4.1 Methodology & Data Description

Methodology is an important part of the research. Methodology is the systematic, theoretical analysis of the methods applied to a field of study, or the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Methodology is used to know what are the methods applied to the analysis of the study. In order to fulfill the objectives of the study following methodology is used in the research:

Data Description

In this chapter the researcher's aim is to examine the impact of foreign direct investment inflow on economic growth of India. India has been receiving significant amount of foreign investment since the beginning of 1990s. This research study is conducted on the basis of secondary data. The study used the twenty two years (1991-02-2012-13) data such as Foreign Direct Investment (FDI) and Gross Domestic Product (GDP). The required data on selected variables have been collected from Reserve Bank of India (RBI) and Department of Industrial Policy and Promotion (DIPP).

4.2 Methods of Analysis: In order to fulfill the objectives of the study following methodology is used in the research:

4.2.1 Growth rate

Growth rate is the rate of increase in size per unit time. Calculating Per cent Growth Rates:

The per cent change from one period to another which is calculated from by formula:

$$GR = \frac{present\ value - pas\ value}{past\ value} * 100$$

Where

GR= Growth Rate

4.2.2 Regression Analysis:

Definition of simple linear regression method:-

Simple linear regression is the least squares estimator of a linear regression model with a single explanatory variable. Simple linear regression is the most commonly used technique for determining how one variable of interest (the **response variable**) is affected by changes in another variable (the **explanatory variable**).

equation is given by

$LnY_i = \alpha + \beta X + U_i$ this is fitted using Simple linear regression is the process of fitting a straight line by the method of least squares on a scatter plot to study the relationship between two variables.

Here Y_i = Dependent variables in i^{th} year (i= 1, 2, 3…N)

α = Intercept, β = Regression coefficient, U_i = Residual term

The parameters α and β are estimated by the least square method.

The significance of the regression coefficients of the model has been tested by usual P-Value. The coefficient of determination has also been calculated for the model.

Method Use in Excel:-

There are many steps use in excel.

Step 1: Firstly, to check whether the installation of Excel has loaded the DATA ANALYSIS ADD-INS. After, the pulls down the TOOLS menu. This will allow running regressions and doing other statistical options.

Step 2: Secondly, to run a regression need a data file. The data is likely in column. It needs to designate a column for the dependent variable and the independent variables.

Regression typically looks like this:

$LnY_i = \alpha + \beta X + U_i$

Y is the dependent variable in i^{th} year (i= 1, 2, 3…N)

X is the independent variable

α is the Intercept term

β is the Regression coefficient on the variable of X

U is a Residual term

Step 3: In order to run a regression, we need to get the variables we want in to columns. Creates these series as their own columns. Once these series are put in a column, we can run the regression.

Step 4: To run the regression, you need to go to the TOOLS menu and click DATA ANALYSIS, from the list that pops up, scroll down and choose REGRESSION. This pops up a screen that asks for a dependent variable (Y) and independent variable (X). To select each variables, type in the cell range, or click the little box in the upper right corner of the range space, go the data click and drag the mouse over the desired range.

Step 5: Do this for both the Y and X variables. Next choose output options. The result on a new worksheet by ply. Once you have selected the output, choose OK and the regression runs. You get sent to the output page and see the regression output.

Step 6: The top part of the regression output includes diagnostic statistics such as R-Squared.

Step 7: These items are found at the bottom of the table. The bottom rows of the table provide the output for each variable in the regression. After each variable name note down in a new table. The first row is the intercept value. The next row is the coefficient value on the first X variable. The p-value gives the significance level of the coefficient estimates.

Step 8: Click OK to complete the important process. Now, you get intercept value and its p-value, coefficient value and it p-value and R-Squared.

Step 9: After complete process a new table draw in excel with intercept value and it p-value and coefficient value and it p-value and R-Squared.

R-Square:

R-Squared is a statistical measure of how close the data are to the fitted regression line. It is known as the coefficient of determination, or the coefficient of multiple determinations for multiple regressions. The definition of the R-squared is fairly straight forward; it is the variation that is explained by a linear model.

R-Squared= explained variation/total variation

R-Squared is always between 0 and 100%. 0% indicates that the model explains none of the variability of the response data around it. 100 per cent indicates that the model explains all variability of the response data around its mean. In generally, the higher the R-Squared, the better the model fit our data.

P-Value:

In the statistical significance testing the p-value is the probability of obtaining a test statistics at least as extreme as the one that was actually observed, assuming that the null hypothesis is true. The p-value can be interpreted in terms of a hypothetical repetition of the probability of the study. P-value is the probability value.

4.2.3 Augmented Dickey Fuller (ADF) Test:

ADF test is the extension of Dickey Fuller Test (DF) to take care of possible serial correlation by adding the lagged deference term of endogenous variable which is included the stationary of the series are checked with the help of following equations.

Intercept Model:

$$\Delta Y_t = \beta_1 + \delta Y_{t-I} + {}_I \Delta Y_{t-1} + \varepsilon_t \quad \dots\dots\dots\dots (3)$$

Trend and Intercept model

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \Delta Y_{t-1} + \varepsilon_t \quad .... \quad (4)$$

Where

ΔY_t is the first difference of the series Y_t

$\alpha_i, \beta_1, \beta_2$ are parameters to be estimated;

t is the time or trend variable;

ε_t is a white noise term.

The ADF tests the null hypothesis (H_0) against the alternative (H_1) hypothesis;

H_0: Each variable has a unit root, $\delta = 0$

H_1: Each variable does not have a unit root, $\delta \; 0$

The parameter, δ is used to check the stationary behavior. The statistically significance of the coefficient Y_{t-1} implies that series do not have unit root. It means the series is stationary. On the other hand, statistically insignificance of the coefficient indicates the non- stationary behavior.

The distribution theory supporting Dickey-Fuller test is based on the assumption that error terms are statistically independent and having constant variance. Therefore, PP test has been developed which is less restrictive nature of the error process.

4.2.4 Granger Causality Tests

The causality tests are performed with the help of E-views software. This method is used to examine the cause and effect of foreign direct investment and gross domestic production. Granger (1969) developed a simple procedure for testing causality. According to this test a variable x_t is said to Granger-Cause y_t, if y_t can be predicted with greater accuracy by using past values of the x_t variable rather than not using such past values, all other terms remaining same.

The Granger-causality test for the case of one equation and two variables proceeds as follows:

First, y_t is regressed on lagged y terms as

$$y_t = \alpha_1 +_j y_{t-j} + u_{1t} \qquad\qquad ....(1)$$

and find restricted residual sum of squares, RSS_R

Again y_t is regressed on lagged y terms plus lagged x terms as:

$$y_t = \alpha_1 +_i x_{t-i} + {}_j y_{t-j} + u_{2t} \qquad\qquad ....(2)$$

and obtained unrestricted residual sum of squares, RSS_U,

then, $((RSS_R - RSS_U)/m)/(RSS_U/n-k)$ follows the $F_{m, n-k}$ distribution, $k=m+n+1$.

The null hypothesis that x_t does not cause y_t ($_i=0$) is rejected if the computed value of F-statistic exceeds the tabulated value at a specified level of significance.

Data Analysis-4.B   (Part-B)

4.1 Empirical Result

Data analysis include the empirical investigation of data by using two variable such as FDI inflow and GDP growth .I collected data from Reserve Bank of India and Department of Industrial Policy & Promotion with the help of this data I want to see the impact of FDI inflow on economic growth. I used different methods and test. There are many factors which affect the growth rate of GDP but I included only GDP on behalf of overall GDP growth. Source: Handbook of Statistics of Indian Economy RBI.

Regression Model:

Variable	Coefficients	T Values	Sig.	F statistic	R Square
Constant	18854.207	12.637	.000	108.025	.844

The relationship between FDI and GDP has been assumed by applying the simple linear regression model. For the purpose the secondary information has been collected. The following regression model has been identified on the base of theoretical & empirical literature available.

GDP = f (FDI)

$$GDP = (\alpha_1 + \alpha_2 \, FDI + u_{1)}$$

The result of Table 4.1 Linear Regression Results

|						
FDI	18.227	10.394	.000			**Regression**

result (1991-92 to 2011-2013)

Dependent variable: GDP

GDP = 18854 + 18.227 (FDI)

$R^2 = 0.844$, F (1, 20) = 108.025

, Significant at 10% , 5% and 1% level

The above regression result supports the fact that the relationship between foreign direct investment (FDI) and gross domestic product year wise is significant and positive relationship. The R^2 (0.844) is highly significant which show that year wise data of FDI is an important factor and explains 84% of variations in the determinations of change in gross domestic product (GDP). F value (108.025) is statistically significant which reveals a positive relationship between the variables of the whole result. P value is so small I. e. 000[3.] We can say that model is very significant. Result show that Rs. 1 billion increase in FDI inflow raises GDP by Rs. 18.23 billion by holding other variables constant.

Correlation between FDI inflow and GDP growth Figure 4.1
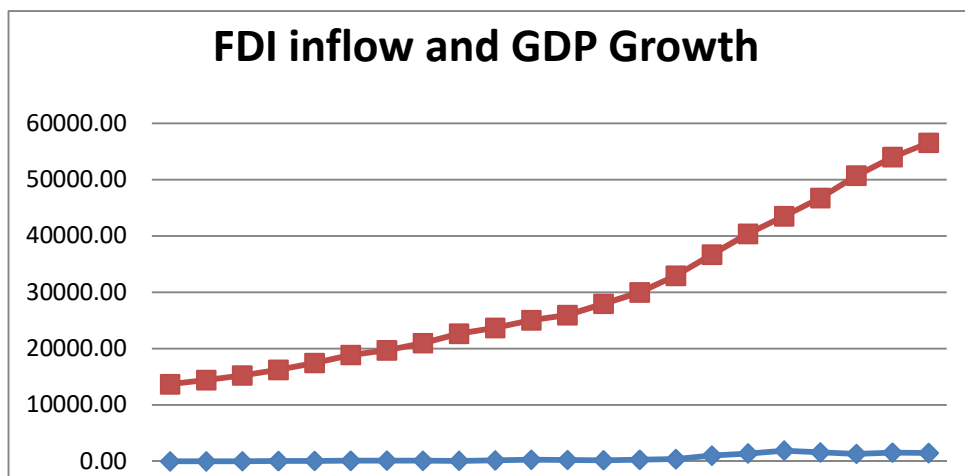
Above figure shows the positive relationship between FDI inflow and GDP growth of India.

Increase in the FDI inflow will lead to increase in Growth Rate of GDP.

Unit Root Test

Augmented Dickey-Fuller test statistic			7.088233	1
Test critical values:	1% level		-3.78803	1
	5% level		-3.012363	
	10% level		-2.646119	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.076635	0.010812	7.088233	0

C	-166.9395	326.4959	-0.511307	0.615

R-squared	0.725604	Mean dependent var	1970.605
Adjusted R-squared	0.711162	S.D. dependent var	1067.025
S.E. of regression	573.4578	Akaike info criterion	15.63164
Sum squared resid	6248223	Schwarz criterion	15.73112
Log likelihood	-162.1322	Hannan-Quinn criter.	15.65323
F-statistic	50.24305	Durbin-Watson stat	1.212071
Prob (F-statistic)	0.000001		

Table No. 4.2

Unit Root Test:

In order to analyze the impact of FDI on the Economic growth, the study utilizes the annually time series data from 1991-92 to 2012-13. The study used variables such as FDI and GDP.

Therefore it is necessary to examine the variable for their stationary. To check the stationary of the data series, the study employs the Augmented Dickey Fuller (ADF). The results of unit root test (ADF) tests are exhibited in table 6. The table 6 for ADF indicates that the variable is stationary in level of GDP at one percent level of significance.

The result of the unit root tests are presented in table 6. The table shows that the variable GDP, at one percent level. The "T" value is 7.09 and R-squared is 0.76 or 76 percent.

Granger causality test:

To find out the direction of causal relationship between FDI and GDP, it can be tested by using the method of granger causality test. The results are:

Table No. 4.3 Result of Granger Causality Test

Null Hypothesis:	Observations	F-Statistic	Prob.
FDI does not Granger Cause GDP	22	0.42458	0.6617
GDP does not Granger Cause FDI		17.8811	0.0001
Conclusion: GDP=>FDI			

Note: <=> Bidirectional causality, => unidirectional causality

significant at 1% level
significant at 10% level.
Source: self computed

In this table F-statistic indicates that the null hypothesis, FDI does not granger cause GDP, cannot be rejected and GDP does not granger cause FDI can be rejected at 1% and10% level of significance. Granger causality only refers to the capacity of FDI to forecast GDP. The result shows that there is unidirectional relationship between GDP and FDI, its means GDP cause FDI but FDI does not cause GDP. In other words, there is statistical evidence that lead lags of FDI could not be used to properly forecast GDP.

4. 2 Sector wise Analysis of FDI Inflow in India

The Sector wise Analysis of FDI Inflow in India reveals that maximum FDI has taken place in the service sector including the telecommunication, information technology, travel and many others. The service sector is followed by the manufacturing sector in terms of FDI. High volumes of FDI take place in electronics and hardware, automobiles, pharmaceuticals, cement, metallurgical and other manufacturing industries. The following table shows that top ten

sectors which attract highest FDI inflow. The table shows that service sectors receive 31.13% of total inflow of FDI in during 2000-2013.

The Foreign Direct Investments in India has been phenomenon over the year. The rapid development of the chemical & telecommunication sector was due to the FDI inflows in form of international players entering the market and transfer of advanced technologies.

Table No. 4.4	TEN SECTORS ATTRACTING HIGHEST FDI INFLOWS Sector-Wise / Year-Wise FDI Inflows\From January 2000 to December 2009 (Rs. In millions)								
Sector	2000-2005	2006	2007	2008	2009	2010	2011	2012	2013
Service Sector	77389.43	175032.2	145099.5	339475.1	279182.5	161538.7	238886.1	252619.24	136161.47
Con. Dev.	17554.24	36613.91	51924.4	103623.5	117479	112001.8	95007.88	127191.56	69207.87
Tel.	72564.74	41699.46	43541.5	115954.8	124438.7	69144.6	104926.2	4293.12	17700.03

Com. Soft. & Hard.	122234	87492.9	102148.5	78102.5	34601.62	45347.95	31350.97	34374.34	36598.31
Auto. Ind.	64919.39	11773.53	14895	48094.92	64701.68	56598	39266.69	59797.67	90020.28
Chem.	32221.08	17944.83	10170.23	26360.71	22078.26	20450.74	265942	17801.47	35785.86
Power	49315.49	8931.46	10207.64	54612.13	79771.86	48676.88	78393.75	39058.98	33770.79
Meta. Ind.	18068.68	7846.58	20298.6	62668.48	22787.35	47404.47	74859.21	84476.15	26752.2
Drug. & phar.	32276.93	9757.29	11405.68	11085.87	9783.57	10039.65	145314.8	33117.16	1,00,054.57
Hotel & tour.	10154.47	8174.86	10581.23	22729.27	28715.75	22790.82	41933.66	1,80,966.16	22320.33

Source: Department Of Industrial Policy & Promotion

Top Ten Sectors Attracting Highest FDI Inflow

% of total FDI Inflow from January 2000 To December 2013

Figure 4.2

% of Total FDI Inflow

- Service Sector
- Con. Dev.
- Tel.
- Com. Soft. & Hard.
- Auto. Ind.
- Chem.
- Power
- Meta. Ind.
- Drug. & phar.
- Hotel & tour.
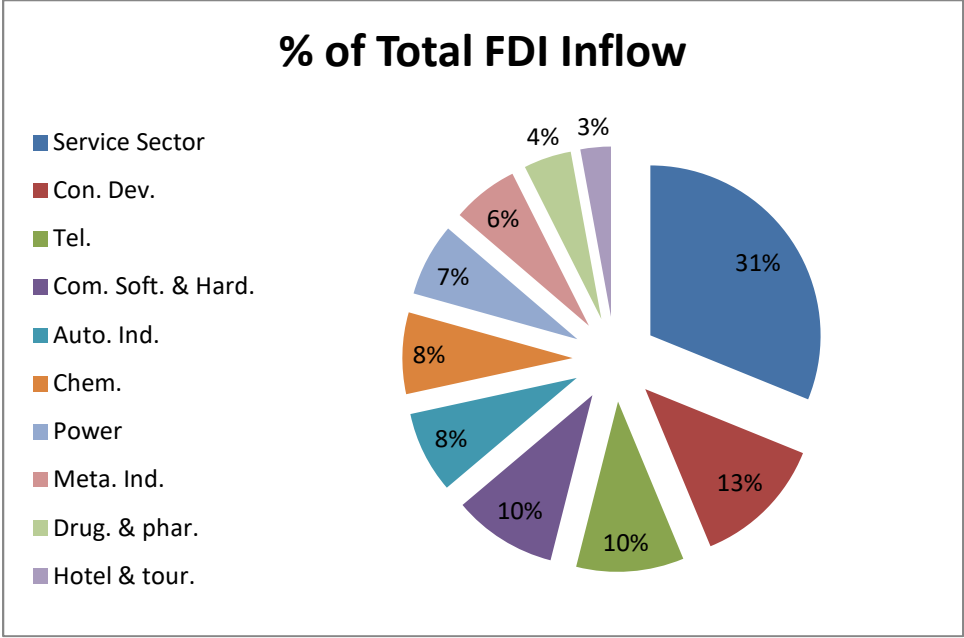
The above figure show only top ten sectors which attracting highest FDI inflow in Indian economy. With the share of total FDI inflow during the period 2000-2013 only.

The following **Table No. 4.5** shows the per year growth rate of different sectors by FDI inflow. This table shows only ten sectors which attract highest FDI inflow. In 2000 to 2006 these sectors receive foreign investment such as service sectors 126.2%, chemical 108.6%, etc., while after 2006 these sectors receive more FDI due to increase in caps in different sectors

Table No. 4.5

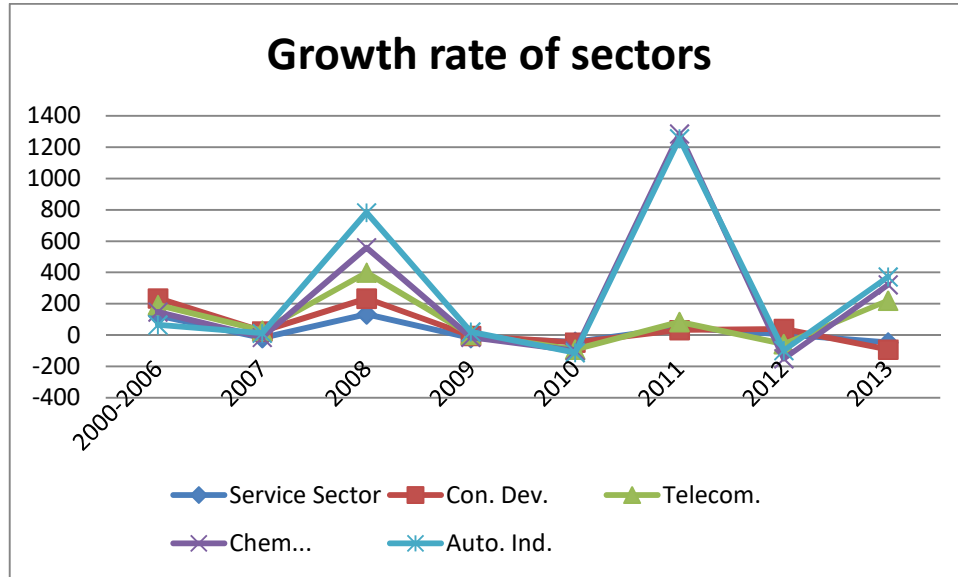Growth Rate of Different Sectors in India

Sector-Wise/year wise growth rate of FDI Inflows\From January 2000 to December 2013

Sector/year	Service Sector	Con. Dev.	Telecom.	Chem…	Auto. Ind.	C.S. & Hard.	Power	Drg. & phar.	Meta. Ind.	Ho Tou
2000-2006	126.2	108.6	-42.5	-44.3	-81.9	-28.4	-81.9	-69.8	-56.6	-19
2007	-17.1	41.8	4.4	-43.3	26.5	16.8	14.3	16.9	158.7	29.
2008	134.0	99.6	166.3	159.2	222.9	-23.5	435.0	-2.8	208.7	114
2009	-17.8	13.4	7.3	-16.2	34.5	-55.7	46.1	-11.7	-63.6	114
2010	-42.1	-4.7	-44.4	-7.4	-12.5	31.1	-39.0	2.6	108.0	91.
2011	47.9	-15.2	51.7	1200.4	-30.6	-30.9	61.0	1347.4	57.9	84.
2012	5.7	33.9	-95.9	-93.3	52.3	9.6	-50.2	-77.2	12.8	33
2013	-46.1	-45.6	312.3	101.0	50.5	6.5	-13.5	202.1	-68.3	

Self Computed

This figure shows the year wise Growth Rate of five Sectors.

Figure 4.3 (2000-13)

Growth rate of sectors

The line graph show that fluctuations of growth rate of five sectors in different years from 2000-6 to 2013. All five sectors continuously maintain per year growth rate. The figure shows that future of automobile industry is very bright. According to a news paper, Hari Bhumi, Haryana make first position in automobile industry in India.

This figure shows the year wise Growth Rate of five Sectors.

Figure 4.4

Growth rate of sectors
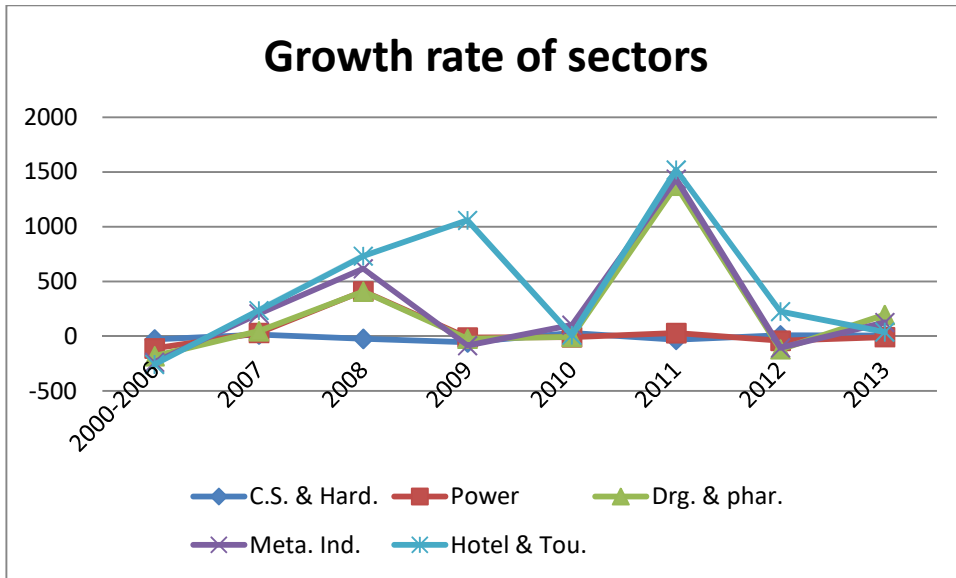
This figure shows the growth rate of five different sectors from 2000-06 to 2013. According to this figure the growth rate of hotel & tourism is higher from 2008 t0 2010.while growth rate of drugs & pharmacy, hotel & tourism and Meta. Growth rate of all sectors increase with a same rate between 2010 to 2012.

4. 3 Top Ten Countries Investing In India

Foreign direct investments have become the major economic driver of globalization in recent times. Top Investing Countries FDI Inflows in India has registered significant growth over the last few years due to the several incentives that have been provided by the Indian government. Investing Countries FDI Inflows in India has helped in the growth of the country's economy. The most profound effect has been seen in developing countries, where yearly foreign direct investment flows have increased in Indian context during 2005-06 to2006-07, FDI grew from Rs 394.67 million to Rs 1026.52 million and now comprise a large portion of global FDI. FDI or foreign investment refers to the net inflows of investment to buy a lasting management interest (10 per cent or more of voting stock) in an enterprise operating in an economy other than that of the investor. A Department of Industrial Policy and Promotion fact sheet mentioned India's top 10 FDI generating countries.

Rank 1: The **Mauritius route** is a channel used by foreign investors to invest in India; Mauritius is the main provider of Foreign Direct Investment to India. In fact 43.78% of Foreign Direct Investment to India came from Mauritius during 2000-2013. India has a Double Taxation Avoidance Treaty (DATT) with Mauritius, under which the corporate registered there can choose to pay taxes in the island nation. Experts said companies prefer to route their investment through the famous Mauritius route because of as low as three per cent effective rate of corporate tax on the foreign companies. The tax levied is no more than 3 per cent. Rank 2: Singapore with Investment: Rs 1087713 (Amount in million) and with 13.08% share. Singapore invests its funds in telecommunications, power, oil refinery, food processing, and electrical equipment. Singaporeans also have interest on transportation. Currently Singapore (**1,70,403.39**) replace ambitious (**72,986.60**) during Jan.-mar. 2014(DIPP). Rank 3: The United Kingdom with Investment: 1005270 Rs. million during 2000- 2013 Besides long standing British companies in India such as ICI, Glaxo, GEC, Rolls Royce, British Aerospace, SmithKline Beecham, British

Petroleum, British Airways, British American Tobacco, and Cadbury, the new major players include British Gas, National Power, National Grid, British Telecom, Shell International Petroleum Co., United Distillers, Trafalgar House, and other British Construction companies. All British oil majors are present in the Indian oil sector. Opening of the roads and ports sector in India has opened immense opportunities for construction and maritime equipment manufacturers. Rank 4: Japan Major Japanese FDI projects in India include Maruti Suzuki, Toyota, MCC PTA, Nissan Motors, Honda Siel Cars, Asahi India Glass, Sony India, Canon India etc. Rank 5: United States of America with Investment 551944 Rs million (Jan. to Dec.2013) Most of the US companies or investments are placed in the areas of telecommunications, services (usually offshoring), power, oil refinery, food processing, and electrical equipment. Rank 6: The Netherlands invest in India are in the agro industries, logistics, water management, information technology, health, financial services and renewable energy. Rank 7: Cyprus, The Cypriot economy is prosperous and has diversified in recent years. Cyprus has been sought as a base for several offshore businesses for its highly developed infrastructure. Rank 8: Germany, German companies like BMW, Volkswagen, Bosch, Deutsche Bank, Siemens and Boehringer - have pledged millions of Euros in the country in recent times. A report released recently by Public Interest Research Group, According to the report, there are three major reasons for German corporations to invest in India -- availability of cheap labour coupled with toothless labor legislation's; India's huge domestic markets of goods and services; and India's lax environmental and public health regulations with their ineffective implementation by the state machinery, automobile, energy and environment sectors among others, said a recent Business Standard report. These investments were mainly driven by IT majors and pharmaceutical companies. Rank 10: United Arab Emirates "The UAE is India's largest trading partner in terms of India's total trade exchange in the first half of the current year," the Emirates News Agency said, citing a report by the analysis and trade information department at the ministry of foreign trade.

Table No. 4.6   Country Wise / Year Wise FDI Inflow from January to December 2000 to 2013 (Amount in Rs. millions)

Source: Department Of Industrial Policy & Promotion

Rank	Country	2000-2005	2006	2007	2008	2009	2010	2011	2012	2013
1	Mauritius	349666.91	222207.52	319437.05	598586.46	560128.88	329399.98	437791.67	491418.84	331290.5
2	Singapore	27588.56	28532.04	58306.08	157758.64	148262.44	96757.8	195969.66	152421.76	222116.3
3	U.K.	57435.49	78247.46	19670.99	70085.39	22594.22	34243.61	454283.15	43718.77	224990.9
4	Japan	56757.64	5229.22	27751.6	16976.32	60943.17	58578.58	143486.13	103644.23	82344.24
5	U.S.A.	117639.56	33203.78	36383.72	75419.79	98730.55	64824.03	47127.75	33832.89	44781.75
6	Netherlands	62934.56	22457.28	27894.49	42813.5	40056.6	52061.05	58889.06	89526.74	125318.3
7	Cyprus	4136.88	2570.04	22043.19	58250.15	77691.41	42099	61530.75	50102.32	27986.74
8	Germany	30914.29	13972.47	14155.04	33288.58	28812.82	9034.62	67162.83	38830.57	56702.58
9	France	22888.72	3876.56	5208.04	20444.93	14360.47	34062.66	22555.13	36176.92	25477.38
10	U.A.E.	5943.77	10972.14	8842.18	12416.59	30148.01	16732.06	10418.11	14310.93	16955.1

Table No 4.7 presents the changing amount of investment of ten countries during 2012 to 2013. In this time period Mauritius decline its investment and stand at 37.19%. Other countries are seeing interested in investment such as Singapore. According to DIPP report in 2014 first quarter of the year Singapore replace Mauritius. But I collected data up to 2013 thus till then Mauritius is the first investor but in future it can be see that other country will take interest according to government policy.

Table No. 4.7

Top ten countries FDI inflow from 2012-2013 (Rs in millions)

Rank	Country	2012	2013	% of FDI inflow
1	Mauritius	491418.84	331290.5	37.19
2	Singapore	152421.76	222116.3	16.93
3	U.K.	43718.77	224990.9	12.15
4	Netherlands	89526.74	125318.1	8.41
5	Japan	103644.23	82344.24	3.55
6	Germany	38830.57	56702.58	9.71
7	U.S.A.	33832.89	44781.75	3.53
8	Cyprus	50102.32	27986.74	4.32
9	France	36176.92	25477.38	2.79
10	U.A.E.	14310.93	16955.1	1.49

Source: department of industrial policy & promotion

Figure 4.5   Top Ten Countries Investing In India (2000-13)

Country Investing Highest FDI Inflow During January to December 2000-2013

■ % of total FDI inflow

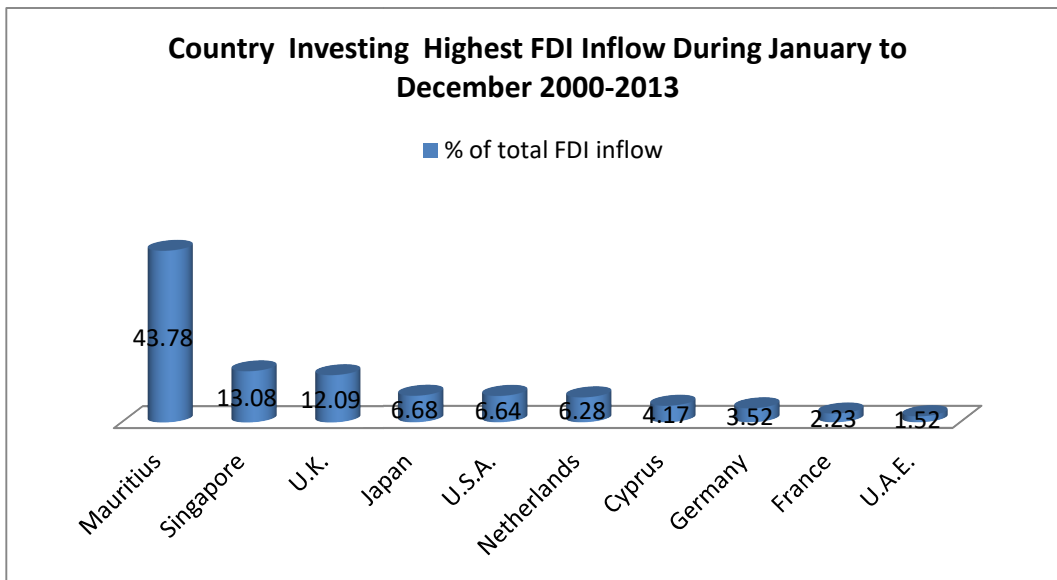|	
Mauritius	43.78
Singapore	13.08
U.K.	12.09
Japan	6.68
U.S.A.	6.64
Netherlands	6.28
Cyprus	4.17
Germany	3.52
France	2.23
U.A.E.	1.52

Figure 4.6   Top ten countries investing in India from 2012-2013 (Rs. in millions) (Table No. 4.7)

share of foreign investment