gone through multiple modes of internationalization in their evolution. Complete history of the companies is studied to understand the reasons for various modes of internationalization decisions during different stages of the company's life. Table 1 below details out some general characteristics of these companies.

Table 1: General characteristics and performance of Big size companies

Name of the firm	Aurobindo	Cipla	Dr. Reddy's	Lupin	Sun Pharmaceuticals
Year of Incorporation	1986	1935	1984	1968	1983
location of the firm	Hyderabad, Telangana, India	Mumbai, Maharashtra, India	Hyderabad, Telangana, India	Mumbai, Maharashtra, India	Vadodara, Gujarat, India
R&D facilities	8	14	8	6	10
Product specialization	Antibiotics, Anti-Retroviral, CVS, CNS, Gastroenterological, and Anti-Allergic.	Inhalation therapy	Diabetes, cardiovascular, inflammation and bacterial infection.	specializes in anti -TB medications	Neuro-Psychiatry, Cardiology
Manpower,	9,500	20,000	19,000	14,000	30,000
Sales	$1.25 bn	$1.6 bn	$ 2.2bn	$ 1.89 bn	$ 2.56 bn
Exports as a share of total sales	70%	60%	85%	78%	75%

II. Aurobindo Pharma

Aurobindo Pharma was founded in 1986 by Mr. P.V. Ramaprasad Reddy, Mr. K. Nityananda Reddy and a small group of people. The company commenced operations in 1988-89 with a single unit manufacturing Semi-Synthetic Penicillin (SSP) at Pondicherry. Table 2.1 lists some basic facts about the company.

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Table 2.1: Aurobindo Pharma – basic facts

Headquarters	Hyderabad, India
Public or Private	Public
Year of Establishment	1986
Revenues (2013-14)	$1.25 bn
Specialties	R&D, Manufacturing Capabilities, Regulatory Approvals

a) Synopsis of the Company

Aurobindo Pharma became a public company in 1992 and listed its shares in the Indian stock exchanges in 1995. It has a presence in key therapeutic segments such as neurosciences, cardiovascular, anti-retrovirals, anti - diabetics, gastroenterology and cephalosporin, among others.

The company entered the specialty generic formulations segment through cost effective manufacturing capabilities. Today, after a decade or so, it has evolved into a global company manufacturing API's and formulation products based on its innovation capabilities. Aurobindo's R&D capabilities has resulted in filing of multiple patents, Drug Master Files (DMFs), Abbreviated New Drug Applications (ANDAs) and formulation dossiers across the world. In fact, AurobindoPharma is among the largest filers of DMFs and ANDAs from India.

Aurobindo exports to over 125 countries across the globe. Around 70% of its revenues are derived out of international operations. It's manufacturing units have been approved by leading regulatory agencies such as USFDA, EU GMP, UK MHRA, South Africa-MCC, Health Canada and Brazil ANVISA.

Aurobindo Pharma Ltd. has evolved into a knowledge driven, R & D focused company, with its manufacturing and marketing infrastructure spread across many countries. Aurobindo has invested significant resources in regulated markets by designing five of its units for APIs and five units for Finished Dosages. These units are approved by US FDA, UKMHRA, WHO, MCC-SA, ANVISA-Brazil, and TGI-Australia. Aurobindo has a robust product portfolio of over 400 generic specialties.

b) Path to Internationalization

Aurobindo has been very active in the international pharmaceutical space. Aurobindo started internationalizing in the 1990's by setting up subsidiaries in various countries. This was followed by doing strategic acquisitions in 2000's to enhance company's product portfolio and access new markets. Table 2.2 below details the international operations of Aurobindo.

Table 2.2: International Operations History – AurobindoPharma

Year	Modes of internationalization	Company Name	Country	Motivating Factor
1998	Subsidiary		USA	International presence
1998	Subsidiary		China	International presence
1999	Subsidiary	Aurobindo (H.K.) Limited	Hong Kong	Market access
1999	Subsidiary	APL Pharma Thai Limited	Thailand	Market access
1999	Joint Venture		Brazil	Resource seeking
1999	Joint Venture		China	Resource seeking
2000	Joint Venture		USA	Resource seeking, Facilitating manufacturing of formulations
2001	Subsidiary	AB FarmoQuimicaLimitada	Brazil	
2002	Joint Venture		USA	
2003	Joint Venture	Shanxi Tongling Pharmaceuticals	China	Resource seeking for manufacturing of Penicillin.
2004	Subsidiary	Aurex Generics Ltd	UK	
2004	Joint Venture		USA	This deal helped the company to locally manufacture in USA.
2005	acquisition	USFDA approved manufacturing facility		The basic purpose was to facilitate the growth platform.
2006	Acquisition	Milpharm	UK	inorganic growth in Europe to reduce the time to market and enhance the relationships in the generic value chain
2006	Acquisition	Pharmacin International B.V.	Netherlands	Market seeking
2007	Subsidiary		Japan	Market seeking for generics
2008	Acquisition	TAD	Italy	Italian operations of German pharmaceutical major TAD Pharmaceuticals

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2009	Licensing Agreement	Pfizer		Aurobindo has strong manufacturing facilities. This agreement will help Aurobindo with a support in marketing and sales.
2011	Licensing Agreement	Astra Zeneca		This agreement accelerates the growth plans of the company and also increases the range of branded medicines.
2012	Joint Venture	Diod	Russia	Helps in international expansion and maintain relationships with local companies in target markets.
2013	Acquisition	Actavis	Western Europe	This acquisition will help Aurobindo to attain strong position in European market.
2014	Acquisition	Natrol	USA	Market penetration in U.S. A

Aurobindo has been present in the US market for quite a long time. It set up its first ever subsidiary in the US in 1984 and followed it up by multiple agreements, joint ventures and acquisitions in that market.

Aurobindo was a late entrant in the European market. It first acquisition was that of UK based Milpharm in 2006. This acquisition was to kick start inorganic growth in Europe to reduce the time to market and enhance the relationships in the generic value chain.

Aurobindo Pharma concluded a strategic deal to acquire Italian operations of Germany based TAD Pharmaceuticals in 2007. This acquisition gave Aurobindo access to more than 70 ready to market products. This strategic acquisition is expected to jump start the business for Aurobindo in Italy where the market and the regulatory procedures are considered as the one of the toughest in all EU. Aurobindo also acquired high profile OTC brands - Mapooro and Carmiooro from TAD as a part of this deal. This was company's third acquisition in Europe, after acquiring Milpharm Ltd in UK and Pharmac in International B.V., in Netherlands. The Company believes that such acquisitions reduce the time to market and enhance the relationships in the generic value chain in addition to building a broad and formidable product portfolio.

c) Analysis & Conclusion

Fig. 2.1 and 2.2 below show the correlation of Aurobindo's export intensity with R&D expenses and total assets. In both the cases, it can be said that they are positively correlated with Aurobindo's export intensity.

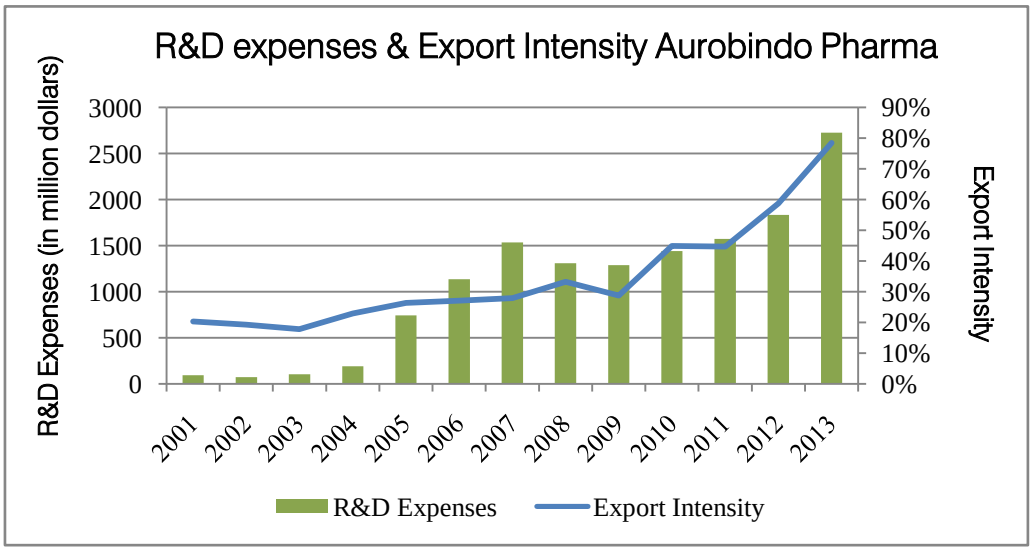


Figure 2.1: R & D expenses & Export Intensity – AurobindoPharma

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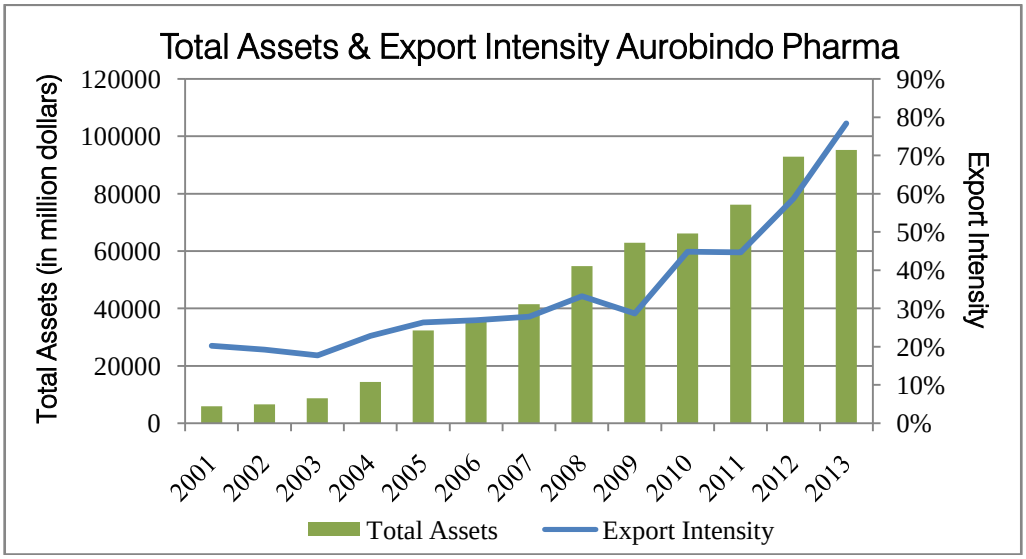


Figure 2.2: Total Assets & Export Intensity – AurobindoPharma

To conclude it can be said that Aurobindo-Pharma has identified international operations as a major part of its growth strategy. It has been gradually expanding its global network of marketing and manufacturing operations. Geographically, its focus has been majorly on China, Brazil, Japan, Netherlands, South Africa, Thailand, UK, USA and Russia. It can be said that subsidiary has been its most preferred modes of internationalization. Aurobindo is today well positioned to surmount any further challenge in international expansion.

III. Cipla Pharmaceuticals

Cipla is a global pharmaceutical company. It is one of the oldest pharmaceutical companies in India and is present in more than 170 countries across the world. The list of countries includes the U.S., Canada and countries in Europe, Africa, Australia, Latin America and the Middle East.

Table 3.1: Cipla – Basic Facts

Headquarters	Mumbai, India
Public or Private	Public
Year of Establishment	1935
Revenues (2013-14)	$1.6 bn
Specialties	Pharmaceuticals

a) Synopsis of the Company

Cipla have 34 manufacturing facilities that make Active Pharmaceutical Ingredients (APIs) and formulations, which have been approved by major international Regulatory Agencies. They have 2000 products in 65 therapeutic categories with over 40 dosage forms.

Cipla's research and development focuses on developing innovative products and drug delivery systems. It has been responsible for creating multiple new products that are accepted in India as well as globally. Despite the tightly regulated environment of foreign countries, Cipla today has more than 30 manufacturing facilities across India that have been approved by major international regulatory agencies including US FDA, MHRA-UK, WHO, Department of Health-Canada, MCC – South Africa, ANVISA – Brazil, and PMDA – Japan.

The company engages in R&D and also offers technical consultancy services. CIPLA's R&D focuses on innovation, both product and process, that result in cost and time saving. CIPLA has gained expertise in producing generics of very complex molecules. The company has given many generic solutions to India and to the world.

b) Path to Internationalization

The core of Cipla's international business is strategic alliances for product development, registration and distribution of the products. Its international business continues to be a major revenue driver for the company. Their overseas sales represent 53% of the total income. Cipla continues to expand and modernize its manufacturing and Research & Development facilities. Table 7.13 lists out the international operations history of Cipla since inception.

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Table 3.2: International Operations History - Cipla

Year	Modes of internationalization	Company Name	Country	Motivating Factor
1984	Subsidiary	Cipla USA Inc.	USA	first Indian company to receive US FDA approval
2002	Exports		Anglo America, South Africa	Market Seeking
2002	Strategic Alliance	MedproPharma	South Africa	Strategy alliance to enter the African market
2011	Acquisition	Manufacturing unit	Uganda	Market Expansion
2012	Acquisition			Integration of value chain and strategic asset seeking
2012	Joint Venture	Aspen Pharma	Australia	First Mover Advantage
2013	Acquisition	Celeris	Croatia	
2013	Acquisition	CiplaMedpro	South Africa	Low Cost Advantage, expansion and recognition
2014	Collaboration	TevaPharma Industries Ltd.	South Africa	Low Cost Advantage
2014	Licensing Agreement	Gileed Sciences Ltd.	USA	To sell and manufacture low cost medicines.
2014	Joint Venture	S&D Pharma	U.K.	Market seeking, Strategic Asset seeking
2014	Marketing Agreement	BioQuiddity		to market One Dose Ready fusORTM in regional anesthetic applications
2015	Joint venture	Cooper Pharmaceuticals.	Morocco	Market seeking
2015	Acquisition	Okasa Pharmaceuticals.	Satara	Operational and financial efficiency

Cipla has been one of the largest exporters of pharmaceutical products from India, exporting API and formulation products to over 170 countries. This includes the U.S., Canada and countries in Europe, Africa, Australia, Latin America and the Middle East.

Cipla started in USA in 1984, when it became the first Indian company to receive US FDA approval. United States of America is a key market of the company. Cipla USA Inc., the US subsidiary of Cipla Limited, is based in Miami, FL. The company has executed over 20 US partnerships and currently has over 40 commercialized products in the US. Cipla has supported the development of more than 170 ANDA's and has received 89 final approvals plus 2 NDA's approved and marketed in the US.

CIPLA also has partnerships and alliances for product development, technical support and marketing. Medpro Pharmaceuticals, South Africa's first generic drug producer formed a strategic alliance with Cipla around 2002. This strategic alliance gave CIPLA an outlet to sell its products in African markets. The strategic alliance was later converted into a joint venture. Recently, in July 2013, Medpro Pharmaceuticals was acquired by CIPLA for US $440 million and the company is now known as CIPLA Medpro.

As part of their growth strategy, Cipla acquired Celeris in 2013. It is a pharmaceutical distribution company based out of Croatia and was recently renamed as Cipla Croatia.

In July 2014 Cipla signed an exclusive partnership with BioQuiddity (Europe based company) to market One Dose Ready fusORTM (a drug used in regional anesthetic applications for post-surgical pain management). Cipla also entered into an alliance with Serum Institute of India to launch vaccines in Europe.

Currently, CIPLA is one of the world's largest generic pharmaceutical companies with its products sold in over 180 countries. So far, the main mode of international business is exports of formulations, Pharmaceutical ingredients, prescription and over-the-counter drugs, and veterinary products. However, going forward CIPLA is looking to make a shift in its business model.

c) Analysis & Conclusion

Cipla is the oldest company amongst its Indian peers. It did not realize the benefit of mergers, acquisitions soon enough and so got left behind a little but is now catching up fast. Just like its peers in Top pharmaceutical companies of India, and as can be seen in Fig 3.1 and 3.2 below, the export intensity has been directly correlated with R&D expenses as well as Total Assets.

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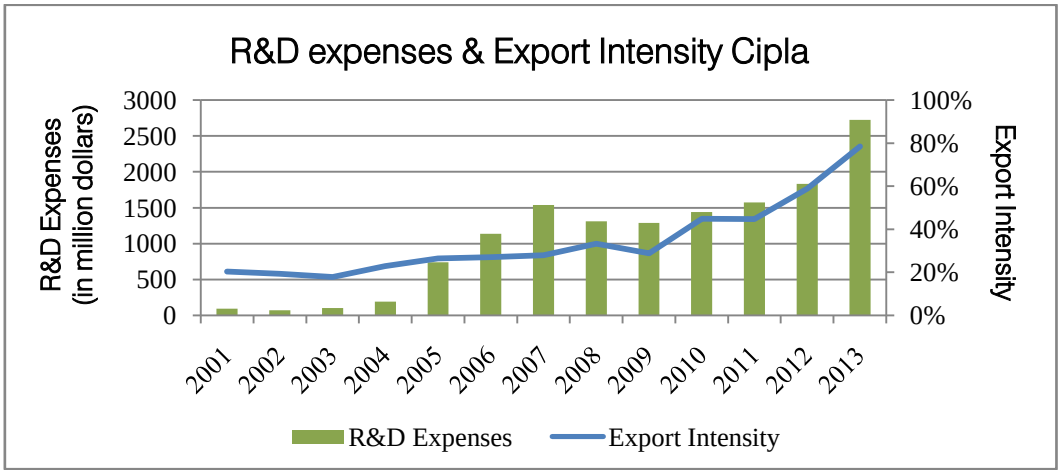


Figure 3.1: R & D expenses & Export Intensity – Cipla

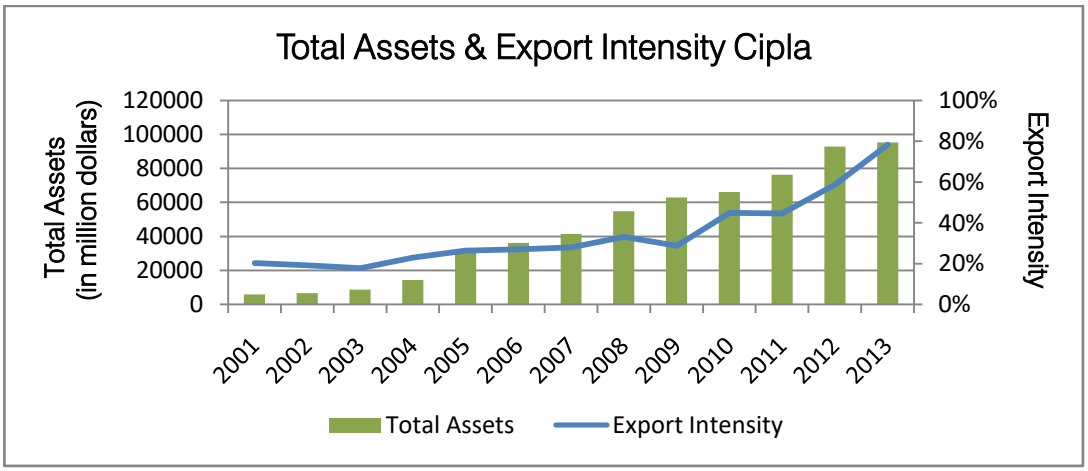


Figure 3.2: Total Assets & Export Intensity – Cipla

Apart from Medpro's acquisition, CIPLA did not grow inorganically through mergers and acquisitions. The company has always expanded organically. Further, except Medpro, CIPLA's physical expansion always took place within India. This may be because any expansion outside India might have made CIPLA vulnerable for legal suites for the previous breach of intellectual property rights.

Therefore, while operating from India, CIPLA conducted its international business through indirect exports. However, the company hopes that it will not face too many challenges when it moves abroad in the near future because it has partners across the globe to help with whom it has long standing relationships. Company is planning to undertake foreign direct investment for expansion in near future. The expansion is most likely to be a forward expansion as the company aims to build marketing and sales network in abroad.

IV. Dr. Reddy Labs

Dr. Reddy's Laboratories is an emerging global pharmaceutical company. It has three core businesses: Pharmaceutical Services and Active Ingredients, comprising Active Pharmaceuticals and Custom Pharmaceuticals businesses; Global Generics, which includes branded and unbranded generics; and Proprietary Products, which includes New Chemical Entities (NCEs), Differentiated Formulations, and Generic Biopharmaceuticals. Table 4.1 lists out some other basic facts about the company.

Table 4.1: Dr. Reddy Labs – basic facts

Headquarters	Hyderabad, India
Public or Private	Public
Year of Establishment	1984
Revenues (2013-14)	$2.25 bn
Specialties	Pharmaceuticals, Specialty, Bigeneric, API, Generic Formulation

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a) Synopsis of the Company

Dr. Reddy's began as a supplier to Indian drug manufacturers. It soon started exporting to other less-regulated markets. This meant not having to spend time and money on a manufacturing plants or seek approval from a drug licensing body such as the U.S. Food and Drug Administration (FDA). This was a great advantage and helped spur the phenomenal growth of the company.

By the early 1990s, bolstered by the expanded scale and profitability in unregulated markets, the company started focusing on tightly regulated markets. It started getting approvals from drug regulators for their formulations and bulk drug manufacturing plants in more-developed economies. This allowed their movement into regulated markets such as the US and Europe.

In 2001 Reddy's completed its US initial public offering of $132.8 million American Depositary Receipts (ADR) issue and also listed on the New York Stock exchange. Funds raised from the US initial public offering helped Reddy's move into international production – and take over technology - based companies.

By 2007, Dr. Reddy's had six FDA-plants manufacturing active pharmaceutical ingredients in India. It also had seven FDA-inspected plants making patient-ready medications – five of them in India and two in the UK.

Reddy's also invested heavily in building R&D labs and is the only Indian company to have significant R&D being undertaken overseas. Dr. Reddy's Research Foundation was established in 1992 and dedicated to research in area of new drug discovery. At first, the foundation's drug research strategy revolved around searching for analogues but its changed focus to innovative R&D by hiring new scientists.

b) Path to Internationalization

Reddy's path into new drug discovery involved targeting specialty generics products in western markets to gain drug discovery abilities. This led Dr. Reddy to adopt aggressive merger & acquisition strategy to explore the international markets. Table 4.2 below lists out the internationalization history of the company.

Table 4.2: International Operations History - Dr. Reddy's Labs

Year	Modes of internationalization	Company Name	Country	Motivating Factor
1992	Joint venture	Biomed	Russia	Market Access
1993	Joint venture	-	Middle East	Created two formulations units
1994	Exports	-	Kazakhstan	Representative office was opened.
1994	Joint Venture	-	Uzbekistan	Representative office was opened.
1994	Subsidiary	Dr. Reddy's Laboratories Inc.	USA	Target USA generic market
1995	Exports	-	Belarus	Representative office was opened.
2000	Subsidiary	Reddy US Therapeutics Inc.	USA	discovery and design of novel therapeutics
2000	Marketing Alliance	Triomed	South Africa	begins its Generic business operation in South Africa
2000	Joint Venture	KunshanRotam Reddy Pharmaceutical Co., Ltd. (KRRP)	China	-
2002	acquisition	BMS Labs and its wholly owned subsidiary, Meridian UK	U.K.	To expand geographically and gain access to the European market.
2003	Joint venture	Par- Pharma Inc.	USA	to market hypertension products
2003	Subsidiary	-	Russia	pharmacy warehouse for better service on the territory of Russia
2004	Agreement	Eurodrug Labs	Netherlands	-
2004	Agreement	Pharmaplan	South Africa	for hiring sales force after Triomed was acquired by Aspen
2004	Joint Venture	Venturepharm	South Africa	
2004	Acquisition	Trigenesis	USA	To access strategic assets in dermatology segment.
2005	Sales & Development Agreement	Rheoscience A/S,	Denmark	-
2006	acquisition	Betapharma	Germany	For the purpose of brand building
2006	Licensing Agreement	MERCK AG	Germany	-
2006	Licensing Agreement	Molteni	Italy	-

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2006	R& D, Commercialization Agreement	Argenta Discovery Ltd.	U.K.	-
2007	Subsidiary	Dr. Reddy's Laboratories SA	Switzerland	provides custom pharmaceutical services for starting materials, intermediates, active ingredients, and finished dosage forms
2008	Acquisition	Affordable Healthcare Ltd.	New Zealand	gaining tenders from the New Zealand govt. body, Pharmac and supplying the pharmaceutical drugs for the prescription market
2009	Subsidiary	Dr. Reddy's Laboratories Australia Pty Ltd	Australia	launch of new Generics Medicine lines
2010	Subsidiary	Dr. Reddy's Laboratories (Pty) Ltd	South Africa	Joint Venture with Venturepharm became the wholly owned subsidiary
2010	Licensing Agreement	Cipla (Senade)	Russia	-
2010	Licensing Agreement	R-Pharm	Russia	Collaboration in the areas of high technology and knowledge sharing.
2011	Licensing Agreement	Novartis (Famvir)	Russia	

Dr. Reddy was a very early mover into the Russian market, forming a joint venture with the country's biggest pharmaceuticals producer Biomed in 1992. In 1993, Reddy's entered into a joint venture in the Middle East and created two formulation units there and in Russia. Reddy's exported bulk drugs to these formulation units, which then converted them into finished products. In 1994, Reddy's started targeting the US generic market by building state of art manufacturing facility.

By 1997, Reddy's was ready for the next major step. From being an API and bulk drug supplier to regulated markets like the USA and the UK, and a branded formulations supplier in unregulated markets like India and Russia.

In 2000, Dr. Reddy's Research Foundation set up a US lab in Atlanta, dedicated to discovery and design of novel therapeutics Reddy's merged Cheminor Drug Limited (CDL) with primary aim of supplying APIs to the technically demanding markets of North America and Europe. This merger also gave Reddy's entry into value added generics business in the regulated markets of APIs.

In 2001 Reddy's became the first Indian company to launch the generic drug, fluoxetine (a generic version of Eli Lilly and Company's Prozac) with 180-day market exclusivity in the USA. The fluoxetine marketing success was followed by the launch of ibuprofen in US under its own brand name, in January 2003. It was the first step in building Reddy's fully fledged distribution network in the US market.

In March 2002, Dr. Reddy's acquired BMS Laboratories, Beverley, and it is wholly owned subsidiary Meridian Healthcare, for EUR 14.81 million. Recently, Dr. Reddy's entered into an R&D and commercialization agreement with Argenta Discovery Ltd., a private drug development company based in the UK, for the treatment of COPD.

With growing success in the generics market, Reddy's also came to realize the need for developing marketing and distribution capabilities in the USA. The company already had one tie-up with Pharmaceutical Resources, Inc. to market Fluoxentine 40 mg tablets. It also had a tie-up with Par Pharmaceuticals Inc., to produce and market over-the-counter drugs in the U.S. In addition to the United States, Reddy's generics business had established a presence in the UK as well. Reddy's also plans to expand its presence in Canada and South Africa. Its API business had sales in over 60 countries, with the US and India being the most significant revenue contributors. The branded formulations business was active in over 30 countries and Reddy's was a significant player in the Indian and Russian markets. The business planned to significantly increase its presence in China, Brazil and Mexico in the near future.

In 2004, Reddy's acquired Trigenesis Therapeutics Inc.; the US based private dermatology company. This acquisition gave Reddy's access to certain products and proprietary technologies in dermatology segment.

In March 2006, Dr. Reddy's acquired BetapharmArzneimittel GmbH from 3i for EUR 480 million. This is one of the largest-ever foreign acquisitions by an Indian pharmaceutical company.

c) Analysis & Conclusion

Dr. Reddy's Labs has been a very aggressive player in the international acquisition space. Its initial success came through exports of generics which continue to be the growth drive to this date. Fig. 4.1 and 4.2 below show the plot of Reddy's export intensity vs R & D expenses and Total Assets respectively.

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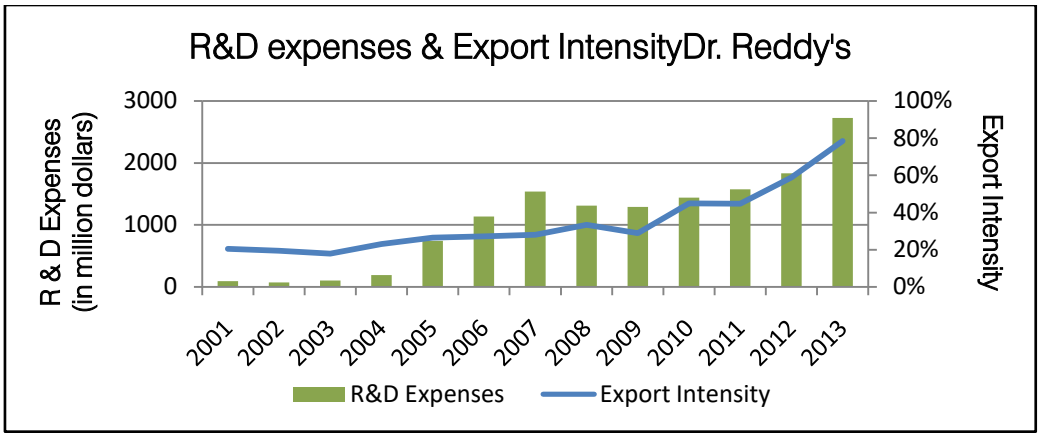


Figure 4.1: R & D expenses & Export Intensity – Dr. Reddy's

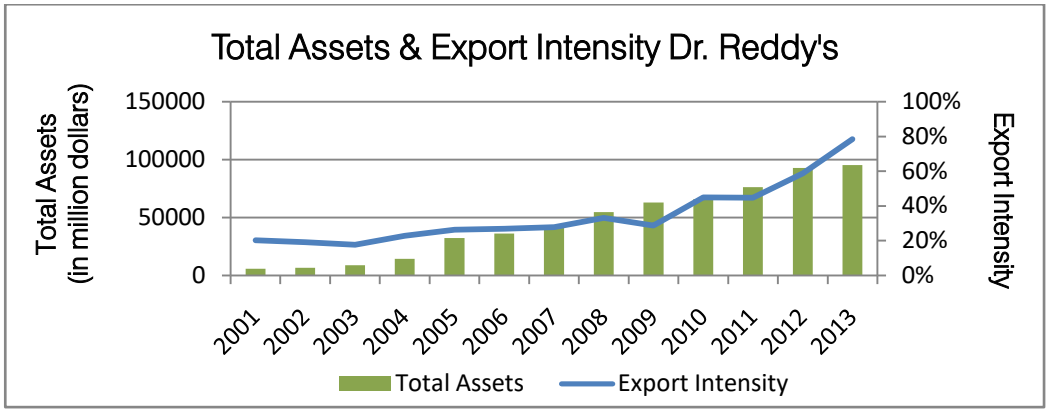


Figure 4.2: Total Assets & Export Intensity – Dr. Reddy's

Reddy's successful growth into a fully integrated pharmaceutical company in less than a decade was founded on a successful and targeted program of inorganic growth and investments in process R&D. It had chosen a high risk-high gain strategy to growth by going into direct competition with existing patent holders.

A major challenge for Reddy's is to find ways to de-risk its overall strategy. One way may lie in managing the cash flows from the 'safer' API and formulations businesses. Another way may be to seek out more experienced partners for the R&D business or use acquisitions to boost R&D resources and revenues. It has chosen the global route and went on an acquiring spree.

V. Lupin

Lupin is an innovation led transnational pharmaceutical major producing and developing a wide range of branded and generic formulations as well as biotechnology products and APIs globally. The Company is a significant player in the Cardiovascular, Diabetology, Asthma, Pediatrics, CNS, GI, Anti-Infective and NSAID space and holds global leadership positions in the Anti-TB and Cephalosporin segment.

Table 5.1: Lupin – basic facts

Headquarters	Mumbai, India
Public or Private	Public
Year of Establishment	1968
Revenues (2013-14)	$1.89 bn
Specialties	Formulations, APIs, Generics, Biotechnology, Novel Drug Discovery and Development, Drug Delivery Systems, Specialty Pharmaceuticals

a) Synopsis of the Company

Lupin is the 5th largest and fastest growing top 5 generics player in the US (5.3% market share by prescriptions, IMS Health) and the 3rd largest Indian pharmaceutical company by sales. The Company is also the fastest growing top 10 generic pharmaceutical players in Japan and South Africa (IMS).

Lupin benefitted from the cost arbitrage between India and developed countries as all of Lupin's manufacturing plants initially were located in India. From

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the international footprint table of Lupin it is clear that Lupin wanted to leverage this cost arbitrage internationally by entering into strategic marketing alliances with firms.

Lupin continues to invest heavily in its R&D programs. The Company invested 8.6% of its net sales in R&D and related spends, amounting to Rs. 9,583 million in 2013-14. Lupin has designed a very successful research program which continues to ensure the delivery of a sustainable pipe line of high - value opportunities that are maximizing growth for the Company across markets.

b) Path to Internationalization

Lupin is one of the largest and fastest growing pharmaceutical companies in India. It is present in more than 70 countries. Lupin has used a mix of international expansion strategies which reflect the need and stage in the growth life cycle of Lupin itself. Table 5.2 below shows the internationalization history of Lupin.

Table 5.2: International Operations History - Lupin

Year	Modes of internationalization	Company Name	Country	Motivating Factor
2003	Subsidiary	Lupin Pharmaceuticals Inc.	USA	Market Access
2004	Subsidiary	Lupin Australia Pty Ltd., Australia	Australia	Market Access
2004	Strategic alliance	Baxter	USA	Will provide Lupin access to the US ceftriaxone vial market.
2005	Strategic agreement	GSK	Philippines	Geographical expansion
2006	Acquisition	51% equity in DafraPharma ltd	Belgium	strategic initiative
2007	Subsidiary	Lupin Atlantis Holdings SA	Switzerland	-
2007	acquisition	Kyowa	Japan	Kyowa has major strengths in product development, manufacturing and marketing of its products nationwide. Lupin will be able to add significant value through its strengths in R&D and global marketing, leading to major synergies.
2008	Acquisition	Generic Health	Australia	Business expansion
2008	Acquisition	Pharma Dynamics	South Africa	3rd largest generic company in the SA prescriptions market.
2008	Strategic Agreement	ASCENA	USA	Extend Suprax franchise and enhance the value of brand business in the U.S."
2008	Acquisition	HormosanPharma	Germany	-
2009	Subsidiary	Lupin (Europe) Ltd.	UK	-
2009	Subsidiary	LupinPharma Canada Ltd.	Canada	-
2009	Acquisition	Multicare Pharmaceuticals	Philippines	acquisition offers Lupin an entry into this $2.5 billion market
2010	Subsidiary	Lupin Mexico S.A. de C.V	Mexico	-
2011	Acquisition	I'Rompharmaceuticals	Tokyo	IP's strong presence in the DPC hospital segment in Japan, through its line of injectable products, is an ideal fit with our existing oral business portfolio in Japan.
2011	Licensing agreement	Sydney	Australia	-
2011	Supply agreement	farmanguinkos	Brazil	providing comprehensive therapeutic care in the areas of conventional TB and MDR-TB,
2013	Licensing Agreement	Romark Lab	USA	grow its brand franchise
2014	Joint venture	yoshindo	Japan	First step forward to establishing Lupin's global Biosimilar portfolio".
2014	acquisition	Laboratorios grin	Mexico	Specialty Ophthalmic Company; Enters the Latin American Market.
2014	acquisition	Nanomi B.V.	Netherlands	use of Nanomi's proprietary technology platform,
2014	Joint Venture	YL Biologics Ltd.	Japan	-
2015	Acquisition	Biocom	Russia	-
2015	Acquisition	Medquimica	Brazil	-

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In 2002-03 Lupin had already made inroads into the active pharmaceutical ingredient or API supplies in the US and Europe, but was a fringe player in most other markets.

Lupin Pharmaceuticals, Inc. entered the U.S. generic pharmaceutical market in 2003. Since then company have received more than 75 FDA approvals and have become one of the fastest growing pharmaceutical companies in the US.

Lupin operates a globally integrated network of 11 manufacturing facilities. Their world class facilities are built to manufacture and deliver a wide range of finished products to the US market. USA is the main market fir Lupin's operations. Lupin has experienced a wide degree of transformation. It has started with opening a subsidiary in USA to sell its product, while the same team is selling some other companies product in the country.

Medicines in Japan have different specifications from other markets. The percentage of residual impurities and the raw material strengths are different from that of US or European requirements and therefore, cannot be clubbed together with those markets. As a result, Lupin revealed the first step in its strategy—a co-operation agreement with a 50-year old local drug firm Kyowa Pharmaceutical to market medicines in Japan. The agreement turned out to be pivotal. While Lupin had to develop and manufacture the medicine, Kyowa was supposed to conduct regulatory testing, obtain approvals and market the drugs in Japan. Two years later, Lupin acquired a majority stake in privately-held Kyowa, and in 2008, turned it into a 100 per cent subsidiary. Kyowa gave Lupin lot of insights into the working of the Japanese generic market. Company added new products in the Kyowa pipeline, and in less than three years, doubled its turnover.

c) Analysis & Conclusion

Again, just like its peers in Top pharmaceutical companies of India, and as can be seen in Fig 5.1 and 5.2 below, the export intensity has been directly correlated with R&D expenses as well as Total Assets.

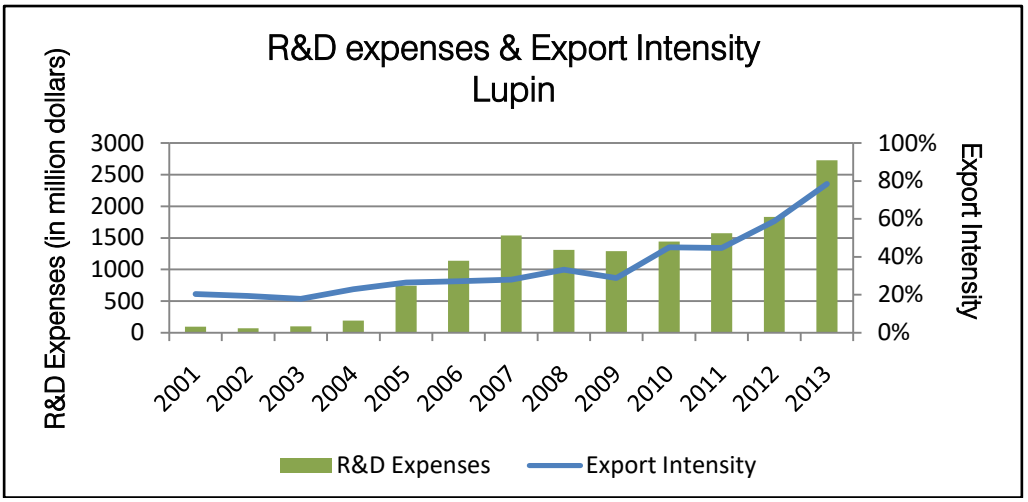


Figure 5.1: R & D expenses & Export Intensity – Lupin

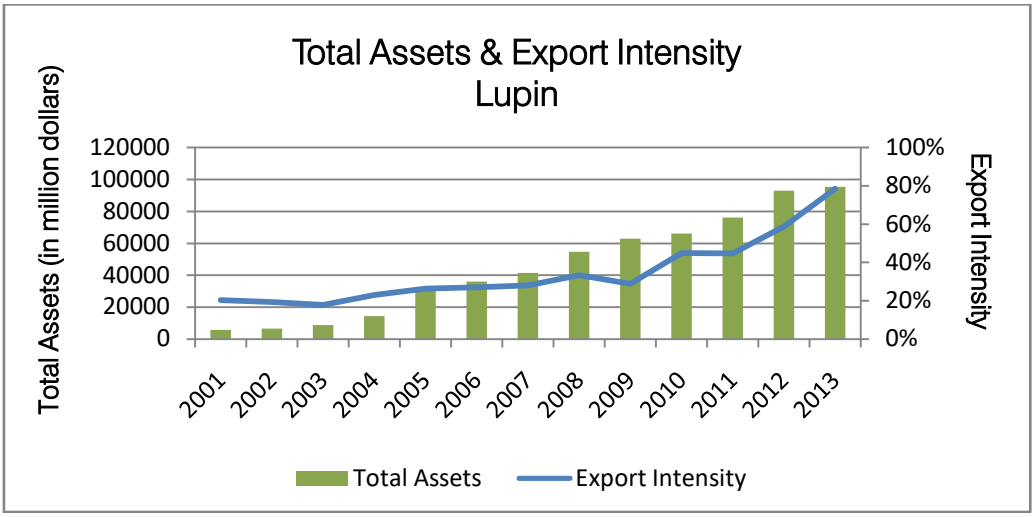


Figure 5.2: Total Assets & Export Intensity – Lupin

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Lupin started with the organics entry in international market. but with its strengths and capabilities it moved to other non- organic modes of expansion as well.

Thus, it can be said that Lupin is set to emerge as a transnational enterprise from a purely Indian operation leveraging its ownership resources of low cost manufacturing and acquired R&D capabilities, tuning its strategies to enter markets with best location advantages and using its core competencies to internalize key functions and actually magnetizing these strategic assets.

VI. Sun Pharmaceuticals Laboratories LTD.

Sun Pharma is a global, integrated, specialty pharmaceutical company. It manufactures and markets a large basket of pharmaceutical formulations in India, US and several other markets across the world. In India, the company manufactures products in niche therapy areas of psychiatry, neurology, cardiology, diabetology, gastroenterology, orthopedics and ophthalmology.

Table 6.1: Sun Pharma – basic facts

Headquarters	Mumbai, India
Public or Private	Public
Year of Establishment	1983
Revenues (2013-14)	$2.56 bn
Specialties	Formulations, API, US Generics, Specialty brands, Technically complex formulations

a) Synopsis of the Company

Over 72% of Sun Pharma sales are from markets outside India, primarily in the US. The US is the single largest market. It accounts for about 60% turnover in all be it in the form of formulations or finished dosage. It manufactures across 26 locations, including plants in the US, Canada, Brazil, Mexico and Israel.

Several regulatory agencies, including FDA-USA, EMA-Europe, MHRA-UK, MCC-South Africa, TGA-Australia, ANVISA-Brazil, WHO-Geneva, BfArM-Germany, KFDA-Korea and PMDA-Japan, have certified their facilities.

Their track-record of successful collaborations includes various in and out licensing of products and technologies, joint ventures, as well as mergers & acquisitions.

Their early investments in R&D began three decades ago. It enabled the company to make technology as their key differentiator and develop a basket of robust products for diverse markets across the world. The company have around 1800 research scientists working in multiple R&D centers. Their scientists have expertise in developing generics, Active Pharmaceutical Ingredients (APIs), Novel Drug Delivery Systems (NDDS) and New Chemical Entities (NCEs).

b) Path to Internationalization

Sun pharmaceutical started exporting products to neighboring countries of India in 1989. Table 6.2 below summarizes the internationalization history of the company

Table 6.2: International Operations History – Sun Pharma

Year	Modes of internationalization	Company Name	Country	Motivating Factor
1989	Exports		Neighboring countries of India	
1996	subsidiary	Sun Pharma Global Inc.	British Virgin Islands	
1997	Acquisition	Caraco Pharmaceutical Laboratories	USA	Technology and R&D seeking
1997	Equity Stake	MJ Pharma	UK	
2001	Subsidiary	Sun Pharmaceutical (Bangladesh) Limited	Bangladesh	Market access
2004	Subsidiary	Sun Pharmaceutical Industries, Inc.	USA	Market access
2004	Acquisition	Niche brands from Women's First Health care	USA	To enrich the product portfolio
2005	Subsidiary	Sun Pharmaceutical UK Limited	UK	Market access

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2005	Acquisition	Manufacturing Unit in Bryan, Ohio	USA	
2005	Acquisition	Able Laboratories	USA	Expansion, to make presence in controlled substances.
2005	Acquisition	ICN	Hungary	Band building and to make presence in controlled substances.
2008	Subsidiary	Sun Pharmaceutical Industries Pty Ltd (Australia)	Australia	Market access
2008	Acquisition	Chattem Chemicals Inc.	USA	To enrich the product portfolio and become more active player in pain management.
2009	Subsidiary	Sun Pharmaceuticals Germany GmbH	Germany	Market access
2009	Acquisition	Products from Forest Inwood	USA	Through Coraco
2010	Acquisition	Taro pharmaceuticals	USA	Expansion in USA
2012	Acquisition	Dusa pharmaceuticals	USA	DUSA's business will bring an entry into dermatological treatment devices, where Sunpharma see good growth opportunities.
2012	Acquisition	Generic business of URL pharmaceuticals.	USA	
2014	Acquisition	Ranbaxy	Various countries	Brand building. Sun pharma became world fifth largest generic pharma company.
2014	Acquisition	Pharmalucence	USA	Manufacturer of human injectable pharmaceuticals.
2014	Licensing Agreement	Merck & Co. Inc.	USA	Enrich the product portfolio
2015	Acquisition	GSK'S opiates business in Australia.	Australia	Expansion in the niche segment of controlled substances.

Then in 1991, fall in bulk drug prices was a setback for the company. It realized the mistake of depending on a single product line so it started to diversify across multiple formulations. Russia became the biggest export market for Sun but the 1998 collapse of the Russian economy came as a big jolt for the company. Sun has become too focused on Russia as country and lost a big chunk of business due to the political upheaval. That's when Sun decided to focus on three key therapeutic areas by employing similar production technology. This allowed Sun to serve different market segments while using the same technology and thereby allowing them access to the best of both worlds.

In 1997, Sun did its first international acquisition. The main purpose of the acquisition was to acquire the technology. As a result, Sun acquired many companies with equity stake. MJ Pharma, TDPL were few of them. Apart from acquisition as a mode of internationalization Sun also focused on exports. In 1997, Sun reported the exports as 18 percent of their total sales. Although Sun was present in many regulated and unregulated markets, USA still remained the single most important country.

In 2004 Sun Pharma bought a few exclusive brands to consolidate its positions as a leader in the segment. The brands were purchased from the US based company Women's First Healthcare (WFHC). Acquisition of WFHC was the foundation stone for entering the branded generic space in the US at a reasonable cost. In same year Sun Pharma increased its stake in Coraco to over 60% from 44% by acquiring a common stock and options from 2 large shareholders of Caraco.

In 2005 Sun acquired a Hungarian firm to operate in the controlled substance market. Company bought raw materials and dosage form manufacturing operations of ICN Hungary from Valeant Pharmaceuticals. In the same year, Sun acquired a manufacturing plant at Bryan, Ohio, USA, and work begun on increasing the capacity and making operations more efficient.

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c) Analysis & Conclusion

Sun although being a new company of the selected sample, manages a broad scope of operations. It is actively pursuing mergers, acquisitions and other strategic tie-ups. Sun pharmaceutical targets API market in Europe and US as these markets are gradually opening up to the use of low cost generics. There is intense competition from API manufacturers in many other developing countries. Therefore, the company is trying to diversify its product offerings by targeting specialty API. The company's acquisition of Knoll's bulk drug facility and its purchase of controlling stakes in Gujarat Pharma, MJ Pharma, and Caraco (U.S.) provide Sun with additional R&D capabilities and access to U.S. FDA approved factories.

As can be seen in Fig 6.1, increase in R&D had a positive impact on export intensity of the company.

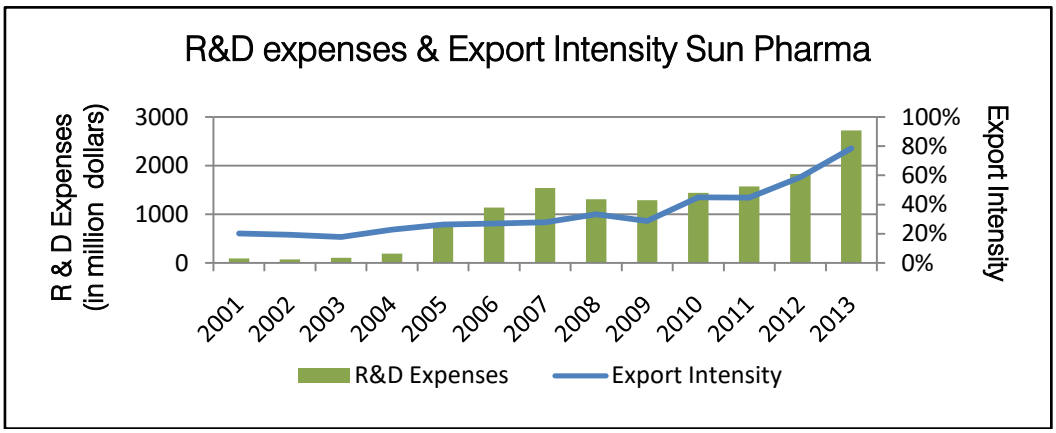


Figure 6.1: R & D expenses & Export Intensity – Sun Pharma

Fig 6.2 shows a plot of Sun Pharma's assets plotted against its export intensity. Company's export intensity seems to be having a positive correlation with its total assets.

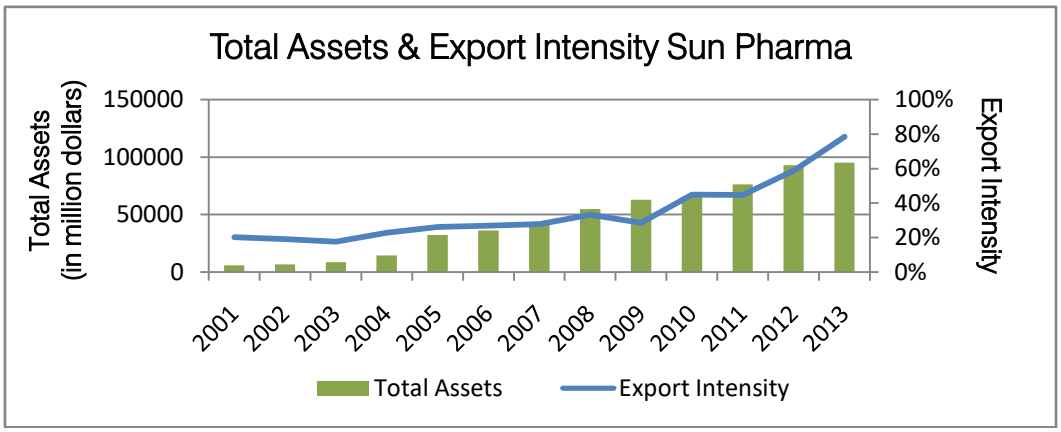


Figure 6.2: Total Assets & Export Intensity – Sun Pharma

After the thorough analysis it can always be said that Sun Pharma is internationalizing with a high pace, but still challenges are on the way. Sun is taking corrective measures to eliminate the threat of increased patent protection. It is investing heavily in sales and marketing capacities and plans to implement its branded generic strategy in multiple markets.

VII. Comparative Analysis of Findings From Case Studies

The first step in internationalization for a small company is always exports. This would mainly be achieved by entering into an agreement with another company in that country. The guiding factor behind it is the philosophy of the company to count on quality. The small company prefers in investing in quality rather than marketing and distribution. Moreover, to encourage the exports they get various incentives from Indian government in form of duty drawbacks, duty free imports of raw materials etc. So it is not only the enthusiasm of the entrepreneur, but also the encouragement on behalf of government that leads to internationalization.

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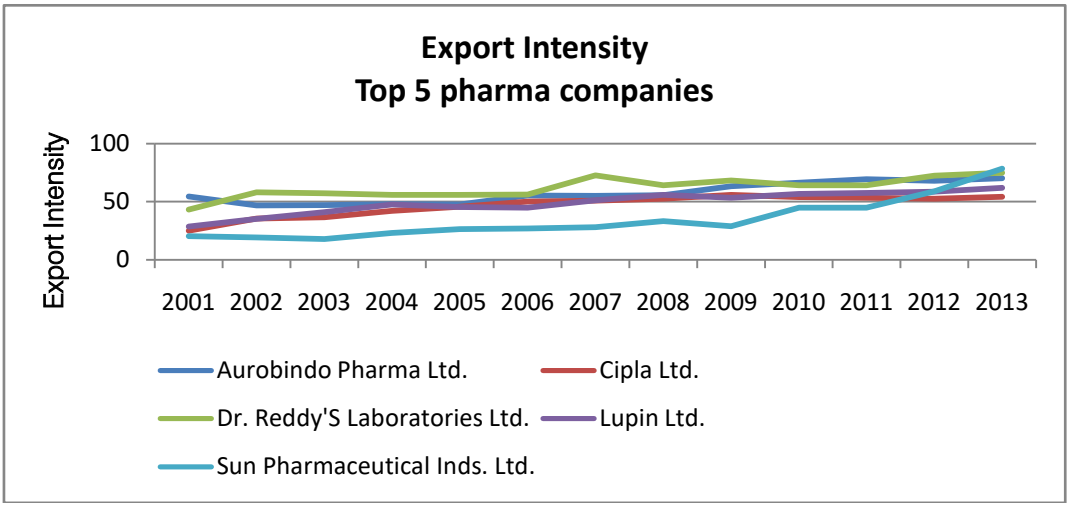


Figure 7.1: Export Intensity of top 5 pharmaceutical firms

Looking at Fig. 7.1 it is clear that Dr. Reddy has maintained an overall lead in export intensity over the years, but, Sun Pharma has seen a spurt in growth in recent years and is all set to taken over Dr. Reddy now.

Table 7.1 below summarizes the internationalization efforts of top 5 pharmaceutical companies by modes of internationalization.

Table 7.1: Modes of internationalization - Summary for top 5 companies

Name of the firm	Aurobindo	Cipla	Dr. Reddy's	Lupin	Sun Pharma
No. of countries exporting to	100	170	130	100	150
No. of Acquisitions	6	5	3	11	13
No. of Joint ventures	7	3	6	2	0
No. of subsidiaries	3	1	6	6	6
No. of Agreements	2	3	10	6	1

Sun Pharma and Lupin have been very active in acquisitions. Aurobindo has relied more on joint ventures whereas Dr. Reddy's has explored multiple modes of internationalization almost equally. Table 7.2 further details out the reasons for selecting a particular modes of internationalization by these companies. It is a comparative analysis on these companies as to what was a significant modes of internationalization and what was factor influencing the decision.

Table 7.2: Comparative Analysis for Modes of internationalization strategy for top 5 pharmaceutical companies

Company Name	Key Modes of internationalization taken	Factor that influenced modes of internationalization	Explanation
Aurobindo	Acquisition	Market Size	The Company believes that such acquisitions reduce the time to market and enhance the relationships in the generic value chain in addition to building a broad and formidable product portfolio.
Cipla	Strategic Alliance	Regulatory framework of host country	Cipla is one of the oldest pharmaceutical companies based in India. During it's early evolution years, it copied many patented drugs due to lax regime in India and exported them to less regulated markets. This prevented Cipla from expanding in the West as it always feared for patent infringement lawsuits due to tight regulatory framework in those countries.
Dr. Reddy's	Joint Venture	Market Size	Dr. Reddy's was the first mover in Russian market. It's first ever joint venture was with Biomed of Russia and it gave Dr. Reddy unparalleled access to the Russian market.

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	Acquisition	R & D	Reddy's successful growth into a fully integrated pharmaceutical company in less than a decade was founded on a successful and targeted program of inorganic growth and investments in process R&D.
Lupin	Strategic Alliance followed by Acquisition	Market Size	Lupin recognized the tremendous opportunity that the Japanese market provided. Even though Japan is a small country but it is a highly developed country. Also cost of living is quite high which makes it very lucrative for any pharmaceutical company with reasonably priced generic medicines. Nobody from India had been able to penetrate the Japanese market before. Lupin entered into a co-operation agreement with a 50-year old local drug firm Kyowa Pharmaceutical to market medicines in Japan. The agreement turned out to be pivotal and had such a good impact on company's financials that is acquired Kyowa eventually.
Sun Pharma	Acquisition	R & D	Acquisition of Knoll's bulk drug facility and its purchase of controlling stakes in Gujarat Pharma, MJ Pharma, and Caraco (U.S) provide Sun with additional R&D capabilities and access to U.S. FDA approved production facilities. Sun is going for major acquisitions to augment its R&D capabilities.

As is evident from the table above that regulatory framework, R & D and Market Size have been some of the factors that have influenced the modes of internationalization decisions for these companies. Fig. 7.2 below further shows the R&D expenses at these 5 pharmaceutical firms.

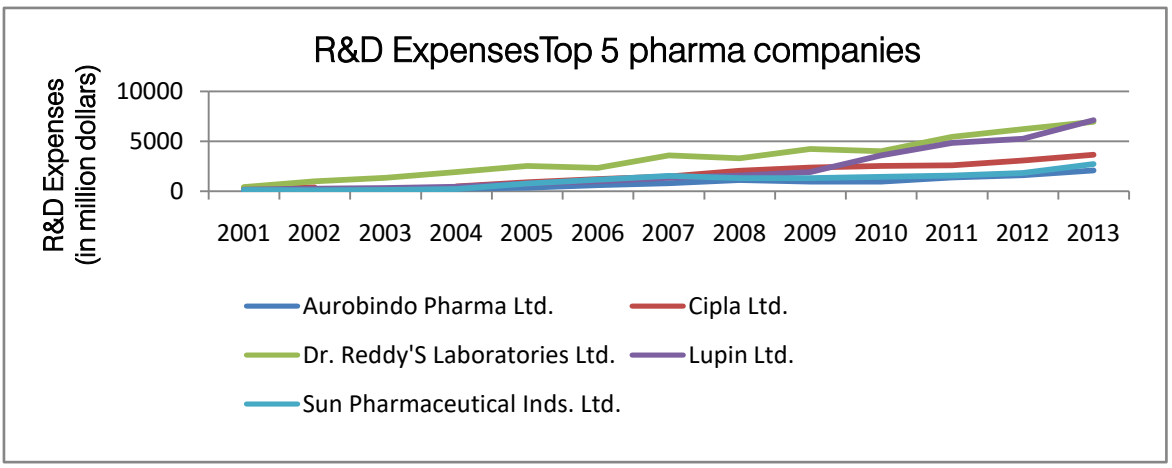


Figure 7.2: R & D expenses of top 5 pharmaceutical firms

Dr. Reddy has once again been a leader in R & D activities over the years. In fact, as stated in the case study for Dr. Reddy, the company has always looked to augment its R & D capabilities through active mergers and acquisitions.

Mergers & Acquisitions are generally followed by larger companies. The guiding objective is either to enter a new market quickly or gain a dominant position in an existing market. Through acquisitions, company generally looks for market expansion and operational efficiency. Perhaps it can be said that mergers and acquisitions are generally guide by an objective of resource seeking. In the global world we live in today, there is cut throat competition at every level and it becomes imperative for firms to go for continuous product expansion and market expansion. This product and market expansion is achieved through mergers and acquisitions.

Subsidiary route or establishing a manufacturing plant in the foreign country is followed by even fewer and largest companies as it is the most cost and time intensive approach. Setting up a new unit takes time as it requires getting all the approvals from local authorities.

Acquisition has emerged as a dominant strategy for internationalization in Europe compared to the US and developing countries. Indian companies are acquiring firms in Europe in order to gain experience in regulatory skills. Use of generics in European market is growing quickly due to government's price controls and

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other regulations. DRL's acquisition of Betapharm provides the company with access to that market. DRL's strength in the product segment combines with Betapharm's front-end presence and thus enhancing DRL's domestic manufacturing advantage. Another factor aiding acquisition in Europe is the wider range of companies available compared to US where acquisition is more expensive and risky for Indian companies.

VIII. Conclusion

To conclude, the changes in US regulations and liberalization of Indian economy have played a key role in aiding Indian firms internationalization strategies. Thus findings of the primary study support the argument that changes in world economy and its interlinked character is responsible for driving the new approaches and patterns of internationalization.

Moreover, the leading Indian pharmaceutical firms show that strategy of acquisitions and direct foreign entry can result in higher profits as long as it is supplemented with superior technology. The insights from the primary study suggest that the motive behind overseas expansion of Indian firms is the need to improve global competitiveness and acquisition of assets including research.

US remains the most attractive market for companies taking the export mode. Given the cost difference between India and US in terms of manufacturing, it is highly beneficial for a company to manufacture in India and export to developed nations.US remains the toughest market to enter too. Getting approval from US FDA opens the floodgates for the company to export its products to multiple countries across the world. But getting US FDA approval requires lot of time and money investment as the requirements for approval are very stringent. The second largest Pharma market in the world is Japan. Japan is supposed to be the most difficult Pharma markets to access. However, Lupin's success in establishing significant presence in Japan shows that building a footprint in this market is not impossible. Indian companies are also look at establishing their foothold in other managed but less regulated markets such as South East Asia and Africa. Liaisons in these developing markets can be facilitated more efficiently by collaborating with international agencies or via government intervention.

After the thorough analysis of the pharmaceutical companies and pharmaceutical industry of India it is found that Indian Pharmaceutical companies are capitalizing on export opportunities in regulated as well as semi regulated markets. Changes in the global arena in terms of increasing healthcare cost have been able to create space and opportunities for Indian pharmaceutical players. Further change in regulatory as well as business perspective is pushing the companies to adapt and change their business strategies. As a result, companies are trying to tap newer markets for their expansion. Company size remains a big factor in determination of modes of internationalization. Size determines the financial and operational capabilities of the company. which further enables the company to take the decision of being risk averse or risk taker.

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Energy use and the Nigerian Economy

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Abstract- The objective of this study is to investigate the influence of energy use on the level of economic development. The case study is limited to oil and gas sub-sectors because they are regarded as the key sub-sectors in the Nigerian energy sector. The methodology for this study entails the followings; ordinary least square regression, Johansen method of co-integration test and vector error correction model (VECM). The findings show that total investment and aggregate oil consumption are the significant variables to influence the level of economic development in Nigeria. The findings of the co-integration test shows that there exists a long run co-integration among the variables and 15 coefficients of the estimated 44 coefficients are significant to explain the long run co-integration among the variables. Furthermore, oil consumption significantly affects the overall activities of the Nigerian economy. Therefore, it is recommended that the government reconsider the oil subsidy policy once again purposely to achieve a sustainable economy.

Keywords: *energy use, oil, gas, poverty.*

GJHSS-E Classification: *FOR Code: 149999*



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Energy use and the Nigerian Economy

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Keywords: energy use, oil, gas, poverty.

I. The Overview

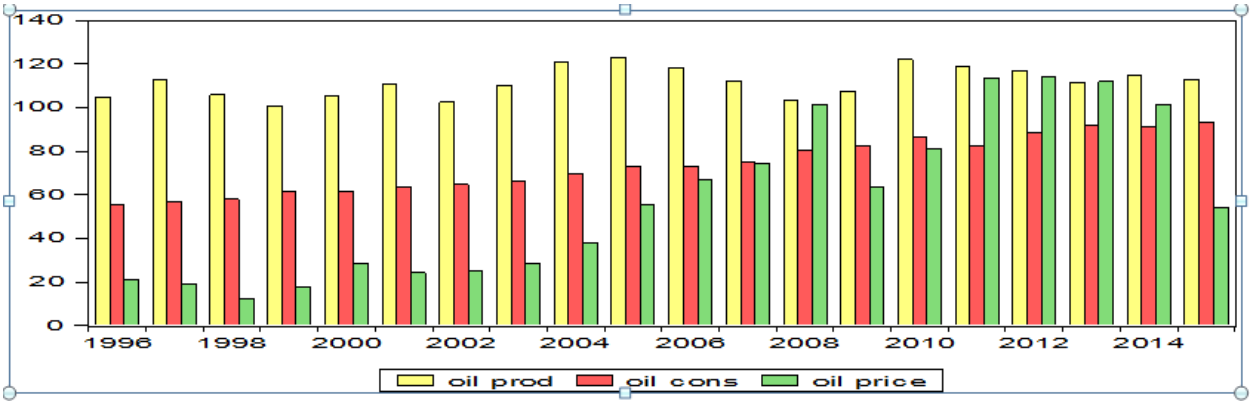
A severe shortage of essential energy infrastructure is undermining Nigeria's efforts to achieve significant social and economic development. It is deduced that a sustainable economy is built on modern energy system, but the Nigerian energy sector has not yet gotten to the developed status. This research attempts to investigate energy use in Nigeria, and thereby its significant effect on Nigerian economy. Nigeria is possessed with the features of LDC such as; shortages of foreign exchange and resources for development, higher levels of market distortion, relative paucity of energy. Nigeria experience with industrialization has not been sustainable over the years. Consequently, a call for sound industrialization in Nigeria may be the broad requirement for a sustainable economy. Industrialization implies vast social and economic changes. For instance, replacement of labor-intensive technique with capital-intensive technique, hand tools by machine tools, a general tendency towards urbanization. Energy supply is therefore suggested as the core factor that is required to enhance industrialization policy.

The energy sector plays a vital role in overall economic activities, as it serves as a prerequisite for sustainable development of an economy. Therefore, energy planning requires link between energy sector and the rest of the economy, and also interaction between different subsectors within the energy sector. According to Bhattacharyya (2011), energy is classified into primary and secondary energy. The primary energy are those energy that have not undergone transformation such as, coal, crude oil, natural gas, solar power and nuclear power. The secondary energy is referred to as transformed energy purposely to make it useful for consumers; such as oil products and electricity. Also primary energy is classified into renewable and non-renewable energy. There has been expanse transition in the primary energy supply system in Nigeria. Formerly, coal was the main source of energy until later when crude oil and natural gas were introduced. To measure the primary energy utilization in Nigeria, it is accurate to focus on at least any of the followings; oil, gas and nuclear power; this is because they generate a significant amount of primary energy use in Nigeria. However, the research background of this study is restricted to oil and gas sector.

Figure 1 and 2 show the production, consumption and price of oil and gas over the years. The evidences show that there has been under utilization of energy over the years. Increasing prices of oil and gas theoretically supports the excess oil production over its consumption over the years. The reason for the disequilibrium in the oil production and consumption identified in Figure 1 is that, Nigeria has one of the richest energy resource centres, but regulatory uncertainty, militant activity and oil theft in the Niger Delta are deterring investment and production. Figure 2 shows a slight disequilibrium in the production and consumption of gas over the specified years.

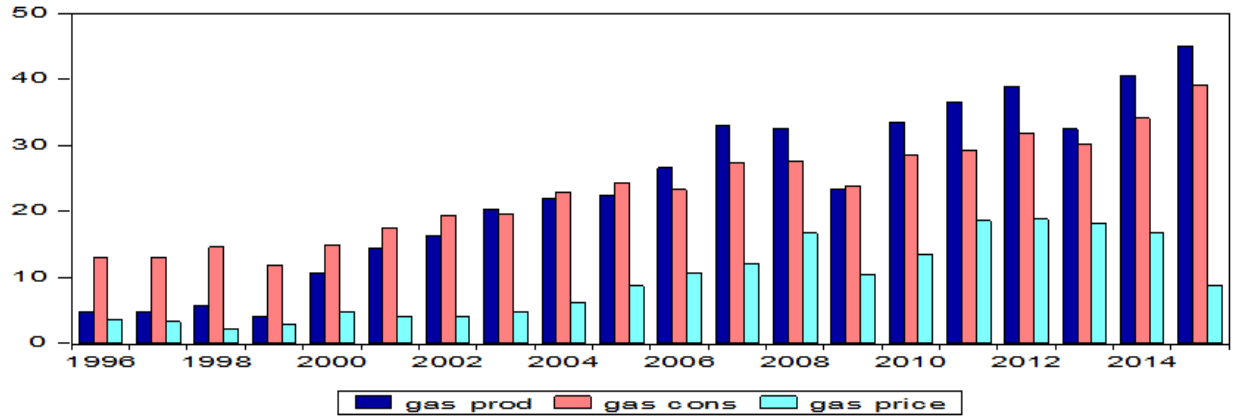
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Source: Computed using data obtained from Statistical Review of World Energy (2016)

Figure 1: Production, Consumption and Price of Oil from 1996 to 2015



Source: Computed using data obtained from Statistical Review of World Energy (2016)

Figure 2: Production, Consumption and Price of Gas from 1996 to 2015

II. Objectives

This work attempts to look at oil and gas consumption in Nigeria. The purpose of this exercise is to investigate the effect of energy use in the oil and gas sector in stimulating the activities in the economy to be sustainable. The following objectives are designed to aid the execution of the aforementioned research topic;

1. To investigate if the energy consumption in the oil and gas sector generate any significant effect on the activities of the Nigerian economy.
2. To examine the energy use in the oil and gas sector as a factor required towards transitioning Nigeria from their developing status to a developed nation.

III. Relevance

A sustainable energy provides services such as lighting, heating, transport, communication and mechanical power that support education, better health, higher incomes and general improvements in the quality of life. Economic roles of the energy industry maybe vital to reviving an economy at a time when issues when issues of unemployment, inflation and low investment are so critical, in other words, a period of economic recession. Energy is regarded as the lifeblood of the global economy; a crucial input to nearly all of the goods and services of the modern world, (Voser, 2012). The energy industry is undoubtedly an engine of growth as its products serve as inputs for production, (NTWGS, 2009).

This research work attempts to explore the inevitable contributions of energy sector on other sectors of the economy. Bhattacharyya (2011) categorized the economic areas linked with energy sector as a supplier of factor input; these are industry, agriculture, residential, commercial and transport.

Evidence from NIRP(2014) shows that the Nigerian manufacturing sector's share of GDP has remained less than 4 percent, contributions to foreign exchange earnings have been minimal and the share of government revenue and employment generated have been very low. This is due to the sector's failure to undergo the critical structural transformation necessary for it to play a leading role in economic growth and development. Also, they identified that there are systematic issues affecting competitiveness in the sector such as energy supply, local freight costs. The implication of this is that low energy supply is a core problem in manufacturing sector.

The broad objective of the agricultural sector has been to be a modern technologically enabled sector that fully exploits the vast agricultural resources of the

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country in order to ensure national food security and contributes to foreign exchange earnings. A sustainable energy supply is relevant to enhance agricultural production; such as the area of transportation of agricultural products, bitumen for manufacturing of pesticide especially for agriculture etc.

Energy use is relevant in residential as it adds to physiological needs of people. Energy use in residential are as follows; maintaining inside temperature, heating water, and cooking, electrical appliances. The form of energy here is final demand, since consumers are interested in transformed energy in order to meet their utility.

ECA (2014), supports prioritizing of power supply for industrial use, because it may generate the following benefits in the country; reduce borrowing costs and mobilize funding for the real sector, facilitate youth training in industrial skills, improve our investment climate, raise our product standard, link innovation to industry and thereby promoting domestic patronage.

IV. Methodology

The methodology shows the model specification, data features and estimation procedure purposely to establish the functional relationship between energy use and the Nigerian economy.

V. Model Specification

Solow growth model is adopted for this study in order to investigate the degree of energy use in the oil and gas sector that affects the Nigerian economy (see Equation 1). For the purpose of deriving an accurate model specification, it may be necessary to exercise some modifications on the adopted growth model. The model to be estimated is developed on the derivative of Equation 1 (Equation 2), by inserting 'Energy use' derives Equation 3. Re-writing Equation 3 derives Equation 4. Transformation of Equation 4 from its functional form to an estimable form derives Equation 5. Decomposition of the Energy use ($\mathfrak{e}$) into "OilCons" and "GasCons" derives Equation 6. It is justifiable to assume that percentage change of GDP is suitable to proxy the degree of economic growth. Furthermore, total investment is used to proxy capital per unit of effective labor. And finally, oil and gas consumption for the amount of energy use in the oil and gas sector. It should be noted that GDP is logged in order to generate its percentage rate and to make it uniform with the rest of the variables, thus, we have a log-linear model. The mathematical model specification is presented as follows:

$$Y_t = F(K_t, A_tL_t) \quad (1)$$

$$y_t = F(k_t) \quad (2)$$

$$y_t = F(k_t, \mathfrak{e}_t) \quad (3)$$

$$GDP_t = F(TOTINV_t, \mathfrak{e}_t) \quad (4)$$

$$GDP_t = \varphi_0 + \varphi_1 TOTINV_t + \varphi_2 \mathfrak{e}_t + \mu_t \quad (5)$$

$$GDP_t = \varphi_0 + \varphi_1 TOTINV_t + \varphi_2 OILCONS_t + \varphi_3 GASCONS_t + \mu_t \quad (6)$$

Where,

GDP_t - Measures the level of Economic Growth for the specified years.

$TOTINV_t$ - Denotes the Total Investment for the specified years.

$OILCONS_t$ - Denotes Oil Consumption for the specified years.

$GASCONS_t$ - Denotes Gas consumption for the specified years.

$\varphi_0, \varphi_1, \varphi_2, \varphi_3$ are the parameters to be estimated.

μ_t - Stands for the disturbance term.

Table 1: The Data

S/N	Variable	Definition	Source	Year	Unit of Measurement
1.	GDP	Gross Domestic Product	Organization of Petroleum Exporting Countries (OPEC)	1996-2015	Millions
2.	TOTINV	Total Investment	World Economic Outlook (WEO)	1996-2015	Millions
3.	OILCONS	Total Oil Consumption	World Energy Outlook (WEO)	1996-2015	Millions
4.	GASCONS	Total Gas Consumption	World Energy Outlook (WEO)	1996-2015	Millions

VI. Estimation Procedure

Table 2 shows the results of residual diagnosis on estimated models. The linear model specified in equation 6 was estimated, and the result indicates that total investment and oil consumption are significant variables to explain the level of economic development. However, the model is not reliable because it is serially correlated. Consequently, the series was logged in order to correct for serial correlation (see equation 7). Hence,

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the regression outcome remains persistent rendering total investment and oil consumption as the only significant variables to explain the level of economic development. Interestingly, the log model passed all the residual diagnosis. Thus, the log model is desirable.

Table 2: Results of residual diagnosis (at 5% level of significance)

S/N	Residual diagnosis	Linear model	Log model
1.	Autocorrelation	0.0190	0.1177
2.	Heteroscedasticity	0.1646	0.1453
3.	Normality	0.6381	0.3678

Source: Author's computation

$$LOGGDP_t = \varphi_1 LOGTOTINV_t + \varphi_2 LOGOILCONS_t + \varphi_3 LOGGASCONS_t + \mu_t \quad (7)$$

In time series data estimation, it is routinely to conduct unit root test because of the usual nature of raw data. This is then followed by the appropriate techniques of de-trending raw data such as, differencing and logging. According to Johnston and Dinardo, the presence of non-stationary variables raises the possibility of conintegrating relations. The essence of a structural equation model is an explanation of the movement of the endogenous variables in terms of the exogenous variable. Differencing operation eliminates the long-term movement (trend) in the series. Regression makes sense if a long run relationship exists.

Table 3 shows that all the series estimated in this study were found to be stationary after first difference, which justifies the precondition of applying Johansen method of co-integration. Result of cointegration test indicates two cointegrating equations. Therefore, this was followed by estimating a VEC model in order to determine the significant coefficients that will influence GDP in the long run. About 44 coefficients were estimated in VEC model, but 15 of them were significant to explain the movement of GDP in the long run.

Table 3: Results of unit root test (at 5% level of significance)

S/N	Series	I(0)	I(1)
1	GDP	0.9926	0.0005
2	TOTINV	0.0798	0.0002
3	OILCONS	0.9817	0.0012
4	GASCONS	0.9996	0.0018

Source: Author's computation

VII. Conclusion

Oil consumption plays a vital role in economic development of nigeria. it determines the level of economic growth, overall production of good and services. Empirically, it should be recalled that since the removal of oil subsidy during GEJ regime, the Nigeria economy has been declining significantly. This evidently revealed the relevance of oil use ininfluencing economic activities. Subsidy removal on oil would have been a good policy if revenue generated from it was channeled towards good governance. Due to corruption, political instability, unproductive feature of the economy, oil subsidy removal policy may not be effective in Nigeria. On the contrary, oil subsidy will enhance aggregate production, and hence augment economic development, since oil use is connected with all economic activities. This study has shown that oil use is required for a sustainable economy. Therefore, it is recommended that the Nigerian government should subsidize oil and employ othermeasures to curb the oil exploiting businessmen (known as the cabals).

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Appendices

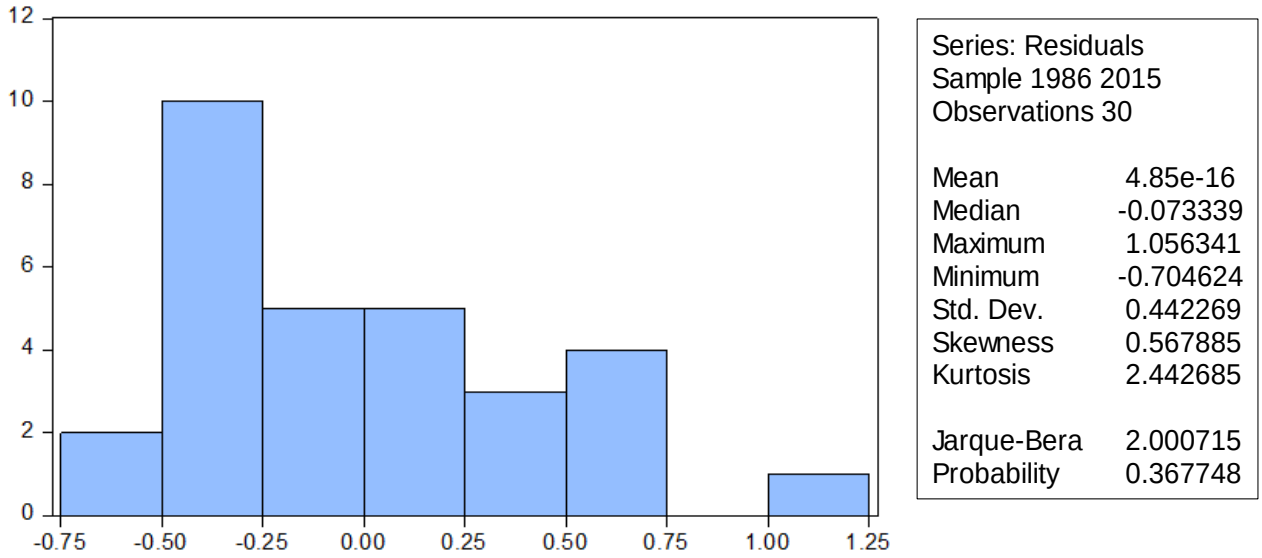
Appendix 1

Appendix 1a

Dependent Variable: LGDP
Method: Least Squares
Date: 01/28/18 Time: 13:34
Sample: 1986 2015
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.380957	3.316574	-0.416381	0.6805
LTOTINV	-2.070958	0.570399	-3.630718	0.0012
LOIL	2.484943	0.617266	4.025727	0.0004
LGAS	0.541917	0.306420	1.768544	0.0887
R-squared	0.855315	Mean dependent var		11.18083
Adjusted R-squared	0.838621	S.D. dependent var		1.162721
S.E. of regression	0.467088	Akaike info criterion		1.438970
Sum squared resid	5.672463	Schwarz criterion		1.625796
Log likelihood	-17.58455	Hannan-Quinn criter.		1.498737
F-statistic	51.23368	Durbin-Watson stat		0.802363
Prob (F-statistic)	0.000000			

Appendix 1b



Appendix 1c

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.898501	Prob. F (3,26)	0.1547
Obs*R-squared	5.390832	Prob. Chi-Square (3)	0.1453
Scaled explained SS	2.920798	Prob. Chi-Square (3)	0.4040

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Test Equation:
Dependent Variable: RESID ^ 2
Method: Least Squares
Date: 01/28/18 Time: 13:33
Sample: 1986 2015
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.010030	1.568876	0.643793	0.5253
LTOTINV	-0.274057	0.269822	-1.015694	0.3191
LOIL	0.516235	0.291992	1.767978	0.0888
LGAS	-0.324742	0.144949	-2.240386	0.0338
R-squared	0.179694	Mean dependent var		0.189082
Adjusted R-squared	0.085044	S.D. dependent var		0.230992
S.E. of regression	0.220952	Akaike info criterion		-0.058176
Sum squared resid	1.269315	Schwarz criterion		0.128650
Log likelihood	4.872646	Hannan-Quinn criter.		0.001591
F-statistic	1.898501	Durbin-Watson stat		1.828018
Prob (F-statistic)	0.154653			

Appendix 1d

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.681986	Prob. F(8,18)	0.1710
Obs*R-squared	12.83310	Prob. Chi-Square (8)	0.1177

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/28/18 Time: 13:30
Sample: 1986 2015
Included observations: 30
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.723958	3.733572	-0.461745	0.6498
LTOTINV	0.490558	0.800515	0.612803	0.5477
LOIL	0.022241	0.839188	0.026503	0.9791
LGAS	0.024086	0.327157	0.073623	0.9421
RESID(-1)	0.660899	0.243342	2.715925	0.0142
RESID(-2)	-0.147204	0.292922	-0.502538	0.6214
RESID(-3)	0.228744	0.297189	0.769691	0.4515
RESID(-4)	0.038005	0.331829	0.114532	0.9101
RESID(-5)	-0.158024	0.319598	-0.494446	0.6270
RESID(-6)	-0.189956	0.320205	-0.593231	0.5604
RESID(-7)	0.079491	0.323940	0.245388	0.8089
RESID(-8)	-0.029115	0.289180	-0.100681	0.9209
R-squared	0.427770	Mean dependent var		4.85E-16
Adjusted R-squared	0.078074	S.D. dependent var		0.442269
S.E. of regression	0.424654	Akaike info criterion		1.414089
Sum squared resid	3.245953	Schwarz criterion		1.974568
Log likelihood	-9.211329	Hannan-Quinn criter.		1.593391
F-statistic	1.223263	Durbin-Watson stat		1.840913
Prob (F-statistic)	0.340002			

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Appendix 1e

Dependent Variable: GDP
Method: Least Squares
Date: 01/27/18 Time: 06:11
Sample: 1986 2015
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-106345.0	98833.36	-1.076003	0.2918
TOTINV	-15490.81	4125.397	-3.754987	0.0009
OIL_DD	2147.587	313.3359	6.853945	0.0000
GAS_DD	-1.762967	4.825047	-0.365378	0.7178
R-squared	0.899174	Mean dependent var		141377.5
Adjusted R-squared	0.887540	S.D. dependent var		171554.6
S.E. of regression	57530.80	Akaike info criterion		24.88159
Sum squared resid	8.61E+10	Schwarz criterion		25.06842
Log likelihood	-369.2239	Hannan-Quinn criter.		24.94136
F-statistic	77.29018	Durbin-Watson stat		0.983094
Prob (F-statistic)	0.000000			

Appendix 1f

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.775243	Prob. F (3,26)	0.1766
Obs*R-squared	5.100340	Prob. Chi-Square (3)	0.1646
Scaled explained SS	2.212501	Prob. Chi-Square (3)	0.5295

Test Equation:
Dependent Variable: RESID ^ 2
Method: Least Squares
Date: 01/27/18 Time: 06:12
Sample: 1986 2015
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.40E+09	5.18E+09	-0.270802	0.7887
TOTINV	15561084	2.16E+08	0.071929	0.9432
OIL_DD	34851578	16431521	2.121020	0.0436
GAS_DD	-562575.1	253028.4	-2.223368	0.0351
R-squared	0.170011	Mean dependent var		2.87E+09
Adjusted R-squared	0.074243	S.D. dependent var		3.14E+09
S.E. of regression	3.02E+09	Akaike info criterion		46.61647
Sum squared resid	2.37E+20	Schwarz criterion		46.80329
Log likelihood	-695.2470	Hannan-Quinn criter.		46.67623
F-statistic	1.775243	Durbin-Watson stat		2.235252
Prob (F-statistic)	0.176605			

Appendix 1g

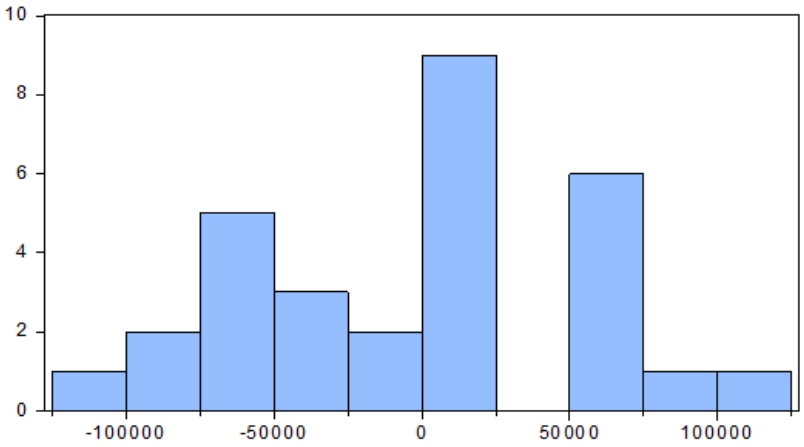
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	4.305498	Prob. F (2,24)	0.0252
Obs*R-squared	7.921558	Prob. Chi-Square (2)	0.0190

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Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/27/18 Time: 06:13
Sample: 1986 2015
Included observations: 30
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-20634.27	88561.46	-0.232994	0.8177
TOTINV	2727.939	3837.224	0.710915	0.4840
OIL_DD	-181.1364	295.8603	-0.612236	0.5461
GAS_DD	2.304342	4.454585	0.517297	0.6097
RESID (-1)	0.532885	0.208547	2.555231	0.0174
RESID (-2)	0.052205	0.219429	0.237915	0.8140
R-squared	0.264052	Mean dependent var		1.05E-10
Adjusted R-squared	0.110729	S.D. dependent var		54473.85
S.E. of regression	51369.47	Akaike info criterion		24.70833
Sum squared resid	6.33E+10	Schwarz criterion		24.98857
Log likelihood	-364.6250	Hannan-Quinn criter.		24.79798
F-statistic	1.722199	Durbin-Watson stat		1.831747
Prob (F-statistic)	0.167847			

Appendix 1h



Series: Residuals
Sample 1986 2015
Observations 30

Mean	1.05e-10
Median	7545.888
Maximum	108395.1
Minimum	-108351.7
Std. Dev.	54473.85
Skewness	-0.035123
Kurtosis	2.155075
Jarque-Bera	0.898541
Probability	0.638094

Appendix 2: unit root test
Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			0.818848	0.9926
Test critical values:	1% level		-3.679322	
	5% level		-2.967767	
	10% level		-2.622989	

**MacKinnon (1996) one-sided p-values.*

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Augmented Dickey-Fuller Test Equation
Dependent Variable: D (GDP)
Method: Least Squares
Date: 01/20/18 Time: 08:42
Sample (adjusted): 1987 2015
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP (-1)	0.039988	0.048835	0.818848	0.4200
C	10822.40	10009.14	1.081251	0.2891
R-squared	0.024232	Mean dependent var		16002.49
Adjusted R-squared	-0.011908	S.D. dependent var		41523.69
S.E. of regression	41770.18	Akaike info criterion		24.18423
Sum squared resid	4.71E+10	Schwarz criterion		24.27852
Log likelihood	-348.6713	Hannan-Quinn criter.		24.21376
F-statistic	0.670513	Durbin-Watson stat		2.041336
Prob (F-statistic)	0.420042			

Null Hypothesis: D (GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.897349	0.0005
Test critical values:	1% level		-3.689194	
	5% level		-2.971853	
	10% level		-2.625121	

MacKinnon (1996) one-sided p-values

Augmented Dickey-Fuller Test Equation
Dependent Variable: D (GDP, 2)
Method: Least Squares
Date: 01/20/18 Time: 08:43
Sample (adjusted): 1988 2015
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-1.001222	0.204442	-4.897349	0.0000
C	16548.12	8939.377	1.851149	0.0755
R-squared	0.479834	Mean dependent var		-1711.832
Adjusted R-squared	0.459827	S.D. dependent var		58495.05
S.E. of regression	42991.78	Akaike info criterion		24.24415
Sum squared resid	4.81E+10	Schwarz criterion		24.33931
Log likelihood	-337.4182	Hannan-Quinn criter.		24.27325
F-statistic	23.98403	Durbin-Watson stat		1.921396
Prob(F-statistic)	0.000044			

TOTINV

Null Hypothesis: TOTINV has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.738978	0.0798
Test critical values:	1% level		-3.679322	
	5% level		-2.967767	
	10% level		-2.622989	

MacKinnon (1996) one-sided p-values.

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Augmented Dickey-Fuller Test Equation
Dependent Variable: D (TOTINV)
Method: Least Squares
Date: 01/20/18 Time: 08:43
Sample (adjusted): 1987 2015
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTINV (-1)	-0.437288	0.159654	-2.738978	0.0108
C	7.086482	2.717829	2.607406	0.0147
R-squared	0.217437	Mean dependent var		-0.245310
Adjusted R-squared	0.188453	S.D. dependent var		2.811146
S.E. of regression	2.532446	Akaike info criterion		4.762721
Sum squared resid	173.1587	Schwarz criterion		4.857017
Log likelihood	-67.05945	Hannan-Quinn criter.		4.792253
F-statistic	7.502003	Durbin-Watson stat		1.949075
Prob (F-statistic)	0.010782			

Null Hypothesis: D (TOTINV) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.356213	0.0002
Test critical values:	1% level		-3.699871	
	5% level		-2.976263	
	10% level		-2.627420	

**MacKinnon (1996) one-sided p-values*

Augmented Dickey-Fuller Test Equation
Dependent Variable: D (TOTINV, 2)
Method: Least Squares
Date: 01/20/18 Time: 08:44
Sample (adjusted): 1989 2015
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOTINV(-1))	-1.555743	0.290456	-5.356213	0.0000
D(TOTINV(-1),2)	0.321033	0.188345	1.704493	0.1012
C	-0.311476	0.535470	-0.581687	0.5662
R-squared	0.642195	Mean dependent var		0.125519
Adjusted R-squared	0.612378	S.D. dependent var		4.419267
S.E. of regression	2.751406	Akaike info criterion		4.966540
Sum squared resid	181.6856	Schwarz criterion		5.110522
Log likelihood	-64.04829	Hannan-Quinn criter.		5.009354
F-statistic	21.53779	Durbin-Watson stat		2.197604
Prob(F-statistic)	0.000004			

OILCONS

Null Hypothesis: OIL_DD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			0.450473	0.9817
Test critical values:	1% level		-3.679322	
	5% level		-2.967767	
	10% level		-2.622989	

**MacKinnon (1996) one-sided p-values*

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Augmented Dickey-Fuller Test Equation
Dependent Variable: D (OIL_DD)
Method: Least Squares
Date: 01/20/18 Time: 08:45
Sample (adjusted): 1987 2015
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OIL_DD(-1)	0.036682	0.081430	0.450473	0.6560
C	-0.798392	19.79228	-0.040339	0.9681
R-squared	0.007460	Mean dependent var		7.862179
Adjusted R-squared	-0.029301	S.D. dependent var		24.96098
S.E. of regression	25.32403	Akaike info criterion		9.367857
Sum squared resid	17315.28	Schwarz criterion		9.462153
Log likelihood	-133.8339	Hannan-Quinn criter.		9.397389
F-statistic	0.202926	Durbin-Watson stat		1.834902
Prob(F-statistic)	0.655966			

Null Hypothesis: D (OIL_DD) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.552592	0.0012
Test critical values:	1% level		-3.689194	
	5% level		-2.971853	
	10% level		-2.625121	

**MacKinnon (1996) one-sided p-values*

MacKinnon (1996) one-sided p-values
Augmented Dickey-Fuller Test Equation
Dependent Variable: D (OIL_DD, 2)
Method: Least Squares
Date: 01/20/18 Time: 08:46
Sample (adjusted): 1988 2015
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OIL_DD (-1))	-0.882710	0.193892	-4.552592	0.0001
C	7.413132	5.063911	1.463914	0.1552
R-squared	0.443566	Mean dependent var		0.596885
Adjusted R-squared	0.422164	S.D. dependent var		33.67432
S.E. of regression	25.59770	Akaike info criterion		9.391632
Sum squared resid	17036.30	Schwarz criterion		9.486789
Log likelihood	-129.4828	Hannan-Quinn criter.		9.420722
F-statistic	20.72609	Durbin-Watson stat		1.895917
Prob (F-statistic)	0.000110			

GASCONS

Null Hypothesis: GAS_DD has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=7)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			1.929967	0.9996
Test critical values:	1% level		-3.769597	
	5% level		-3.004861	
	10% level		-2.642242	

**MacKinnon (1996) one-sided p-values*

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Augmented Dickey-Fuller Test Equation
Dependent Variable: D (GAS_DD)
Method: Least Squares
Date: 01/20/18 Time: 08:46
Sample (adjusted): 1994 2015
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GAS_DD(-1)	0.413939	0.214480	1.929967	0.0757
D(GAS_DD(-1))	-0.781293	0.360536	-2.167030	0.0494
D(GAS_DD(-2))	-1.045153	0.305846	-3.417253	0.0046
D(GAS_DD(-3))	-1.239672	0.374774	-3.307782	0.0057
D(GAS_DD(-4))	-0.773563	0.417456	-1.853041	0.0867
D(GAS_DD(-5))	-1.624423	0.418256	-3.883798	0.0019
D(GAS_DD(-6))	-1.540116	0.696857	-2.210088	0.0456
D(GAS_DD(-7))	-2.163973	0.740146	-2.923711	0.0119
C	95.72147	1370.070	0.069866	0.9454
R-squared	0.677073	Mean dependent var		608.8118
Adjusted R-squared	0.478348	S.D. dependent var		2396.668
S.E. of regression	1731.004	Akaike info criterion		18.04288
Sum squared resid	38952888	Schwarz criterion		18.48922
Log likelihood	-189.4717	Hannan-Quinn criter.		18.14802
F-statistic	3.407095	Durbin-Watson stat		2.623737
Prob(F-statistic)	0.024496			

Null Hypothesis: D (GAS_DD) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.391163	0.0018
Test critical values:	1% level		-3.689194	
	5% level		-2.971853	
	10% level		-2.625121	

**MacKinnon (1996) one-sided p-values*

Augmented Dickey-Fuller Test Equation
Dependent Variable: D (GAS_DD, 2)
Method: Least Squares
Date: 01/20/18 Time: 08:47
Sample (adjusted): 1988 2015
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GAS_DD(-1))	-0.852442	0.194127	-4.391163	0.0002
C	447.0405	421.3979	1.060851	0.2985
R-squared	0.425824	Mean dependent var		-12.22008
Adjusted R-squared	0.403741	S.D. dependent var		2797.358
S.E. of regression	2160.059	Akaike info criterion		18.26241
Sum squared resid	1.21E+08	Schwarz criterion		18.35757
Log likelihood	-253.6737	Hannan-Quinn criter.		18.29150
F-statistic	19.28231	Durbin-Watson stat		1.915502
Prob (F-statistic)	0.000168			

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JOHANSEN

Date: 01/20/18 Time: 09:15
Sample (adjusted): 1988 2015
Included observations: 28 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP TOTINV OIL_DD GAS_DD
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigen Value	Statistic	Critical Value	Prob.**
None *	0.508674	50.27528	47.85613	0.0291
At most 1 *	0.429025	30.37713	29.79707	0.0428
At most 2	0.362895	14.68567	15.49471	0.0659
At most 3	0.071019	2.062668	3.841466	0.1509

** denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values*
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigen Value)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen Value	Statistic	Critical Value	Prob.**
None	0.508674	19.89815	27.58434	0.3483
At most 1	0.429025	15.69147	21.13162	0.2434
At most 2	0.362895	12.62300	14.26460	0.0894
At most 3	0.071019	2.062668	3.841466	0.1509

** denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values*
Max-Eigen Value test indicates no cointegration at the 0.05 level

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
GDP	TOTINV	OIL_DD	GAS_DD	
9.13E-06	0.301478	0.014346	-0.000389	
-1.06E-06	-0.486046	0.014412	-0.000344	
-2.12E-05	-0.238610	0.057174	-0.000152	
-1.09E-07	0.041772	-0.011966	-0.000156	

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Unrestricted Adjustment Coefficients (alpha):				
D(GDP)	1008.960	7473.891	-7776.774	-9684.481
D(TOTINV)	-1.173364	1.305825	0.312721	0.144807
D(OIL_DD)	-2.485692	9.255466	-11.24279	0.398760
D(GAS_DD)	1036.588	746.7815	240.1517	139.0173
1 Cointegrating Equation(s): Log likelihood -768.9769				
Normalized cointegrating coefficients (standard error in parentheses)				
GDP	TOTINV	OIL_DD	GAS_DD	
1.000000	33009.98	1570.841	-42.57900	
	(11608.3)	(912.006)	(12.9114)	
Adjustment coefficients (standard error in parentheses)				
D(GDP)	0.009215			
	(0.07833)			
D(TOTINV)	-1.07E-05			
	(4.7E-06)			
D(OIL_DD)	-2.27E-05			
	(4.6E-05)			
D(GAS_DD)	0.009467			
	(0.00324)			
2 Cointegrating Equation(s): Log likelihood -761.1312				
Normalized cointegrating coefficients (standard error in parentheses)				
GDP	TOTINV	OIL_DD	GAS_DD	
1.000000	0.000000	2748.366	-71.07198	
		(1215.96)	(16.5422)	
0.000000	1.000000	-0.035672	0.000863	
		(0.02179)	(0.00030)	
Adjustment coefficients (standard error in parentheses)				
D(GDP)	0.001258	-3328.476		
	(0.07749)	(4820.29)		
D(TOTINV)	-1.21E-05	-0.988434		
	(4.0E-06)	(0.24883)		
D(OIL_DD)	-3.26E-05	-5.247964		
	(4.3E-05)	(2.64509)		
D(GAS_DD)	0.008672	-50.46182		
	(0.00291)	(181.324)		
3 Cointegrating Equation(s): Log likelihood -754.8197				
Normalized cointegrating coefficients (standard error in parentheses)				
GDP	TOTINV	OIL_DD	GAS_DD	
1.000000	0.000000	0.000000	-33.74560	
			(5.72584)	
0.000000	1.000000	0.000000	0.000379	
			(0.00016)	
0.000000	0.000000	1.000000	-0.013581	
			(0.00190)	
Adjustment coefficients (standard error in parentheses)				
D (GDP)	0.166064	-1472.856	-322.4416	
	(0.19088)	(5120.87)	(501.428)	
D (TOTINV)	-1.87E-05	-1.063053	0.019866	
	(9.9E-06)	(0.26643)	(0.02609)	
D (OIL_DD)	0.000206	-2.565317	-0.545068	
	(9.1E-05)	(2.45103)	(0.24000)	
D (GAS_DD)	0.003583	-107.7645	39.36449	
	(0.00723)	(193.891)	(18.9855)	

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VECM

Vector Error Correction Estimates
Date: 01/26/18 Time: 15:50
Sample (adjusted): 1989 2015
Included observations: 27 after adjustments
Standard errors in ( ) & t_statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
GDP(-1)	1.000000	0.000000
OIL_DD(-1)	0.000000	1.000000
GAS_DD(-1)	-12.66540	-0.014058
	(11.0433)	(0.00286)
	[-1.14688]	[-4.91425]
TOTINV(-1)	-73623.74	-19.35941
	(15436.4)	(3.99858)
	[-4.76949]	[-4.84158]
C	1175437.	188.2398

Error Correction:	D(GDP)	D(OIL_DD)	D(GAS_DD)	D(TOTINV)
CointEq1	0.105641	3.94E-05	-0.015170	-2.17E-06
	(0.11049)	(4.7E-05)	(0.00208)	(5.3E-06)
	[0.95607]	[0.83299]	[-7.29917]	[-0.41221]
CointEq2	-368.5201	0.240679	65.30062	0.057766
	(534.763)	(0.22898)	(10.0584)	(0.02547)
	[-0.68913]	[1.05110]	[6.49218]	[2.26820]
D(GDP(-1))	-0.209098	-0.000108	0.033906	-3.28E-05
	(0.35483)	(0.00015)	(0.00667)	(1.7E-05)
	[-0.58929]	[-0.71278]	[5.08029]	[-1.94137]
D(GDP(-2))	0.117240	-3.18E-05	0.051971	-2.40E-05
	(0.34710)	(0.00015)	(0.00653)	(1.7E-05)
	[0.33777]	[-0.21421]	[7.96053]	[-1.45282]
D(OIL_DD(-1))	110.1778	-0.272626	-47.81626	-0.018495
	(624.058)	(0.26721)	(11.7379)	(0.02972)
	[0.17655]	[-1.02025]	[-4.07366]	[-0.62229]
D(OIL_DD(-2))	393.9240	-0.796114	-35.31005	-0.082686
	(569.088)	(0.24368)	(10.7040)	(0.02710)
	[0.69220]	[-3.26708]	[-3.29878]	[-3.05089]
D(GAS_DD(-1))	-7.890356	0.001208	0.408069	0.000253
	(5.50518)	(0.00236)	(0.10355)	(0.00026)
	[-1.43326]	[0.51229]	[3.94091]	[0.96506]
D(GAS_DD(-2))	-1.819969	-0.000828	0.310338	9.02E-06
	(5.70244)	(0.00244)	(0.10726)	(0.00027)
	[-0.31916]	[-0.33928]	[2.89340]	[0.03320]
D(TOTINV(-1))	-1674.429	5.051368	52.50290	0.363987
	(5463.27)	(2.33931)	(102.759)	(0.26018)
	[-0.30649]	[2.15934]	[0.51093]	[1.39896]
D(TOTINV(-2))	-1201.425	3.838556	39.67175	0.196625
	(4517.92)	(1.93452)	(84.9775)	(0.21516)
	[-0.26592]	[1.98424]	[0.46685]	[0.91384]
C	19280.81	21.26373	-727.1465	1.692110
	(16955.7)	(7.26024)	(318.919)	(0.80750)
	[1.13713]	[2.92879]	[-2.28003]	[2.09549]
R-squared	0.207654	0.597316	0.891650	0.591295
Adj. R-squared	-0.287562	0.345639	0.823932	0.335855
Sum sq. resids	3.79E+10	6951.145	13412695	85.98871
S.E. equation	48677.98	20.84338	915.5837	2.318252
F-statistic	0.419320	2.373343	13.16703	2.314807
Log likelihood	-322.6580	-113.2475	-215.3757	-53.94946
Akaike AIC	24.71541	9.203517	16.76857	4.811071
Schwarz SC	25.24334	9.731450	17.29650	5.339005
Mean dependent	17049.04	8.182618	543.4805	-0.160111
S.D. dependent	42899.13	25.76674	2182.016	2.844653
Determinant resid covariance (dof adj.)		1.99E+18		
Determinant resid covariance		2.45E+17		
Log likelihood		-693.7816		
Akaike information criterion		55.24308		
Schwarz criterion		57.73876		

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System: UNTITLED
Estimation Method: Least Squares
Date: 01/26/18 Time: 16:00
Sample: 1989 2015
Included observations: 27
Total system (balanced) observations 108

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.105641	0.110495	0.956073	0.3426
C(2)	-368.5201	534.7630	-0.689128	0.4932
C(3)	-0.209098	0.354830	-0.589292	0.5577
C(4)	0.117240	0.347096	0.337773	0.7366
C(5)	110.1778	624.0581	0.176551	0.8604
C(6)	393.9240	569.0882	0.692202	0.4913
C(7)	-7.890356	5.505176	-1.433261	0.1567
C(8)	-1.819969	5.702444	-0.319156	0.7506
C(9)	-1674.429	5463.269	-0.306488	0.7602
C(10)	-1201.425	4517.920	-0.265924	0.7912
C(11)	19280.81	16955.68	1.137130	0.2597
C(12)	3.94E-05	4.73E-05	0.832994	0.4079
C(13)	0.240679	0.228980	1.051095	0.2972
C(14)	-0.000108	0.000152	-0.712782	0.4786
C(15)	-3.18E-05	0.000149	-0.214206	0.8311
C(16)	-0.272626	0.267215	-1.020251	0.3115
C(17)	-0.796114	0.243677	-3.267083	0.0017
C(18)	0.001208	0.002357	0.512293	0.6102
C(19)	-0.000828	0.002442	-0.339278	0.7355
C(20)	5.051368	2.339312	2.159339	0.0346
C(21)	3.838556	1.934524	1.984238	0.0515
C(22)	21.26373	7.260237	2.928793	0.0047
C(23)	-0.015170	0.002078	-7.299172	0.0000
C(24)	65.30062	10.05835	6.492179	0.0000
C(25)	0.033906	0.006674	5.080294	0.0000
C(26)	0.051971	0.006529	7.960528	0.0000
C(27)	-47.81626	11.73790	-4.073663	0.0001
C(28)	-35.31005	10.70397	-3.298780	0.0016
C(29)	0.408069	0.103547	3.940915	0.0002
C(30)	0.310338	0.107257	2.893396	0.0052
C(31)	52.50290	102.7586	0.510935	0.6112
C(32)	39.67175	84.97751	0.466850	0.6422
C(33)	-727.1465	318.9192	-2.280034	0.0259
C(34)	-2.17E-06	5.26E-06	-0.412206	0.6816
C(35)	0.057766	0.025468	2.268200	0.0267
C(36)	-3.28E-05	1.69E-05	-1.941369	0.0566
C(37)	-2.40E-05	1.65E-05	-1.452820	0.1512
C(38)	-0.018495	0.029720	-0.622287	0.5360
C(39)	-0.082686	0.027102	-3.050889	0.0033
C(40)	0.000253	0.000262	0.965064	0.3381
C(41)	9.02E-06	0.000272	0.033199	0.9736
C(42)	0.363987	0.260184	1.398958	0.1667
C(43)	0.196625	0.215163	0.913844	0.3642
C(44)	1.692110	0.807501	2.095488	0.0401
Determinant residual covariance		2.45E+17		

Equation: D(GDP) = C(1)* (GDP(-1) - 12.6654042887*GAS_DD(-1) - 73623.7390221*TOTINV(-1) + 1175436.62628) + C(2)*(OIL_DD(-1) - 0.0140577575163*GAS_DD(-1) - 19.3594109553*TOTINV(-1) + 188.239825109) + C(3)*D(GDP(-1)) + C(4)*D(GDP(-2)) + C(5) *D(OIL_DD(-1)) + C(6)*D(OIL_DD(-2)) + C(7)*D(GAS_DD(-1)) + C(8) *D(GAS_DD(-2)) + C(9)*D(TOTINV(-1)) + C(10)*D(TOTINV(-2)) + C(11)

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Observations: 27			
R-squared	0.207654	Mean dependent var	17049.04
Adjusted R-squared	-0.287562	S.D. dependent var	42899.13
S.E. of regression	48677.98	Sum squared resid	3.79E+10
Durbin-Watson stat	1.917069		
Equation: D(OIL_DD) = C(12)*(GDP(-1) - 12.6654042887*GAS_DD(-1) -			
73623.7390221*TOTINV(-1) + 1175436.62628) + C(13)*(OIL_DD(-1) -			
0.0140577575163*GAS_DD(-1) - 19.3594109553*TOTINV(-1) +			
188.239825109) + C(14)*D(GDP(-1)) + C(15)*D(GDP(-2)) + C(16)			
*D(OIL_DD(-1)) + C(17)*D(OIL_DD(-2)) + C(18)*D(GAS_DD(-1)) +			
C(19)*D(GAS_DD(-2)) + C(20)*D(TOTINV(-1)) + C(21)*D(TOTINV(-2)) +			
C(22)			
Observations: 27			
R-squared	0.597316	Mean dependent var	8.182618
Adjusted R-squared	0.345639	S.D. dependent var	25.76674
S.E. of regression	20.84338	Sum squared resid	6951.145
Durbin-Watson stat	1.983234		
Equation: D(GAS_DD) = C(23)*(GDP(-1) - 12.6654042887*GAS_DD(-1) -			
73623.7390221*TOTINV(-1) + 1175436.62628) + C(24)*(OIL_DD(-1) -			
0.0140577575163*GAS_DD(-1) - 19.3594109553*TOTINV(-1) +			
188.239825109) + C(25)*D(GDP(-1)) + C(26)*D(GDP(-2)) + C(27)			
*D(OIL_DD(-1)) + C(28)*D(OIL_DD(-2)) + C(29)*D(GAS_DD(-1)) +			
C(30)*D(GAS_DD(-2)) + C(31)*D(TOTINV(-1)) + C(32)*D(TOTINV(-2)) +			
C(33)			
Observations: 27			
R-squared	0.891650	Mean dependent var	543.4805
Adjusted R-squared	0.823932	S.D. dependent var	2182.016
S.E. of regression	915.5837	Sum squared resid	13412695
Durbin-Watson stat	2.235936		
Equation: D(TOTINV) = C(34)*(GDP(-1) - 12.6654042887*GAS_DD(-1) -			
73623.7390221*TOTINV(-1) + 1175436.62628) + C(35)*(OIL_DD(-1) -			
0.0140577575163*GAS_DD(-1) - 19.3594109553*TOTINV(-1) +			
188.239825109) + C(36)*D(GDP(-1)) + C(37)*D(GDP(-2)) + C(38)			
*D(OIL_DD(-1)) + C(39)*D(OIL_DD(-2)) + C(40)*D(GAS_DD(-1)) +			
C(41)*D(GAS_DD(-2)) + C(42)*D(TOTINV(-1)) + C(43)*D(TOTINV(-2)) +			
C(44)			
Observations: 27			
R-squared	0.591295	Mean dependent var	-0.160111
Adjusted R-squared	0.335855	S.D. dependent var	2.844653
S.E. of regression	2.318253	Sum squared resid	85.98872
Durbin-Watson stat	2.287702		

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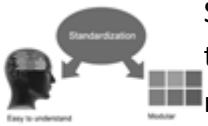
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- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Social Science Research Paper

Techniques for writing a good quality homan social science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of homan social science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.
Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

19. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

20. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

21. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

22. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



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Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



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Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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