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ABOUT THE JOURNAL

It is a double blind reviewed bi-annual Journal launched exclusively to encourage students to pursue research on the contemporary topics and issues in the area of commerce, economics, management, governance, polices etc. The journal provides an opportunity to the students and faculty of Shri Ram College of Commerce to publish their academic research work.

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Shri Ram College of Commerce is committed to upholding the high academic standards. Therefore, the Committee on Publication Ethics (COPE) follows a 3-Stage Selection Process while approving a paper for publication in this Journal. The policy is as follows:

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The following guidelines are to be carefully adhered by the students before final submission of the manuscript. The submitted manuscripts not conforming to the following guidelines are not taken into consideration for any further processing.

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Format of the article on the front page should be:
a) Title
b) Name(s) of the student(s) and mentor along with their details
c) Abstract
d) Keywords

Abstract

The abstract should capture the essence of the article and entice the reader. It should typically be of 100 -150 words, and in Italics.

Font type and word limit

The research paper is to be typed on A-4 size paper with single line spacing. The complete length of the paper should not exceed 5000 words including endnotes and references. The font size should be 12 and font style should be Times New Roman.

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The Journal adheres to the APA (American Psychological Association) Referencing Style, Sixth Edition. Students must refer to the APA Referencing Guidelines to ensure conformance to this reference style. For further information you may visit the following link - http://www.apastyle.org

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Endnotes should be serially arranged at the end of the article well before the references and after conclusion.

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The first letter of the caption for table, figure, graph, diagram, picture etc. should be in capital letter and the other words should be in small letter - e.g. Table-1: Demographic Data of Delhi, Figure-1: Pictorial Presentation of Population etc.

MANUSCRIPT SUBMISSION GUIDELINES

Soft Copy: The soft copy of the manuscript should be sent through e-mail to the editor at strides@srcc.du.ac.in and cc to principaloffice@srcc.du.ac.in.

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Declaration

As part of the submission process, the student and mentor needs to declare that they are submitting original work for first publication in the Journal and that their work is not being considered for publication elsewhere and has not already been published elsewhere. Again, the paper should not have been presented in any seminar or conference. The scanned copy of duly signed declaration by the students and their respective mentors has to be emailed along with the research paper.

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AWARD

The authors of best three papers from every Issue are awarded – First Prize, Second Prize and Third Prize on the SRCC Annual Day.

Principal's Message

The mission statement of the college signifying the existence and its road map to the achievement of its vision, reads as:

"To achieve and sustain excellence in teaching and research, enrich local, national and international communities through our research, improve skills of alumni, and to publish academic and educational resources"

To achieve and promote excellence in publications and applied research, the college has taken the initiative to launch a new journal exclusively to publish students' research papers and articles. It will be an add-on to the enriched catalogue of college publications and academic literature.

The Journal has provided an opportunity to the students of our college to focus on research. Since the students were not opened to the research methodologies at the undergraduate level, they were mentored by experienced faculty of our college. Simultaneously, their articles were also reviewed by the referees and tested for plagiarism before publication. After reporting all the suggestions recommended by the referees, the articles were revised and then finally published. The college had successfully released the foundation issue of the Journal **"Strides – A Students' Journal of Shri Ram College of Commerce, Volume 1, Issue 1, 2016-17"** on the occasion of 91st Annual Day of the College held on 13th April, 2017. The Journal was released by Shri Prakash Javadekar, Honb'le Union Minister of Human Resource Development, Government of India.

I would like to congratulate the students whose papers are published in this issue of the journal and simultaneously encourage all the students to contribute their research papers and articles for the successive issues of the Journal.

Best wishes for their future endeavors.

Prof. Simrit Kaur
Principal

Editor's Message

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It is a bi-annual Journal launched exclusively to publish academic research papers and articles by the students on contemporary topics and issues in the area of commerce, economics, management, governance, policies etc.

In order to maintain high standards of publication, COPE (Committee on Publication Ethics) has been constituted. The COPE shall be the apex authority to take all decisions related to publication of research papers and articles in Strides. The decision of COPE shall be final and binding.

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for publication. The research work published in Strides is original and not published or presented at any other public forum.

The foundation issue of the Journal **"Strides – A Students' Journal of Shri Ram College of Commerce, Volume 1, Issue 1, 2016-17"** was successfully released on 91st Annual Day of SRCC held on 13th April, 2017 by Shri Prakash Javadekar, Honb'le Union Minister of Human Resource Development, Government of India.

The successive Issues of 'Strides – A Students' Journal of Shri Ram College of Commerce' shall be bi-annually released.

I congratulate all the students whose research papers are published in this Issue of Strides and express my sincere thanks to their mentors and referees.

Dr. Santosh Kumari
Editor

STRIDES – A STUDENTS' JOURNAL OF SHRI RAM COLLEGE OF COMMERCE

RESEARCH PAPERS

Understanding Tax Neutrality – A Comparative Study of Indian and Estonian Tax Structure

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Abstract

Tax neutrality is crucial in determining the fairness of a tax system because establishing a tax system without affecting the economic decisions of individuals has been a major challenge especially since the work done so far is largely theoretical. The paper looks at how the Indian taxation system, by deviating from neutrality, impacts the investment decisions. It first checks the neutrality of taxes through 'Internal Rate of Return' method and then analyses how the tax system affects the incentives to invest by employing statistical tools such as linear regression and ANOVA. The neutral tax regime of Estonia is used as a proxy to determine the probable investment level for India in case of tax neutrality and conclusions are drawn regarding the relevance of neutrality for India and the scope for improvement in the same by making some changes in the components of corporate tax structure that create distortion. However, given that a hundred percent neutrality may have shortfalls on social front, a tax structure that is approaching towards neutrality should be adopted.

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[1]What "Tax Neutrality" Means and Why Businesses Don't Care. Retrieved from https://www.gradingstates.org/ the-tax-foundations-state-business-tax-climate-index/the-sbtci-is-a-poor-measure-of-growth-potential/ what-tax-neutrality-means-and-why-businesses-dont-care/

INTRODUCTION

The Concept of Tax Neutrality

Tax neutrality[1] refers to a tax system which does not interfere with the economic decision making process. In simple words, a neutral tax rate is one which does not affect an individual's consumption or investment decisions. Non- neutral tax rates create a distortion in consumption and investment and that is why non- neutral tax rates are not desirable. However, some people say that neutral tax rates are a myth and do not exist in reality.

To explain the concept, we can take the following example. While choosing between tea and coffee, the choice of the individual should be based on his/ her preference of tea or coffee and not on the tax charged on the products. Obviously, if the difference between the tax rate on tea and that on coffee is extremely significant, the individual's choice will also be influenced by tax rates, given that he/ she has an income constraint.

This paper deals mainly with the non-neutrality of Corporate Income tax in India and its effect on investment decisions in India.

Most of the policymakers, while designing a tax system, chose not to take into consideration the concept of tax neutrality as the concept was supposed to be impractical. For example, India overlooked the concept of neutrality while developing or amending the Goods and Services Tax laws, creating a 5 slab structure with frequent amendments in the product list for each rates. This created a lot of distortions and uncertainty[2]. However, countries like Estonia have actually made it possible. The reason tax neutrality has been an emerging issue is that the behavioural response of taxpayers has a macroeconomic impact. Firstly, since the non- neutral tax rates affect the taxpayers' behavior, it in turn affects the government's revenue. Secondly, it affects the consumption and investment choices which impact the aggregate demand and employment levels, which further affect composition of GDP.

Non neutral tax rates are also termed as 'inefficient' because they are distortive in nature. Efficient tax rates are those which do not result in increased satisfaction for some and decreased satisfaction for others. Since non- neutral tax rates create distortions or deadweight loss[3] by influencing economic decisions, they have different impact on satisfaction of different groups of people and thereby, resulting in inefficient economic conditions. Therefore, for an efficient economy, it is mandatory to have neutral tax rates.

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[2]Bhatia, S. (2018). Goods and Services Tax: A Good Idea Gone Bad. India Legal. Retrieved from http://www.indialegallive.com/cover-story-articles/focus/goods-and-services-tax-a-good-idea-gone-bad-52286
[3]Dead weight loss is a loss for the economy as a whole created due to changes in behavior of economic participants with the introduction of some influencing factors such as tax, price ceilings etc.

IMPACT OF NON- NEUTRAL TAX RATES ON INVESTMENT

Investments are an important macroeconomic factor for determining a country's economic growth and therefore, it is necessary to take into consideration the variables affecting the rate of investment. Investments are dependent on national income, availability of natural resources, real interest rates, rate of technological advancements, institutional factors, market size, etc. Corporate Tax rates are also an important factor in determining the level of investments. Firms finance their investments mostly from retained earnings, which are influenced by the corporate tax rates. Therefore, higher the corporate tax rates, lower will be the retained earnings and lower will be the level of investments. Neutral tax rates are necessary to ensure that corporate tax rates no longer remain a factor determining the level of investments in the country.

INDIAN TAXATION SYSTEM

This paper deals with the non-neutrality of Corporate Tax in India, so it is essential to first understand the Corporate Taxation System(CIT henceforth) of the nation. India is known for having one of the highest corporate tax rates in the world and mandates both Indian and Foreign companies to pay CIT under Income Tax Act, 1961. While, a resident company is taxed on its global income, a foreign company is taxed on income that is received in India or that arises or is deemed to accrue in India. A flat corporate tax rate of 30 per cent (for resident companies) and of 40 per cent (for foreign companies) is levied and an additional surcharge, education cess, and secondary and higher education cess is applied to tax payable amount.

The table below shows the various tax slabs under CIT:

Income*	Domestic company				Foreign company	
	Rate of CIT (%)				Basic	Effective**
	Turnover less than INR 500 million in FY 2015/16		Turnover above INR 500 million in FY 2015/16			
	Basic	Effective**	Basic	Effective**		
Less than 10 million Indian rupees (INR)	25	25.75	30	30.90	40	41.20
More than INR 10 million but less than INR	25	27.55	30	33.06	40	42.024
More than INR 100 million	25	28.84	30	34.61	40	43.26

** Effective tax rates include surcharge, education cess, and secondary and higher education cess.
Source: Corporate taxes on Corporate Income, PWC, available at http://taxsummaries.pwc.com/ID/India-Corporate-Taxes-on-corporate-income

Also, there is a wide array of deductions available for investment in certain categories of assets or businesses. Some of these deductions are available under section 80I (deductions available to industrial undertakings), section 80IA (deduction for undertakings engaged in infrastructure development), deductions for hotels and convention centers, etc. Due to the availability of so many tax benefits individual preferences become distorted and the tax can be said to be non-neutral.

The CIT creates distortion through following ways:

- CIT allows interest payments to be deducted while calculating taxable income, thus making debt as the preferred mode for financing, thereby influencing the investing and financing decisions.
- CIT allows special deductions, exemptions or reliefs for certain businesses (as mentioned above), due to which some corporations are able to reduce tax burdens and change their investment decisions accordingly.
- In general, all corporate taxes, including CIT, tend to increase required rate of return, which impacts the quantum of investment.

TAX SYSTEM OF ESTONIA

Although it is mostly argued that neutral tax regime is practically not feasible, Estonia has developed a tax system which is near perfect to neutrality and has ranked no. 1 as per the International Tax Competitiveness Index (ITCI)[4] for the past few years continuously. The government of Estonia realised the costs of deadweight losses due to the impact on decisions made by the distortions of tax. Thus, the tax system, which was developed, was focused to be neutral at all ends. There are no local or municipal taxes or any corporate tax. However profits distributed to shareholders in any form be it dividend, payment at the time of liquidation, buy back of shares, etc. are taxable at the same flat rate. So even capital gains are exempt from tax. Moreover there is no specific exemption or deduction for any category of investments or entities. Therefore, there are no distortions because of tax rate and no decision making is affected by the tax regime of the nation.

METHODOLOGY

Objective

The paper analyses tax neutrality in India with the following specific objective:-
- To show the non-neutrality of Corporate Taxation system in India
- To assess the impact of corporate tax rates on investments in India

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[4]International Tax Competitiveness Index (ITCI) is an index that measures the tax regimes of countries on 2 basic aspects: competitiveness and neutrality.

THEORETICAL FRAMEWORK

(Auerbach, 1980) proposed that a tax system is said to be non-neutral if the effective tax rate on different categories of assets remains the same. It implies that the tax laws of a nation do not favour one investment over other. This is possible only if the effective tax rate of an asset is not dependent on the depreciation rates as these are dictated by the tax policy of the government. Effective tax rate of an asset can be mathematically written as

$$P(\delta) = \frac{(r+\delta)(1-k(\delta)-\tau z(\delta))}{1-\tau} - \delta$$

Where,

'P(δ)' is the effective tax rate of an asset,

'r' is the required rate of return of the organisation,

'k(δ)' is the tax credit on investment made,

'τ' is the applicable tax rate,

'z(δ)' is the present value of depreciation allowance and,

'δ' is the decay rate or depreciation rate\

Let's take a scenario where there is a company X located in India so applicable tax rate is 34.61% inclusive of surcharges and cesses. The depreciation rate on plant and machinery is 15% and the credit on investment in new plant is 20% as per section 32(1)(iia) of Income Tax Act, 1961. Let us assume the required rate of return of the organisation to be 9.38%[5]. Then the present value of depreciation allowance on an investment of Rs.1, assuming the life of machinery to be 10 years, comes out to be Rs.0.5658[6]. Putting the above information in the equation, we get P(δ) to be around 0.0753.

However, if we change the depreciation rate to say 20%, z(δ) changes to 0.6509[7] and the effective tax rate changes to 0.0582. Thus, it can be deduced that Indian tax structure is non- neutral in nature and it influences an individual's decision-making process.

Empirical verification through Regression Analysis

To prove that Corporate Tax rates in India are non-neutral and to check the impact of such tax rates on investment, a regression analysis is carried out through which a relationship is established between the tax rate and the investment.

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[5]The required rate of return is taken to be the same as the implied market return of equity in India for February 2018. (http://www.market-risk-premia.com, 2018)
[6]Refer to table 1 of appendix for calculations
[7]Refer to table 2 of appendix for calculations

Data:The data has been taken from World Bank website for variables like investment, interest rates, inflation rates and GDP. The figures for corporate tax rates have been taken from moneycontrol website[8].

Model Specification: For our regression model, we have tried to establish a relationship between investment and its factors. Investment is taken as a variable dependent on the following factors- corporate income tax (CIT), gross domestic product (GDP), interest rates, and inflation rates, keeping all other variables as exogenous. The following equation is as follows:

$$I = \alpha + \beta_1 G + \beta_2 i + \beta_3 \pi + \beta_4 CT, \text{ where}$$

G = GDP
CT = Corporate Tax Rate
π = Inflation
i = Interest Rates
Interpretation of Results/ Findings

The following table shows the results of the regression analysis:

Regression Statistics	
Multiple R	0.99
R Square	0.98
Adjusted R Square	0.98
Standard Error	38104.19
Observations	25.00

(Source: Excel)[9]

R square depicts the dependence of dependent variable on independent variables. The significant R square (0.98) here shows that the 98% of variance in investment can be explained collectively by the explanatory variables taken in the model.

Analysis of Variance

	Df	SS	MS	F	Significance F
Regression	4.00	1529175381085.64	382293845271.41	263.30	0.00
Residual	20.00	29038585288.74	1451929264.44		
Total	24.00	1558213966374.38			

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[8]Budget 2017: Here's what you need to know about corporate taxes. (2018). Retrieved from https://www.moneycontrol.com/news/business/economy/budget-2017-heresyou-need-to-know-about-corporate-taxes-947227.html
[9]Refer to Table 3 of appendix for data

ANOVA analysis was conducted to check the appropriateness of the model. Based on the number of independent variables (4) and number of observations (25), the critical f-value is calculated to be 2.8660 and since the f-value of 263.30 is quite greater than the critical f-value, the model is considered to be significant. This means that all the explanatory variables are different from each other.

The significance F in the above table gives the p value for the entire model and since significance F of 0.0, i.e. the p-value is less than the significance level (α) 0.05, we can reject the null hypothesis (i.e., $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$)[10] and prove that our model fits the data better than a model with no independent variables. The significance F (0.00) shows that the probability of null hypothesis being true is 0. This would suggest that the variability or differences in the data is not due to thesampling effect but due to variation in the actual population data. Thus, concluding that the investment has significant relationship with at least one of the variables.

Coefficient Analysis

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	178666.85	84317.09	2.12	0.05	2784.47	354549.22
GDP	0.33	0.02	18.05	0.00	0.29	0.37
inflation rates	11187.22	6724.23	1.66	0.11	-2839.28	25213.72
interest rates	-3701.37	6800.03	-0.54	0.59	-17885.99	10483.25
tax rates	-5950.09	2290.90	-2.60	0.02	-10728.82	-1171.36

(source: Excel)

The coefficient analysis gives the value of dependence of investment on each of the independent variable. The following figures are derived from the above study:
$\alpha = 85$
$\beta_1 = 0.33$
$\beta_2 = 11187.22$
$\beta_3 = -3701.37$
$\beta_4 = -5950.09$.

These coefficients reveal the degree of dependence of investment on each of the individual variables[11].

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[10]Null hypothesis taken in this model: H_0: Investment has no significant relationship with any of the independent variables. While alternate hypothesis is taken as H_1: Investment has significant relationship with at least one of the independent variables. In a F- test, H_0 can be rejected if f-value> critical value and the significance f < (1- confidence interval).
[11]For example, a unit change in GDP will result in $0.33 million (= β1) change in the investment. Similarly, for a unit change in inflation rates, or interest rates or tax rates, the investment will be affected by β2, β3, β4 respectively.

From the above coefficient analysis, we can say that there is a negative relationship between investments and tax rates since the coefficient of tax rates is negative and quite significant. Since p value is extremely low, the null hypothesis can be rejected[12] and a linear relationship can be established between investment and tax rates. A unit change in taxes will lead to -$5950 million change in the investments, thus showing that the tax rate is non-neutral and influences the investment decisions.

ANALYSIS OF INVESTMENT IN INDIA AT ESTONIAN (NEUTRAL) TAX RATES

As we earlier noted that investment is majorly affected by 4 independent variables which are Gross Domestic Product, interest rates, inflation rates and tax rates. The regression equation that emerged was

$$I = 178666.85 + 0.33\,G - 3701.37\,i + 11187.22\pi - 5950.09\,CT$$

Keeping all other variables as constant but substituting Corporate Tax Rate of India with that of Estonia for the past 25 years, we tried to analyze the impact of neutrality on the decision making behaviour of the nation as a whole. Tax rates of Estonia have constantly been lower than tax rates of India thus we can observe that there is a vast difference between what would have been invested at neutral tax rates and what was actually invested. Even though India cannot be perfectly compared with Estonia, due to differences in size, population and GDP of the two countries, it is acceptable to take Estonian tax rates for this study as no other country with comparable figures has achieved tax neutrality.
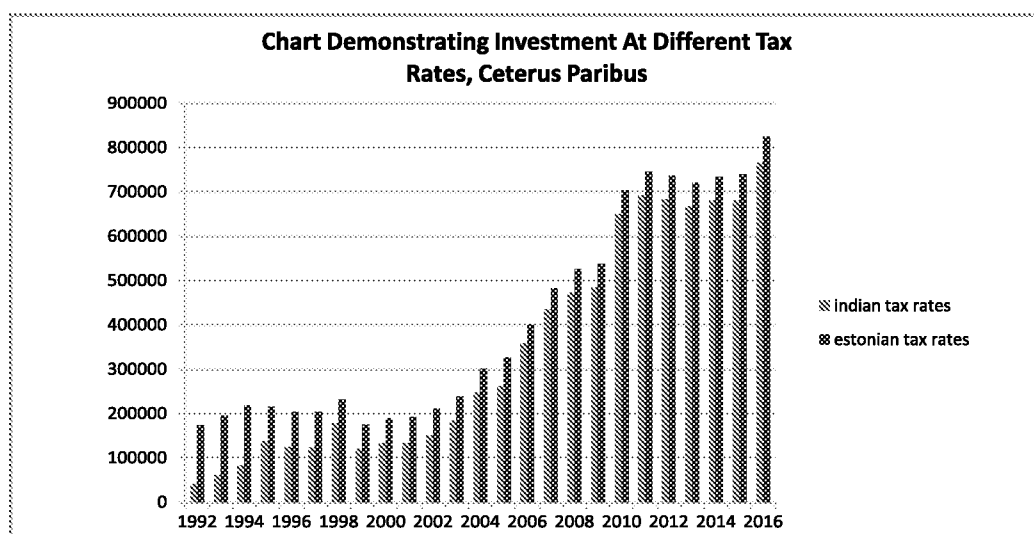
(Source: Excel)[13]

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[12]In a p- test, H0 can be rejected if p value< (1- confidence interval).
[13]Refer to table 4 of appendix for data.

In the graph, blue bars represent the investment levels of India using the regression line and replacing the variables with actual data for the past years. However if we replace the actual tax rates of India with the 'neutral' tax rates of Estonia for the same time period we observe that the investment level risessubstantially and the modified investment level is reflected through the red bars. There is a vast difference between these two and this arose due to difference in tax rates.

Given that we have observed that the tax system of India is burdened with lots of non-neutralities, arguments can be made in favour of deviations from neutrality in the case of certain qualitative factors such as environmental bads, pension scheme etc. Still, there is a vast scope for improvement in the current tax regime in India. However "To the degree that policymakers depart from neutrality to achieve specific goals like encouraging homeownership or childcare, it is generally better to implement these measures through refundable tax credits rather than deductions."[14] The tax structure is non-neutral on various fronts which are unjustifiable from a social welfare angle. To resolve this issue, (Mirlees and Adam, 2011) made the following three recommendations:

First, introduction of measures such as Allowance for Corporate Equity (ACE) to remove the preference for debt due to its tax deductibility. If a specified deduction is available on equity as well then distortions between equity and debt will be eliminated. Secondly, the preference of one organizational form over others needs to be removed. For this, tax treatment of distributed profit need to be brought in line with tax treatment of employed person. So it means similar rate of taxation for all entities. Third recommendation, which will solve most of the problems, altogether, could be the substitution of corporate tax structure with land value taxation. All the deductions and tax preferences for different kinds of businesses will vanish and a more neutral and efficient tax regime could be established.

CONCLUSION

The objective of the study was to show the non-neutrality of Indian corporate tax system and establish the relationship between such taxes and investment decisions. The model of study used shows that non neutral tax rates have much greater impact on investments and therefore, to build an efficient economy, neutral tax rates are a desirable.

While comparing the Indian and Estonian corporate tax models, we realize that India is still a long way from establishing neutral taxation system and neutral tax rates should be an important economic goal for Indian policymakers. This is because current corporate tax rates are hampering the investments in India (as established by the regression model), which has been an impediment in country's growth rate.

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[14]Furman, J. (2018). The Concept of Neutrality in Tax Policy. Retrieved from https://www.brookings.edu/testimonies/the-concept-of-neutrality-in-tax-policy/

Our regression study helped shedding a light on the importance of neutral tax rates and in calculating the size of impact of non-neutral tax rates. Policymakers should aspire to implement neutral tax rates, which will result in less distortion of income and help people make decisions based on their preferences and not based on the tax rates, thereby creating an efficient decision making system in the country. However tax neutrality cannot be established in all cases of distortions and one should compare the advantages of deviating from tax neutrality with the demerits ofcomplexing the tax structure and then, a tax policy should be developed which is neutral at those ends which result in unwanted and unjustifiable distortions and which is not too complex for the citizens to understand.The quote by Hans Hoffman - "The ability to simplify means to eliminate the unnecessary so that the necessary may speak" also fully applies to the tax regime and therefore, we recommend that the nature of taxes should be flexible in the sense that they can be decided on a case-by-case, context specific basis. But at the same time, this should not lead to complications such as multiple levels of taxation. The tax regime should be simple and one that approaches a neutral tax regime but we do not recommend an entirely neutral tax system because it has pitfalls of its own.

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APPENDIX

Table 1
(Calculation of Present Value of Depreciation Allowance @ 15%)

period	Opening	Depreciation @15%	closing	pvf@9.38	present value of Depreciation
1	₹ 1.00	₹ 0.1500	₹ 0.85	0.914244	₹ 0.13714
2	₹ 0.85	₹ 0.1275	₹ 0.72	0.835842	₹ 0.10657
3	₹ 0.72	₹ 0.1084	₹ 0.61	0.764163	₹ 0.08282
4	₹ 0.61	₹ 0.0921	₹ 0.52	0.698632	₹ 0.06436
5	₹ 0.52	₹ 0.0783	₹ 0.44	0.63872	₹ 0.05001
6	₹ 0.44	₹ 0.0666	₹ 0.38	0.583946	₹ 0.03886
7	₹ 0.38	₹ 0.0566	₹ 0.32	0.533869	₹ 0.03020
8	₹ 0.32	₹ 0.0481	₹ 0.27	0.488086	₹ 0.02347
9	₹ 0.27	₹ 0.0409	₹ 0.23	0.44623	₹ 0.01824
10	₹ 0.23	₹ 0.0347	₹ 0.20	0.407963	₹ 0.01417
			SUM	₹ 0.56584	

Table 2
(Calculation of Present Value of Depreciation Allowance @ 20%)

period	Opening	Depreciation @20%	closing	pvf@9.38	present value of depreciation
1	₹ 1.00	₹ 0.2000	₹ 0.80	0.914244	₹ 0.18285
2	₹ 0.80	₹ 0.1600	₹ 0.64	0.835842	₹ 0.13373
3	₹ 0.64	₹ 0.1280	₹ 0.51	0.764163	₹ 0.09781
4	₹ 0.51	₹ 0.1024	₹ 0.41	0.698632	₹ 0.07154
5	₹ 0.41	₹ 0.0819	₹ 0.33	0.63872	₹ 0.05232
6	₹ 0.33	₹ 0.0655	₹ 0.26	0.583946	₹ 0.03827
7	₹ 0.26	₹ 0.0524	₹ 0.21	0.533869	₹ 0.02799
8	₹ 0.21	₹ 0.0419	₹ 0.17	0.488086	₹ 0.02047
9	₹ 0.17	₹ 0.0336	₹ 0.13	0.44623	₹ 0.01497
10	₹ 0.13	₹ 0.0268	₹ 0.11	0.407963	₹ 0.01095
			SUM	₹ 0.65092	

Table 3
(Data of Past 25 Years for Running Regression)

Year	GDP (in million dollars)	inflation rates	interest rates	tax rates	INVESTMENT (in million dollars)
1992	284363.88	8.965152361	9.132749407	50	73009.2
1993	275570.36	9.861782853	5.814776514	50	68146.05
1994	322909.90	9.980044775	4.337109732	50	88991.49
1995	355475.98	9.062702221	5.864178113	40	100127.55
1996	387656.02	7.575018289	7.792994301	40	102316.55
1997	410320.30	6.476271263	6.909578991	40	116937.19
1998	415730.87	8.010167524	5.12127633	35	112149.30
1999	452700.00	3.06839552	9.191247326	35	134371.49
2000	462146.80	3.644970161	8.34261083	35	124963.94
2001	478965.49	3.215616018	8.591449296	35	129410.80
2002	508068.95	3.715683776	7.90717719	35	140140.98
2003	599592.90	3.867798086	7.30788116	35	179294.20
2004	699688.85	5.72540656	4.910134919	35	255910.25
2005	808901.08	4.236931692	6.2483308	35	312366.79
2006	920316.53	6.422584341	4.477353833	30	365735.73

2007	1201111.77	5.756243466	6.869182971	30	510187.23
2008	1186952.76	8.664665347	4.277227228	30	453788.57
2009	1323940.30	6.063829304	5.773571194	30	538260.71
2010	1656617.07	8.983819558	-0.596849661	30	673937.49
2011	1823049.93	8.539714396	1.498946519	30	721753.15
2012	1827637.86	7.934387478	2.473520489	30	700851.89
2013	1856722.12	6.186504001	3.865992863	30	631716.32
2014	2035393.46	3.051401319	6.985444729	30	703579.88
2015	2089865.41	1.785789761	8.078282432	30	687652.84
2016	2263792.50	3.611788437	5.84944209	30	687642.86

Table 4
(Investment in India at Indian As Well As Estonian Tax Rates Using the Regression Equation)

Year	GDP (in million dollars)	inflation rates	interest rates	tax rates (India)	Investment (at indian tax rate) (in million dollars)	tax rates (Estonia)[15]	Investment (at Estonian tax rate) (in dollars)
1992	284364	8.96515	9.13275	50	41493.8775	27.8	173577.3
1993	275570	9.86178	5.81478	50	60903.8638	27.5	194788.3
1994	322910	9.98004	4.33711	50	83318.3257	27.2	219009.9
1995	355476	9.0627	5.86418	40	137651.274	26.9	215655.6
1996	387656	7.57502	7.79299	40	124488.377	26.6	204313.5
1997	410320	6.47627	6.90958	40	122945.512	26.3	204599.5
1998	415731	8.01017	5.12128	35	178260.655	26.0	232001.7
1999	452700	3.0684	9.19125	35	120111.309	25.7	175699.6
2000	462147	3.64497	8.34261	35	132820.138	25.3	190266.5
2001	478965	3.21562	8.59145	35	132645.983	25.0	191962.7
2002	508069	3.71568	7.90718	35	150377.237	24.7	211578.2
2003	599593	3.8678	7.30788	35	184500.093	26	238050.9
2004	699689	5.72541	4.91013	35	247188.177	26	300739
2005	808901	4.23693	6.24833	35	261623.159	24	327074.1
2006	920317	6.42258	4.47735	30	359147.126	23	400797.8
2007	1201112	5.75624	6.86918	30	435502.008	22	483102.7

2008	1186953	8.66467	4.27723	30	472960.478	21	526511.3
2009	1323940	6.06383	5.77357	30	483531.718	21	537082.5
2010	1656617	8.98382	-0.5968	30	649560.91	21	703111.7
2011	1823050	8.53971	1.49895	30	691758.135	21	745308.9
2012	1827638	7.93439	2.47352	30	682892.968	21	736443.8
2013	1856722	6.1865	3.86599	30	667782.761	21	721333.6
2014	2035393	3.0514	6.98544	30	680124.974	21	733675.8
2015	2089865	1.78579	8.07828	30	679897.046	20	739397.9
2016	2263793	3.61179	5.84944	30	765970.597	20	825471.5

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[15]The tax rates of Estonia were available only for 14 years so we extrapolated the data for more 11 years.

Structural Breaks in the Indian Agriculture : A Painful Journey
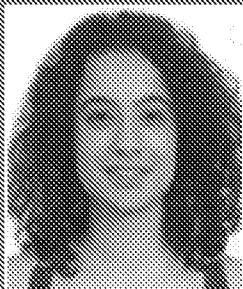
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Abstract

This paper econometrically analyses the relationship between the growth of the agriculture sector and Gross Domestic Product (GDP) of the Indian economy. It uses a vast time series data from 1950-51 to 2016-17 to conclude the momentousness of the agriculture sector in the Indian economy. Furthermore, it seeks to scrutinize the question "Whether various reforms induced structural breaks in the agriculture sector or not during the given period?" with the help of Chow Test and concludes the fact that the paramount sector experienced various unfavourable structural breaks and its share in GDP declined notably but on the other hand the sector remained as the highest employer.

Keywords: Growth of the Agriculture Sector, Gross Domestic Product, Time Series Data, Structural Break

INTRODUCTION

Few scientists think of agriculture as the chief or the model science. Many indeed do not consider it a science at all. Yet it was the first science - the mother of all sciences; it remains the science which makes human life possible; and it may be that, before the century is over, the success or failure of science as a whole will be judged by the success or failure of agriculture.'

-T.W, Schultz

Mentor

Mr. Aasheerwad Dwivedi
Assistant Professor
Department of Economics
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In today's world, agriculture is paramount to survival as the idea of food security is uppermost. Secondly, it plays a strategic role in the process of economic development of a country. It has made significant contributions to the economic prosperity of advanced countries and its role in the economic development of developing countries is of vital importance. It makes its contribution in the following ways : by providing food and raw material to non agriculture sectors, by creating demand for goods produced in non-agriculture sector, by earning valuable foreign exchange through the exports of agriculture products and most importantly by playing a central role in the lives of many people and being one of the most powerful tools to eradicate poverty from the world.

The agriculture sector,   diverse and extensive sector is the backbone of the Indian economy as it is a source of basic ingredients to the mankind, raw materials for the non-agriculture sector, exports of agriculture products and employment to a large number of people. It is pivotal for sustained growth and development of Indian economy. Since the inception of planning in 1951, Indian agriculture has travelled a long journey with too many peaks and valleys.

HISTORICAL GROWTH TRENDS OF INDIAN AGRICULTURE

Indian agriculture has been playing a decisive role in shaping the overall growth trajectories of the Indian economy since independence. 200 years of the British rule reduced India from its glory of one of the richest countries in the world to the poorest one. They left the most crucial sector of India in a state of despair and the conditions of the peasants were deteriorated. Thus, at the inception of planning in 1951, the primacy was given to the agriculture sector and the intend was also successfully achieved. But, despite that due to various challenges on its path such as shifting of the primacy from the agriculture sector to other sectors from second five year plan, years of severe droughts and many more exacerbated the conditions. This convinced India to reform its

Graph 1: Presentation of Growth in the Agriculture sector and GDP at factor cost
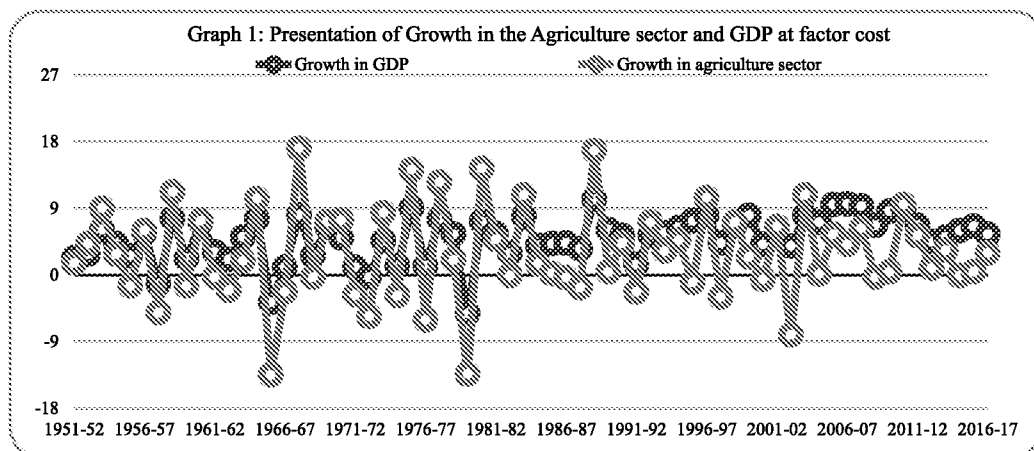
agriculture and thus green revolution was initiated in 1966 to relieve the plights. Accompanied with this phase came the phase of wider dissemination of technology period to achieve a sustained growth in the sector. Further, economic reforms initiated in the early nineties had a significant impact on the agriculture sector, primarily due to opening up of the economy to external competition, liberalization of trade and deregulation of input and other sub-sectors resulted into a major stagnation of public expenditure on agriculture infrastructure. Indeed, the sector has gone under various structural changes along with an anticipated decline in the contribution of the primary sector in Gross Domestic Product (GDP) drastically. In spite of this decline it is still the most important sector as half of India's population is still dependent on agriculture for the major source of their livelihood. Moreover, as a source of raw materials for a number of sectors and its share in the country's exports, the linkages of agriculture with economic growth and well being are well established.

REVIEW OF LITERATURE

There are several studies scrutinizing the impact of the agriculture sector on an economy. Some studies shed their light on the momentousness of the agriculture sector as being a major source of poverty reduction for instance Green Revolution in India raised farmers' incomes and led to

Graph 2:Poverty rates based on NSS data and the official

decline in rural poverty from 64 percent in 1967 to 50 percent in 1977 and to 34 percent in 1986 accompanied with a decline in urban poverty (World Bank's World Development Report, 2008). It presents the results of a study by University of California at Berkeley by

Graph 3:Course of structural transformation
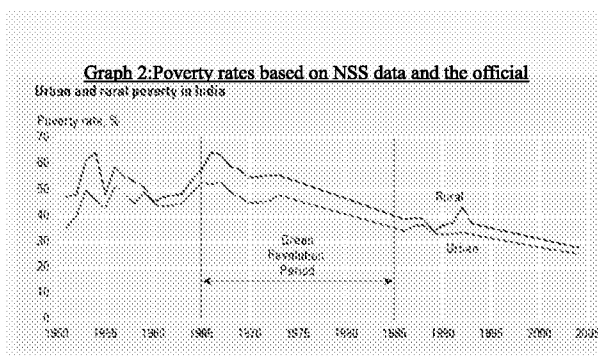
economists Ethan Ligon and Elisabeth Sadoulet who compared the effects of 1% increase in GDP in agriculture with non-agriculture on the expenditure of each decile of the income distribution. Cross country econometrics indicate that growth in agriculture sector has large benefits for poor and is at least three times as effective as the growth in any other sector in reducing poverty.
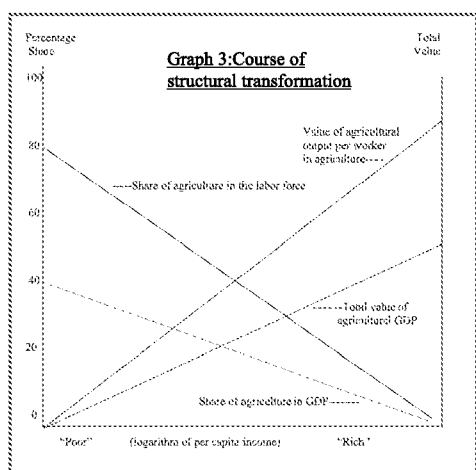
Further, it is believed that the central feature of the economic development is that at low levels of income, agriculture sector dominates both as

a share of GDP and as a share of employment. However as an economy grows, the share of agriculture sector both in GDP and employment declines. This is both a cause and an effect of economic development (see figure 3). It was observed that there are more lawyers in the United States than farmers, more dry cleaning establishments than farms (C. Peter Timmer, 2007). Also, over long historical periods, agriculture's role seems to evolve through four basic stages : the early "Mosher" stage when getting agriculture moving is the main policy objective (Mosher, 1966) ; the "Johnston-Mellor" stage when agriculture contributes to economic growth through a variety of linkages (Johnston and Mellor ,1961) ; the "T.W.Schultz" stage when rising agriculture incomes still fall behind those in a rapidly growing non-agricultural economy inducing serious political tensions (Schultz,1978) ; and the "D Gale Johnson" stage where labour and financial markets fully integrate the agricultural economy into the rest of the economy (Johnson, 1997 ; Gardner, 2002).

The agriculture sector, backbone of the Indian economy was deteriorated under the British regime as a result of which one of the chronic problems India faced following Independence was the insufficiency of food. Thus, the primary concern of the First Five Year Plans was agriculture. But, with the success of the First Five Year Plan, in the Second Five Year Plan there was a shift of priority from agriculture to industries and within industries to basic heavy industries. It emphasized the growth of heavy industries which would enable the economy to accelerate the rate of capital formation and therefore economic growth (Mahalanobis Growth Model, Prof.P.C.Mahalanobis). In the critique of it, an alternative model was formulated according to which a top priority was given to agriculture and other wage-goods industries for the growth of employment and income instead of to capital goods industries (Wage-Goods Model, Vakil and Brahmananda). As a consequence of the abandonment of the agriculture sector consecutively for several years, the sector was degenerated and thus in mid-1960's to combat the problem of food shortage Green Revolution was implemented. There are several studies investigating the impact of the Green Revolution on agriculture. However, there is roughly an equal split between their conclusions. Some studies cast a light on the positive impacts of Green Revolution stating that the green revolution didn't contribute much initially but in 1980's it led into increase in rural income and alleviated poverty substantially (Koichi Fujita, 2010) while some cast a light on the negative impacts of it stating that it led into increase in interpersonal inequalities, regional disparities etc (Kathryn Sebby, 2010). Further, in 1991 there was an initiation of economic reform which led to an additional deceleration in the total agriculture output (G S Bhalla, Gurmail Singh, 2009).

A number of studies have highlighted the various characteristics of Indian agriculture such as an important attribute of the Indian Agriculture is the presence of surplus labor within families. For instance, peasant families with five working members, each of whom was 20 percent idle. In that case, withdrawing one member would leave output unchanged,

indicating the presence of surplus labor (Amartya Sen). In support of this various studies also shed their light on surplus labour in Indian Agriculture such as by using panel data at the plot and farm level it was observed that over 20% of the Indian agricultural labour force is surplus if minimum farm scale is 20 acres (Andrew D. Foster and Mark R. Rosenzweig, 2010). Further, it has been highlighted that in the presence of increasing agriculture productivity, withdrawal of excess labor from agriculture will lead to an increase in industrial growth and GDP (W. Arthur Lewis, 1964). He famously wrote, "industrialization is dependent upon agriculture improvement; it is not possible to produce a growing volume of manufacturers unless agriculture production is growing simultaneously. This is also why industrial and agrarian revolutions always go together, and why economies in which agriculture is stagnant do not show industrial development."

METHODOLOGY

This paper uses an extensive time series data from 1950-51 to 2016-17 of the growth rates in Gross Domestic Product by economic activity at constant (2004-05) prices. To build up the research in the subsequent time series data regression analysis, the dependent variable is the growth rate of GDP at factor cost at constant (2004-05) prices and the primary independent variable is the growth rate of the agriculture sector at constant (2004-05) prices. The other independent variables of interest are the growth rate of the manufacturing sector and service sector at constant (2004-05) prices. The variables are concisely presented in the following table :

Table 1: Growth Rates at constant (2004-05) prices		
Variable	Data source	Expected sign of coefficient
Gross Domestic Product at factor cost (Dependent Variable)	Ministry of Statistics and Programme Implementation	-
Agriculture sector (Independent Variable)	Ministry of Statistics and Programme Implementation	Positive
Manufacturing sector (Independent Variable)	Ministry of Statistics and Programme Implementation	Positive
Service sector (Independent Variable)	Ministry of Statistics and Programme Implementation	Positive

Firstly, in order to examine the extent of the momentousness of the agriculture sector in the Indian economy and compare it with the manufacturing and service sector, correlation, a statistical tool to scrutinize how strongly each independent variable is related to the dependent variable is calculated. A positive correlation indicates the extent to which the pair of variables increase or decrease in parallel while a negative correlation indicates the extent to which one variable increases as the other decreases.

Secondly, to further analyze the relationship between the explained or dependent variable (Y) and the independent or explanatory variables (X) Ordinary Least Squares ^1 regression is undertaken. The general expression of the model can be written as :

$$Y_i = \beta_1 + \beta_2 X_i + e_i \quad \text{(sample regression function)}$$
$$\text{Where : } Y_i \text{ is the dependant variable}$$
$$X_i \text{ is the independent variable}$$
$$e_i \text{ is the residual term}$$

The sample regression functions obtained in the paper are as follows :

$$GDP = \beta_1 + \beta_2 \text{ Agriculture} + e_i$$
$$GDP = \beta_1 + \beta_2 \text{ Manufacturing} + e_i$$
$$GDP = \beta_1 + \beta_2 \text{ Service} + e_i$$

In the above regression model the following parameters are analysed :

- The goodness of fit of a regression line is measured by coefficient of determination, r^2 which measures the percentage of total variation in Y explained by the regression model.

- In order to check that whether the independent variable is significant or not i.e. the independent variable has an effect on dependent variable or not , the following hypothesis is made :

Null Hypothesis , H_0 : Independent variable is insignificant

Alternative Hypothesis , H_1 : Independent variable is significant

If the |t-ratio| is greater than t-critical then the null hypothesis is rejected and hence the independent variable is significant.

- In order to check whether the regression equation is relevant or not F statistic is calculated and the following hypothesis is made :

Null Hypothesis , H_0 : Model is irrelevant

Alternative Hypothesis , H_1 : Model is relevant

If the F calculated is greater than F-critical then the null hypothesis is rejected and hence model is relevant.

Further, in order to test whether various reforms like green revolution , liberalisation etc brought a structural change in agriculture sector or not Chow Test, a statistical and econometric test by Gregory Chow to check whether the coefficients in two linear regressions on different data sets are equal or not is conducted. In order to conduct the test the following hypothesis is made :

Null Hypothesis, H_0 : There is no structural change

Alternative Hypothesis, H_1 : There is a structural change

Then we calculate -

$$F = \frac{((RSS_{RESTRICTED}-(RSS_{UNRESTRICTED}))/k}{(RSSUNRESTRICTED)/(N_1+N_2-2k).}$$

If F calculated is greater than F statistic then the null hypothesis is rejected and hence a structural change is concluded.

DISCUSSION OF RESULTS

Table 2 : Correlation

Dependent Variable (Y)	Independent Variable (X)	Correlation	Regression Equation	r^2
GDP At Factor Cost	Agriculture Sector	0.79	Y=0.3877X+ 3.3369+e	0.6279
GDP At Factor Cost	Manufacturing Sector	0.48	Y=2.818+ 0.387X+e	0.2337
GDP At Factor Cost	Service sector	0.64$\square^2$	Y=0.8704X- 0.3531+e	0.4083

*Refer appendix for the entire output table

The results shown in the table explains that strongest uphill (positive) linear relationship exists between GDP and the agriculture sector. Also, all the independent variables have significant impact on the GDP and all the regression equations are relevant but, r^2 is highest between GDP and the agriculture sector that implies approximately 63% of total variations in the GDP are explained by the variation in the agriculture sector.

Based on the above results it would be safe to conclude that the Agriculture sector has a significant impact on the GDP of India and is the most important sector in the Indian economy. In order to examine the structural changes in the agriculture sector the data is divided into several periods as follows:

Table 3 : Periods

Pre Green Revolution	1951-52 To 1965-66
First Wave Of Green Revolution	1966-67 To 1979-80
Second Wave Of Green Revolution / Wider Technology Dissemination	1980-81 To 1990-91
After Liberalization	1991-92 To 2016-17

- **PRE GREEN REVOLUTION**

  Agriculture has always played a significant role in the Indian society. India was a self-sufficient economy and was largely dependent on the agriculture sector at the start of the British rule. However, Britishers' policies had a major effect on the agriculture sector and it was left backward in every aspect on the eve of Independence in 1947. The commercialization of agriculture, introduction of new land reforms (zamindari system), use of primitive technology etc lead to stagnation, famines and scarcities.

  Thus after independence, the government launched the First Five Year Plan (1951-56) focusing on agriculture, price stability, power and transport. It was a successful plan as the target growth was 2.1% while the actual growth rate was 3.6%. But, with the Second Five Year Plan (1956-61) the focus was shifted from the agriculture sector, as a result, there was a shortfall in the production of all commodities except sugar cane and tea along with that an increase in price level. Besides that, an increase in population from 36.1 crore in 1951 to 41.9 crore in 1961 increased the pressure on the agriculture sector further worsened the situation and India was not able to meet its food demand. As a result of all the above-stated series of activities food grains were imported which were cut in the First Five Year Plan. Now with the Third Five Year Plan (1961-66), the priority was again shifted to the agriculture sector but in spite of that, the plan failed due to a series of crisis such as - Chinese aggression (1962), Indo-Pak war (1965) and two successive years of severe drought. All this further exaggerated the situation leading to inflation, food shortage (decline in production of food grains by 19%) and strained foreign exchange.

- **FIRST WAVE OF GREEN REVOLUTION**

  In 1966 government adopted a new agricultural policy to combat food shortage. It emphasised technological innovation such as high yielding variety (HYV) seeds, tractors, pump sets etc. This period is referred as the First Wave of Green Revolution.

  In order to examine whether green revolution brought a structural change or not, Chow test is conducted and the results are as follows:

Table 4:Output

Model	Equation	RSS	Number of Observations
Restricted Model (1951-51 TO 1979-80)	$Y = 2.495 + 0.439X_i + e_i$	30.966	29
Unrestricted Model (1951-52 TO 1965-66)	$Y = 2.626 + 0.469X_i + e_i$	11.965	15
Unrestricted Model (1966-67 TO 1979-80)	$Y = 2.331 + 0.423X_i + e_i$	17.079	14

*Refer appendix for the entire output table.

Null Hypothesis , H_0 : There is no structural change

Alternative Hypothesis , H_1 : There is a structural change

$$F = \frac{((RSS_{RESTRICTED}-(RSS_{UNRESTRICTED}))/k}{(RSSUNRESTRICTED)/(N_1+N_2-2k).}$$

$$= 0.826597689686636 < F_{0.01,2,25}$$

The null hypothesis is not rejected at 1% level of significance. Hence there is no structural change from the period of pre green revolution to the period of the first phase of the green revolution.

This happened because the first phase of the green revolution didn't contribute much to the development of the economy as it was only confined to a few areas such as Punjab and was confined to only some crops like wheat. Also, during this period there was a severe drought in 1979 which adversely affected the production in Eastern Rajasthan, Punjab, Himachal Pradesh, and Uttar Pradesh and resulted in the decline of production of food grains by 17.5% against 19% in 1965-66.

Thus despite the introduction of green revolution, it didn't bring a favourable change in the agriculture sector and the share of agriculture sector kept on declining during the period.

- **SECOND WAVE OF GREEN REVOLUTION / WIDER TECHNOLOGY DISSEMINATION PERIOD**

The period from 1980-81 to 1990-91 is referred to as the wider technology dissemination period. The area under High Yielding Varieties (HYV) had a downfall in 1979-80 (38.4 million hectares) but the area increased in this period from 45.3 million hectares in 1980-81 to 63.9 million hectares in 1990-91. Various steps were taken to increase the use of HYV seeds in irrigated areas such as diffusion of tube wells. Also in 1983, the use HYV was also increased to paddy.

Agriculture credit is an indispensable part of the agriculture sector as the modern farm technology is costly and the personal resources of the farmers are inadequate. It increases the efficiency and profitability of the agriculture sector. During the period an important development took place which was the establishment of National Bank For Agriculture And Rural Development (NARBAD) with the motto of providing short-term credit to agriculture, rural small scale industries etc in order to promote integrated rural development. This led to an increase in the agriculture credit and in 1982 it sanctioned Rs1019 crore.

The growth in the agriculture sector also depends on effective utilization of existing irrigation facilities and creation of new potential. Each year marked the creation of

additional irrigation facilities and by 1990-91 the irrigation potential reached 82.8 million hectares.

During the period scheme for free distribution of improved varieties of seeds of cereals, oilseeds and pulses to farmers in form of mini kits were also started and it proved very helpful. In 1985, crop insurance was implemented by General Insurance Corporation (GIC) on behalf of the Central and State government. It provides financial support to insured farmers in event of a crop failure.

In order to examine whether wider technology dissemination brought a structural change or not, Chow test is conducted and the results are as follows:

Table 5: Output

Model	Equation	RSS	Number of Observations
Restructed Model (1966-67 TO 1990-91)	$Y_i = 2.968 + 0.401X_i + e_i$	40.188	25
Unrestricted Model (1966-67 TO 1979-80)	$Y_i = 22.331 + 0.423X_i + e_i$	17.079	14
Unrestricted Model (1980-81 TO 1990-91)	$Y_i = 4.144 + 0.306X + e_i$	8.181	11

*Refer appendix for the entire output table.

Null Hypothesis , H_0 : There is no structural change

Alternative Hypothesis , H_1 : There is a structural change

$$F = \frac{((RSS_{RESTRICTED} - (RSS_{UNRESTRICTED}))/k}{(RSSUNRESTRICTED)/(N_1 + N_2 - 2k).}$$

$$= 6.20435 > F_{0.01,2,21}$$

So, the null hypothesis is rejected at 1% level of significance. This means that as the economy moved from the first face of the green revolution to the second it experienced structural change but not a favorable one as in spite of all the pros experienced during the period, the agriculture sector suffered from many problems which resulted in its decline. It experienced poor rainfall for four periods in succession after last good monsoon in 1983-84. The major drawback of HYV seeds experienced during the period was that the increase in output was concentrated in a few areas having good infrastructure as a result it widened regional disparities. This period experienced a rise in agriculture credit but at the same time it faced the problem of increasing overdue which has slowed down the credit expansion by eroding the lending capacity. Also, Command Area Development Programme established to achieve optimal utilization of irrigation potential lagged behind the completion of main works of the project like the construction of field channels and drains which further widened the gap between the utilization and creation.

- **AFTER LIBERALIZATION**

On 24th July 1991, Manmohan Singh, the minister of finance, facing a balance of payment crisis, liberalized the economy by scrapping licensing and opening up to traders and investors. The liberalization had both positive and negative impacts on the agriculture sector. It led to an increase in horticulture output and diversification of agriculture. However, as compared to the growth in the other sectors, the primary sector was left behind. This period marked the shift of the focus from the agriculture sector to other sectors. There was an increase in irrigation facilities but then there was persistent underutilization of potential.

Agriculture credit increased but the problem of overdue prevailed. The stagnation in investment along with the downscaling of production due to fragmentation excessively worsened the situation. All this has led to an increase in farmer suicides (12% of total suicides in the country in 2000). In order to check the structural change the following output is obtained:

Table 6: Output

Model	Equation	RSS	Number of Observations
Restricted Model (1980-81 TO 2016-17)	$Y_i=5.343+0.254X_i+e_i$	91.744	37
Unrestricted Model (1980-81 TO 1990-91)	$Y_i=4.144+0.306X+e_i$	8.181	11
Unrestricted Model (1991-92 TO 2016-17)	$Y_i=5.768+0.247X_i+e_i$	68.053	26

*Refer appendix for the entire output table.

Null Hypothesis , H_0 : There is no structural change

Alternative Hypothesis , H_1 : There is a structural change

$$F = \frac{((RSS_{RESTRICTED}-(RSS_{UNRESTRICTED}))/k}{(RSSUNRESTRICTED)/(N_1+N_2-2k).}$$

$$= 3.3566706286 > F_{0.05,2,33}$$

The null hypothesis is rejected at 5% level of significance. Thus an unfavorable structural change is observed due to the reasons stated above and hence as a consequence of this structural change it has been observed a deceleration of output.

CONCLUSION

The paper endeavored to firstly show that agriculture sector has the largest impact on the GDP of Indian economy i.e. it is the most crucial sector of the Indian economy and the sector plays an important role in the lives of a large number of people. After the Independence, it contributed around 45% in GDP. It has made substantial progress in

terms of production and productivity in the beginning of the Planning process. The successive Five Year Plans have directly or indirectly emphasized growth in the agriculture sector, as a result of which food grains production increased a lot. However, the challenges are far from over. With the help of the Chow test and the trends experienced in the sector, it has been concluded that the sector has experienced various unfavourable structural breaks and as a consequence its share in GDP has continuously declined. In 2016, the sector contributed only 17% in GDP. The figure below indicates that initially at low levels of income, agriculture sector dominated as a share of GDP and as the economy moved towards middle levels of income per capita, the share of agriculture sector in GDP has declined.

Graph 4: Share of Agriculture sector in GDP
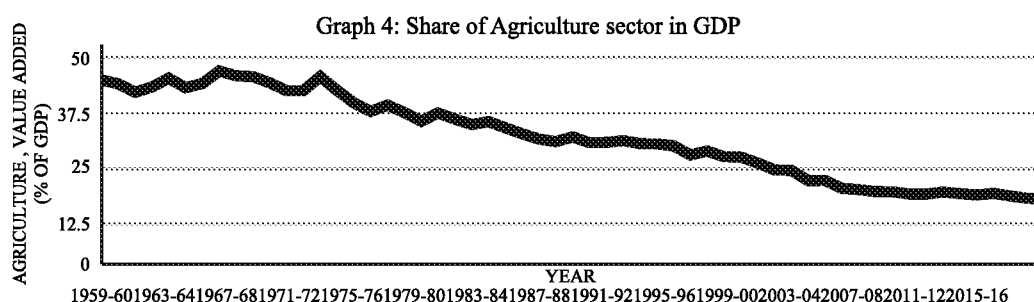
However, the conclusion is juxtaposed with the fact that the share of the sector in employment has not declined by that much proportion and it still dominates in employment and hence, it accounts for a large amount of labor surplus.

Given this unpleasant situation it is recommended that the agriculture sector can play an important role to increase the GDP of the economy by firstly increasing the productivity in the agriculture sector through various measures like increasing the investment in research and development, effective coordination and monitoring of ongoing agriculture and allied sectors programmes, pooling of many landholding for economies of scale, increasing the utilisation of irrigation facilities to reduce the dependence on monsoons etc and secondly by removing excess labour from agriculture sector without reduction in agriculture output which would lead into an increase in the industrial sector and hence an increase in total GDP.

END NOTES

☐[1] Ordinary least squares (OLS) states that the residual sum of squares (RSS), $\sum e_i^2$ is as small as possible.

☐[2] The correlation is calculated taking into consideration the period from 1950-51 to 2012-13 but if we consider that period for all the other sectors then also Agriculture sector has the highest correlation with GDP at factor cost.

APPENDIX

Graph 5 : Regression of GDP on Agriculture sector

y = 0.3877x + 3.8869
R² = 0.6279

GDP AT FACTOR COST

AGRICULTURE

Graph 6:Regression of GDP on Manufacturing sector

y = 0.3874x + 2.818
R² = 0.2337

GDP AT FACTOR COST

MANUFACTURING

Graph 7:Regression of GDP on Service sector

$y = 0.8704x - 0.3531$
$R^2 = 0.4083$
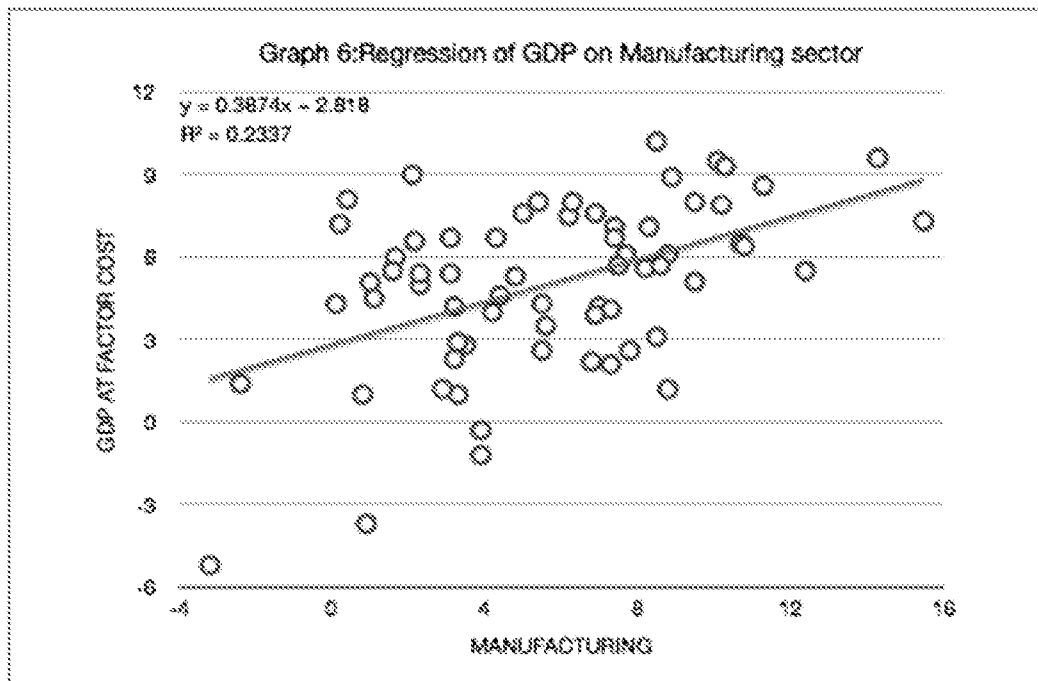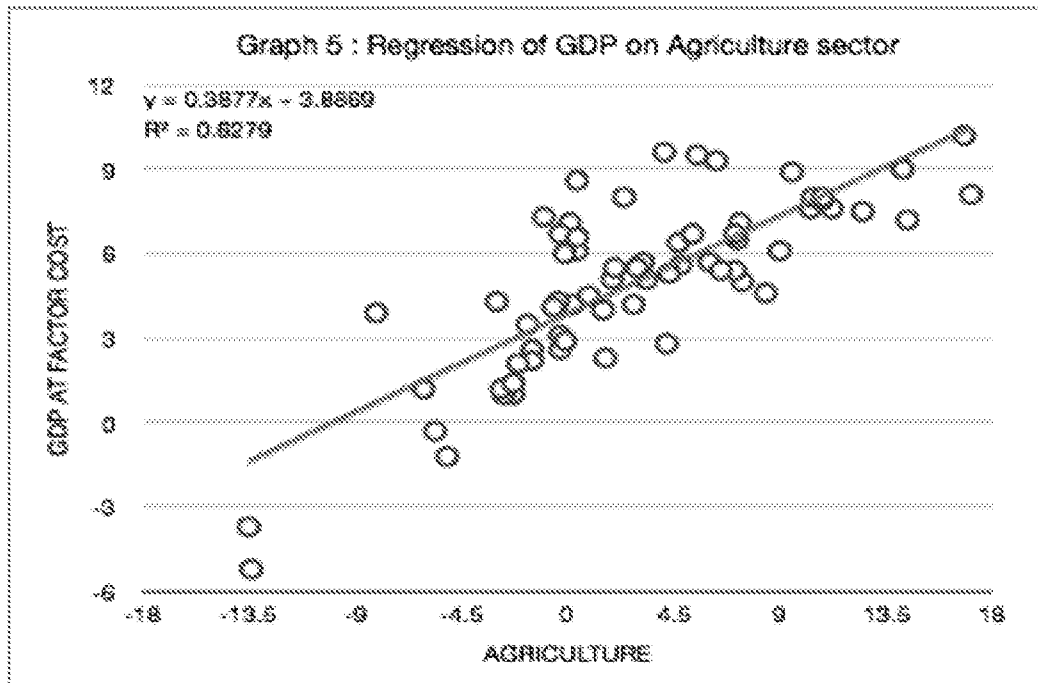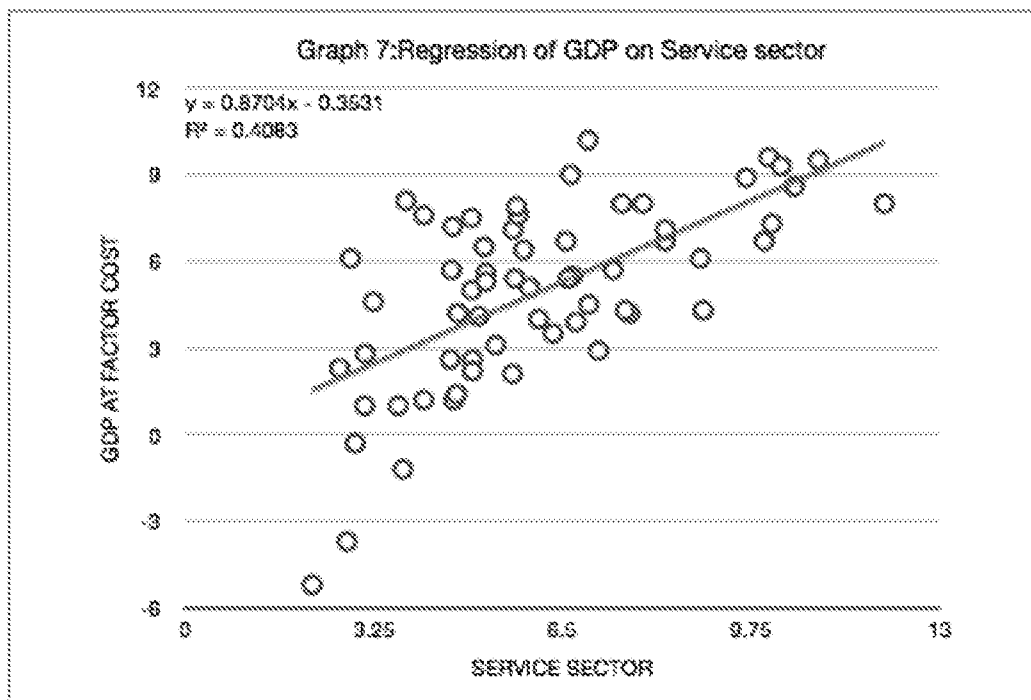
Table 7 : Regression of GDP on Agriculture sector

	Coefficients	Standard Error	t stat	Significance
Intercept	3.886907	0.2563883	15.16	Yes
Agriculture	0.3876924	0.0373043	10.39	Yes
	Regression	Statistics		
R square			F(1,64)	Relevant
0.6279			108.01	Yes

Table 8 : Regression of GDP on Manufacturing sector

	Coefficients	Standard Error	t stat	Significance
Intercept	2.817994	0.5990348	4.70	Yes
Manufacturing	0.3873508	0.087667	4.42	Yes
	Regression	Statistics		
R square			F(1,64)	Relevant
0.2337			19.52	Yes

Table 9 : Regression of GDP on Service sector

	Coefficients	Standard Error	t stat	Significance
Intercept	-0.3530581	0.8834019	-0.40	Yes
Service	0.8703981	0.1352602	6.43	Yes
	Regression	**Statistics**		
R square			F(1,64)	Relevant
0.4083			41.41	Yes

Table 10 : Output Summary for Period from 1951-52 to 1965-66

	Coefficients	Standard Error	t stat	Significance
Intercept	2.625983336	0.260251591	10.09017207	Yes
Agriculture	0.468985147	0.039512873	11.86917357	Yes
	Regression	**Statistics**		
Multiple R	0.956826574		F	Relevance
R square	0.915517093		140.8772811	Yes
Adjusted R square	0.909018408			
	Anova	**Table**		
	SS	**df**	**MS**	
Regression	129.6640756	1	129.6640756	
Residual	11.96525777	13	0.9204044438461	
Total	141.6293333	14	10.11638095	

Table 11 : Output Summary for Period from 1966-67 to 1979-80

	Coefficients	Standard Error	t stat	Significance
Intercept	2.331373762	0.332840219	7.004483326	Yes
Agriculture	0.423055262	0.037547734	11.26713162	Yes
	Regression	**Statistics**		
Multiple R	0.955843562		F	Relevance
R square	0.913636915		126.9482546	Yes
Adjusted R square	0.906439991			

	Anova	Table		
	SS	df	MS	
Regression	180.68932	1	180.68932	
Residual	17.07996571	12	1.42333047583333	
Total	197.7692857	13	15.2130219769231	

Table 12 : Output Summary for Period from 1980-81 to 1990-91

	Coefficients	Standard Error	t stat	Significance
Intercept	4.144286686	0.35988771	11.51549935	Yes
Agriculture	0.306134244	0.046699655	6.555385494	Yes
	Regression	Statistics		
Multiple R	0.909303814		F	Relevance
R square	0.826833426		42.97308	Yes
Adjusted R square	0.807592696			
	Anova	Table		
	SS	df	MS	
Regression	39.06412107	1	39.06412107	
Residual	8.181333477	9	0.909037053	
Total	47.24545455	10	4.724545455	

Table 13 : Output Summary for Period from 1991-92 to 2016-17

	Coefficients	Standard Error	t stat	Significance
Intercept	5.76877533	0.397015102	14.53036747	Yes
Agriculture	0.247070213	0.075787136	3.260054749	Yes
	Regression	Statistics		
Multiple R	0.554002161		F	Relevance
R square	0.306918395		10.62796	Yes at 1% l.o.s
Adjusted R square	0.278039995			
	Anova	Table		
	SS	df	MS	

Regression	30.13619914	1	30.13619914
Residual	68.05341625	24	2.8355590104166
Total	98.18961538	25	3.9275846152

Table 14 : Output Summary for Period from 1951-52 to 1979-80

	Coefficients	Standard Error	t stat	Significance
Intercept	2.495398445	0.207958593	11.99949665	Yes
Agriculture	0.43905076	0.026764176	16.40441898	Yes
	Regression	**Statistics**		
Multiple R	0.953318477		F	Relevance
R square	0.908816118		269.104962	Yes
Adjusted R square	0.905438937			
	Anova	**Table**		
	SS	df	MS	
Regression	308.6327	1	308.6327	
Residual	30.96592065	27	1.14688595	
Total	339.5986207	28	12.128522167857	

Table 15 : Output Summary for Period from 1966-67 to 1990-91

	Coefficients	Standard Error	t stat	Significance
Intercept	2.967632	0.290375	10.21998	Yes
Agriculture	0.400799	0.034673	11.55939	Yes
	Regression	**Statistics**		
Multiple R	0.92366		F	Relevance
R square	0.853147		133.6194	Yes
Adjusted R square	0.846762			
	Anova	**Table**		
	SS	df	MS	
Regression	233.4736	1	233.4736	
Residual	40.18797	23	1.7473030434782	
Total	273.6616	24	11.402566666666	

Table 16 : Output Summary for Period from 1980-81 to 2016-17

	Coefficients	Standard Error	t stat	Significance
Intercept	5.34314638	0.322048152	16.59114124	Yes
Agriculture	0.254109404	0.052987293	4.795666875	Yes
	Regression	Statistics		
Multiple R	0.629710483		F	Relevance
R square	0.396535293		22.99842077	Yes
Adjusted R square	0.379293444			
	Anova	Table		
	SS	df	MS	
Regression	60.28446871	1	60.28446871	
Residual	91.74353429	35	2.621243836857	
Total	152.028003	36	4.223000083333	

Table 17 : Growt Rates in Gross Domestic Product by Economic Activity at Constant (2004-05) Prices

Period	GDP at Factor Cost	Agriculture	Manufacturing	Service
1951-52	2.3	1.6	3.2	2.67
1952-53	2.8	4.2	3.5	3.11
1953-54	6.1	9	7.7	2.86
1954-55	4.2	2.8	7	4.71
1955-56	2.6	-1.5	7.8	4.96
1956-57	5.7	6	7.5	4.60
1957-58	-1.2	-5.1	3.9	3.76
1958-59	7.6	11.2	5	4.12
1959-60	2.2	-1.5	6.8	4.96
1960-61	7.1	7.3	8.3	5.66
1961-62	3.1	-0.3	8.5	5.36
1962-63	2.1	-2.1	7.3	5.65
1963-64	5.1	1.9	9.5	5.94

1964-65	7.6	10.3	6.9	5.75
1965-66	-3.7	-13.5	0.9	2.80
1966-67	1	-2.3	0.8	3.1
1967-68	8.1	17.1	0.4	3.81
1968-69	2.6	-0.3	5.5	4.58
1969-70	6.5	7.2	10.7	5.16
1970-71	5	7.4	2.3	4.95
1971-72	1	-2.7	3.3	3.68
1972-73	-0.3	-5.6	3.9	2.94
1973-74	4.6	8.4	4.4	3.25
1974-75	1.2	-2.8	2.9	4.12
1975-76	9	14.2	2.1	6.65
1976-77	1.2	-6.1	8.8	4.64
1977-78	7.5	12.5	6.2	4.94
1978-79	5.5	2	12.4	6.68
1979-80	-5.2	-13.4	-3.2	2.20
1980-81	7.2	14.4	0.2	4.62
1981-82	5.6	4.8	8.2	5.19
1982-83	2.9	-0.1	3.3	7.13
1983-84	7.9	10.8	10.2	5.72
1984-85	4	1.5	4.2	6.10
1985-86	4.2	0.2	3.2	7.67
1986-87	4.3	-0.4	5.5	7.59
1987-88	3.5	-1.7	5.6	6.35
1988-89	10.2	16.8	8.5	6.95
1989-90	6.1	0.4	8.8	8.88
1990-91	5.3	4.3	4.8	5.19
1991-92	1.4	-2.3	-2.4	4.69
1992-93	5.4	7.1	3.1	5.69
1993-94	5.7	3.2	8.6	7.38
1994-95	6.4	4.7	10.8	5.84

1995-96	7.3	-1.0	15.5	10.11
1996-97	8	10.4	9.5	7.53
1997-98	4.3	-3.0	0.1	8.93
1998-99	6.7	7.1	3.1	8.28
1999-00	8	2.4	5.4	12.05
2000-01	4.1	-0.6	7.3	5.07
2001-02	5.4	6.5	2.3	6.61
2002-03	3.9	-8.1	6.9	6.74
2003-04	8	10.8	6.3	7.89
2004-05	7.1	0.1	7.4	8.28
2005-06	9.5	5.5	10.1	10.91
2006-07	9.6	4.1	14.3	10.06
2007-08	9.3	6.3	10.3	10.27
2008-09	6.7	-0.3	4.3	9.98
2009-10	8.6	0.4	11.3	10.50
2010-11	8.9	9.5	8.9	9.67
2011-12	6.7	5.3	7.4	6.57
2012-13	4.5	0.9	1.1	6.96
2013-14	5.08333333333333	3.36	1	N/a
2014-15	6	-0.12	1.66	N/a
2015-16	6.58333333333333	0.42	2.16	N/a
2016-17	5.5	2.94	1.58	N/a

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Abstract

Recent banking scams in Indian banking sector have questioned the trust, credibility and the repute of Indian banks. Indian economy which stood firmly even during sub prime mortgage crisis of 2007-09, is grappling with the banking sector scams. Through our analytical study we endeavor to outline the problems infested in Indian banking sector. Meanwhile it is also acknowledged that to reinstate the world's trust and bring back the pride in Indian banking system, a more decentralized and transparent structure is the need of the hour.

Through our study we propose a "Model X"- a process for the robust and efficient functioning of crypto banks, wherein, the adoption of "Model X" would empower the Indian banks to bury the ghost of the past. Through our research we not only identify the working of the "Crypto Banks" but also highlighted that crypto banks hold immense potential for revolutionizing the Indian banking industry.

Keywords: Growth of the Agriculture Sector, Gross Domestic Product, Time Series Data, Structural Break

INTRODUCTION

"Bitcoin is a remarkable cryptographic achievement having the ability to create something that is not duplicable in the digital world and has enormous value."

-Eric Schmidt, Former CEO, Google

The last decade has seen the rise of a disruptive force called Blockchain. The disruption has impacted over 50

industries and has totally changed the outlook. Companies like IBM, Microsoft and Amazon are the ones who are betting big on the blockchain. On the flipside, Cryptocurrency major Bitcoin has garnered interest throughout the world. Large scores of the people around the globe, irrespective of their country are investing heavily while the governments are battling the power struggle. Countries like China, Sweden, Turkey, Finland have banned cryptocurrency trading as well as the Initial Coin Offering (ICOs) which at one point amounted up to 75% of the total cryptocurrency in circulation. While countries like England, Venezuela, Zimbabwe and Switzerland have already launched the prototype of their own cryptocurrencies. Amid this, India is still toying with the idea of cryptocurrency.

Reports indicate that Reserve Bank of India and NITI Aayog aim to build a proof-of-concept (PoC) of the modus operandi of Indian counterpart of cryptocurrency completed by the end of 2018 and launch a government-backed crypto coin, proposed as 'Lakshmi'. Along with this, Government is also working out while the cost and benefits of the blockchain ledger in the wake up of several hacking and duping scams in Bitcoin and Ethereum. The Government has still not made its stance clear and hence creating an ambiguous environment not only for crypto traders but for businesses as well.

OBJECTIVE OF STUDY

The study is primarily undertaken to accomplish the following objectives:
* To identify the prominent issues in the current banking structure
* To suggest the possible ways to tackle the problems faced by the Indian Banking sector
* To analyze the potential of cryptocurrency in Indian banking system.

PROBLEM STATEMENT

As per *Global Fraud Study 2016,* prepared by *Association of Certified Fraud Examiners*. Indian banking is one of the most corrupted sectors of the Indian economy. In the last few years, the Indian banking has lost more than 75000 crores of money in frauds alone and this amount is increasing with every year. Earlier banking frauds were just limited to fake currency, forged cheques, and advancing loans to parties without checking their creditworthiness. But as the time passed, the level of the frauds became murkier and penetrated widely in the system. With the advent of technology, cybercrime has become the new menace of the day. Off-shore accounts, cybercrime, benami accounts, nepotism and KYC violation induce for the frauds in the current period. As they increase with each day, it is important to address the issue on a priority basis as the mounting burden of debt on banking sector can wreak havoc on Indian economy.

Figure 1: Reasons for the occurrence of Frauds in Indian Banks (2007-2014)

Lack of Fraud Risk Framework — 20%
Difficult Business Scenario — 12%
New Tech/Channels — 14%
Lack of tools to identify red flags — 14%
Pressure to meet targets — 18%
Lack of Oversight by Management — 22%
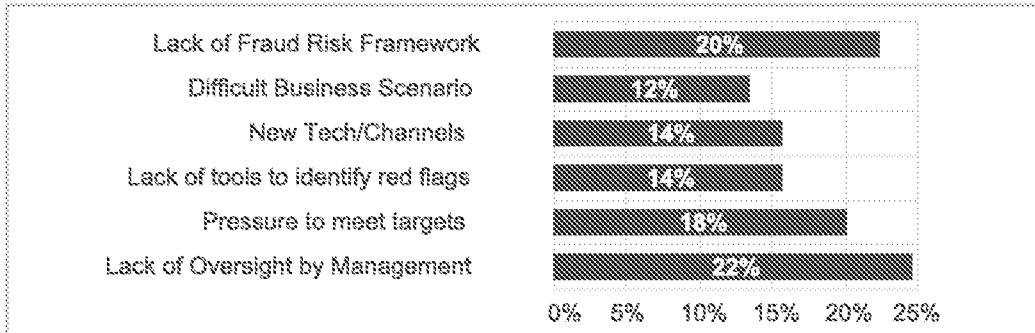
Source: PWC India and Assocham (2014)

Most of the frauds detected in India are detected due to a customer complaint and internal whistleblower. It is alarming to see that most of the banks lack a framework to detect frauds and hence around 17% cases are detected due to accidents, third party information and review by Law Enforcement agency such as National Investigation Agencies (NIA) and Enforcement Directorate (ED). Clearly going forward, banks need to adopt strong international reforms & measures to tackle frauds. As per the RBI, bank frauds can be classified into three board categories: Deposit related frauds, advance related frauds, and service related frauds. But with the evolution of CTS (Cheque truncation system) by commercial banks, use of electronic transfer of funds have helped in significantly reducing the number of deposit related frauds. Nowadays, advance related frauds have emerged to be a major challenge thus posing a serious problem.

Figure 2: Group wise summary of bank fraud cases (Mar 2010- Mar 2013)

Bank Group Wise No. of Cases of F
17.53%
27.31%
55.16%
 Nationalised Banks including SBI Gr
 Private Sector Banks
 Foreign Banks

Bank Group Wise Total Amount Involv Frauds
4.13%
12.87%
83.01%
 Nationalised Banks including SBI Gr
 Private Sector Banks
 Foreign Banks
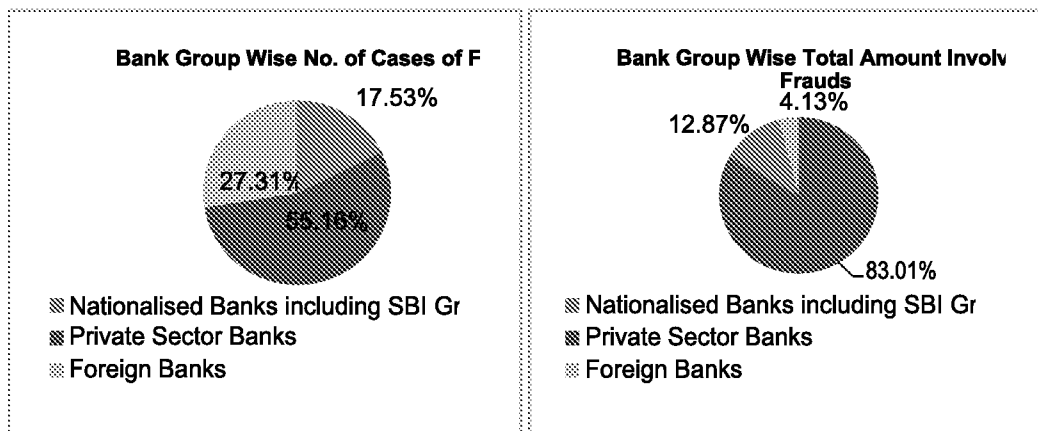
Source: Chakrabarty (2013)

Figure 3: Group wise summary of advance related fraud cases
(Mar 2010- Mar 2013)
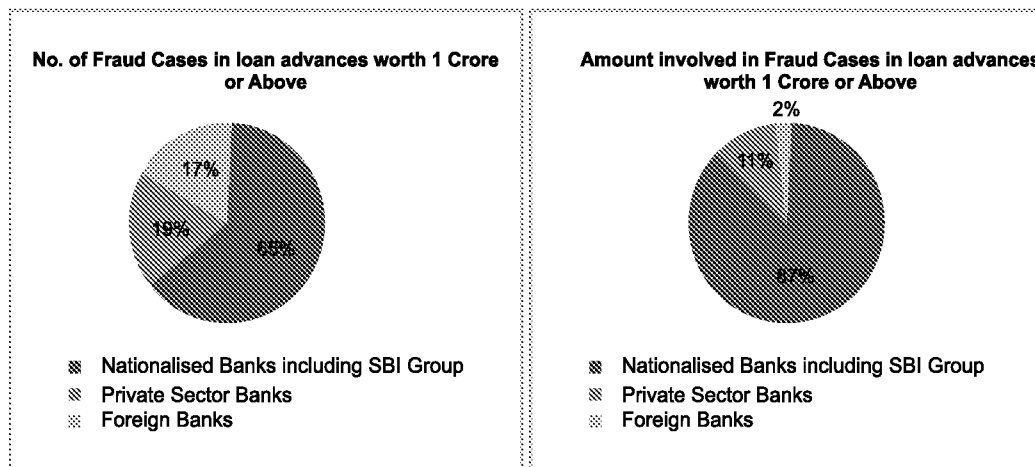
Source: Chakrabarty (2013)

Another thing which poses a threat to Indian banks is non-performing assets. Most of the challenges faced by banks go hand in hand with each other and leads to another. So, frauds are one of the reasons for NPAs. These are those assets which due to some reasons will not generate any further income for the lender because of any kind of default by the borrower. As per RBI, Indian banks suffer from an NPA of more than 7.5 lakh crores of money thus posing a serious problem for Indian banks. India has second highest NPA ratio in the major economy of the world after Italy at 9.6%. This needs to be reduced otherwise it can hinder the growth of the economy. The Government has come up with new policies like Financial Resolution and Deposit Insurance Bill, Insolvency Bankruptcy Code, Securitization and Reconstruction of Financial Assets and Enforcement of Securities Interest Act and some other bills to curb this problem. But as we go with the facts, these policies haven't proved to be productive enough.

Recent frauds like PNB Scam, ICICI Scam, and other frauds have questioned the effectiveness of these policies. Both fraud and NPA give birth to another challenge which haunts the efficiency of the Indian banking. Following are the latest ratings published by CARE ratings which shows that India is among the top five countries in the world with worst NPA ratio. Now NPA always has been an alarming situation and government has been on its toes to tackle this. They have come up with numerous policies and corrective measures over the year but as per the statistics it proves to all be in vain.

Figure 4: NPA in Major Economies, Nov 2016
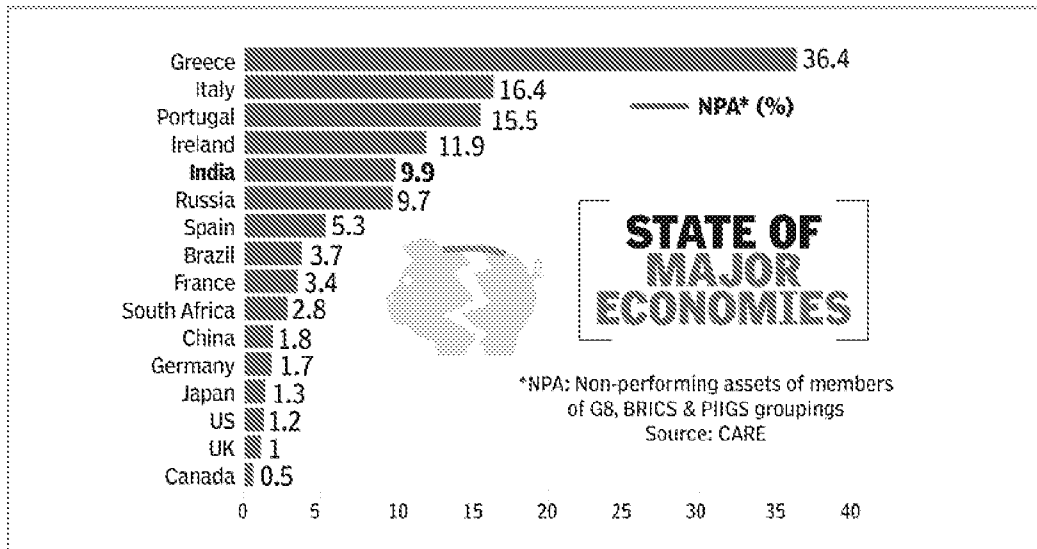
Source: Care Ratings (2016)

Now there are many reasons for the spurt of these inefficiencies in the Indian banking. One reason often leads to another reason which makes it a vicious cycle which can act as cancer and if not treated early then the patient would die. So, some of the reasons for these problems are inefficient management, corporate governance, lack of efficient controls etc. Till now the government has taken various steps to address these problems. The government formed various committees like fraud monitoring cell, a special committee of board members and have come up with new laws and rules like Indian Bankruptcy Code, Benami Act, Basel 3 and some more laws to quarantine Indian banking sector from these problems. But as per the records till now these policies are not able to make a difference. So, it is important to come up with a new structure which can change the basic problems which prove to a mosquito breeding ground for these challenges. Hence, these inefficiencies are forcing the Indian banks to adopt new technology, which is decentralized, transparent and cost-effective, which is – *"Blockchain"*.

RESEARCH METHODOLOGY

The research methodology employed in this study is descriptive in nature. The conceptual framework of this paper is developed by comparing the working of the crypto bank with the current banking structure.

Through the analytical framework: the study will show how fraud and NPA related problems can be tackled. The study also employs cost-benefit analysis by using the data

from accredited reports related to digital and cash payments and consequently analyze the benefits.

- **MODEL X – The Future of Bank**

Core banking system (CBS) is a storehouse which enables all banking transactions - holding deposits, lending, payments etc. A new age crypto bank needs a robust core. By creating a single Blockchain node for all the banks and then replacing the deposits system with the tokenized system, a new Core Blockchain-banking system (CBSS) can be created.

In between April and December 2016, over 3,500 cases of fraudulent transactions were reported involving Rs 177.50 billion, which were facilitated by 450 private and public-sector employees. Public Sector Banks in India lost at least 227.43 billion (Rs 22,743 crore) owing to fraudulent banking activities between 2012 and 2016, according to an IIM-Bangalore study. According to data released by the apex bank for the first nine months of FY17, approximately 455 cases of fraud transactions - each of Rs 1,00,000 or above - were detected at ICICI Bank; 429 at State Bank of India, 244 at Standard Chartered Bank and 237 at HDFC Bank. So, to tackle such a scenario and ensure that a scam – internal or external – never occur again, decentralization is not a matter of choice but the only option.

Let's understand this through an example of any bank say Punjab National Bank.

Punjab National Bank has a network of 6,937 branches over 764 locations and a band of 10,681 ATMs. It's impossible for a committee or says some prominent branches to keep an eye on every branch or its personnel and ensure transparency and high standards. As in the case of PNB Scam, how a manager kept it from the entire PNB systems and issued Letter of Undertakings to Nirav Modi's firm, proves how much difficult the task is and how much it can cost to the economy.

Model X will solve the problem: A CBSS or Blockchain Powered bank will be created for all of 6,937 branches of PNB. And similarly, for every bank. And instead of current cash and deposit system, every individual will be given digital tokens equal to the money they hold, and the transaction will take place like this. Let's say there's an individual A in India who hold Rs 4,00,00,000 digital tokens in Punjab National bank. Also, there's an individual B in America who holds $ 560,000,000 digital tokens in Citi Bank. Now A wants to pay B $10,000 for a business deal executed. A will instruct the PNB Bank to release Rs 6,50,000 digital tokens to B in America at Citi Bank. This instruction will be broadcasted throughout the PNB network and after approval, the block will be added to the ledger (which can't be deleted either edited) or tokens will be transferred to Citi Bank. The same process will take place at Citi, hence an indelible imprint of transparency.

Therefore, a complete record of transactions will be available, and this will prevent any fraudulent transactions from taking place. Let's take this forward to much bigger scale.

Figure 4: NPA in Major Economies, Nov 2016
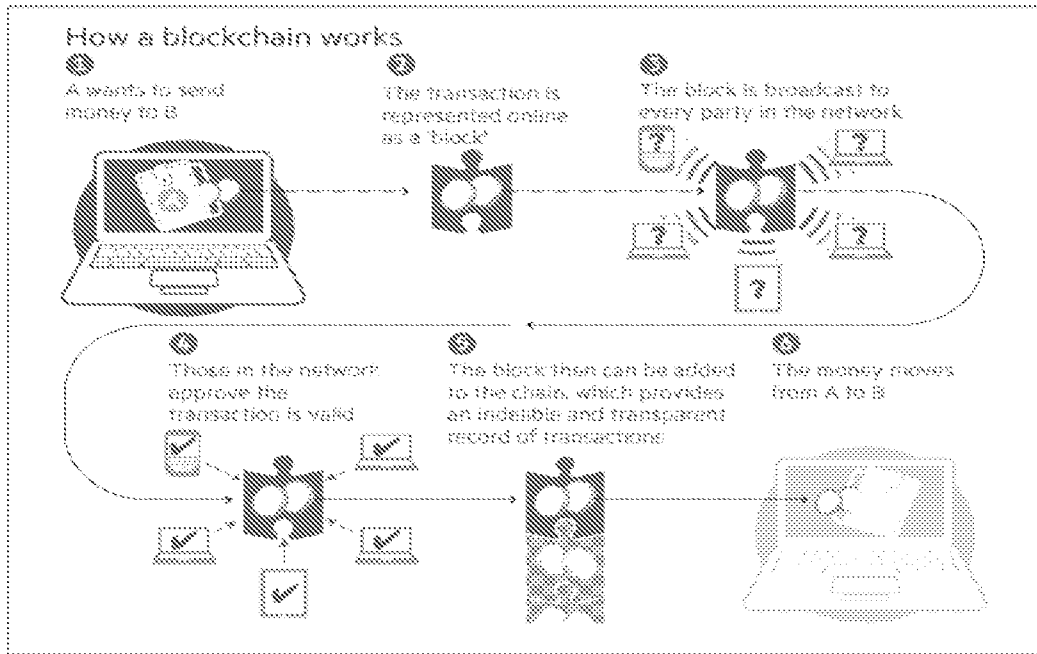
SOURCSource: Blockchain Council of Indian Report (2016)

In the PNB scam, the manager under influence kept issuing LOU's to Nirav Modi's Firm and keeping it from the PNB committee and board. PNB was simply clueless at the time of discovery and knew nothing about it. The fact that LOU's were granted through SWIFT (Society for Worldwide Interbank Financial Telecommunication) with already outstanding dues show how much our Banks, especially public banks are plagued by scams and influence (nepotism). But with the onset of the blockchain, if loans or LOU's are to be issued to someone the request needs to be approved by every bank in the network. In such a system, the scam wouldn't have taken place. So, if Rs 2,000 crores digital tokens are requested by Nirav Modi, the bank manager can't approve it on his own. He / She will broadcast it in the network, every bank will scrutinize the transaction in terms of dues paid, financials, operating margin, etc and if deemed fit, the request will be approved, the block will be added, and loan released then only. In this case, clearly, the loan will be rejected, and the block won't be added. Even the ministers or big corporates can't do anything about this, as even if every bank approves it under influence and release it, the transaction will be available in the ledger and up for review by the Central bank (Reserve Bank of India) at any time and incur penalties and sanctions.

Such system is required to bring honesty and pride back in Indian Banking System. A crypto bank would be built on cloud and microservices architecture compared to most banks today which use mainframe technology and have monolithic architecture. This enables a crypto bank to deploy financial products and react to changes in days rather than weeks or months. The backend systems can primarily be composed of micro-services communicating over modern data-pipelines, using blockchain based primary data store.

RESULTS AND FINDINGS

The first thing which needs to be considered is the cost involved with the paper currency and the credit cards which are used for most of the transactions today. If implemented as a legal tender, what would be the costs, what would be the benefits and if it would be advantageous for a big economy like ours?

As per the Financial Stability Report of 2015-16, published by the Reserve Bank of India, 95.2% of total value is now paid using digital currency. These include mainly the credit cards debit cards, net banking and mobile wallets. The card transactions can cost the merchant anywhere between 2% to 2.5%. In a typical credit card transaction, there are 5 parties that are involved: Consumer, Merchant, Issuer, Acquirer, and Switch. The consumer purchases a good or service from the merchant and the backend of the transaction is facilitated by the issuer, acquirer, and switch. The issuer is the bank from which the consumer received their debit or credit card. The acquirer is the bank that the merchant uses to process their debit/credit transactions. Then finally the switch, Visa or Mastercard, tie the Issuer and the Acquirer together to complete the transaction.

The switch plays the middleman that can connect all the Merchant's banks, or Acquirers, to all of the customer banks, or card issuers. This makes it easy for these banks to allow transactions to flow between themselves without having to have specific bilateral relationships. Rather they must have a relationship with a mutually acceptable switch, such as Visa or Mastercard.

Suppose the consumer pays Rs 100 to the merchant for the good, the merchant then has to pay a 2% fee and a Rs 0.25 transaction charge. This means that the merchant is now left with Rs 97.76, after paying the merchant discount fee of Rs 2.24. The Rs 2.24 is split up between the Issuer, Acquirer, and Switch. From this example, we can see that the majority of the transaction fee is kept by customer and merchant banks, and only about 0.1% of the transaction goes to Visa or Mastercard. While some of the fees that are charged by the customer's bank (Issuer) goes to paying for things like fraud (~Rs 0.12), the majority of it is for low value-added services such as advertising including customer rewards.

In addition, there are also other costs of fraud and chargebacks that are paid by the merchant which add another (~Rs 0.29). Now, we will have a look at the costs of transactions done using the cryptocurrencies. The Ethereum Network can handle a higher number of transactions per second. The cost of one transaction in December 2017 using Ethereum was 1 gwei or $0.007. The thing which makes cryptocurrencies better here is that there are no intermediaries. The transactions costs are very low (with respect to other forms of the transaction). Also, the transaction is completed at a faster rate.

With respect to the current structure and the crypto currency-oriented structure, the study shows the following results:

Figure 4: NPA in Major Economies, Nov 2016

Basis	Traditional	Currency
Time	No. of parties is involved in the traditional currency increases the time taken to complete a transaction.	A little over 5 seconds are required to get a crypto coin. There are only one or two parties involved in the exchange; making it time efficient.
Accessibility	There are around 2.2 billion people with access to the Internet or smart-phones & no access to a traditional exchange.	Cryptocurrency is perfect as it can be assessed by anyone who has a phone.
Cost	Traditional banks charge fees to process transactions & even the printing is the cost is higher than crypto currency.	With Crypto currency being exchanged over the internet, there are usually little/no transaction fees.
Structure	Digital & Traditional Currency are centralized in nature meaning a group of people generally control all the transactions.	Digital & Traditional Currency are centralized in nature meaning a group of people generally control all the transactions.
Transparency	Digital currencies are not transparent. You cannot choose the address of the wallet and see all the money transfers.	Crypto currencies are transparent. Everyone can see any transactions of any user since all the revenue streams are placed in a public chain.
Anonymity	Everyone knows about the parties in the transaction as banks take their identification proof and some documents are submitted to the authorities. Thus, the parties in transactions are not anonymous.	Though the transaction is known to everyone, the identities of the parties are anonymous. No confidential information is known to the parties in trade. IP address used by parties is not shared with the network.
Regulation	Traditional currency is under the regulation of the authorities and all the transactions are monitored by them.	Crypto currencies are unregulated, and no authority is monitoring the transactions going on. Thus, making it less credible.

Purchase Power Parity	There are different currencies in different countries; making it difficult to trade as one must match the currencies of the countries.	With cryptocurrency in circulation, there can be one single currency for the world. This can ease the trade and can help in making the world a global village economy.

CONCLUSION

The Government of Estonia's e-Residency kit, for example, has been launched to leverage the benefits of blockchain to encourage "digital migrants" to set up businesses there. As blockchain patterns evolve in the future, it's probably it could be extended to help governments collect taxes from overseas citizens, or that taxes on goods and services are

Blockchain-based Taxation

Citizens pay taxes — a blockchain keeps a record history — Government tax officials easily audit everything
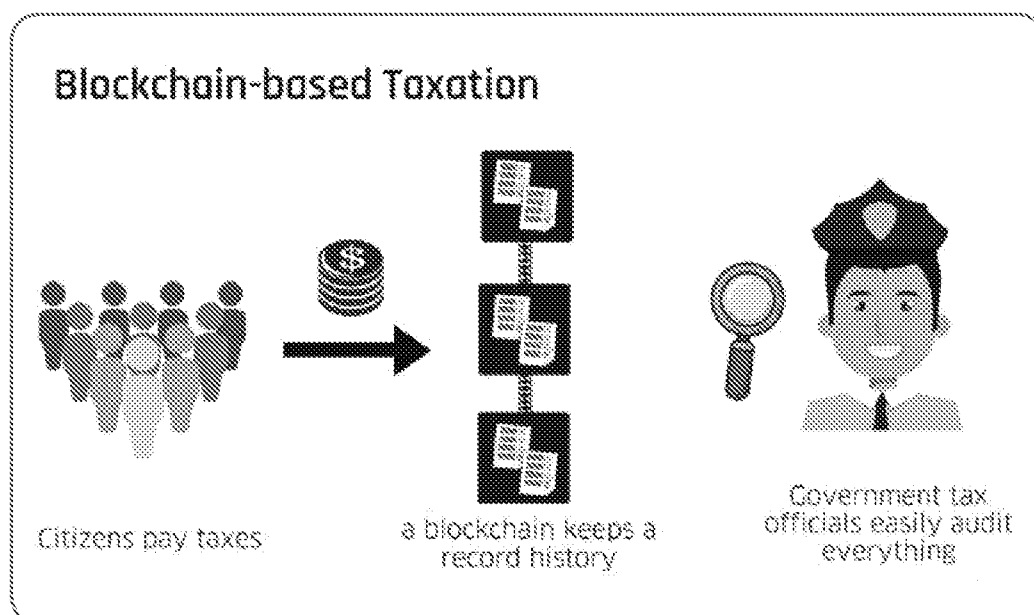
controlled using a traceable network on the blockchain. For employees, well payments made for services rendered in or outside the country could easily be done through digital tokens and the ledgers can be used for automatic tax deduction. Cryptocurrencies could help reduce the costs of money such as printing, distribution, and management, and increase efficiency. Free trade and flow of goods and services can be amplified through blockchain utilities.

As the pressure for digital money builds, creating widely accepted, fully convertible cryptocurrencies could be a process managed in the private sector, challenging the role of the state in managing money. To improve transaction transparency and reassure consumers that virtual currencies are safe, however, governments need to provide firm

foundations — such as digital identities, legal standing and the right kind of regulations. The opportunities are limitless and without precedent. For those countries with the boldness to pursue it, the internet of money presents an invaluable tool to unleash the potential of this powerful driver of growth and productivity. The challenge is to encourage

FIGURE 2
THE COST OF PRINTING EACH DENOMINATION

Denomination	Absolute cost (₹)	Cost as a % of face value
₹5	0.48	9.6
₹10	0.96	9.6
₹20	1.5	7.5
₹50	1.81	3.62
₹100	1.79	1.79
₹500	2.5	0.5
₹1,000	3.17	0.317
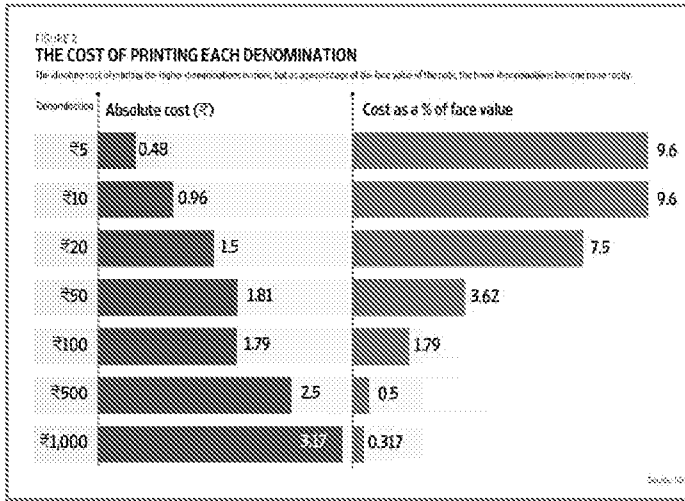
and harness that potential without stifling it. While we have tried to cover every possible view, but the research still might leave some aspects.

It can be finally concluded that cryptocurrency is the future of the banking sector, with the abundant potential to explore.

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'Shell'tering Behind the Corporate Facade: Unmasking Money Laundering
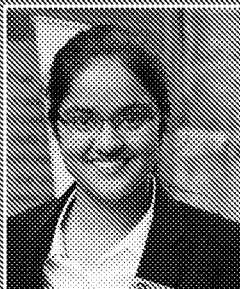
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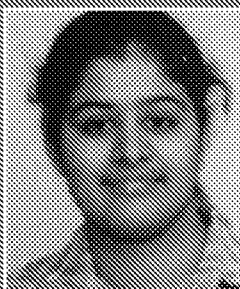
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Abstract

The recent regulatory action by Securities and Exchange Board of India (SEBI) directing stock exchanges to initiate action against 331 listed companies is only the tip of the iceberg. The use of shell companies to route illicit funds and legitimise the ill-gotten gains (or money Laundering) has been rampant much before the post-demonetisation period (when they Actually came on government's radar). This paper is an attempt to study the concept of money laundering through creation of shell companies. The intent is to demonstrate the factors that lead to abuse and present the steps to be taken to plug the loopholes and reduce the risk. Study of the relevant laws [Benami Transactions (Prohibition) Amended Act 2016, Income Tax Act 1961, Prevention of Money Laundering Act 2002 and Companies Act], relevant case laws and recommendations by FATF and SIT on black money has been done to identify the vulnerabilities involved.

BASICS OF SHELL COMPANIES AND MONEY LAUNDERING

The Prevention of Money Laundering Act 2002 defines money laundering as the process or activity connected with proceeds of crime including its concealment,

possession, acquisition or use and projecting or claiming it as untainted property. It typically involves three stages- placement, layering and integration. Illegal funds (money generated from criminal activities) are introduced into the financial system [placement], converted and moved a number of times to hide its criminal source [layering] and ultimately reach the legitimate economy when the launderer spends it for consumption/investment purposes [integration]. Having classified the three stages, it is also important to note that all transactions don't necessarily follow the above pattern . While there can be diverse and ever-evolving mechanisms of laundering like cash smuggling, insurance policies, smurfing (as elaborated in PIIE 2004), this paper offers insights into the most popularly used mechanism i.e. shell companies.

The term 'shell company' is not defined in any of acts and must be distinguished from 'dormant company'[1] and 'inactive company'[2].

Typically ,in the Indian context, shell companies are identfied as (but not limited to) those having no active business or assets, high reserves and surplus (high share premium), investments in unlisted companies, high liquidity, no dividend income and mostly used for financial transactions.

Two noteworthy points in this regard are :1) The above list of indicators is not exhaustive and applicable in every case. The list of companies suspected as 'shell' by Ministry of Corporate Affairs (MCA) includes SQS BFSI, a dividend paying German MNC with a 53% promoter holding and Prakash Industries which paid taxes to the extent of 600 crore over a three year period.

2) Not all shell companies are used as vehicles for money laundering. Some can be formed for legitimate purposes like currency/asset transfers or for mergers and reorganizations.

WHY THERE IS A NEED TO CHECK LAUNDERING ACTIVITIES

Many governments have tacitly encouraged tax avoidance for the fear of being termed as 'uncompetitive' and for attracting multinationals. Hence, plugging all the loopholes is neither advisable nor feasible as new ones keep emerging. However, it cannot be denied that unless the tendency towards concentration of wealth is counteracted and the rich-poor gap narrowed, social cohesion and cooperation cannot be established in India. Take the case of Jaganmhan Reddy, the politician and his associates floated a number of

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[1]Where a company is formed and registered under this Act for a future project or to hold an asset or intellectual property and has no significant accounting transaction, such a company or an inactive company may make an application to the Registrar for obtaining the status of a dormant company.
[2]A company which has not been carrying on any business or operation ,or has not made any significant accounting transaction during the last two financial years ,or has not filed financial statements and annual returns during the last two financial years

companies (since 2004) and favoured related parties by awarding government projects/contracts without any examination. The beneficiaries bribed him by investing exorbitant amounts in his companies. The list of politicians engaged in laundering and illegally sanctioning projects is unending.Besides causing revenue losses to the government, the network of launderers are a threat to the integrity of financial markets and promote nefarious activities like corruption, terrorism, drug and human trafficking.

THE ROAD SO FAR

The menace of money laundering requires co-ordinated international efforts as many a times it involves cross-country transfers. India is a signatory to various UN Conventions (International Convention for the Suppression of the Financing of Terrorism 1999, UN Convention against Transnational Organized Crime 2000 and UN Convention against Corruption 2003). Enactment of Prevention of Money Laundering (Amendment) Act 2009, Benami Transactions (Prohibition) Amendment Act 2016, Project Insight, renegotiation of DTAAs (Double Tax Avoidance Agreements) and constitution of Financial Intelligence Unit (FIU) are some steps in this direction.

A LOOK AT THE ROADBLOCKS

From the narrow alleys of Kolkata (historically called the mecca of parallel banking) to flashy offices in Mumbai, operators and service providers galore. Finding the real culprit in the labyrinth of network of shell companies coupled with structured transactions and innovative ways to route illicit funds is like finding a needle in a haystack.

CORPORATE SERVICE PROVIDERS

These are financial intermediaries who float 'paper' companies, infuse capital in them and sell them to beneficiaries for a lump sum amount. Their diligence and regularity in completing all the necessary paperwork is unparalleled. This keeps them away from the radar of the authorities. Later, these shell companies are used for making illicit payments. Some of the popularly used means for making these payments are:

Figure 1: Average Authorised Capital of a newly registered company.

– Buying shares in a company owned by the beneficiary at high valuations (Y.S Jaganmohan Reddy vs C.B.I.)

– Payment using multiple transactions to hoodwink the department (A pays B who pays C and so on till G gets the money). It is also called layering. (Madhu Koda vs. State of Jharkhand through C.B.I.)
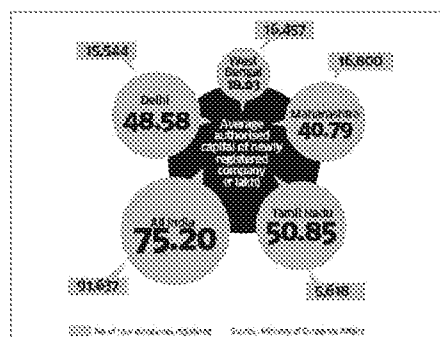
- Making loans to the beneficiary's company (M/S.Kalaignar TV Pvt.Ltd vs. The Deputy Commissioner Of Income Tax, Chennai)
- A study of 150 grand corruption cases also explains role of financial intermediaries who supply shell companies for hiding the trail of dirty money and masterminding frauds. (Sharman, 2013).

Let us take the case of Kolkata where it became an organised business in 1980s. According to a news report, the operator who set up LNP Ltd. (said to be one of the city's largest jamakharchi operators then) ran a set of 200 companies. Managed by a few chartered accountants and well-orchestrated network of entry operators of the city, it provided paper entries on companies' accounts to facilitate the movement of cash (Celestine, 2013) . The companies being probed by the IT department are believed to have a cumulative unpaid tax liability of Rs. 38000 crore. A clutch of auditors who agree to sign on the balance sheets (without probing the financial affairs of the company) for a few thousand rupees or even less also contribute to this menace. High corporate registrations and comparatively lower average authorised capital in Kolkata give us an idea of this serious problem (Figure 1)

ARE BANKS ON BOARD?

Knowingly or unknowingly, banks are often a party to the flow of dirty money. Overlooking of KYC norms and background checks are a few malpractices that help launderers to deposit and transfer money easily. Besides this, there have been cases where the staff is hands-in-glove in these operations. The colluding bankers rotate the money several times to give the false impression of an active business. Increasing competition can be a reason why banks lower their guards.

LOOPHOLES IN THE LAW

Section 89 of the Companies Act 2013 is the guiding provision for the concept of beneficial interest in a share. The said provision puts every person under liability who has a beneficial interest in a share as well as the beneficial owner to make a declaration to the company in respect of such beneficial interest. However, the absence of any definition of 'beneficial interest in a share' and concept of 'beneficial ownership' made this provision susceptible to abuse.

The Companies (Amendment) Act 2017 seeks to amend its deficiency. For the purpose of declaration of beneficial interest, it is proposed that beneficial interest in a share includes, directly or indirectly, through any contract, arrangement or otherwise, the right or entitlement of a person alone or together with any other person to— (i) exercise or cause to be exercised any or all of the rights attached to such share; or (ii) receive or participate in any dividend or other distribution in respect of such share.

Furthermore, Section 90 of Companies (Amendment) Act 2017 (Investigation of beneficial ownership in certain cases) provides that 'Every individual, who acting alone or together, or through one or more persons or trust, including a trust and persons resident outside India, holds beneficial interests, of not less than twenty-five per cent. or such other percentage as may be prescribed, in shares of a company or the right to exercise, or the actual exercising of significant influence or control as defined in clause (27) of section 2, over the company shall make a declaration to the company ' From the above two amendments, it can be seen that while the definition of 'beneficial interest in a share' and mandatory maintenance of a register of interest are commendable measures, the threshold of 25% is still susceptible to abuse. The companies can prevent the reporting of true beneficial owners by reducing the ownership stake to slightly lesser than 25%. Similarly, the Benami Transactions (Prohibition) Amendment Act 2016 does not take into account trusts or foundations for greater scrutiny.

INVESTIGATING THE ILLICIT

The enforcement and investigating mechanisms play a paramount role in regulating such activities. According to Money Laundering and Financial Crimes 2016, India may have launched a strike on black money hoarders, criminals counterfeiting high value notes and financiers of terrorist groups with its demonetization move, but weak law enforcement and deficiencies in the system have meant zero conviction rate when it comes to nabbing these frauds. "Money laundering investigations without a predicate offense are rarely successfully prosecuted in the Indian judicial system and even if they are, the resulting punishment is often minimal," the INSCR report says.

Financial Year	Investigations Completed
2003-2004	1
2004-2005	3
2005-2006	8
2006-2007	17
2007-2008	1
2008-2009	7
2009-2010	12
2010-2011	13
2011-2012	20
2012-2013	22
2013-2014	22
2014-2015	39
2015-2016	60
2016-2017	87
Total	312

Figure 2: Investigations completed by Serious Fraud Investigation Office, MCA
Source: www.sfio.nic.in

The Central Government ordered investigation into the affairs of 188 companies during the 2016-17 through SFIO and Regional Directors Office. Out of the investigations ordered by the Central Government, investigations have been completed in the cases of 62 companies during 2015-16. No information has been published regarding the prosecution or fines on the above.

ROC-wise statement showing the Statistics of Prosecutions for the year 2015-2016

Name of ROC	Cases Pending as on 1.4.2015	No. of Companies Involved	Cases launched during 1.4.15 to 31.3.16	No. of Companies Involved	Conviction	Acquittal	Withdrawal	Disposed of Otherwise	Total Disposal	Amount of Cost Awarded (Rs)	Amount of Fine Imposed (Rs)	No. of Cases Pending as on 31.3.16
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Bihar	4397	2354	27	6	22	0	14	30	66	15000	30900	4358
Delhi & Haryana	391	486	265	205	1	1	6	122	130	0	5000	646
Goa	139	35	39	44	14	0	0	0	14	0	94000	164
Gujarat	1868	1387	38	15	2	0	21	0	23	0	6000	1883
Hyderabad	873	22	100	29	46	6	48	78	130	49700	80250	343
J&K	137	67	0	0	0	0	0	0	0	0	0	137
Bengaluru	560	118	87	15	6	4	3	3	16	9000	18000	631
Kerala	471	94	3	2	188	5	0	4	197	43000	80050	276
Maharashtra(Mumbai)	6040	3447	137	88	34	4	60	192	330	213000	722270	5867
Maharashtra(Pune)	685	390	28	28	167	0	0	15	182	283500	116300	798
Madhya Pradesh	968	237	64	49	0	0	0	0	0	0	0	1032
Orissa	2358	1011	30	16	271	0	0	0	271	39600	314681	2107
Puducherry	22	4	0	0	0	0	0	0	0	0	0	22
Punjab & Chandigarh	325	133	67	38	33	0	4	122	299	102500	99650	183
Himachal Pradesh	19	9	10	5	5	0	0	0	5	5500	4500	24
Rajasthan	118	44	25	35	16	0	2	56	74	36000	42000	119
Tamil Nadu (Chennai)	1467	789	188	139	94	8	13	1	116	797150	1594300	1539
Tamil Nadu (Coimbatore)	290	327	0	0	0	0	0	0	0	0	0	290
Shillong	1486	256	27	0	0		0	0	0	0	0	1473
Uttar Pradesh & Uttarakhand	1875	970	64	16	0	3	48	45	86	63900	698873	1833
West Bengal	22862	10846	518	190	28	10	169	4	211	30250	60900	23169
Chhattisgarh	58	25	7	5	0	0	0	0	0	0	0	65
Total	47169	19809	1830	914	927	39	332	672	2328	3283900	6491882	46979

Figure 3: Statistics of prosecutions for non-compliance with Companies Act 2013
Source: Ministry of Corporate Affairs

TECHNOLOGY GONE FOR A TOSS

The use of technology for sharing information between various government departments , data mining and raising 'red flags' in case of threats can go a long way in detecting fraudulent transactions . At the same time, it is imperative that the income tax officials get the hang of such technology solutions and be vigilant, dynamic to deal with the scourge through training and infrastructural resources, which is usually not the case. The increasing use of sophisticated technologies by criminals adds layers of complexities for the authorities.

The factors explained above are the most relevant in the Indian context. However, there can be various others like lack of awareness (people preferring the Hawala system to avoid seemingly lengthy banking processes) and lack of political will.

THE ROAD AHEAD

The following recommendations have been proposed after taking into account the above listed findings and observations by SIT on black money, Global Economic Crime

Survey 2016, INSCR report, Financial Action Task Force and Bank for International Settlements:

- Data available on MCA website should be used for mining and raising warning signals as characteristics like same registered address, common directors, and occasional large transactions are popular indicators to look for. A comparison of share capital, inflows/outflows, revenue from operations can serve as indicators. An effective and robust monitoring mechanism is a must.

- Secondly, action taken against the launderers and the intermediaries abetting the illicit transfers must be as swift as the detection and must act as a deterrent to others. Some states such as Delaware in U.S. impose accountability safeguards on 'registered agents' and other corporate service providers to ensure that the companies they create, sell or buy are not used as vehicles of abuse. (Financial Crimes Enforcement Network, 2006)

  These providers can extract significant information on beneficial ownership and purpose of formation of the entity (legitimate/illegitimate), given their role in supporting, forming and assisting these companies. They are of critical importance to regulatory authorities and can nip the evil in the bud.

- Public registers on beneficial ownership can be an important step in this direction. Countries like UK, Denmark and Norway have already made this a reality. Further, there can be international talks and agreements for sharing data on company ownership to lift the veil of secrecy and punish those behind the corporate façade.

- Sharing of information between SEBI (Securities and Exchange Board of India), Financial Intelligence Unit (FIU), Serious Fraud Investigation Office (SFIO) Income Tax departments and the financial institutions should take place in a systematic and smooth manner for closer surveillance. For instance, annual returns and directors' information can be checked in case of warning signs provided by SEBI (on the basis of trading volumes) or banks in case of large deposits.

- Bank managements must be directed to put in place basic procedures to prevent criminal use of the banking systems. Providing training to the staff on anti-laundering techniques, rigorous background checks and reporting to the above mentioned authorities in suspicious cases are some important measures.

To conclude, it can be said that free and competitive environment for businesses is not in conflict with the proposed regulations. In fact, there is synergism between the two. Equating 'ease of business' with a cut on necessary compliances can have serious repurcussions. The surge in flows of dirty money with negligible transaction costs and non-compliance of tax provisions has a serious impact on the social fabric and functioning of financial markets besides harbouring criminal activities.

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Urban Housing in India

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Abstract

With more than one third of the Indian population living in cities, problems related to urbanisation are looming large. Providing sustainable housing facilities to all is one of the main challenges before the government. Through this paper we aim to analyze the housing situation in India. Data was collected through a primary survey conducted in Delhi, NCR. The analysis was done under the following heads: factors contributing to rampant housing poverty, gaps in current housing policies and standards of good housing. The former two heads have been explained under three main categories- informal settlements, resource crunch and administration and governance, while the latter has been analysed in three successive stages, namely, building, occupancy and sustainability which are further broken down into socio-cultural, economic, technological, environmental and legal factors.

THE SITUATION OF HOUSING IN INDIA

India's urban population is on a constant rise but so are the problems related to urbanisation such as overcrowding, lack of sanitation, lack of security, poor infrastructural facilities, etc. Out of these, affordable, adequate and quality housing remains to be one of the biggest challenges facing the government. A huge proportion of the urban population in India lives in shoddy surroundings characterised by abysmal quality of ventilation, lighting, water supply, sewage system, etc. Since previous studies have shown that good housing has the potential to solve many of the problems related to urbanisation. Housing policies, if implemented properly, can have astounding impacts

on the quality of urban life. Through this report we aim to explore the housing situation in India and understand the characteristics of good housing.

Housing embodies many concepts such as comfort, safety, identity and above all it has central importance to everyone's quality of life and health with considerable economic, social, cultural and personal significance. It is also a critical component in the social and economic fabric of all nations. No country is yet satisfied that adequate housing has been delivered to the various segments of its population.

Problems related to housing projects are not generally well-defined in a way that can be clearly solved. They are characterized by unique, complex, dynamic situations having various issues. It is essential that everyone's interests are catered to in order to solve these problems, and for the same, an effective group of players to need to follow an integrated approach and generate viable ideas.

Various problems in housing stem from housing poverty and shortage. The Ministry for Housing and Urban Poverty Alleviation considers four components of urban housing shortage: (a) homeless population; (b) households living in non-serviceable units; (c) those living in dangerous and physically dilapidated units; and (d) those living in socially unacceptable conditions.
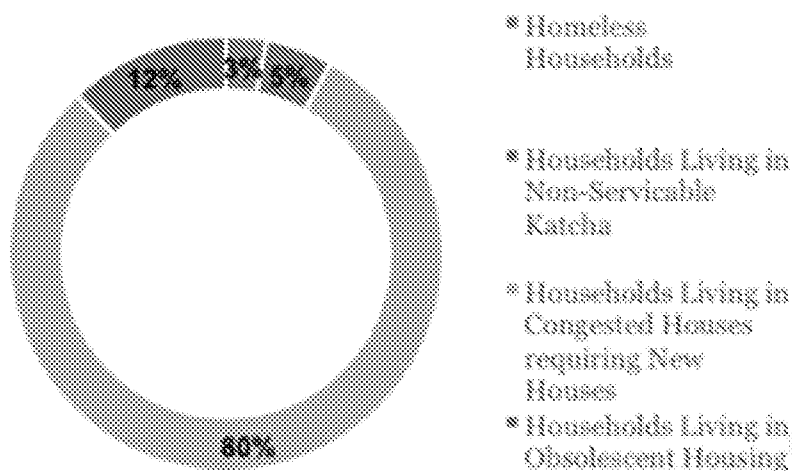
Source: Report of the Technical Group on Urban Housing Shortage, MoHUPA 2012

HOUSING IN DELHI – PRIMARY SURVEY

Housing for the urban poor is provided in two types: ownership housing and rental housing. In order to determine what makes good housing, it is important to visit each type and understand the prevailing problems. We decided to visit both types in the city

of Delhi and interact with the poor, to deeply understand their problems and devise solutions for the same.

METHODOLOGY

Places in which surveys were conducted included slums across Delhi NCR as well as poorly constructed or unfinished settlements rented out to the poor: Nizamuddin, Noida Citi Centre, Chandrawal among others. A detailed questionnaire which contained questions about different aspects of housing was made. A translator who knew the local language translated the questionnaire. Re-translation was carried out to the origin language to ensure that there were no semantic barriers. Questionnaires contained questions about infrastructure (sanitation, availability of water, electricity, etc), affordability (expenditure on housing- ownership and rental, cost of borrowing, cost of maintenance, etc), day-to-day problems faced (security, health hazards, waste management, community living, etc). Questionnaires were self-administered in most households and for illiterate people, personal interviews were conducted. Additionally, FGDs were held with the poor to understand in detail their problems and requirements.

FINDINGS

A sample of 200 households was covered across ten areas in Delhi, NCR. The harsh realisation of the visits was that both these types were abysmal in their own ways. The slums lacked sanitation, hygiene and water. The dwellings were overcrowded (with an average of 8 people per household) and all houses had only one room where all activities like cooking, bathing and sleeping took place. They all complained that no organisation

Demographic Composition

⬛ SLUMS ▨ UNFINISHED SETTLEMENTS
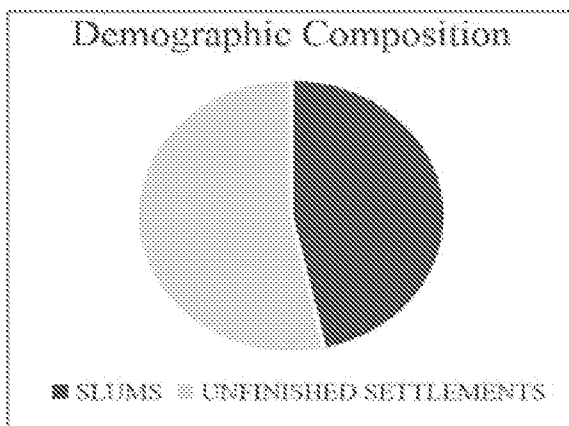
took any efforts to make their situation better. However we realized that behaviour change was a huge problem - reluctance to use facilities provided was commonly observed. For example, a few slums were provided with dustbins and yet, nobody used them. All waste was thrown out in the open. The leachate from the waste flowed into the houses in the event of rain. Open defecation was prevalent despite toilet facilities being available. We doubted whether this behaviour was entirely due to reluctance and found that toilet facilities provided were also very poorly maintained. The rental housing on the other hand, had facilities necessary for subsistence. Every 10 households had a toilet, they had piped water facility and so on. However, every resident complained of being

exploited by their landowner. The average rent paid by them for less than 100 sq. ft of carpet area was rupees 5000 (this amount excluded electricity, water and other utilities). This is not just exorbitant by itself; it is about 70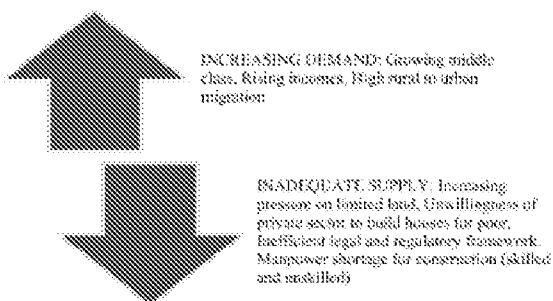% of the household's income and such catastrophic expenditure on housing reinforced their poverty. Further, these dwellings had extremely inadequate ventilation and lighting. These visits gave us huge insights about urban housing for the poor and helped us devise a conceptual framework of what makes good housing and how to get there. We used the findings of the survey to analyze the problems of urban housing in detail and arrived at the determinants of good housing.

PROBLEMS OF URBAN HOUSING

Housing shortage is undoubtedly the result of both demand-side as well as supply-side factors, as shown below.

Each of these factors should be addressed collectively, and only then can the problem of urban housing be solved. While this chart gives us a bird's eye view of the housing problem, it is imperative to delve deeper into each problem to understand it, and devise ways to solve it.

INCREASING DEMAND: Growing middle class, Rising incomes, High rural to urban migration

INADEQUATE SUPPLY: Increasing pressure on limited land, Unwillingness of private sector to build houses for poor, Inefficient legal and regulatory framework, Manpower shortage for construction (skilled and unskilled)

We have classified the problems faced by the housing sector into three major heads, namely, unplanned and informal settlements, governance and administrative inefficiencies and crunch of resources. Together, these problems have debilitating effects on urban life.

UNPLANNED AND INFORMAL SETTLEMENTS

Through the course of the urbanisation process in independent India, a gigantic number of informal settlements have mushroomed in our cities. These settlements have predominantly come up in a haphazard manner, and needless to say, they are devoid of essential facilities like clean drinking water, toilets, etc. They are occupied by economically weak sections like daily wage workers, who migrated from rural areas in pursuit of better economic opportunities. While these dwellings do accommodate a large number of people, they are characterised by terrible living conditions and local governments have been determined to clear them up. However, the displaced dwellers are almost never relocated to liveable housing, since the rate of destroying such informal settlements is far higher than the rate of construction of new affordable accommodation. In Delhi alone, one million people have seen their shanties being demolished in the last one decade. Only a tiny fraction of those displaced have been

compensated with tiny plots or flats in resettlement sites. invariably on the outskirts of the city lacking in even basic amenities such as drinking water, electricity, toilets etc.

Government initiatives to achieve objectives of slum-free cities, although good on paper, are too ambitious to be successful. The Delhi Urban Shelter Improvement Board (DUSIB) aims to clear close to 197 hectares of land that are under slums and plans to construct 150,000 flats. Another example of a similar project is the PMAY, which plans to incentivise private players to realise the aim of housing for all. Surely, the intention behind these schemes and many others are pure. However, they view the land occupied by slums as a commercial asset whose sale can provide good money. However, the density of population in the said land is too high. In Delhi, less than three per cent of the land is under slums which house 30 percent of all Delhi households. These policies would thus have to shift these residents to more cramped high-rise apartments, and that would hardly be a good solution.

Source: ICL Affordable Housing in India 2017

Another concern with regard to informal settlements is that houses for the poor are often built far away from the centres of the cities. Since these areas lack in essential amenities, the poor choose not to live in those areas and are thus left homeless. Thus, housing development should aim to drive economic growth and improve the quality of life of people by better citizen services, governance and urban mobility. Peripheral urban and suburban areas need to be developed, and housing projects there should guarantee liveability for the poor. This would be possible by the preparation of plans which focus upon provision of essential and recreational amenities, which are integral to housing development. The figure below shows the location of housing projects in major Indian cities, and their distance from the cities' centre.

Among the facilities which are prerequisites for any household, water and power carry prime importance. Adoption of water recycling and renewable energy use can save 10 to 15 % of water and energy. Checking of leakages, thefts and transmission losses and simultaneously enhancing organisational efficiency are also feasible solutions.

The unique, complex and intertwined nature of the problem of informal settlements does not have a one stop solution. Error learning through an efficient feedback mechanism and improvising on the positive aspects of successful projects such as chawls in Mumbai are the ways to make strides in this direction.

ADMINISTRATION AND GOVERNANCE

Efficient administration and governance are indispensable for implementation of any policy. This is especially true of the housing sector, which is brimming with problems like long drawn approval processes pertaining to new constructions and avoidable delays in delivery of ongoing projects.

REGULATORY FRAMEWORK AND MANAGEMENT

Reports have shown that housing shortage is related to people living in inadequate, congested and dilapidated units, and this points to the lack of a well-functioning upgradation system. Land laundering and rampant corruption are common in the Indian scenario, and these are the major reasons for ineffective implementation of housing policies for the poor. Misappropriation of funds, misuse of land reserved to accommodate the poor, and other such activities stem from the lack of a proper regulatory system with checks and balances. The Real Estate (Regulation & Development) Act, 2016, is one initiative which aims to bring in accountability in real estate sector by rating of developers and projects and licensing of real estate agents/ brokers/realtors.

Additionally, issues related to land titling are also inherent in India. Titling issues are two-fold: recognition of property rights, and registration hassles. Since not all land transactions require registration, there is no reliable fall-back mechanism. Also, it is the transaction and not the title that is registered during a land sale, due to the failure of records to verify history of land ownership. These issues are bound to cause huge delays and inefficiencies in the deployment of land for housing, and thus, need to be looked into urgently. The city-wide spatial data infrastructure and computerization of land records can help in the selection of sites for in-situ upgradation and redevelopment of slums. Adoption of digitized, comprehensive, and reliable property registry and land titling system can have immediate benefits. It is also necessary to put in place a unified regulatory mechanism, simplifying the procedures for fast project approval.

The planning norms and regulatory building controls adopted in the country, which often focus on greenfield development, should facilitate easier and simplified ways of redevelopment of existing areas. This may require various changes and exemptions from the conventional processes, such as submission of earlier approved building plans, various clearances, amalgamation and sub-division of properties, ownership rights, minimum standards of roads and parking, etc.

IDENTIFICATION OF NEEDS

Another major problem that has caught the attention of policymakers is the need to distinguish between seekers of rental housing and seekers of ownership of housing. To

quote the Economic Survey 2017-18, "Rental housing is important for both horizontal and vertical mobility as it allows people to access suitable housing without actually having to buy it. Across the income spectrum, rental housing is an important foothold into a city for new arrivals, until they are able to, or choose to, purchase their own homes. For rural migrants, in particular, whose financial portfolios may already be tied up in land and livestock, it is access to shelter that is more important than investing in another lumpy asset that is subject to local market risk." Thus, the Housing for All initiative under the PMAY might not prove very successful, because it primarily promotes housing ownership in urban areas. Permanent houses created by schemes like PMAY in cities do not cater to the temporary and transient housing needs and imaginations of seasonal migrant workers. As mobile populations, they require temporary, dignified and affordable housing solutions in the city. Most of them have migrated to the city to earn and repay the debts they have taken in the process of building houses back in the village. They cannot afford to invest in a second home in the city, which is the only solution that the affordable housing scheme offers them. The comparison between rental housing and owner-occupied housing is shown in the figure below.
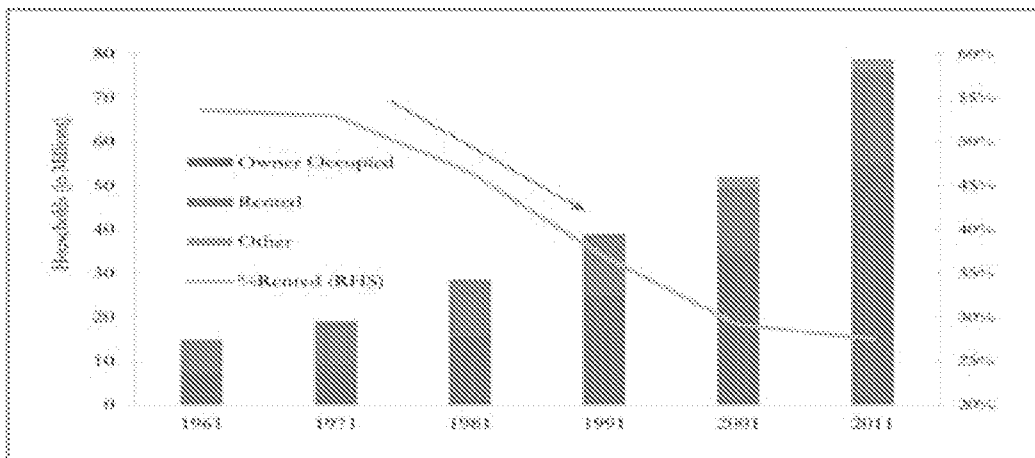

Source: For years 1981 to 2011- Harish (2015); for 1971 and 1961 - Census of India.

Another problem closely related with the identification of needs of the target population is the problem of houses lying vacant in the country. While there is a massive housing shortage, there were 11 million vacant housing units scattered all across the country in 2011. This depicts a serious mismatch. Low occupancy rates often exist because affordable housing projects are not formulated based on the needs and vulnerabilities of their intended buyers. Misunderstanding and incorrectly addressing the problem of housing shortage has been exhibited by both, privately-built and state-provided affordable housing. The adjoining figure summarises this situation.
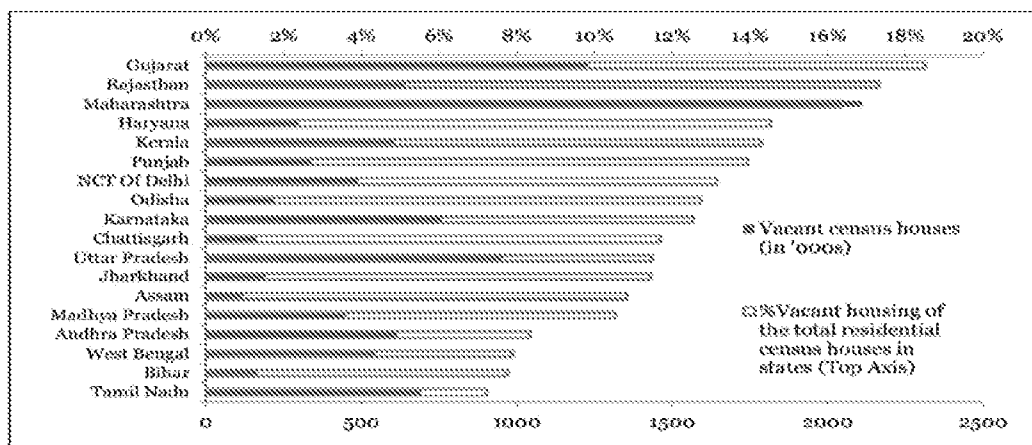
Source: Census of India (2011) & IDFC Institute (2017).
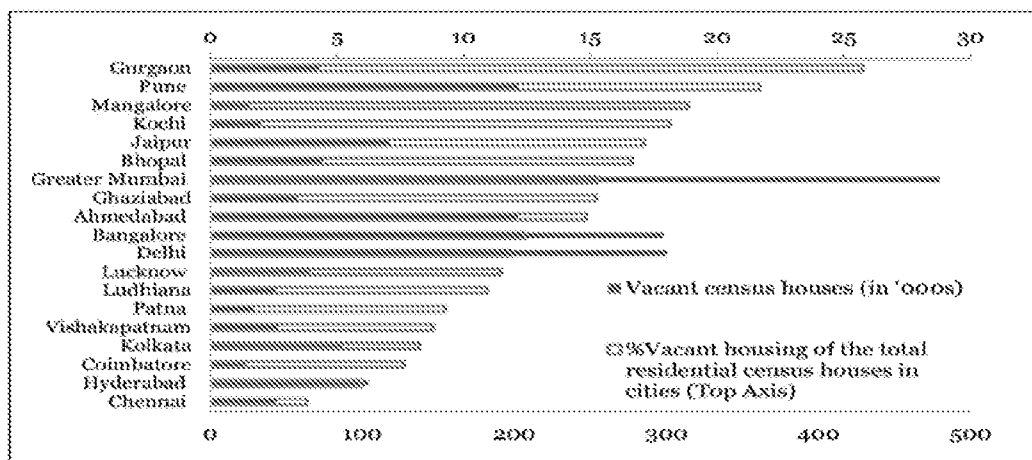
Source: Census of India (2011) & IDFC Institute (2017).

RESOURCE CRUNCH

The resource crunch has been classified into the lack of financial resources and land resources.

LAND

Housing scarcity stems mainly from the scarcity of land. As mentioned earlier, the overwhelming pressure on land resources in crowded cities makes it hard to find viable land for building new housing for the poor. Therefore there is a need to optimally use the available land.

Governments across the world are recognising the possibility of the homeless occupying the unused land in cities. The right to occupy unused land is guaranteed in Brazil. Unfortunately, the contrary is true in the Indian setting. The Public Premises (Eviction of Unauthorized Occupants) Act, 1971, prohibits the general public from occupying any public premises. Further, this act was recently amended, providing even more power to government authorities for the speedy eviction of unauthorised occupants from public premises. The railways authorities have been increasingly putting this act into effect and have been evicting settlements from their unused land.

This policy is just making the situation worse in India. The national sample survey estimates that about 90 per cent of Delhi slums were built on public land, owned mostly by local bodies (46 per cent), railways (28 per cent) and state government (16 per cent), and only about two per cent of the slums are on private land. Moreover, the land owned by public entities are non-marketable pockets which don't usually fit into the criteria of private developers such as infrastructural connectivity, basic utilities, etc.

This demand for well-serviced land in turn plays into the willingness to pay and affordability factors. Thus, the government and its agencies are facing an urgency to find land for construction and this cannot be achieved without optimising the usage of unused and even under-used land pools.Some ways to address the problem of finding land include taking up brownfield development, land pooling, town planning scheme, transferable development rights and accommodation reservation.

A geographic information system (GIS) based technique has the potential to aid the above interventions. Building norms need to be prudently decided so as to maximise the utility from a given piece of land.
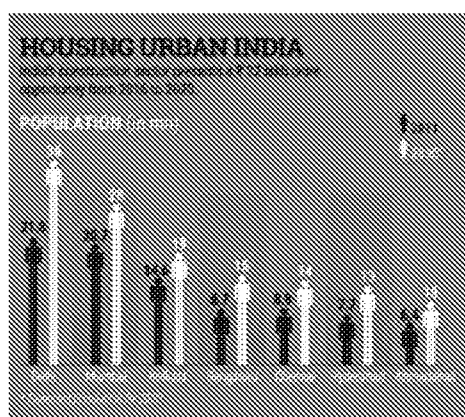
Further, the digitisation of land records can help to efficiently identify areas that are fit for in-situ upgradation. However, to make in-situ slum rehabilitation viable, the strategies of mixed land use and remunerative components need to be employed. An example of a successful project is that of the Vijaywada Municipal Corporation (VMC). It partnered with land owners and built over 18,000 dwelling units (DU), by obtaining 40 per cent of the land, reserved for public purpose and housing for poor.

Finally, the problem of obtaining adequate land for housing and its optimal usage can be solved only with the active involvement of all stakeholders. The government should devise ways of collaboration with the community and private agencies. Communities should be equipped with the facilities to understand their housing problems and negotiate with the housing boards, private agencies and other bodies that function in their areas. When all people that are involved work together, the needs of the residents can be met by the appropriate provision of housing facilities.

FINANCE

Finance remains as one of the major problems in the housing sector. This problem is twofold: burden on the government's exchequer in providing housing for the poor and lack of affordable housing for the poor.

India will likely spend between Rs 5 trillion and Rs 7.5 trillion ($75-110 billion) in constructing houses and other infrastructure for its increasing number of city dwellers between 2016 and 2020, according to a report released jointly by KPMG and the National Real Estate Development Council (Naredco). The pressure on the government can be greatly reduced if the burden is shared by private players through public- private joint ventures. One major reason why private players don't prefer entering this domain is the lack of profitability and incentives to do so. Active steps are being taken by state governments to incentivise the private sector to provide affordable housing: (1) Projects undertaken on land owned by and executed by the state. (2) Projects undertaken in PPP mode where the state provides land and incentives to the private sector who conceive and execute the project (3) State concessions to projects undertaken on private land. The figure below shows the opportunities in the housing sector in India for private players.

Source: Census of India, KPMG

Yet another way to reduce the burden on the government is the adoption of cost reduction strategies. Some of these strategies as recommended by Mckinsey Global Institute (2014) are building components off-site using industrial

processes, eliminating low value added activities and applying critical path management techniques to optimize overall plan. Such efficient activities will reduce the cost of housing as well, making it more affordable for the poor.

Globally, the accepted definition of affordable housing is that the cost of housing should not be more than 30 percent of a household's gross income. Even if the actual house is affordable, most of these projects are usually developed on the city outskirts as high land costs in the core of the city make it financially unviable. This raises daily commuting costs and other expenditures at the household level which adds to the financial burden on households, ultimately making housing unfordable and making them move into shanties within the city. According to National Sample Survey Office (NSSO) data, households across urban India spend more on conveyance next to only food; Particularly for the urban poor, such data validates the complex relationship between housing, its location and mobility.
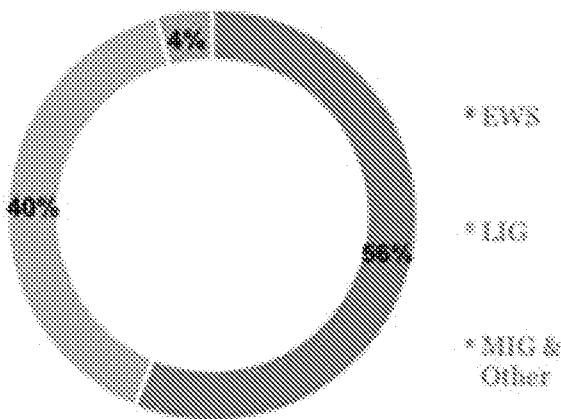
These associated costs, added with high rentals, high interest payments on housing loans, etc have caused the impoverishment of many people, a situation termed as housing poverty. The government has to focus on policies which make the whole housing process affordable, and not just on constructing structures.

This figure shows the housing shortage in relation with income distribution of the households. The figure clearly indicates the lack of financial resources with poor households as the reason for homelessness.

WHAT MAKES GOOD HOUSING: FINDINGS FROM DELHI

We have divided the whole housing process into three stages: Building, Occupancy and Sustainability, to explain the characteristics of good housing.

Building- This corresponds to the stage of making a housing structure available to those who are demanding it. It includes all the factors that have to be considered before and during the construction of a building.

Occupancy- This corresponds to the stage that is the bridge between the builder/seller and the buyer. It refers to the process of making the house accessible to the seekers and executing the sale.

Sustainability- This refers to the long-term sustenance of the building and integrated development of the households living in them. It includes those factors that convert building structures into a prosperous, sustainable neighbourhood.

Each of these stages have been analysed under the following heads:

Socio Cultural- This includes factors to do with a person's culture, tradition, psychological well-being and way of living. It involves several dimensions such as adaptability, equality, sense of pride, belongingness and community involvement.

Economic- This includes factors to do with affordability, reducing poverty, generating employment opportunities, cost effectiveness and activities that are essential for sustainable development.

Technological- This includes factors to with innovations in construction and techniques, efficient processes, feasibility, functionality, strength, durability and reliability.

Environmental, Health and Hygiene- This involves factors that address resource limits of the environment, use of renewable resources, minimizing the impact of waste materials and pollution and protection of the ecosystem. It encompasses practises that foster healthy and disease-free living.

Legal- This involves factors that have to do with following the laws of the land, procedural processes and legally binding constraints.

	BUILDING	OCCUPANCY	SUSTAINABILITY
SOCIO-CULTURAL			
ECONOMIC			
TECHNOLOGICAL			
ENVIRONMENT, HEALTH AND HYGIENE			
LEGAL			

CONCLUSION

While the pace at which urbanisation is growing, it is important for the development of the nation, India has a long way to go before it can reap the benefits of the same. The problem of housing needs to be addressed in a structured manner, with policies adopting a holistic approach, considering the various factors and stakeholders involved. Most of the problems such as cluttered living and lack of hygiene require integrated efforts of the lawmakers and the public. People should be educated about sustainable

practices and made aware of their rights to ensure inclusive growth. Further research on how to tackle these problems is imperative for improvement.

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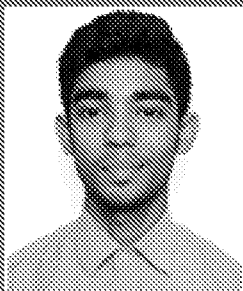
Green Investment: Dimensions and Policy Perspective

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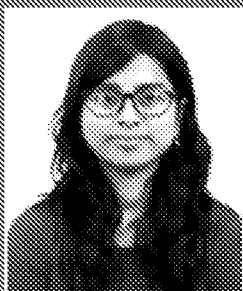
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Abstract

Amidst the rising concerns regarding the increasing levels of greenhouse effect and global warming, today it is a matter of paramount importance to address this problem and to explore the investment opportunities in green practices. The aim of this paper is to provide a comprehensive review of the concepts related to green investment that are available in the current literature. The aim of this research is to dissect and explore what is being generally included under the term "Green Investment" and how it is being classified. The paper examines how green investment is defined through the perspective of various stakeholders like International institutions, Indian government and corporate houses. The paper concludes that, given the varied scope of the concepts of green investment, the most practical approach could be to take an open minded and flexible stand towards definitions and standards, with governments adopting a governance approach and the corporates adopting a strategically sustainable approach to green investment.

INTRODUCTION TO GREEN INVESTMENT

In the wake of energy crisis confronting the global citizens today, in relation to the price, supply and pollution associated with the conventional sources of energy, the international community has invested considerably for the use and development of non - conventional energy as a viable alternative solution. For instance as per the United Nations Environment Programme's "Global Trends in Renewable Energy

Investment 2016", "all investments in renewables, including early-stage technology and research and development as well as spending on new capacity, totalled $286 billion in 2015". Additionally, the quantum of investments by the developing countries in renewable energy surpassed that of the developed countries for the first time in 2015.

Paris agreement has been accepted by more than 55 countries under which they aim at decreasing the GHG emissions and mitigating the climate change as a part of global commitment. These countries together account for more than 55% of the global GHG emissions.

The Sustainable Development Goals on Sustainable Energy have also been adopted by UN General Assembly in 2015. In addition to this various international forums like G20 and G7 groups of countries have committed to increase energy efficiency and to accelerate programmes on clean energy, respectively. Many agreements like International Renewable Energy Agency (IRENA), UN Framework Convention on Climate Change, the Energy Charter Treaty and the Kyoto Protocol have been formulated and are being worked upon to accelerate the use of renewable energy for a greener tomorrow.

MEASURING GREEN INVESTMENT

Amidst all the concerns revolving about the future of energy consumption around the globe and rising greenhouse emissions, the term Green Investment has gained importance of late and has emerged as a newly propounded concept. Increasing number of international forums and governments are formulating laws and policies and the corporates are making their practices more and more eco-friendly to confirm to these regulations.

In order to gain a complete understanding it is important to review the term Green Investment. Green investment has been referred to as "the investment necessary to reduce greenhouse gas and air pollutant emissions, without significantly reducing the production and consumption of non-energy goods" (Luc Eyraud, 2011). In this paper we have covered the public as well as private investments. Green investment is a growing and evolving area and has various components. Of these the three main components of green investment are:

1. *Low-emission energy supply* – The foremost objective of green investment is to shift the supply of energy from fossil fuels to various other substitutes which are cleaner and pollution less by nature, either for electricity generation like solar, wind or nuclear or as a direct source of supply like biofuel. The scope of green investment covers both the established technologies like hydro power and nuclear energy as well as upcoming and emerging technologies like solar, geothermal and wind power.

2. *Energy efficiency** - This component of green investment talks about technologies which help in reducing the quantity of energy required for provision of goods and

services. In the electricity segment, a vast amount of energy is lost while performing various functions ranging from power generation to power consumption. This head talks about the scope of green investment which involves innovative initiatives like improving efficiency in power generation, transmission and distribution by using more effective smart grid technologies. Potential efficiency surplus in the area of transport can be achieved by utilisation of more fuel-efficient and hybrid cars as well as greater use of mass transit. With regard to industrial goods, efficiency can be achieved through energy-saving appliances and a better waste management system.

* This is relevant in energy supply and energy-consuming sectors.

3. *Carbon capture and sequestration* (including deforestation and agriculture) - Deforestation happens to be the second largest contributor to carbon emissions worldwide after the fossil fuel combustion. It accounts for 20% of total emissions (IPCC, 2007). Therefore, controlling and minimising the ongoing deforestation, exponentially increasing the rate of afforestation and sequestering more carbon in soils by the help of new agricultural practices is of crucial importance for reducing carbon emissions. However, a shortage in the availability of data for this segment has restricted the scope of discussion.

Researchers have tried to hypothesise the "greenness" of assets in absolute terms (whether a product or technology is green or not) and in relative terms (a company having comparatively lower GHG emissions than the other). The extent can also be argued on ex ante basis (viz activity in energy efficiency, sustainable energy or water management) or based on specific indicators. There are definitions with focus on quantity and quality aspect to highlight different levels of "greenness". There is a broader consensus that production of renewable energy is considered a green activity, including wind, hydropower, solar, biomass, geothermal and ocean energy. Few researchers are of the opinion that nuclear power also forms a part of renewable energy sector. However others argue that though it is a low-carbon source of energy, it entails other risks related to harmful radiation, waste treatment and national security. Furthermore, in areas of co-generation, hydrogen and waste, no consensus has been reached as these are usually by-products of industries which themselves are substantial contributors to greenhouse gas emissions. Also, ambiguity exists as to how to include the areas of the agriculture, green IT and financial services under the dimensions of Green Investment. Consensus of various authors keeps on changing with regards inclusion of biofuels and shale gas under the scope of green investment.

Green investing is generally also related with the following commonly used terms: Sustainable Investing, Socially Responsible Investing (SRI), Ethical Investing and Environmental Investing. The idea of green investment can be interpreted in different ways by different investors and this interpretation is generally based upon their financial motives and moral values.

From the perspective of an investor Green investment can be defined as a process which involves making investment decisions based upon environmentally conscious criteria with the objective of generating returns from the investment made but without compromising with the health of the environment. Today the investors are also aware of the environmental problems and are taking initiatives for the development and implementation of sustainable solutions to these problems by investing their financial resources in such upcoming projects. Indeed, values and standards have recently joined the ever vast universe of investments. With a change for the better, investors are now demanding for a wider range of investment products which incorporate their desire "to do well financially by doing good ethically". Green Investment has been growing over the past years, via green private equity and infrastructure bonds, green bonds and green assets classes.

The definition of green investment is an evolving topic which clearly deserves further research and analysis. A discussion at a greater scale between the institutional investor communities, organisations at an international platform and the financial regulators is desirable to develop further understanding on this and to gain a more informed viewpoint on the broader long-term investing and green growth issues.

More and more changes can now be seen at the grass root level with the international community and governments setting targets and implementing laws to achieve them. Various targets have been set in different areas, be it increasing the production capacity of renewable resources, decreasing GHG emissions or increasing green cover. Recent additions in the renewable energy sector provide indications on how this sector will develop globally in the upcoming decades. As per the trends shown in Figure 1 we can note that solar (Photovoltaic, Concentrated Solar Power, Heating and Cooling), wind (off-shore and on-shore), hydro and bio power are more popular amongst developers and investors.

Figure 1: Projected Capacity Addition Trends
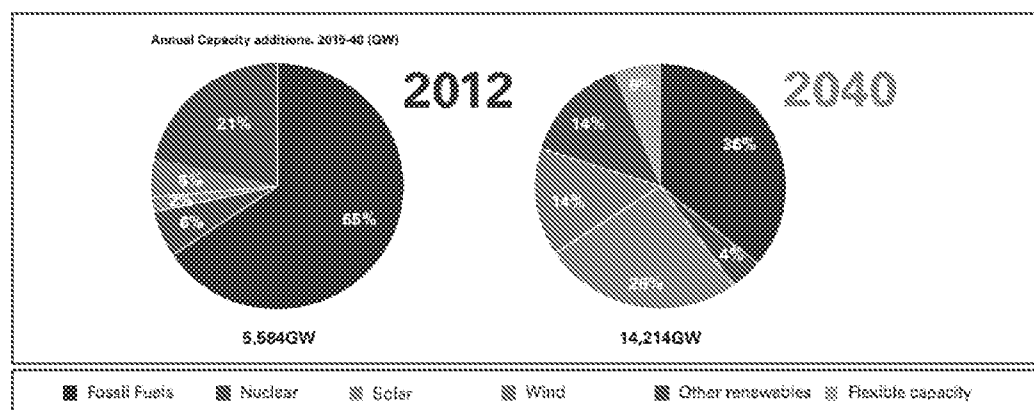
Source: Bloomberg New Energy Finance, 2016

Figure 2, shows that by late 2015, the top 5 countries for total installed renewable electric capacity were China, the United States, Brazil, Germany and Canada. China is the leader in renewable power with approximately 495 GW which is one-quarter of world's renewable power capacity. India and China have emerged as the top two destinations for green investment. However, India is yet to wholly capitalise upon its abundant renewable energy and is keen to explore and expand its operational activities for the same.

Figure 2: Renewable Power Capacities in World, EU 28, BRICS and Top 7 Countries, End-2015
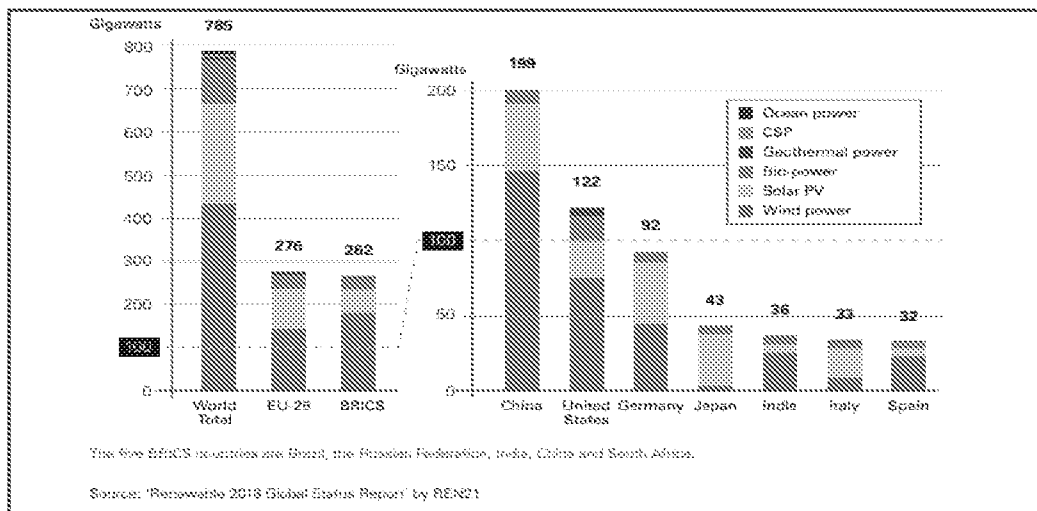
GREEN INVESTMENT: AN INDIAN POLICY PERSPECTIVE

India stands at a critical juncture in upgrading renewable energy to provide access of energy to growing cities and widespread rural communities. With the changing environment in the international arena, the aim of the Indian government is to increase the capacity of renewable energy by giving push to the renewable sector. The government has targeted to achieve the installed capacity of 175 GW by 2022.

In order to speed up the investment in clean energy the Indian government has introduced Renewable Energy Certificate (REC) scheme. REC is a market based intervention scheme which offer incentives for renewable electricity through demand created by giving mandatory Renewable Purchase Obligation (RPO). The International Solar Alliance which has its headquarter in India, is also helping in accelerating the investment in solar power systems through international collaboration for innovative financing.

Table 1: Renewable energy targets for the next two years.

Source	2017-2018(in MW)	2018-2019(in MW)
Solar Power	15,000	16,000
Wind	4,600	5,200
Biomass	750	850
S H P	100	100
Total	20,450	22,150

Source: Ministry of New and Renewable Energy (2016)

Indian Government has been successful in achieving the set targets in various areas. Some of them are:

- There has been solar power capacity increment of 3,020 MW in 2015-16. Adding to this around 1750 MW capacity has also been added till late 2016.

- Globally, India is at 4th position in terms of wind power installed capacity succeeding China, USA and Germany which are the leading ones. In 2015-16, wind power capacity addition has been around 3423 MW.

- Installations of 51 MW of biomass power plants have been done in 2016-17. Family Type Biogas Plants are also being installed by the Central and State governments under the National Biogas and Manure Management Programme (NBMMP) for households of rural and semi-urban areas.

Some of the other incentives taken by the Government of India to step up its position in use of renewable sources are:

- National Solar Mission has been launched with the aim of increasing the solar power capacity from 20 GW to 100 GW by 2021-22.

- Installation of 34 Solar Parks of total capacity 20,000 MW in 21 states has also been authorised by Ministry of New and Renewable Energy.

- With a target of achieving 40 GW grid connected solar rooftops by 2020 government has started working intensively on increasing solar rooftop space. By 2016 about 500 MW rooftop panels have been installed and close to 3,000 MW capacity project has been sanctioned which is under installation. Major sectors like Airports, Railways, Hospitals, Government Buildings, Educational Institutions are also being targeted in addition to the private sector.

- A project for setting up of 1000 MW Inter-State Transmission System (ISTS) connected Wind Power Projects has also been implemented by the government.

Government is also taking various steps to promote the adoption of renewable energy by various other players in the market like corporates, households, NGOs etc. For this the government is offering incentives like concessional finance, viability gap funding, capital and interest subsidies, generation-based incentives (GBIs), fiscal incentive (MNRE,2016).

GREEN INVESTMENT: A CORPORATE PERSPECTIVE

Undoubtedly, the hardships facing the globe today cannot be resolved by any single player and requires a collaborative effort of the major three players - government, business and society. Corporates have a very meaningful and influential role to play in bringing about a change in the patterns of energy utilisation. With their diverse entrepreneurial capabilities, managerial skills and a spirit of innovation, corporates can bring about transformational change in the classical frameworks by expanding the use of renewable sources. The pioneering abilities which businesses employ to come up with various products and services can contribute to sustainable and inclusive growth.

The private sector is becoming more responsible in its operations and is looking for more and more renewable energy options for functions that consume large amounts of electricity. Google's data centers consume heavy amounts of electricity and in light of such challenges it took up a resolution of sourcing 100% renewable energy power and has committed to purchase 2.5GW of renewable energy. Google has also committed to invest close to USD 2.5 billion in renewable energy projects. Apple has also recently issued USD 1.5 billion green bonds to finance various projects in the field of energy storage and efficiency projects. Many Indian companies have also come up with their own targets to reduce the consumption of energy and to invent and develop energy conservation mechanisms.

ITC LIMITED

ITC has been actively investing in green energy and has earned itself the repute of being the only company in the world to be water positive for around 15 years, carbon positive for close to 12 years and solid waste recycling positive for around 10 years. During the year 2016-17, there has been a considerable reduction of 1.6% in the overall energy consumed as against 21,946 TJ (Tera joule) consumed in 2015-16. In addition to this, ITC has also increased its use of renewable energy in its overall energy consumption portfolio. Its use has increased from 47.3% to 48.2% on a year on year basis.

Six ITC units have procured more than 90% of their electrical energy needs from renewable sources in 2016-17. ITC has continuously put in efforts to minimise energy consumption and to increase the usage of renewable energy across various units. This has led to a control over GHG emissions. EY has verified the 2016-17 GHG inventory of ITC to be at the 'Reasonable Assurance' level. Around 8,100 tons of greenhouse gas

emissions (under Scope 1 & 2) were avoided with the implementation of the energy conservation measures in order to save both direct and indirect energy. The reduction in GHG emissions has primarily been attributed to the following factors:

- Decrease in Direct GHG (Scope 1) emissions - Reduction in utilisation of fossil fuels in cogeneration plants due to increased usage of wind electricity and various energy saving equipments.

- Decrease in Energy Indirect GHG (Scope 2) emissions – By replacing grid electricity with wind electricity at several ITC units and a decrease in energy consumption through multiple energy savings initiatives.

- Increase in Other Indirect GHG (Scope 3) emissions - Due to remarkable push to the business at Agro Business Division, the transport emissions are leading to an increase in Scope 3 emissions.

The company highlights a few main reasons which have contributed towards reduction in its consumption of energy:

- Upgrading the boiler and steam turbine system for bettering the cogeneration.
- Most favorable electricity mix from wind power and cogeneration plant.
- Introducing energy saving initiatives such as optimisation of refiners, automation of equipment etc.
- Utilisation of wind energy to improve the efficiency of cogeneration units.
- Better utilisation of steam through process optimisation by remodelling the process of condensate recovery and introducing effective steam traps.

Figure 3: Renewable energy utilisation in ITC
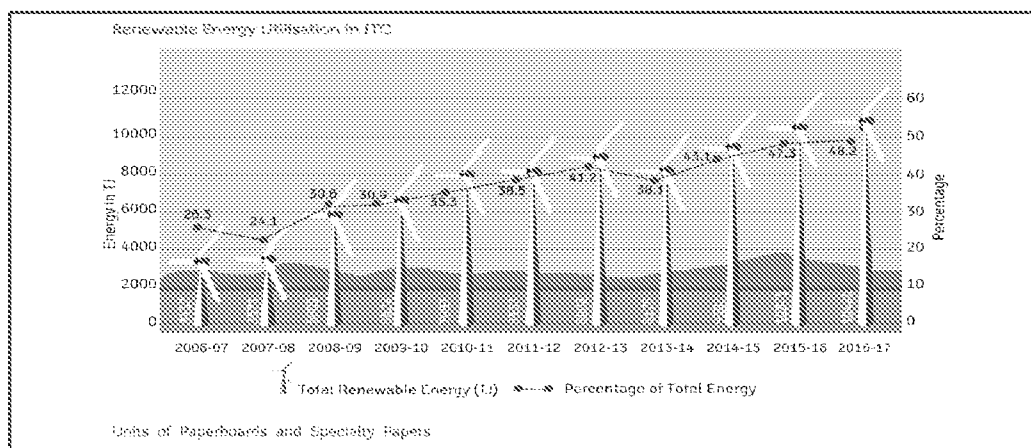
Source: Ministry of New and Renewable Energy (2016)

The company's goal is to move towards a 50% share of renewable energy by 2020. ITC aims at achieving the set standards by following the respective strategies-

- Sustaining the management approach in terms of conducting regular energy audits, benchmarking and target setting to reduce specific energy, enhancing the techno-commercial feasibility to invest in renewable energy and using Integrated Sustainability Data Management System (ISDMS) for continuous review of performance.
- Redesigning the strategy as per the requirements of the economy.

INFOSYS

Infosys is an information technology giant which has been on the forefront in adoption of green practices. In 2017, 11.1 million square foot of built-up area of their campuses was given a Platinum rating by LEED (Leadership in Energy and Environmental Design), renewable energy sources help it to meet 44.6% of the overall electricity requirements of its office campuses in India and it also became a member of the Carbon Pricing Leadership Coalition (CPLC) and announced an internal carbon price. Here are some of the other steps and initiatives taken by Infosys.

RENEWABLE ENERGY

Infosys has been making use of green energy for its power consumption for some time now. This green energy is either sourced from outside or is harnessed on site using solar panels. As per their sustainability report (2016-17) they claim to meet 44.6% (118.90 million units) power requirement in India using electricity from renewable sources.

Also 17,570 MW of electricity generation was done using their solar power system during 2017. With the aim of minimising the use of electricity from non-green sources in 2016-17, 2.4 MW capacity of solar energy plants have been installed by them.

Table 2: Location wise solar power capacity installation

Location	Capacity (KW)
Pune	787
Hyderabad	550
Bhubaneswar	470
Bangalore	290
Chandigarh	202
Mysuru	103

Source: Infosys Sustainability Report, 2017

ELECTRICITY

Based upon Infosys Sustainability Report 2016-17, it is evident that with the increasing use of green energy by Infosys, there has been a reduction in its overall energy consumption. Additionally, it has reduced its per capita power consumption by 51% in 2017 as compared to 2008.

Figure 4: Electricity consumption per month for Infosys
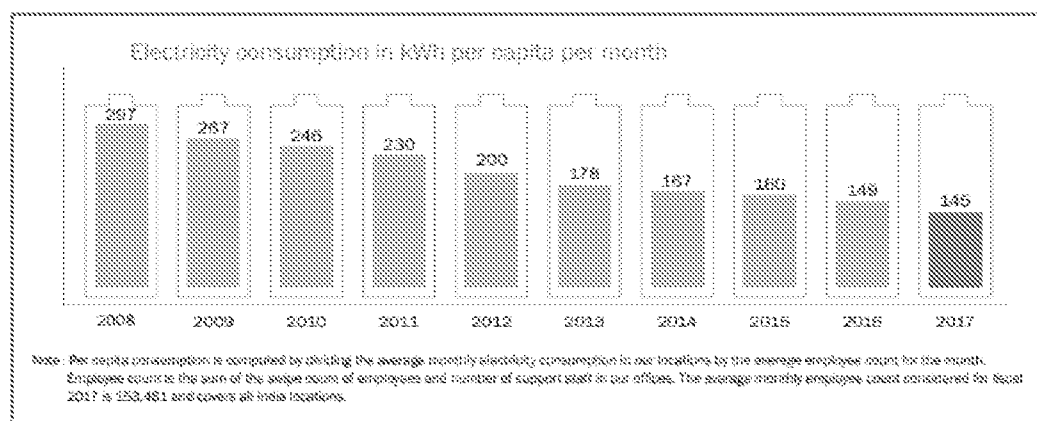
Source: Infosys Sustainability Report, 2017

CARBON OFFSET PROJECTS

Under carbon offset scheme individuals as well as corporate players get an opportunity to invest in green projects with the end objective of balancing out their carbon footprint. More and more projects are being taken up in developing countries where different players are taking initiatives like using clean energy technology, purchasing and splitting up carbon credits from an emission trading scheme or planting more trees to reduce future emissions.

Infosys is also taking various initiatives which include a rural electrification project and two biomass cook stoves distribution projects in rural and sub-urban areas. As per their estimation all these projects will generate close to 50% of their carbon offset requirement.

GHG EMISSIONS

Today more and more companies are tracking their greenhouse gas emissions under various voluntary activities and legal laws. Under GHG Protocol Infosys is also tracking its greenhouse gas emission in various activities. GHG emissions can be classified as Scope 1, Scope 2 and Scope 3.

Scope 1: Direct GHG emissions

These emissions occur from sources that are either owned or controlled by the company.

Scope 2: Electricity indirect GHG emissions

These are greenhouse gas emissions from generation of purchased electricity consumed by the company. These emissions physically occur at the place where the electricity is generated.

Scope 3: Other indirect GHG emissions

These emissions are generated as a result of the activities of the company but they don't occur from sources which are either owned or controlled by the company.

Table 3: GHG emissions under various scopes

GHG emissions (tCO2e)	2017	2016	2015
Scope 1	16,165	18,725	22,126
Scope 2	117,641	153,117	141,195
Scope 3	158,536	177,504	166,808
Total GHG emissions	292,342	349,311	330,702
Per capita emissions	1.90	2.36	2.46

Source: Infosys Sustainability Report, 2017

WATER

Corporations today are also paying attention towards their water consumption habits and disposal. In some countries rising cost of water is the reason why corporates are adopting water saving techniques. Water saving techniques includes a lot of ways; some of them are:

* Rainwater harvesting
* Innovative wastewater treatment technologies
* Use of water efficient fixtures
* Smart water metering for continuous monitoring of consumption
* Reuse of treated wastewater

Infosys is also making use of such techniques to make efficient use of the water. In 2016-17 it has been successful in reducing its water consumption by 8.36% on year-on-year basis. It has 270 injection wells and 25 lakes across different campuses in India. It is also harvesting rooftop rainwater and is using this collected water to recharge the ground water level using injection wells. As per the Infosys Sustainability Report (2016-17),

Infosys has recycled and reused a large amount of water used by them. Around 2,256,796 kilo liters of water was recycled which amounts close to 70.5% of the total water withdrawal.

CONCLUSION

The worldwide scenario has triggered a wave of concern and action to mitigate the harm done to the environment by adopting green practices at every possible stage. A growing number of countries are setting their energy efficiency and usage targets and are defining their roadmaps, adopting new policies and practices and upgrading the existing legislations to cover a wider range of activities. Several new financial incentives have been introduced to channelise additional funding towards green investment. The Government of India is also encouraging investments in green projects particularly involving the desired shift from "Carbon Credit" to "Green Credit". However, the clarity on what constitutes green investment is yet to be achieved and this structural deficiency hinders the exponential benefits which individuals might avail in the future.

The gaps which exist in the renewable sector are yet to be bridged. Markets need a clearer and transparent mechanism to smoothen the flow of funds to green investing measures. The set targets need to be revised retrospectively and achieved accordingly. A unified effort from all the stakeholders is needed to ensure that green investment becomes a handier topic of discussion and that it helps us move a step forward towards a greener and healthier tomorrow.

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Development of the Industrial Sector in India: An Enquiry

Abstract

India, an emerging economy, is characterized by a unique phenomenon of an underdeveloped industrial sector. As often pointed out by many economists, South-Asian countries like China and India are characterized by a higher population and are rich in terms of the availability of a variety of natural resources. The abundance of human labor and natural resources forms favorable conditions for the flourishing of the industrial sector in India too as it happened for China, but still, India has not been able to fully derive the benefit of her advantageous position in terms of gaining economic progress with a leading character of Industrial sector. This paper, taking the historical perspective, critically examines the country's industrial performance, after making an analysis of the industrial policies adopted since independence. Furthermore, the factors that led to the under performance of the industrial sector in India have been derived by using extracts from the growth pattern of the industrial sector and relevant industrial policies of China and South Korea.

INTRODUCTION

Industrialization is an imperative process for economic development of any country which has to be incorporated as an important economic strategy. The European countries and USA transformed into industrialized and developed nations from

predominantly agrarian and rural economies through a series of concerted efforts to employ more and more machines in verities of economic activities, which we call Industrial Revolution. Industrialization helps in capital formation and withdraws surplus labor from the agriculture sector by creating better job opportunities. Manufacturing sector, which constitutes the foremost component of the industrial sector, transforms the raw materials with the aid of human resources and capital goods into consumer goods and new capital goods. Industrial sector acts like an engine to the growth and development of an economy, as it is expected to play a vital role in making a country economically self-reliant.

In this research paper, we have first analyzed the industrial policies and their impact on the industrial growth of India. Then we have attempted to make a comparative assessment of India's industrial performance with that of South Korea and China.

Further, using instances of China and South Korea, we have identified few arguments and factors that can be considered as reasons for the passive industrial performance of India.

RESEARCH METHODOLOGY

For any research paper, the research methodology forms the base to reach at some fruitful conclusion and making the relevance of the study. For the current study we have largely used the existing literature on the topic for all three countries for the relevant data and we have recognized the studies wherever they have been used in this study. We have also used the data available on the RBI website to substantiate our arguments and analyze industrial performance of India. The techniques used in this study confine to primarily basic statistical concepts such as average, average growth rates, basic charts and aggregative economic variables. Other data which have been taken directly from the existing studies have been sighted without any alterations in the calculations, provided they make sense to our study.

THE INDUSTRIAL POLICIES AND PERFORMANCE IN INDIA

This section is divided across two subsections. First subsection attempts to highlight the industrial policies of India as it showcases the intent and scope of industrialization in any country and so is the case for India. The second subsection deals with the aftermath of these policies in terms of industrial growth rate attained.

I. Evolution of Industrial Policies

India embarked on the industrialization path for ensuring a self-sufficient economy since its independence. It adopted concerted efforts to prepare the strategy for industrialization which is reflected through various industrial policies. Industrial policy

means the procedures, principles, rules, and regulations which control the industrial undertakings of a country and the pattern of industrialization. Industrial policies are formulated by the government and hence reflect the developmental approach of the state i.e. whether a socialist or capitalist approach is adopted.

In India, major industrial policies were formulated primarily after independence which can be categorized into two heads: **Pre-reform period policies (1948-1990) and the Industrial Policy adopted under The New Economic Policy, 1991.**

Following are the major industrial policies adopted by India since independence according to the above categorization:

1. Industrial Policy Resolution,1948

The first important policy resolution statement made was the Industrial Policy Resolution, 1948. The main focus was to lay down the foundation of a mixed economy whereby both public and private sectors co-exist and are considered to be equally important components for the development of industries. Yet the public sector had a primary role to play. Under this policy, industries were divided into 4 broad categories and the areas of operation of the public and private sector were determined. The categories were:

* Industries with exclusive state monopoly- It included strategic industries like atomic energy, railways and, arms & ammunition.
* Industries with government control- It included industries of national importance that needed to be registered. Included 18 such industries like fertilizers, heavy chemical, heavy machinery etc.
* Industries in the Mixed Sector- It included the industries where private and public sector, both were allowed to operate. The government was allowed to review the situation to acquire any existing private undertaking.
* Industries under Private Sector- Industries not covered by the above categories fell herein.

2. Industries (Development and Regulation) Act (IDRA),1951

The Industries (Development and Regulation) Act was passed in 1951 to implement the industrial policy resolution, 1948. IDRA is the key legislation in the industrial regulatory framework as it gave power to the government to regulate industries in a number of ways and hence this period led to the advent of "License Raj".

All the industrial undertakings except those owned by the central government were compulsorily required to be registered with the designated authority and were, from

now on, required to take a license from the central government for expansion. No one (except the central government) was allowed to establish any new industrial undertaking without a license from the central government.

3. Industrial Policy Resolution, 1956

Based on the industrial model given by P.C. Mahalanobis, the emphasis was upon heavy industries which were reclassified into 3 categories:

- Schedule A industries- It consisted of the industries that were under the complete monopoly of the state. It included 17 industries.
- Schedule B industries- Consisted of 12 industries wherein the state was allowed to establish new units but the private sector was not denied to establish or expand its existing units, however, industries in this category were progressively state-owned. It included industries like that of fertilizers, rubber, etc.
- Schedule C industries- Included the industries not falling in the above categories.

Encouragement to small-scale and cottage industries was also given along with an emphasis on reducing regional disparities.

4. Industrial Policy Statement, 1973

The term "Core Industries" was introduced which included 6 core industries namely Iron & Steel, Cement, Coal, Crude oil, Oil refining, and electricity. They were called the basic industries or infrastructure industries.

The private players were allowed to apply for licensing in these industries. The Public-Private Partnership (PPP) was emphasized as a prototype and it was called as a joint sector in which a partnership between state, centre and private sector was allowed.

5. Industrial Policy Resolution, 1977

Emphasis was put upon the development of small and cottage industries. The policy statement considerably expanded the list of reserved items for exclusive manufacture in the small sector. Furthermore, a restrictive approach towards large business houses was adopted. The policy emphasized that the funds from financial institutions should be made available largely for the development of the small sector, the large sectors should generate internal finance for financing their new projects or expansion of existing businesses.

The role of public sector in development was further emphasized; the policy stated that the public sector would be used not only in the strategic areas but also as a stabilizing force for maintaining essential supplies for the consumer.

6. Industrial Policy, 1980

The policy emphasized that the public sector is the pillar of economic infrastructure development; hence the focus was on the effective management of the public sector.

Liberalization of industrial licensing was done through an increase in the asset limit in Monopolistic and Restrictive Trade Practices Act (MRTP Act), 1969 (which tends to control the establishment and expansion of all industrial units that have asset size over a particular limit). Along with this, relaxation from licensing to a large number of industries was also provided. Also, the focus was on redefining the small-scale industries through increasing the investment limit to boost the development of this sector. As can be observed, from the 1980's a more of liberalized policies towards private sector were adopted.

7. Industrial Policy, 1991

There was abolishment of industrial licensing; now the industries that were required to take a license were reduced to only 5. The policy limited the role of the public sector and encouraged the private sector participation over a wider field of industries. Now only 4 industries (defense, atomic energy, railways and, mineral used in the generation of atomic energy) were reserved for the exclusive monopoly of the public sector. Efforts were made to revive loss-making public enterprises through the formulation of schemes for the rehabilitation and revival of such units. Further disinvestment was done from the units that could not be revived. Greater autonomy to public enterprises in their day to day functioning was given along with the adoption of liberalized policy towards foreign capital and technology.

Thus, on the basis of above mentioned industrial policies, we can say that there have been 3 phases of policy regimes which the government has followed to influence the process of industrialization: **Planned Government Control (1948-1980), Limited Liberalization Phase (1980-1990), and Liberalization Regime (1991 onwards).**

II. Industrial Performance of India

The effectiveness of these policies can only be analyzed on the basis of the actual performance of the industrial sector, which is dealt with in this segment. To ensure better understanding, the complete performance of the industrial sector has been divided into the following 4 phases on the basis of the growth rates attained-

Phase I- High Industrial Growth Phase (1950- 66)

It was the period from the advent of 1st five year plan till the end of 3rd five year plan which laid a foundation for building a strong industrial base. There was a noticeable acceleration in industrial output particularly after the 2nd five year plan as a high

priority to industrial sector was given through substantial investment, furthermore, this period was characterized by price stability and the food grain price remained stable. In the 1st five year plan, the total outlay of expenditure proposed was of Rs. 2069 crores out of which Rs. 359.9 crores was allocated towards investment in industries which comes out to be 17.39% of total expenditure; in the 2nd five year plan, out of total estimated expenditure of Rs. 4800 crores, Rs. 890 crores were directed towards industry and mining that is 18.54% of the total estimated expenditure was allocated towards the industrial sector.

This figure further rose in the 3rd five year plan plan wherein out of total outlay of Rs. 7500 crores, Rs. 1784 crores was allocated towards industry and minerals which turns out to be 23.8% of total expenditure.

Phase II- Deceleration and Structural Retrogression (1966-80)

This phase is also known as a low growth phase characterized by higher fluctuation. The decline in the growth rate of capital goods industries is known as structural retrogression. From the point of view of the long run industrial development, the most important group of industries is the capital goods industries, and during this phase, there was a decline in the growth rate of these core industries.

The government expressed the view that exogenous factors like wars of 1965 and 1971, oil crisis of 1973 and drought conditions in some years were responsible for such low performance; however, the internal factors were equally responsible for such a decline. The low growth of the agriculture sector accounted for the slowdown of industrial growth by restricting the supply of raw materials on the one hand and constraining the demand for the industrial goods on the other hand.

Several economists pointed out that the market for industrial goods in the country at that time was limited to the top 10% of the population due to extreme inequalities of income and wealth. Once the demand of this section gets saturated there can be no further expansion in demand. This limits the demand for consumption goods, limiting in turn, the demand for machinery and capital goods in subsequent stages.

Phase III- The Period of Industrial Recovery (1980-91)

One of the primary reasons for recovery was the liberalized policies formulated in 1980 (as mentioned above). Furthermore, because of growth in the number of prosperous farmers and increase in the growth rate of the service sector (because of sector-specific policies formulated), there was some increase in the growth rate of industrial sector as such segment of the population contributed to the generation of demand for industrial products.

Phase IV- Post-Economic Reforms Phase (July 1991 Onward)

The worst industrial growth was observed in 1991-92 when the industrial sector grew at a negative rate of 0.29% due to initial adjustments that took place after the launch of New Economic Policy. The recovery in industrial growth started in 1992-93 when it grew at a rate of 3.25% followed by 7.47% in 1993-94. These were the initial adjustment years in response to the reforms. The industrial growth then accelerated to 10.44% in 1994-95 and 13.16% in 1995-96 surpassing the growth rates of the 1980s.

After the initial birth-pangs of a competitive economy were over, the benefits of liberating Indian Industry from the Control Raj were clearly visible by mid-1990s. When it was expected that India will enter a period of sustainable growth, the growth performance slowed down and there was a sustained decline. It was only during 2002-03 that a bit of stability was experienced.

The following table gives an overall analysis of the performance of India's industrial sector:

Table1: Industrial performance of India

Phases	Years	Industrial Growth Rate (%)
High Industrial Growth (1950-66)	First five-year plan (1951-56)	5.73
	Second five-year plan (1956-61)	6.57
	Third five-year plan (1961-66)	6.92
Deceleration and Structural Retrogression (1966-80)	Annual plan (1966-67)	1.43
	Annual plan (1967-68)	1.37
	Annual plan (1968-69)	5.68
	Fourth five-year plan (1969-74)	4.62
	Fifth five-year plan (1974-79)	6.55
	Annual plan (1979-80)	-2.40
Period of Industrial Recovery (1980-1991)	Sixth five-year plan (1980-85)	5.76
	Seventh five-year plan (1985-1990)	6.93
	Annual plan (1990-91)	5.72
Post Reform Phase (1991 onwards)	Annual plan (1991-92)	-0.29
	Eighth five-year plan (1992-97)	8.46
	Ninth five-year plan (1997-2002)	3.57
	Tenth five-year plan (2002-07)	8.03

Source: Burange, L.G, Yamini, S. (2011). A Review of India's Industrial Performance. (Division into phases has been done by the authors themselves).

The developmental theories emphasize that there is a sequence of developmental phases that characterize the majority of economies before they attain the title of developed economies. The developmental phases are expressed in terms of sectoral contributions which vary during the different phases of economic development. Such ordered succession of the dominance of the sectors in the developmental phases is called "Sectoral Contribution Model". In brief, according to this model, an ideal strategy for development is the one that follows the transition from the dominance of agriculture to the dominance of manufacturing and further to the dominance of the services. The dominance of sector reflects its size as a percentage of GDP of the concerned economy.

Table 2: The decadal average of the year on year share of the different sectors in India's GDP for the period 1950-2010

Sector	1950-51 to 1959-60	1960-61 to 1969-70	1970-71 to 1979-80	1980-81 to 1989-90	1990-91 to 2000-01	2000-01 to 2009-10
Agriculture	55.3	47.6	42.8	37.3	30.9	21.8
Industry	14.8	19.6	21.3	22.3	23.3	24.5
Service	29.8	32.8	35.9	40.3	45.7	53.7

Source: International Journal for Research In Applied Science & Engineering Technology Volume 3 Issue 5, May 2015.

As we can observe, India seems to have violated this model. It has shifted directly from agriculture to services sector in terms of contribution to GDP, skipping the transfer from agriculture to industry and then to services, resulting into differences between the growth indicators and on-ground reality, evident from the huge unemployment and persistent high levels of poverty (for unemployment and poverty data, refer to NSSO website). But from our analysis done above, we found out that the industrial sector has somewhat shown results corresponding to the policies and measures adopted by the government. Thus, it can be inferred that what could possibly be the reasons for problems which industrial development is supposed to eradicate to still exist is *"not an up-to-the-mark development of industrial sector"*.

THE POSSIBLE REASONS FOR PASSIVE INDUSTRIAL PERFORMANCE IN INDIA

There were discrepancies between India's policy targets and actual outcome for which numerous arguments are given, the primary reason given is that the permit-license raj had held up the industrial growth during the planning era, but if such was the case then why did the industrial growth not zoom after the liberalized policies? Thus certainly we can say that some other factors were also at play that restricted the growth of industrial

sector; one of which and the crucial one is poor infrastructure, followed by unskilled labor force and underdeveloped primary sector. To understand the reasons for such deviations in industrial performance, we have compared it with industrial performances of other countries who had similar conditions like India in their pre-industrial periods. In this research paper, we have taken the cases of China and South Korea and found out that they had better industrial performance (see Table 3) than India despite similarities in the industrial policies of the three countries.

Initially, the industrial sector of all the three countries had a significant role of government and gradually all of them moved towards liberalized economy but still in the present times, we can see that China and South Korea are ahead of India on the economic front.

Table 3: Sectoral Contribution of China, India and South Korea

	1950				1960				1980				2005			
	A	IN	MN	S	A	IN	MN	S	AG	IN	MN	S	A	IN	MN	S
China	51	21	14	29	39	32	27	29	30	49	40	21	13	48	34	40
India	55	14	10	31	43	20	14	38	36	25	17	40	18	28	16	54
S. Korea	47	13	9	41	35	16	10	48	16	37	24	47	3	40	28	56

A=Agriculture, IN=Industry (including manufacturing), MN=Manufacturing, S= Services

Source: Karimov, A.(2013). Industrialization and Industrial Policy in South Korea: Some Development Lessons for transiting Estonia.

It can be inferred from the table that share of industrial sector in GDP experienced a sustainable rise for both the countries whereas in the case of India, it although rose but not as per the potential. Now, using the inferences from China and South Korea, we verify the verity of the above-mentioned arguments as below under the following subheadings:

a. Inadequate Focus on Infrastructure Development

Infrastructure helps in developing the base required by the industries to flourish. However, in India, significant attention has not been paid to develop infrastructure. In the case of South Korea, to pursue the objective of industrialization and keeping in mind the initial weakness of private sector, the government of South Korea not only played a major role in formulating and implementing industrial and trade policies but also invested in activities that further facilitate the development of industries.

The Korean government had focused on setting up a favorable macroeconomic environment by allocating and investing a significant portion of funds towards infrastructural development along with formulating sector-specific policies. The

government targeted infrastructure to ensure a more sustainable and smooth growth of its industries. The government and public enterprises accounted for close to 40% of the total domestic investment in the period between 1963 and 1979 and a major portion of this investment was directed towards the infrastructure (see Table 4). The industrial composition of government investment reveals that the share of infrastructural investment has been readily rising reaching as high as 76% of the total public sector investment in the year between 1977 and 1980. Government-owned industries were established to serve as industrial infrastructure and to supply inputs to the downstream industries. In addition to creating this forward linkage effect, they made a substantial contribution to the capital formation and technological development. The following table shows the expenditure by the Korean government as a percentage of total expenditure for various sectors during the first four five-year plans.

	Primary industry	Mining and manufacturing	Infrastructure and social overhead	Total
First five-year plan (1962-66)	25.7%	20.8%	53.5%	100
Second five-year plan (1967-71)	25.9%	13.3%	60.8%	100
Third five-year plan (1972-76)	22.7%	15.6%	61.7%	100
Fourth five-year plan (1977-80)	15.7%	8.5%	75.8%	100
Total average	22.9%	14.9%	62.2%	100

Source: Kwan S. Kim(1991). The Korean Miracle (1962-1980) Revisited: Myths and Realities in Strategy and Development.

India on the other hand directly invested into the core industrial sector and failed to create the corresponding level of infrastructure that would ensure a smooth functioning of these industries, this inadequacy of infrastructural investment had hence hampered the industrial growth. India during the 1st Five-year plan (1951-56) invested 17.93% out of the total estimated expenditure towards industries and 71.15% into infrastructure and social overhead (includes irrigation and power, transport and communication and social services including rehabilitation) however the point of notice is that if this expenditure is further bifurcated we can see that only 50.7% was invested towards irrigation, power, transport, and communication and rest was allocated towards social services schemes. In the 2nd Five-Year plan (1956-61) the infrastructural investment reduced to 38.9% of total expenditure and in the 3rd Five-Year plan (1961-66) investment towards developing irrigation, power, transport, and communication was close to 42% of total estimated expenditure. During the two

Annual Plans (1966-67 and 1968-69) investment in infrastructural schemes of water, power, transport, and communication was only 10.94% of total expenditure. Furthermore, during the 4th Five-Year plan (1969-74) only 10.28% (of total expenditure) was directed towards infrastructure. It can be observed from the data that the required priority to infrastructure has never been given in India in its path to industrial advancement which suffocated the industrial performance and prevented it from reaching the optimum level. *(Source of data: Analysis of the Pattern and Composition of Public Expenditure in India by Utsav Vatsyayan)*

b. Unskilled Labor Force

For the development of any sector, not just physical and fixed capital is required but at the same time, human capital also plays an equivalently vital role. Hence, adequate consideration to labor should also be given in order to ensure the proper transformation of raw materials into finished products with the aid of technology. In order to ensure high productivity of labor, primary attention should be given to the areas of skill, health and physical capital per worker. First of all, what is of prime importance is that there should be an availability of labor force which is in a good health condition and is equipped with adequate and updated skills. Therefore, the goal should be to have an adequate, skilled and healthy labor force. The quality of skills that the labor force possesses determines the developmental path that an economy will be following. The best example to illustrate this can be given by comparison between India and China. Skills of labor can be measured by their education level or literacy level (assuming education develops coherent skills of an individual). China focused on 'Mass basic education' (primary and secondary education for all) that helped it in preparing a larger workforce capable enough of performing routine tasks involved in a manufacturing process, therefore China could develop its industrial sector, more progressively than India, which also helped in its overall economic development.

It is a matter of fact, that both India and China initially focused on ensuring the primary level of education, however, India, later on, shifted onto focusing more on 'Deep education' (higher education but for few) which helped it in preparing few but highly skilled labor required by service sector, which facilitated the advancement of service sector in India. This education policy is one of the prime reasons for why India violated the sectoral contribution model because small but high skilled labor force that was prepared by it was more suitable for employment in the tertiary sector than in industrial sector and this highly skilled workforce took the service sector to new heights. Later on, both the countries realized where they lacked and their education policies started converging.

Adequate focus on health is also required to ensure that people grasp whatever skills are imparted and retain them; hence, a healthy population should be there. For this, if

we take China's example what it did was it introduced various policies to eradicate life-threatening diseases, and to provide health security, State Owned Enterprises (SOEs) took care of the health of its employees and their family members.

c. Negligence to Agriculture

Agriculture plays an important role in the industrial development of any economy in two ways: first, it provides raw materials for processing; second, it helps in creating the market for industrial goods. This is nothing but the 'forward and backward linkage effect of agriculture'. Manufacturing units form the primary constituent of the secondary sector, demands raw materials for the production activities, which are supplied by the primary sector i.e. agriculture. If agriculture in an economy performs well, an industry can be ensured of secured and a continuous supply of requisite inputs and assuming other things affecting industrial production like demand and technology remaining constant the industry will also grow. This is called the forward linkage effect of agriculture. Now to produce the requisite agricultural output, the demand for products like seeds, fertilizers, tractors, etc., which are industrial products, will also rise and this will be directly helping the industry to grow by creating a market for its goods. This is called the backward linkage effect.

Now the question which arises is how development in agriculture takes place? Basically, there can be two stages for the development of agriculture: first, when agriculture is impoverished, and internal reforms, like, land reforms, improving the traditional methods of agriculture like irrigation etc. can increase the agriculture growth; second, when traditional methods of agriculture reach their potential of increasing the harvest, then growth in agriculture can be ensured only through further innovations in the methods of farming, which would help in increasing yield with the existing land resources. We can analyze India's agricultural performance according to these stages and corresponding industrial performance.

Table 5: Average Decadal Growth Rates

Period	Primary Sector	Secondary Sector
1900-01 to 1946-47	0.4%	1.5%
1950-51 to 1960-61	2.8%	6.1%
1960-61 to 1970-71	2.1%	5.4%
1970-71 to 1980-81	2.0%	4.2%
1980-81 to 1990-91	3.5%	5.5%
1990-91 to 2000-01	3.3%	6.2%
2000-01 to 2010-11	3.2%	8.5%

Source: Dreze, J. and Sen, A. (2013). An Uncertain Glory: India and its contradictions.

In the 1950's, because of the land reforms initiated and the measures taken to improve irrigation and other facilities during the initial phases of planning, there was an improvement in agriculture growth rate in comparison with the pre-independence period. An agricultural growth rate of 2.8% was achieved during the 1950's which also facilitated the growth of the industrial sector. Hence, by adopting internal reforms agricultural output boomed (according to the first stage mentioned above).

After reaping maximum benefits from internal reforms, there was a requirement for innovative measures which came in the form of Green Revolution in the latter half of the 1960's because of which agriculture output boomed, however, it may be noticed that instead of growing in the 1970s, agriculture output grew more in the 1980s, it is because the events of drought and war in the early 1970s delayed the impact of Green revolution.

As can be inferred from the Table 5 given above, increase in agriculture growth rate is accompanied by a corresponding increase in industrial (secondary sector) growth rate, satisfying the argument that the primary sector builds the foundation for industrial development. However, it should be noted that agriculture output constitutes two types of crops- food grains and non-food grains (including industrial crops). So if in any case there is a decline in agriculture growth rate but still industry grows, contradicting our argument, this may be because of the reason that overall agriculture output may have gone down but industrial crop production may have increased or remained the same hence not deterring the input supply for industries. Like in the 1990s, (the post-economic liberalization period) we see a decline in overall agriculture growth rate but still a rise in industrial growth rate. This is because more of non-food items were demanded, industrial crop production increased more and hence because of increased supply of raw materials industrial sector also initially grew at a steady pace.

Table 6: Comparative growth of industrial output

Year	China	India
1952-1965	12.3%	8.2%
1965-1978	10.2%	4.3%
1978-1995	11.6%	6.8%
1995-2008	13.8%	7.8%

Source: Brandt, L., Ma, D. and Rawski T.(2016). Industrialization in China.

Table 7: Percentage Growth Rate of Agriculture sector

Year	China	India
1964-1973	3.64%	3.00%
1974-1983	5.94%	2.98%
1978-1983	7.16%	2.92%
1964-1983	4.57%	2.77%

Source: Lunga-Fai Wong(1989). Agriculture productivity in China and India: a comparative analysis.

As can be inferred from the Table 6 and Table 7 that in the case of China a strong growth of industrial output was accompanied by a steady growth in agriculture as well.

When India's agriculture and Industry relations are compared with that of China, it is observed that post Green revolution, Indian agriculture became stagnant because of no further reforms, affecting the productivity of industries as well. Whereas, China also achieved stagnation in agriculture after a point of time but it was able to develop its industrial sector sufficient enough that it could absorb the surplus labor force from agriculture and act as an engine of growth for the economy. Although, initially, China too did not give adequate attention to its primary sector and rather directed all of its focus on developing heavy industry following the Soviet model (like that of India) but later on, realized the importance of agriculture in the development of industry and launched agriculture reforms as a result of which agriculture grew, facilitating industrial growth.

CONCLUSION

India's industrial policies, although yielded some positive impact in terms of attaining a modest industrial growth rate, were not successful enough in developing the industrial sector in a sustainable manner, which as a result failed in generating adequate employment opportunity that could have raised the level of living standards and address the issue of abject poverty and unemployment.

The arguments that we were trying to verify seems to hold true, India although allotted funds for infrastructural development to build a stronger macroeconomic environment that would be favorable for industries but, the allocation made was never substantial and in line with the targets made, therefore, India could not succeed in achieving this ultimate objective. Furthermore, the inappropriate and non-serious education policy with less focus upon primary and secondary education for all was equally responsible for why industries could not grow as per the desired targets, because of the shortage of skilled and efficient labor force. And finally, because no further innovative measures

have been taken during the post-Green Revolution period, stagnation in agriculture sector creeped in. Although there were some cyclical fluctuations, in overall there was a sluggishness in agriculture growth rate and this could also be formidably taken as a responsible factor for the underdevelopment of industries in India.

We observe that the industrial policies that were formulated were good in principle but the above-mentioned factors that were essential to ensure their effective implementation were not given due consideration, which means proper policy formulation was not done to adequately back the industrial policies. Apart from this, whatever good policies we had, there were differences between their expected targets and actual outcomes, thus the overall policy formulation as well as implementation was at flaw, evident from this quote from approach to 10th Five year, Planning Commission, GOI- "We must respond to the growing impatience in the country at the fact that large numbers of our population continue to live in abject poverty and there are alarming gaps in our social attainments even after five decades of planning."

To correct this flaw, what is required in present scenario is that there is an urgent need to reimagine the focus from tertiary sector to industrial and agriculture sector if we need the development to trickle down to the bottom of the pyramid, as these sectors lead to more inclusive levels of growth. The point is that one should not get blinded by high industrial trajectories (if any), and the focus should be diverted onto increasing the share of industrial sector in the total GDP contribution so that these high numbers of GDP growth rates get transformed into on ground development for all.

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A Study of Some Determinants of an Education Policy

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Abstract

This paper focuses on certain aspects of education namely-accessibility, equity and quality. These are deemed essential pillars of a good education policy. The paper focusses on evaluating outcomes on each of them. For instance, the paper considers the question of how to evaluate if accessibility to education has improved, the tools that would be employed to judge it and the effectiveness of these tools in evaluating the outcomes. The paper further studies factors affecting each one of them. Regression analysis has been carried out to understand the impact of the underlying factors that affect accessibility, equity and quality. As an illustration, secondary data has been used to analyze the impact of numerous factors - infrastructure (such as proportion of schools with electricity or playground), nutrition (proportion of schools that provide mid-day meal, state-level health indicators), education level of instructors, proportion of teacher training institutes and performance of students on mathematical/language ability tests- on quality. Additionally, lack of data on some missing determinants has also been highlighted, such as measures that account for pedagogy and their impact on quality. Similar exercises were carried out for accessibility, and equity. The methodology for assessing performance on these three metrics has been outlined. Further the effectiveness of some of the existing measures was examined and modifications have been suggested in few cases.

INTRODUCTION

Research within the education sector in India in last two decades has highlighted the poor and ever worsening situation of quality of education within the Indian primary education system (Joshi, 2016). Not only do we fare poorly on overall indicators of education such as literacy as compared to other rapidly developing nations, we occupy the lowest spots across the world when it comes to quality of learning outcomes. There are many persisting concerns and challenges relating to access to and participation in education, quality of the education imparted, and equity in education.

Considerable amount of literature exists on education in India that focusses on enrolment, drop-out rates and incentive schemes.

Handa (1999) points out that raising primary school enrollment itself is easier said than done. The relative importance of school supply versus households' demand factors remains controversial, with serious implications for education policy. For the study household's characteristics data and information on school infrastructure were used. The impact of school characteristics on household schooling decisions is measured using a reduced form demand equation for children's schooling. The independent variables of this equation include characteristics of the individual (age), household characteristics that capture access to resources (age and sex of the head, literacy status of head) and the vector of school infrastructural characteristics.

Historically, empirical analysis has focused on two complementary explanations-school supply and household level determinants of demand-and broadly support this claim. In particular, studies have generally found that attainment of education increases with improvement in school infrastructure, given household characteristics, and that, given school infrastructure, attainment of education increases with income and expected returns to educational investment.

However, attendance, performance of students, school infrastructure and quality of teachers should also be considered. Das (2007) points out that enrolment alone is not a sufficient indicator of education policy unless a standard education attainment measure is used.

There has been a welcome change in the way we look at education policy in recent years, shifting gears from measures that value quantum such as enrolment ratios to quality-driven metrics such as attendance rates and pedagogical considerations.

(Chaterjee, 2018) analyses primary education policies and their outcome in India from 2005 to 2011 and suggests that progress has been mixed. Attendance on an average day has worsened despite improvement in enrolment rates. Further, the proportion of

underperforming students based on the age-specific requirements set by the NCERT[1] is high.

This paper takes an output-driven approach, it looks into education from different facets and the efficiency metrics used in assessing them.

RESEARCH QUESTION

1) How do we measure educational outcomes with respect to accessibility, equity and quality?

2) How effective are the existing measures of accessibility, equity and quality?

3) What are the factors affecting educational outcomes with respect to accessibility, equity and quality?

METHODOLOGY

To check the effectiveness of existing measures, variability of the measure has been considered. This has been assessed using boxplots. The aspects of education concerned are qualitative and broad in nature, this is the reason behind considering variability, any measure with low variability might not capture diversity to the fullest extent. Thereafter, factors crucial for determining outcomes for each of these aspects have been considered. The significance of the factors has been judged using a simple linear regression model of the form-

$$Y_i = B_0 + B_1X_{1i} + B_2X_{2i} + e_i$$

Where Y_i is the proxy measure of the dependent variable in each case (say GER in case of accessibility) and $X^{'s}$ represent the independent variable hypothesized to affect the dependent variable.

ACCESSIBILITY

Gross Enrollment Ratio (GER) is widely used for measuring accessibility. GER is defined as the ratio of students enrolled in a grade and the total students eligible for that grade[2]. A high GER is an indication of high enrollment and improved accessibility.

Analysis of GER data for primary classes (I-VIII) for Indian states shows that, GER generally varies between 90 to100 in most of the states. Only three states have GER below 90 namely, Andhra Pradesh (83.3), Jammu & Kashmir (80.1) and Uttar Pradesh (86.2). All the Union Territories (expect Delhi NCR) also have GER below 90.

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[2]The United Nations Educational, Scientific and Cultural Organization(UNESCO), describes 'Gross Enrolment Ratio' as the total enrolment within a country "in a specific level of education, regardless of age, expressed as a percentage of the population in the official age group corresponding to this level of education.

The low variability in GER is further ascertained by a boxplot[3] of GER data. The boxplot clearly shows the clustering of the GER data about the median. The low variability in GER might suggest that GER may not be very effective in capturing differences in accessibility. Further inadequacy of GER in capturing educational accessibility is reflected from the fact that several states have GER exceeding 100. These include states of Bihar (107.7), Jharkhand (107.1), Delhi (116.6), Himachal Pradesh (101), West Bengal (104.2) etc. GER can exceed 100 in case of late enrollment, early enrollment, or repetition, resulting in the total enrollment exceeding the population of the age group that officially corresponds to the level of education.

The fact that 17 states and union territories have GER exceeding 100 points out that such distortionary cases are high in the Indian context. It is also possible that high GER may in turn reflect other inefficiencies say repetitions and dropouts. A better measure of accessibility would be Net Enrollment Ratio (NER), which excludes overage and underage students. The divergence between NER and GER is also a reflection of inefficiency of GER. However, most of the official statistics and studies continue to rely on GER.

Moreover, GER or NER both being based on enrollment data neglect the important aspect of actual attendance. Studies have recorded high absenteeism in primary schools despite high overall enrollment in the schools. (Public Report On Basic Education in India, 2000). Accessibility is a broad concept and its essence is that education should comfortably be within the reach of whosoever wants to attain it. If high enrollment is not corroborated with high attendance, it may in turn reflect that although it is easy to get enrolled, lack of transport facilities, and other facilities within school, inhibit the accessibility of education. Hence a measure discounting the GER for attendance seems more fitting.

Fig-1- Boxplot GER data for all states

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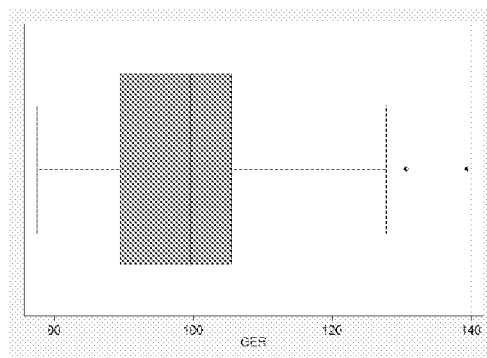
[3]The width of the box represents the inter quartile range i.e. the distance between the first and third quartile. The line inside the box is the median. The whiskers emerging from the box end at 1.5 times the nearest quartile.

Although, GER may not be a very good tool in capturing all the aspects of accessibility, it can reasonably be assumed that the observed variation in GER is caused by some underlying differences within sates. Analysis has been carried out to study these underlying determinants.

**Fig 2 - Plot of GER and no of govt SCH per 10sqkm area (a) for all states
(b) for 20 selected states**
(The GER data is from DISE flash statistics 2016)
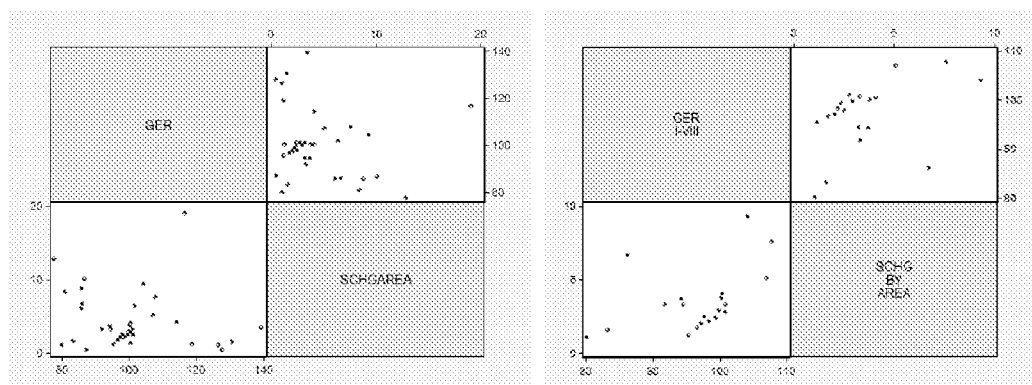
Through analysis of cross sectional state wise data of India, factors that are crucial in determining improved accessibility as measured by GER have been studied. In this analysis the impact of availability of school within a 10 square km radius on accessibility has been considered.

A plot of GER primary students (class 1 to 8) and the number of schools per 10 square km area as shown in figure 2 (a), shows a positive relation between the two, but the observed relation is not very sharp, and many data points are scattered away from the cluster. Figure 2 (b) plot the same relation for 20 selected states[4], again the relationship is positive but not very sharp. This analysis shows that the Gross Enrollment Ratio and number of schools in an area are positively related to some extent which can mean that the policies aimed at improving the availability of schools implemented thus far, have been successful in increasing enrollment in India. But the lack of a strong relation might indicate that apart from the physical presence of the school itself, factors such as availability of transport and better infrastructure within the school could also potentially affect enrollment.

EQUITY

While issues in equity include a wide spectrum such as caste, class and disability, this study only aims to understand gender equality in education. A measure for gender

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[4]Union territories and north eastern states were excluded from the analysis owing to their smaller size to eliminate outlier observations and observe whether that made a difference to the relationship obtained.

equity in education is the Gender Parity Index (GPI) which is the ratio of female to male enrollment discounted for the state wise gender ratio[5].

Fig 3– Boxplot of GPI data
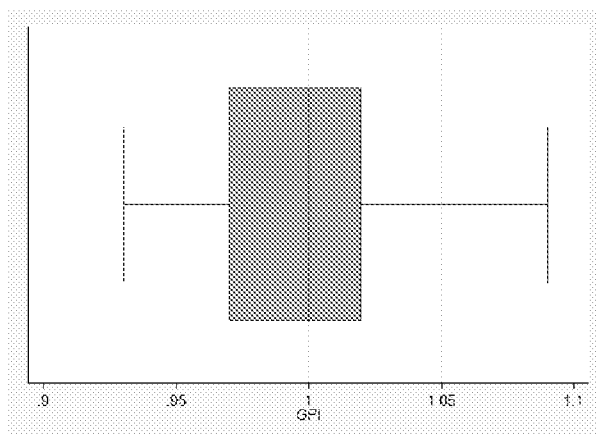
Analysis shows that just like GER, the variation in GPI data for Indian States is small. The minimum and maximum value of GPI is 0.93 and 1.09 respectively. Average GPI across states is 1.002 and standard deviation being 0.0388 with most of the data points clustered between 0.9 and 1. It is also clear from the above boxplot data that the GPI data is clustered around the median value of 1. From the data it seems that there is gender parity in terms of enrollment. However, the low variation in GPI is a caveat to such an interpretation. Further, as the preceding analysis shows the enrollment data itself has little variation, being based on enrollment data variation in GPI is further reduced. Moreover, education equity is a very broad term and looking at it just in terms of enrollment parity would be myopic. These distinctions between gender parity goals [achieving equal participation of girls and boys in all forms of education based on their proportion in the relevant age-groups in the population] and gender equality goals [ensuring educational equality between boys and girls] needs to be understood well. The Gender Equality Index is a tool used by EU and its member states to assess how far (or close) they are from achieving a gender-equal society. The Gender Equality Index[6] measures gender equality in eight areas which includes work, money, knowledge, time, power, and health. In comparison the enrollment data as used in GPI doesn't capture all the dimensions of gender equity. Say girls may be discriminated against based on availability of resources or biased classroom pedagogy. This might further get reflected

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[5]The Institute for Statistics of UNESCO also uses a more general definition of GPI: for any development indicator one can define the GPI relative to this indicator by dividing its value for females by its value for males.
[6]Gender Equality Index was developed by the European Institute for Gender Equality (EIGE), a full-fledged European Union agency for gender equality.

in the performance of boys and girls in various areas, which again is not captured by GPI. An Equity index as similar to the one used by EU rather than a parity index would be more appropriate in case of educational equity. Such an index could be based taking into consideration access and participation, gender-aware educational environments, processes, and outcomes.

Although GPI may not effectively capture educational equity, it can reasonably be assumed that the variations in GPI among states are caused by some underlying factors. Henceforth, further analysis has been carried taking GPI as a proxy for gender parity. Through the analysis of cross-sectional-state-wise data of Indian states, factors that are helpful in assessing any improvements in equity with respect to gender have been examined.

Fig 4(a) - Plot of GPI and proportion of schools with girl's toilet. (b) - Plot GPI on State female literacy (all states)
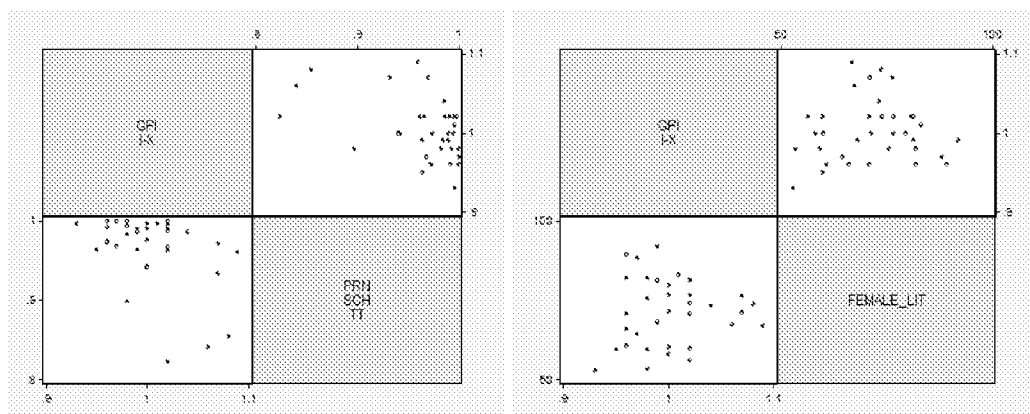
Fig 5- Regression result if GPI on state female literacy and portion of schools with girls' toilet

```
. regress GPI female_lit pct_sch_toi

      Source |       SS           df       MS            Number of obs =       35
-------------+----------------------------------        F( 2,    32) =     4.47
       Model |  .011211719        2   .005608859        Prob > F      =   0.0194
    Residual |  .040148295       32   .001254634        R-squared     =   0.2183
-------------+----------------------------------        Adj R-squared =   0.1694
       Total |  .051360014       34   .001510559        Root MSE      =   .03542

-------------+----------------------------------------------------------------
         GPI |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  female_lit |   .0005831   .0005856     1.00   0.327    -.0005995    .0017759
 pct_sch_toi |  -.3995343   .1361341    -2.93   0.006    -.6765304   -.1222351
       _cons |   1.345953   .1320101    10.20   0.000     1.075957    1.616849
-------------+----------------------------------------------------------------
```

The first factor that has been considered for improved gender parity is the proportion of schools with girls' toilet. The second factor that has been considered is state female literacy. This is an independent variable and may act as a proxy for improved gender consciousness translating into improved gender parity through encouragement and creation of an environment conducive for the pursuit of education by a female child. We carry out a regression with state GPI as the dependent variable and the proportion of schools with girls' toilet in the state and state female literacy as the independent variable. The regression model turns out to be significant, but the sign of the coefficients is opposite to expectation as shown in figure 5. This is also evident from the plot of GPI on proportion of schools with girl's toilet which doesn't yield any clear systematic picture. The regression results show that some variable correlated with the independent variable has not been included.

The result can be interpreted as; building girl's toilet alone may not result in an improved parity in enrollment. As claimed in several reports the quality of toilets and their maintenance is also a concern[7]. For instance, lack of water or cleanliness might deter female students from using the toilet. The coefficient of state female literacy turns out to be insignificant, which is also evident from the lack of any clear pattern in fig 4 (b). It can be inferred that improved female literacy standalone might not translate into improved gender parity, however, more information is required to make any stronger claim.

QUALITY

The paper also aims to understand factors that influence quality of education. For this we use factors that influence learning outcomes or more specifically performance on assessment tests. The following two parameters were used for the same-[8]

- Ability to divide a three-digit number by a one-digit number among children from age group 6 to 14 years

- Ability to read and comprehend a paragraph designed for students in the second grade. These constitute the dependent variable for our analysis.

Based on availability of data numerous factors were considered as independent variables. These include education-level of instructor represented by proportion of teachers with education at the undergraduate level (or higher), number of teacher training institutes, infrastructure represented by proportion of schools with computers and/or playgrounds and nutrition represented by proportion of schools with mid-day meals.

---

[7]A report by Child Rights and You (CRY) on RTE published in 2013 highlights the problem of infrastructure quality in government schools. (Downloaded from https://www.cry.org/resources/pdf/RTE-booklet.pdf)
[8]Selected of parameters based on data published by the Pratham in the ASER (Annual Status of Education Report).

Fig -6- Scatterplot of percentage of students

who can- (a)- divide 3-digit number by 1-digit number (b)- can read a class 2 equivalent para on percentage of total schools that have computer.
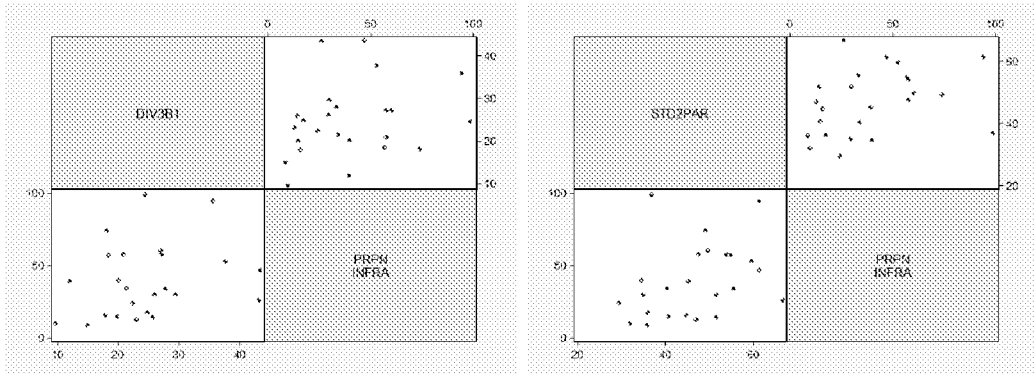
The relation between availability of 'good' infrastructure and learning outcomes, as evident from the scatterplot of the ability to divide and the percentage of schools with computers and ability to read and percentage of schools with computer, it has a positive relation on learning outcomes.

Fig-7 - Scatterplot of percentage of students

who can- (a)- divide 3-digit number by 1-digit number (b)- can read a standard 2 equivalent para on percentage of teachers with qualification equivalent to undergraduate degree or above.
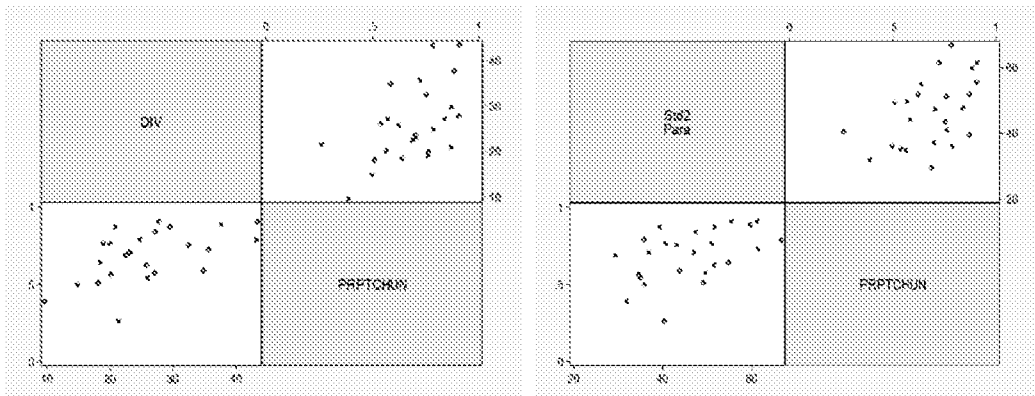
Further, the scatterplots show a positive relationship between the proportion of teachers having undergraduate (or higher) education and the students' ability to divide and read a paragraph designed for students in the second grade.

Additionally, the analysis did not indicate any relationship between learning outcomes and proportion of schools with the mid-day meal scheme. This calls for the use of other indicators that can help in drawing a conclusive relationship between nutrition and assessment of quality.

Fig -8- Regression result of Percentage of students

who can divide 3-digit number by 1 digit number on percentage of schools with computer (proxy for infrastructure) and percentage of teachers with qualification equivalent to undergraduate degree or above.

When a regression of the learning outcome as indicated by the percentage of students who can divide a 3-digit number by a 1-digit number on factors of teacher quality and school infrastructure is carried out, the model turns out to be jointly significant as indicated by a significant F statistic at 1% level of significance. Further, the coefficient of teacher quality turns out to be significant at 1% level of significance, while that if infrastructure is not significant. The regression results give an indication of the importance of pedagogy and quality teachers.

The lack of availability of age-wise data for learning outcomes and attendance records act as a limitation of the data set used and consequently of the analysis itself.

CONCLUSION

The paper highlights some shortcomings in assessment of the outcomes when attempting to understand the impact of education policies on accessibility, equity and quality. Gross Enrollment Ratio, a measure of accessibility is restricted to enrollment

figures only and does not take attendance into account. The gender parity index faces similar issues as it too depends on enrollment. Other factors such a pedagogical biases and resource unavailability that might aid inequity are not taken into consideration. Inferior quality of learning outcomes is apparent from the analysis in this study and available literature. Effective management seemed to reduce dropout rates, however, limitations of the available data set hindered our ability to carry out further meaningful analysis

Analysis carried out on the available data shows that increasing the number of schools in an area directly translates into improving students' enrollment. While the thrust on infrastructure improvement seems to have paid dividends, quality of infrastructure remains a matter of concern. However, the weak relationship between proportion of schools with girls' toilet and enrollment with respect to gender, may reflect upon the inferior quality and/or lack of maintenance of infrastructure. As shown in the paper 'good' infrastructure does have a positive effect on learning outcomes, thus making quality of infrastructure as important as availability of infrastructure itself.

Further, the paper shows that learning outcomes improve as the education level of teachers improves. Along with the availability of physical inputs, education of the instructor is also a key factor in influencing learning outcomes. Vast literature is available on methods to revamp teaching in primary education in India.

Moreover, the paper emphasizes on the need for a holistic approach towards understanding and analyzing outcomes of the efforts made to improve education in India.

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LIST OF TABLES

1 - (a) – GER for all states   (b) - GER for 20 selected states

SL No	States/UTs	GER I-VIII	SL No	States/UTs	GER I-VIII
1	A & N Islands	87.1	1	Andhra Pradesh	83.3
2	Andhra Pradesh	83.3	2	Bihar	107.7
3	Arunachal Pradesh	127.8	3	Chhattisgarh	100.9
4	Assam	101.6	4	Gujarat	96.7
5	Bihar	107.7	5	Haryana	91.8
6	Chandigarh	86.7	6	Himachal Pradesh	100.9
7	Chhattisgarh	100.9	7	Jammu & Kashmir	80.1
8	D & N Haveli	85.6	8	Jharkhand	107.1
9	Daman & Diu	81.0	9	Karnataka	99.4
10	Delhi	116.6	10	Kerala	95.4
11	Goa	101.1	11	Madhya Pradesh	94.3
12	Gujarat	96.7	12	Maharashtra	98.3
13	Haryana	91.8	13	Odisha	100.2
14	Himachal Pradesh	100.9	14	Punjab	100.4
15	Jammu & Kashmir	80.1	15	Rajasthan	97.2
16	Jharkhand	107.1	16	Tamil Nadu	99.9

17	Karnataka	99.4	17	Telangana	97.8
18	Kerala	95.4	18	Uttar Pradesh	86.2
19	Lakshadweep	77.5	19	Uttarakhand	94.6
20	Madhya Pradesh	94.3	20	West Bengal	104.2
21	Maharashtra	98.3			
22	Manipur	130.6			
23	Meghalaya	139.4			
24	Mizoram	126.6			
25	Nagaland	100.4			
26	Odisha	100.2			
27	Puducherry	85.6			
28	Punjab	100.4			
29	Rajasthan	97.2			
30	Sikkim	118.8			
31	Tamil Nadu	99.9			
32	Telangana	97.8			
33	Tripura	114.3			
34	Uttar Pradesh	86.2			
35	Uttarakhand	94.6			
36	West Bengal	104.2			

Source – DISE School Report Card 2015-16 (downloaded from http://udise.in /drc.htm)

Table - 2 – (a) – GPI data for all states

Sl No	States/Ut	Gpi I-x
1	A & N Islands	0.98
2	Andhra Pradesh	1.02
3	Arunachal Pradesh	0.95
4	Assam	1.06
5	Bihar	0.98
6	Chandigarh	1.02
7	Chhattisgarh	0.96
8	Dadra & Nagar Haveli	0.96
9	Daman & Diu	1
10	Delhi	1.0
11	Goa	0.96

12	Gujarat	0.96
13	Haryana	1.09
14	Himachal Pradesh	1
15	Jammu & Kashmir	1
16	Jharkhand	1.02
17	Karnataka	0.99
18	Kerala	0.99
19	Lakshadweep	0.97
20	Madhya Pradesh	1
21	Maharashtra	0.98
22	Manipur	1.04
23	Meghalaya	1.08
24	Mizoram	0.96
25	Nagaland	1.02
26	Odisha	0.97
27	Puducherry	0.99
28	Punjab	1
29	Rajasthan	0.93
30	Sikkim	1.07
31	Tamil Nadu	1.02
32	Tripura	1.01
33	Uttar Pradesh	0.98
34	Uttarakhand	1.02
35	West Bengal	1.07

Source – DISE School Report Card 2015-16 (downloaded from http://udise.in /drc.htm)

Table 3–State wise ASER Reading and Arithmetic test for children in the age group 5-16

SL No	States/UTs	Std2 Para	DIV 3D by 1D
1	A & N Islands	0.98	
1	Arunachal Pradesh	29.4	22.4
2	Assam	35.9	14.9
3	Bihar	43.9	34.9
4	Chhattisgarh	51.1	19
5	D & N Haveli	45.2	11.9
6	Daman & Diu	54	20.8

7	Gujarat	49.2	18.1
8	Haryana	61.4	43.5
9	Himachal Pradesh	66.7	43.3
10	Jammu & Kashmir	36	24.8
11	Jharkhand	37	23.4
12	Karnataka	40.4	21.4
13	Kerala	61.5	35.7
14	Madhya Pradesh	40.7	20
15	Maharashtra	54.8	18.4
16	Manipur	43.2	32.5
17	Meghalaya	32	9.6
18	Mizoram	35	26
19	Nagaland	34.6	20.1
20	Odisha	51.7	25.8
21	Puducherry	36.9	24.5
22	Punjab	59.7	37.7
23	Rajasthan	51.7	29.5
24	Sikkim	49.7	27.1
25	Tamil Nadu	47.5	27.2
26	Tripura	44.7	17.9
27	Uttar Pradesh	39.4	20.8
28	Uttarakhand	55.6	27.8
29	West Bengal	47	23

Note: Data represents the percentage of all eligible children in the age group 5-16 who (i) can read a para equivalent to a Std 2 level text in language of their choice (ii) can solve a 3-digit by 1-digit division problem
Source: ASER Survey Data 2016 (downloaded from http://www.asercentre.org/education/)

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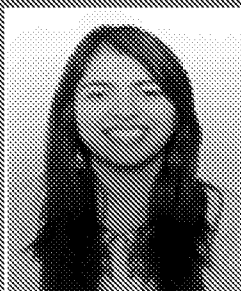
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Exploring Multitasking: Boon or Bane

Abstract

This research paper was initiated to examine the take of college going students on multitasking. A questionnaire was circulated among the students of Shri Ram College of Commerce. After going through the results we observed that most of them favoured Multitasking. For them multitasking is not a cause of distraction, it does not hamper their creativity or performance. The results were uniform be it male or female or students of various courses.

INTRODUCTION

Multitasking as the word suggests is working on two/more works simultaneously. Media multitasking is very popular among the middle level students (talking over phones, texting friends, playing video games writing papers for school, listening to music etc.) where they work on academics and co-curricular together. It is the forte of the young and that is why they are known as the Multitasking Generation or "GenM." Youngsters believe that they are tech savvy and that they are skilled at multitasking. Some students know that multitasking might be harmful for them but they prefer multitasking because in the fast pacing life where everyone is running short on time they believe that multitasking will be time saving. On reading various articles we got to know that most researchers believe that it degrades the quality of the work when done while multitasking and it should be avoided during learning process. It even hampers the thinking process. This made us more and more curious

to know the actual fact so we decided to conduct a survey amongst the people of our age to know their take on multitasking.

Our basic **objective** for this were:

- To determine the impact of gender on ease of multitasking
- To highlight the relation between multitasking and learning of students.
- To assess the level of awareness regarding multitasking amongst students.
- To discuss the relevance of multitasking amongst students.

LITERATURE REVIEW

After reading several research papers we were curious enough to do this research. (Hwang & Jeong, 2018) Stated in his research that Performance depends upon task hierarchy-Performance is greater for primary work, and sensory interference reduces performance. (Christine, 2008) Said Multitasking makes the brain incapable to functioning properly. People who multitask are inefficient to work well. (Adams, 2012) Pointed that young people multitask more than adults, especially girls. Teens are comfortable with multitasking because they have grown up doing it. Besides this it disables the ability to think and analyze and doesn't promote creativity, also degrades the quality of work. (Rekart, 2011) Concluded that divided attention because of multitasking impedes learning and performance in the short-term and could also affect long-term memory and retention. Individuals who multitask more often are more distractible than those who do so less often. (Manhart, 2004) Psychology testing was done by the author to determine the possible effects of multitasking on brain and its pattern. He found out that multitasking results can be improved with practice and the result of multitasking depends upon the quality of work which people do. He quoted multitasking as an extreme sport and called it the cause of inefficiency and degradation in performance level. (Hilton et al., 2018) In this paper Sample study and experimentation was done on study college students' behavior when they walk and type simultaneously. This was a pre and post analysis. It was concluded that although the chances to stumble or bumping while walking was less, the speed although decreased. For typing the accuracy was not affected but the speed was. (Schuur et, 2018) His paper was sample study of various school students through questionnaire; it was done to find out the possible sleeping problems related to multitasking. He concluded that although there is no major impact on grades but the sleeping patterns and hence health is affected as expected because of multitasking and media.

DATA COLLECTION

We conducted a primary survey where our target was students of Shri Ram College of Commerce. We received a total of 101 responses from the Students (all three years) of

B.Com.(Hons.) and B.A. Economics (Hons.). The data collected showed that 36.6% of the students were male whereas 63.4% of the students were female, taking about seniority 3.7% were freshmen, 65.3% were sophomore and the remaining 4% were third years. Majority of the students were in the grade percentage of 70-80% and were from the course bachelor of commerce (77.2%). We used the SPSS software for organizing and analysing the data collected.

DATA ANALYSIS

Observations:

1. About 74.3% students agreed to have been doing multitasking. About 25.7% students disagreed to do multitasking.

2. About 61.4% of students agreed that multitasking improves performance level. Only 38.6% of students disagreed with the multitasking improves the performance level.

3. About 76.2% of students believe that multitasking boosts creative thinking. Whereas, about 23.8% of students disagreed with the multitasking boosting creativity.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	101	17	25	18.83	1.020
Does multitasking impair your ability to think and analyse?	101	1	5	3.25	1.033
Do you think multitasking reduces short term learning and accuracy?	101	1	5	2.88	1.080
Does multi-tasking degrades the quality of work and is a distraction?	101	1	5	2.87	1.111
Valid N (list wise)	101				

Average age is 19 (Approximately). People are, on an average, neutral about multitasking impairing their ability to think and analyse. They disagree with multitasking reducing short term learning and accuracy. Also they don't think that multitasking degrades the quality of work and is a distraction. All in all, the students favour multitasking and think it's a necessity for modern competitive world.

Independent Sample T Test

Group Statistics

	Course	N	Mean	Std. Deviation	Std. Error Mean
Does multitasking impair your ability to think and analyse?	B.Com. (H)	78	3.22	1.028	0.116
	B.A. Eco. (H)	23	3.35	1.071	0.223
Do you think multitasking reduces short term learning and accuracy?	B.Com.(h)	78	2.83	1.110	0.126
	B.A. Eco. (H)	23	3.04	0.976	0.204
Does multi-tasking degrades the quality of work and is a distraction?	B.Com.(H)	78	2.85	1.129	0.128
	B.A. Eco. (H)	23	2.96	1.065	0.222

Students were asked to rate few questions on a scale ranging from 1 to 5 (1 being strongly agree 5 being strongly disagree). Students of both the courses on an average, were neutral about multitasking impairs ability to think and analyse. Students of B.Com.(H) disagreed that multitasking reduces short term learning, whereas B.A. Economics (H) were neutral about that. Both of them disagreed that multitasking degrades the quality of work and is a distraction.

Independent Samples Test

		Levine's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Does multitasking impair your ability to think and analyse?	Equal variances assumed	0.007	0.934	-0.528	99	0.599	-0.130	0.246	-0.618	0.358
	Equal variances not assumed			-0.516	34.839	0.609	-0.130	0.252	-0.641	0.381
Do you think multitasking reduces short term learning and accuracy?	Equal variances assumed	0.627	0.430	-0.819	99	0.415	-0.210	0.257	-0.719	0.299
	Equal variances not assumed			0.879	40.299	0.385	-0.210	0.239	-0.693	0.273
Does multi-tasking degrades the quality of work and is a distraction?	Equal variances assumed	0.167	0.684	-0.417	99	0.677	-0.110	0.265	-0.635	0.415
	Equal variances not assumed			-0.431	37.809	0.669	-0.110	0.256	-0.629	0.408

This sample T test was run to find if any difference of opinion prevailed amongst students of various courses.

Ho:-There is no difference in the response of B.Com. (H) and B.A. Economics (H) students.

Ha:-There is a significant difference in the opinion of B.Com. (H) and BA Economic (H) students.

Since, p values are greater than 0.05, we do not reject the null hypotheses (Ho).

Group Statistics

	Course	N	Mean	Std. Deviation	Std. Error Mean
Does multitasking impair your ability to think and analyse?	Male	37	3.27	1.071	0.176
	Female	64	3.23	1.020	0.127
Do you think multitasking reduces short term learning and accuracy?	Male	37	2.95	1.177	0.194
	Female	64	2.84	1.027	0.128
Does multitasking degrades the quality of work and is a distraction?	Male	37	2.62	1.037	0.170
	Female	64	3.02	1.134	0.142

Students were asked to rate few questions on a scale ranging 1~5 (1 being strongly agree 5 being strongly disagree). Both male and female participants were neutral, on an average, about multitasking impairs ability to think and analyse. Both of them disagreed that multitasking reduces short term learning and accuracy. Male student disagreed that multitasking degrades quality of work and is a distraction, whereas female students were neutral about that.

Independent Samples Test

		Levine's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Does multitasking impair your ability to think and analyse?	Equal variances assumed	0.121	0.729	0.167	99	0.867	0.036	0.214	-0.390	0.461
	Equal variances not assumed			0.165	72.264	0.869	0.036	0.217	-0.397	0.469

Do you think multitasking reduces short term learning and accuracy?	Equal variances assumed	0.211	0.647	0.456	99	0.649	0.102	0.224	-0.342	0.546
	Equal variances not assumed			0.440	67.208	0.661	0.102	0.232	-0.361	0.566
Does multi-tasking degrades the quality of work and is a distraction?	Equal variances assumed	0.158	0.692	-1.735	99	0.086	-0.394	0.227	-0.845	0.057
	Equal variances not assumed			-1.777	80.887	0.079	-0.394	0.222	-0.835	0.047

The above sample T test was run to find out any possible difference of opinion amongst male and female students.

Ho: - There is no difference in the opinion of male and female students.

Ha: - There is significant difference in the opinion of male and female students.

Since, p values are greater than 0.05 we do not reject null hypotheses (Ho).

We also asked the students to interpret what they understood by multitasking and this is what we received as a reply.

While most of the people said that multitasking is performance of two tasks at the same time, few also said that it's like an adventure for them. Some believed it is managing more than two activities without losing efficiency and within the given time. Others said it is a useful tool to save time and is all about pushing oneself out of their comfort zone. Besides that, they named multitasking as a personality builder, which develops and encourages creative thinking and side by side tests their mind's ability and capacity. Meanwhile they also quoted that is has become an essential part of today's modern and hectic lifestyle, which more or less has made it a requirement, however some of them preferred not to multitask. The most common example that many of them quoted was: listening to music while studying.

LIMITATIONS

The paper is clinically deprived. There are a lot of limitations in this paper.
- In this paper we have analysed only the students.
- Only the students of Shri Ram College of Commerce, New Delhi have been targeted.
- We haven't explored the other universities and industries.
- Our main focus was on youngsters i.e. age has been a constraint as the adults weren't surveyed.
- We received a limited number of responses due to which our research itself was limited.

- Only the education sector has been targeted in the paper. It overlooks the other sectors of the society.
- Students lacked awareness regarding multitasking.

CONCLUSION

After the entire analysis we found out that the youngsters have a positive take on multitasking and they are in favour of it. The analysis that we have derived from the survey has been put together here using the SPSS software. Students believe that multitasking has nothing to do with their grades nor is a distraction, rather it promotes creativity and is time saving. For them multitasking has become an important tool to manage various activities and juggle through errands.

The results of various research papers were not supporting multitasking they [(Hwang & Jeong, 2018) (Adams, 2012) (Christen, 2008) (Hilton et al., 2018) (Manhart, 2004) (Rekart, 2011) (Schuur et, 2018)] indicated that multitasking hampers performance and often becomes a distraction. However, results of this research were contradictory, this was because of lack of awareness amongst students. Also the topic has a much wider areas left unexplored by us and can be further explored.

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Appendix 1

Table 1: Correlations

		Percentage (in last semester)	Does multitasking impair your ability to think and analyse?
Percentage (in last semester)	Pearson Correlation	1	0.002
	Sig. (2-tailed)		0.984
	N	101	101
Does multitasking impair your ability to think and analyse?	Pearson Correlation	0.002	1
	Sig. (2-tailed)	0.984	
	N	101	101

No significant correlation could be established between performance and multitasking impairing ability to think and analyse, because of insufficient data collected and lack of awareness amongst students.

Table 2: Correlations

		Percentage (in last semester)	Do you think multitasking reduces short term learning and accuracy?
Percentage (in last semester)	Pearson Correlation	1	0.078
	Sig. (2-tailed)		0.437
	N	101	101
Do you think multitasking reduces short term learning and accuracy?	Pearson Correlation	0.078	1
	Sig. (2-tailed)	0.437	
	N	101	101

No significant Correlation could be established between grade and multitasking reduces short term learning and accuracy, because of lack of sufficient data and awareness amongst students.

Table 3: Correlations

		Percentage (in last semester)	Does multitasking degrades the quality of work and is a distraction?
Percentage (in last semester)	Pearson Correlation	1	-0.132
	Sig. (2-tailed)		0.189
	N	101	101
Does multitasking degrades the quality of work and is a distraction?	Pearson Correlation	-0.132	1
	Sig. (2-tailed)	0.189	
	N	101	101

No significant correlation could be established between grades and multitasking degrades the quality of work and is a distraction, because of lack of sufficient data and awareness amongst students.

Appendix 2:

Multitasking

*Name

----

*Age

----

*Gender

- o   Male
- o   Female
- o   Other

*Grade (in last semester)

- o   Less than 4
- o   Less than 6
- o   Less than 8
- o   More than 8

*Course

- o   Bcom (H)
- o   BA Eco (H)

*Do you multitask while studying\ working?

- o   Yes
- o   No

*In your opinion does multitasking improve performance?

- o   Yes
- o   No

*Do you think multitasking boosts creativity?

- o   Yes
- o   No

*Does multitasking impair your ability to think and learn?

Strongly	O O O O O	Strongly
Disagree		Agree

*Do you think Multitasking Reduces short term learning and accuracy?

Strongly	O O O O O	Strongly
Disagree		Agree

*Do you think multitasking degrades quality of work and is a distraction?

Strongly	O O O O O	Strongly
Disagree		Agree

*What is multitasking for you?

Bilateral Causality between Economic Growth and Economic Development

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Abstract

In the present world, when conventional measures of economic growth and overall prosperity of a country (National Income) are taking a backseat and overall economic development measures (like HDI) are taking the lead, this paper aims to test a causality (if it exists) between the two.

The paper also goes ahead to put forward possible causes of existence of a causality in a particular phase of a country's development.

INTRODUCTION

'Development'- a word so complicated, seers fail to define. Is it confined to just income or production in a country? Or is it measured by utmost happiness (as described by the Gross National Happiness of Bhutan.)? Or is it comprehensively structured under the Human Development Index Scores given by UNDP? Well, maybe- it is all in the mind!

Heated debates have always surrounded the idea of development. People have their own versions of what should be included as a country's (or for that matter- an individual's) measure for development.

There may be high economic growth (generally measured by a country's GDP) but this can easily be accompanied with huge inequality which is generally accompanied by poverty, malnourishment, high mortality rates – proven companions of   high crime rates. This may eventually lead to   forming an overall low level of standards of living for the poorer section of the society.

Then we have countries like Bhutan, their idea of an ideal development revolves around happiness of their citizens. Bhutan replaces the widely followed Gross Domestic Product by Gross National Happiness.

With all this and many more debates around, one widely accepted measure of development is the Human Development Index, created by Mahbub-ul-Haq for UNDP. Haq goes a step (in fact three!) ahead and brings in life expectancy, education and per capita income, thus promising a measure for a decent living standard. Health and education- the two tonics for human capital formation, being given utmost priority.

Staunch proponents of the HDI theory clearly reject the GDP growth rate claimed victories of the fast developing countries stating that the high levels of inequality make things worse for the individual citizen. They cite the helpless education and health conditions in these countries as examples. Critiques however, argue that high GDP growth eventually translates into high Government expenditure on important building blocks like health and education thus eventually feeding into the overall 'development'.

The researchers aim to study the bilateral causal relationship between economic growth and economic development making use of both empirics and theory. Granger causality test has been used to study the degree of causality between the two variables in three categories of countries: developed, developing and turmoil-ridden.

THEORY

Economic growth is the increase in the value of goods and services produced in an economy and is conventionally measured by a country's national income.

On the other hand, economic development reaches far beyond growth encompassing structural changes and quality shifts. Growth must therefore be seen as a quantitative change, while development includes both quantitative change and qualitative, measured using Human Development Index which is a summary measure of average achievements in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living.

In other words, economic growth is a necessary but not the sufficient condition for economic development.

It has been established by various studies that there is a correlation between these two variables but we want to study if a causality exists between the two, i.e. if the value of one variable changes with a change in the other variable, which can be studied through Granger Causality Test in case of Panel Data. According to Granger causality," if a variable X "Granger-causes" another variable Y, then past values of X should contain information that helps predict Y above and beyond the information contained in past values of Y alone." Its mathematical formulation is based on linear regression modelling of stochastic processes.

$X_t = \beta_0 \sum X_{t-k} + U_1$ (restricted regression)

$X_t = \beta_0 \sum X_{t-k} + \beta_1 \sum Y_{t-k} + U_2$ (unrestricted regression)

$Y_t = \alpha_1 \sum Y_{t-k} + U_3$ (restricted regression)

$Y_t = \alpha_0 \sum X_{t-k} + \alpha_1 \sum Y_{t-k} + U_2$ (unrestricted regression)

where k is the number of lags taken.

Test 1- Causation of X on Y

H_0: X does not granger-cause Y

H_1: X granger-causes Y

Test 2- Causation of Y on X

H_0: Y does not granger-cause X

H_1: Y granger-causes X

Variable for testing: F-variable of the system of equations: $F = \dfrac{RSSUR-RSSR \backslash m}{RSSR/n-k}$

where m is the number of lagged values of the variable other than the dependent variable.

Testing procedure: If the F value is significant then the lagged values of the added variable have an impact on the dependent variable and hence proving that the additional variable granger-causes the dependent variable. The null hypothesis in this case is rejected.

LITERATURE REVIEW

A study of the interrelationship between economic growth and development is essential to develop a holistic understanding of the economics of growth. Understanding the economics of growth in its entirety helps us in understanding the dynamics of sustained growth.

A superficial understanding of income and growth is to view these in the context of factor endowments and productivity of an economy. Both factor endowments and

productivity are, however, factors that are endogenous to an economy and are therefore in turn based on a deeper core of interrelated variables which give rise to them. The basic variables that help explain factor endowments and productivity of an economy and, thus, lie at the heart of the economics of growth are: trade, institutions and geography. " Trade, here, refers to the market size and integration as well as the scope of international trade. Institutions refer to the quality of formal and informal socio-political arrangements. Geography relates to the advantages and disadvantages posed by a country's physical location as also the environmental and climatic conditions" (In Search of Prosperity, University Press, Princeton, Rodrik Dani). While trade and institutions are semi-endogenous factors to an economy, geography is an exclusively exogenous factor. It is these three factors mentioned above and the dynamic space in which they interact, that forms the bridge linking economic growth and development in the bilateral relationship which the researchers wish to empirically explore in this paper.

Amartya Sen describes economic development as " the process of expanding the real freedoms that people enjoy. It requires the removal of major sources of 'unfreedom': poverty as well as tyranny, poor economic opportunities, social deprivation, neglect of public facilities, intolerance or over activity of repressive states." In this light then institutions become the most important of the three factors discussed above for linking economic growth with economic development and for ensuring sustained growth as has been empirically proved by Rodrik, Subramnium and Trebbi in their paper titled 'Institutions Rule: The primacy of institutions over geography and integration in economic development'. Paul Romer talks about economic growth and development in terms of idea and object gaps in his paper 'Idea gaps and object gaps in economic development'. Here object gap refers to the lack of physical objects like factories and roads that go directly into generating economic growth. Idea gap refers to lack of knowledge required for creating value in a modern economy which is in the researchers' opinions, just an another way of talking about the expansion of real freedoms and the important rule of institutions.

"Another important aspect of study in this space that defines the interrelationship between economic growth and development are the related concepts of human and social capital. Human capital comprises different forms of formal education and on-the-job experience while social capital comprises different forms of social networks and social norms. A study of both these concepts draws our attention to those institutions necessary for serving economic life that might otherwise go unnoticed" (Dasgupta, 2000).

In empirically testing the bilateral relationship between economic growth and development in this paper, it has been the researchers' motive to differentiate between the degrees of this interrelationship in developed, developing and turmoil-ridden

economies respectively as resulting from the tests conducted and explain these differences in terms of the underlying factors explaining these inter-linkages as discussed above.

METHODOLOGY

The researchers have chosen three different sets of countries identified as- developed, developing (both by the IMF list) and countries under continuous turmoil. The main idea is to search for a causality- even if it exists under a particular stage of a country's development (or when the country is under a constant state of turmoil.). 3 developed, 5 developing and 3 countries under constant turmoil are chosen so as to get a rough ratio of the actual composition. A fair representation from all the continents is also kept in mind.

The researchers have taken the growth data in per capita GDP (in thousands) . The reason being the fact that the data for Human development index is measured in per capita terms (per capita income, individual life expectancy and education levels.). The data for economic development (here), is represented by the human development index scores given by UNDP.

Secondary data from years 2001-02 to 2010-11 is collected for the above stated 11 countries. Granger Causality Test has been used to test the bilateral causality between economic growth and economic development for a period of five years for these countries. Two lags for each of the variables are taken.

The results for each country and their corresponding F-values are then obtained. Further details and interpretations (of the same) follow the regression results for each country under the 'Observations and Interpretations' section of the paper. The 'Conclusion' section of the paper further comments on the overall generalized picture of the trends- as observed by the researchers.

Table 1: Observations and Inferences

	2001-02		2002-03		2003-04		2004-05		2005-06	
	GDP ('000)	HDI SCORE	GDP ('000)	HDI SCORE	GDP ('000)	HDI SCORE	GDP ('000)	HDI SCORE	GDP ('000)	HDI SCORE
DEVELOPED ECONOMIES										
UK	32.7	0.837	34.4	0.842	35.4	0.846	36.1	0.851	37.5	0.853
USA	46	0.898	46.4	0.899	47.3	0.9	48.6	0.901	50.6	0.904
JAPAN	33.9	0.872	33.9	0.875	34.3	0.879	35.1	0.882	34.47	0.891
DEVELOPING ECONOMIES										
INDIA	2.57	0.47	2.62	0.478	2.78	0.487	2.96	0.495	3.514	0.512
CHINA	3.98	0.597	4.32	0.606	4.72	0.615	5.17	0.624	6.36	0.644
KENYA	2.15	0.448	2.11	0.453	2.11	0.457	2.16	0.462	2.319	0.474
SOUTH AFRICA	9.89	0.613	10.1	0.609	10.3	0.606	10.6	0.602	11.6	0.601
KAZAKHSTAN	9.95	0.657	12.4	0.68	13.5	0.691	14.7	0.703	17.11	0.721
TURMOIL-RIDDEN ECONOMIES										
CENTRAL AFRICAN REPUBLIC	0.839	0.307	0.852	0.308	0.791	0.309	0.824	0.31	0.869	0.316
AFGANISTAN	0.972	0.23	1.06	0.274	1.1	0.296	1.06	0.318	1.173	0.354
SYRIA	5.23	0.591	5.47	0.598	5.34	0.606	5.55	0.613	5.888	0.624

2006-07		2007-08		2008-09		2009-10		2010-11	
GDP('000)	HDI SCORE	GDP('000)	HDI SCORE	GDP('000)	HDI SCORE	GDP('000)	HDI SCORE	GDP('000)	HDI SCORE
38.16	0.856	37.74	0.86	35.84	0.86	36.2	0.861	36.5	0.863
51.01	0.905	50.38	0.907	48.56	0.906	49.37	0.908	49.8	0.91
35.18	0.894	34.8	0.896	32.88	0.895	35.8	0.898	35.8	0.901
3.806	0.523	3.901	0.527	4.177	0.535	4.41	0.541	4.64	0.547
7.225	0.656	7.88	0.665	8.565	0.674	9.53	0.681	10.4	0.687
2.416	0.486	2.358	0.493	2.371	0.499	2.509	0.504	2.56	0.509
12.05	0.604	12.26	0.608	11.9	0.61	12.09	0.6145	12.2	0.619
18.42	0.727	18.8	0.729	18.53	0.733	19.6	0.739	21.3	0.745
0.892	0.323	0.894	0.327	0.892	0.334	0.901	0.3385	0.913	0.343
1.298	0.363	1.311	0.37	1.548	0.387	1.637	0.3925	1.66	0.398
6.094	0.628	6.246	0.629	6.497	0.63	6.603	0.631	6.36	0.632

The idea of this paper is to track down a causality (if it exists) between the general idea of economic growth (as measured by a country's national income. GDP is the variable used in this paper as the data is easily and widely available across countries and time period.) and the general idea of economic development (as measured by the HDI).

According to Granger causality," if a variable X "Granger-causes" another variable Y, then past values of X should contain information that help predict Y above and beyond the information contained in past values of Y alone." Its mathematical formulation is based on linear regression modelling of stochastic processes.

$X_t = \beta_0 \Sigma X_{t-k} + U_1$ (restricted regression)

$X_t = \beta_0 \Sigma X_{t-k} + \beta_1 \Sigma Y_{t-k} + U_2$ (unrestricted regression)

$Y_t = \alpha_1 \Sigma Y_{t-k} + U_3$ (restricted regression)

$Y_t = \alpha_0 \Sigma X_{t-k} + \alpha_1 \Sigma Y_{t-k} + U_2$ (unrestricted regression)

where k is the number of lags taken.

Test 1 - Causation of X on Y

H_0: X does not granger-cause Y

H_1: X granger-causes Y

Test 2 - Causation of Y on X

H_0: Y does not granger-cause X

H_1: Y granger-causes X

Variable for testing: F-variable of the system of equations: $F = \dfrac{RSSUR - RSSR \backslash m}{RSSR/n-k}$

where m is the number of lagged values of the variable other than the dependent variable.

Testing procedure: If the F value is significant then the lagged values of the added variable have an impact on the dependent variable and hence proving that the

additional variable granger-causes the dependent variable. The null hypothesis in this case is rejected.

In the study that follows,
X stands for GDP and Y stands for HDI scores

Table 2

```
Sample:  2004 - 2011                        No. of obs      =        8
Log likelihood =  39.86424                  AIC        = -7.46606
FPE        =  3.02e-06                       HQIC       = -8.135811
Det(Sigma_ml)  =  1.61e-07                   SBIC       = -7.366758

Equation         Parms     RMSE     R-sq       F       P > F

GDP                 5    .906084   0.6446   1.36014   0.4168
HDI                 5    .001203   0.9819  40.60032   0.0060
```

		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP	GDP						
	L1.	.9785074	.4390806	2.23	0.112	-.4188429	2.375858
	L2.	-.4383292	.5183148	-0.85	0.460	-2.087838	1.21118
	HDI						
	L1.	-297.8389	370.1611	-0.80	0.480	-1475.857	880.1789
	L2.	253.5958	282.6213	0.90	0.436	-645.8312	1153.023
	_cons	55.39886	92.03887	0.60	0.590	-237.5099	348.3076
HDI	GDP						
	L1.	.000858	.0005831	1.47	0.238	-.0009978	.0027137
	L2.	-.0005466	.0006883	-0.79	0.485	-.0027373	.001644
	HDI						
	L1.	.2265119	.4915929	0.46	0.676	-1.337956	1.79098
	L2.	.5116444	.3753355	1.36	0.266	-.6828407	1.70613
	_cons	.2161665	.1222323	1.77	0.175	-.1728314	.6051643

United Kingdom (Developed)
H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 1.36014

Conclusion: The null is not rejected, hence, ***HDI does not granger – cause GDP.***
GDP to HDI
F-critical: 5.79
F-cal: 40.60032

Conclusion: The null is rejected, hence, ***GDP granger-causes HDI***.
Thus, unilateral causality (GDP to HDI) exists.

Table 3

```
Sample:  2004 - 2011                     No. of obs    =        8
Log likelihood =  50.16482               AIC          = -10.04121
FPE         =  2.30e-07                   HQIC         = -10.71096
Det(Sigma_ml) =  1.23e-08                 SBIC         = -9.941903
```

Equation	Parms	RMSE	R-sq	F	P > F
GDP	5	.575322	0.9088	7.472895	0.0651
HDI	5	.000523	0.9898	73.12232	0.0025

	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP						
GDP						
L1.	1.880116	.3878953	4.85	0.017	.6456605	3.114573
L2.	-1.329928	.3826978	-3.48	0.040	-2.547843	-.112013
HDI						
L1.	-922.3936	323.4421	-2.85	0.065	-1951.731	106.9435
L2.	1082.256	348.9177	3.10	0.053	-28.15626	2192.667
_cons	-121.2045	109.3259	-1.11	0.348	-469.1283	226.7192
HDI						
GDP						
L1.	.0017015	.0003527	4.82	0.017	.000579	.002824
L2.	-.0017754	.000348	-5.10	0.015	-.0028829	-.000668
HDI						
L1.	-.4736893	.2941183	-1.61	0.206	-1.409705	.4623266
L2.	1.758862	.3172843	5.54	0.012	.749122	2.768602
_cons	-.2512733	.0994142	-2.53	0.086	-.5676537	.0651071

United States of America (Developed)

H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 7.472895

Conclusion: The null is rejected, hence, ***HDI granger – causes GDP***.
GDP to HDI
F-critical: 5.79
F-cal: 73.12232

Conclusion: The null is rejected, hence, ***GDP granger-causes HDI***.
Bilateral causality exists.

Table 4

```
Sample:  2004 - 2011                    No. of obs     =         8
Log likelihood =  35.44423              AIC            = -6.361058
FPE            =  9.13e-06              HQIC           = -7.030809
Det(Sigma_ml)  =  4.86e-07              SBIC           = -6.261756


Equation          Parms    RMSE     R-sq       F       P > F

GDP                 5     .827421   0.6729   1.54289   0.3759
HDI                 5     .003468   0.9133   7.898078  0.0605
```

	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP						
GDP						
L1.	-.9404183	.4855535	-1.94	0.148	-2.485666	.6048295
L2.	-1.22729	.5246426	-2.34	0.101	-2.896937	.4423573
HDI						
L1.	249.1187	157.9646	1.58	0.213	-253.5951	751.8324
L2.	-180.4428	136.0997	-1.33	0.277	-613.5729	252.6874
_cons	47.78006	34.20076	1.40	0.257	-61.06203	156.6222
HDI						
GDP						
L1.	.0005823	.002035	0.29	0.793	-.005894	.0070587
L2.	-.0003319	.0021988	-0.15	0.890	-.0073296	.0066658
HDI						
L1.	.7398767	.6620486	1.12	0.345	-1.367058	2.846811
L2.	.082132	.5704105	0.14	0.895	-1.733169	1.897433
_cons	.1529737	.1433395	1.07	0.364	-.3031967	.6091441

Japan (Developed)
H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 1.54289

Conclusion: The null is not rejected, hence, *HDI does not granger – cause GDP*.
GDP to HDI
F-critical: 5.79
F-cal: 7.898078

Conclusion: The null is rejected, hence, *GDP granger-causes HDI*.
Unilateral causality (GDP to HDI exists.)

Table 5

```
Sample:  2004 - 2011                    No. of obs      =        8
Log likelihood =  63.97243              AIC           = -13.49311
FPE          =  7.29e-09                HQIC          = -14.16286
Det(Sigma_ml)  =  3.88e-10              SBIC          = -13.39381

Equation          Parms     RMSE     R-sq       F      P > F

  GDP                5    .102656   0.9896   71.65935   0.0026
  HDI                5    .002853   0.9924   98.28885   0.0016

                  Coef.   Std. Err.     t    P>|t|    [95% Conf. Interval]

  GDP
      GDP
      L1.      3.456194   1.777163    1.94   0.147    -2.19953    9.111919
      L2.     -3.287199   1.356738   -2.42   0.094    -7.604945   1.030547

      HDI
      L1.     -115.1004   66.95576   -1.72   0.184    -328.1835   97.98267
      L2.      127.0463   51.88813    2.45   0.092    -38.08492   292.1774
      _cons   -2.569308   10.06407   -0.26   0.815    -34.59766   29.45904

  HDI
      GDP
      L1.      .0656172   .0493934    1.33   0.276    -.0915745   .2228089
      L2.     -.0826677   .0377083   -2.19   0.116    -.2026725   .037337

      HDI
      L1.     -1.945825   1.860927   -1.05   0.373    -7.868124   3.976474
      L2.      3.068561   1.442146    2.13   0.123    -1.520992   7.658114
      _cons    .0140081   .2797144    0.05   0.963    -.8761679   .9041841
```

India (Developing)

H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 71.69535

Conclusion: The null is rejected, hence, *HDI granger-causes GDP*.
GDP to HDI
F-critical: 5.79
F-cal: 98.28885

Conclusion: The null is rejected, hence, *GDP granger-causes HDI*.
Bilateral causality exists.

Table 6

```
 Sample:  2004 - 2011                     No. of obs      =        8
 Log likelihood =    45.968              AIC             =   -8.992
 FPE           =  6.57e-07               HQIC            = -9.661751
 Det(Sigma_ml) =  3.50e-08               SBIC            = -8.892698

 Equation          Parms    RMSE     R-sq       F       P > F

 GDP                 5    .344962   0.9874   58.78678   0.0035
 HDI                 5    .004486   0.9875   59.37354   0.0035
```

		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP							
	GDP						
	L1.	1.148468	1.418812	0.81	0.477	-3.366825	5.663761
	L2.	-.8322986	2.104574	-0.40	0.719	-7.529992	5.865395
	HDI						
	L1.	-16.3331	103.1697	-0.16	0.884	-344.6651	311.9989
	L2.	59.73421	144.2583	0.41	0.707	-399.3602	518.8286
	_cons	-22.61484	33.56693	-0.67	0.549	-129.4398	84.2101
HDI							
	GDP						
	L1.	.0049863	.0184502	0.27	0.804	-.0537305	.0637031
	L2.	-.0249779	.0273679	-0.91	0.429	-.1120747	.0621188
	HDI						
	L1.	.2682836	1.341617	0.20	0.854	-4.001342	4.537909
	L2.	1.80828	1.875934	0.96	0.406	-4.161778	7.778337
	_cons	-.5489036	.4365039	-1.26	0.298	-1.938054	.8402466

China (Developing)

H_0: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 58.78678

Conclusion: The null is rejected, hence, ***HDI granger-causes GDP.***
GDP to HDI
F-critical: 5.79
F-cal: 59.37354

Conclusion: The null is rejected, hence, ***GDP granger-causes HDI.***
Bilateral causality exists.

Table 7

Sample: 2004 - 2011				No. of obs	=	8
Log likelihood = 61.95816				AIC	= -12.98954	
FPE = 1.21e-08				HQIC	= -13.65929	
Det(Sigma_ml) = 6.43e-10				SBIC	= -12.89024	

Equation	Parms	RMSE	R-sq	F	P > F
GDP	5	.039647	0.9718	25.8156	0.0117
HDI	5	.003033	0.9895	70.70384	0.0027

		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP							
	GDP						
	L1.	-.0818732	.4712287	-0.17	0.873	-1.581533	1.417787
	L2.	-1.264667	.3190575	-3.96	0.029	-2.280051	-.2492836
	HDI						
	L1.	17.86241	10.08216	1.77	0.175	-14.22352	49.94834
	L2.	-2.732519	7.052025	-0.39	0.724	-25.17521	19.71017
	_cons	-1.876839	.6705959	-2.80	0.068	-4.010975	.2572963
HDI							
	GDP						
	L1.	-.0156489	.0360545	-0.43	0.694	-.1303904	.0990926
	L2.	-.0380808	.0244116	-1.56	0.217	-.1157695	.0396079
	HDI						
	L1.	1.924784	.771403	2.50	0.088	-.5301646	4.379733
	L2.	-.6393768	.5395623	-1.18	0.321	-2.356505	1.077751
	_cons	-.012501	.0513084	-0.24	0.823	-.1757873	.1507853

Kenya (Developing)

H_0: Does not Granger-cause H_A: Does Granger-cause

HDI to GDP
F-critical: 5.79
F-cal: 25.8156

Conclusion: The null is rejected, hence, ***HDI granger-causes GDP***.
GDP to HDI
F-critical: 5.79
F-cal: 70.70384

Conclusion: The null is rejected, hence, ***GDP granger-causes HDI***.
Bilateral causality exists.

Table 8

```
Sample:  2004 - 2011                        No. of obs      =        8
Log likelihood =  47.24167                  AIC            = -9.310418
FPE           =  4.78e-07                    HQIC           = -9.980169
Det(Sigma_ml) =  2.55e-08                    SBIC           = -9.211116


Equation          Parms    RMSE     R-sq       F       P > F

  GDP               5     .368504   0.8985   6.638352  0.0759
  HDI               5     .00154    0.9739  27.94769   0.0104
```

		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP							
	GDP						
	L1.	1.39969	.9238265	1.52	0.227	-1.540338	4.339718
	L2.	.0888599	.5017503	0.18	0.871	-1.507933	1.685653
	HDI						
	L1.	-187.4011	166.4182	-1.13	0.342	-717.018	342.2158
	L2.	183.6571	209.6167	0.88	0.445	-483.4367	850.7509
	_cons	-2.957873	45.98518	-0.06	0.953	-149.3032	143.3875
HDI							
	GDP						
	L1.	.0081292	.0038606	2.11	0.126	-.0041569	.0204153
	L2.	-.0002528	.0020968	-0.12	0.912	-.0069257	.00642
	HDI						
	L1.	.0843482	.695448	0.12	0.911	-2.128878	2.297574
	L2.	1.193288	.875971	1.36	0.266	-1.594443	3.981018
	_cons	-.2565639	.1921683	-1.34	0.274	-.8681293	.3550015

South Africa (Developing)

H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 6.638352

Conclusion: The null is rejected, hence, ***HDI granger-causes GDP***.
GDP to HDI
F-critical: 5.79
F-cal: 27.94769

Conclusion: The null is rejected, hence, GDP ***granger-causes HDI***.
Bilateral causality exists.

Table 9

```
Sample: 2004 - 2011                    No. of obs    =        8
Log likelihood = 32.67333              AIC           = -5.668333
FPE         = .0000182                 HQIC          = -6.338085
Det(Sigma_ml) = 9.72e-07               SBIC          = -5.569031
```

Equation	Parms	RMSE	R-sq	F	P > F
GDP	5	.561247	0.9794	35.72571	0.0073
HDI	5	.008044	0.9151	8.082682	0.0587

		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP							
	GDP						
	L1.	-.4196027	.5885316	-0.71	0.527	-2.292573	1.453367
	L2.	-.2639674	.3490348	-0.76	0.504	-1.374752	.8468169
	HDI						
	L1.	137.4944	46.81351	2.94	0.061	-11.48711	286.4759
	L2.	62.64367	59.83788	1.05	0.372	-127.7872	253.0745
	_cons	-113.5355	43.91014	-2.59	0.081	-253.2771	26.20621
HDI							
	GDP						
	L1.	-.0059056	.0084348	-0.70	0.534	-.0327491	.0209378
	L2.	.0017068	.0050024	0.34	0.755	-.014213	.0176266
	HDI						
	L1.	.8649017	.6709323	1.29	0.288	-1.270304	3.000108
	L2.	.3692959	.8575977	0.43	0.696	-2.359963	3.098555
	_cons	-.083499	.6293211	-0.13	0.903	-2.08628	1.919282

Kazakhastan (Developing)

H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 35.72571

Conclusion: The null is rejected, hence, *HDI granger-causes GDP.*
GDP to HDI
F-critical: 5.79
F-cal: 8.082682

Conclusion: The null is rejected, hence, GDP *granger-causes HDI.*
Bilateral causality exists

Table 10

```
Sample:  2004 - 2011                    No. of obs     =        8
Log likelihood =  34.74022              AIC            = -6.185054
FPE            =  .0000109              HQIC           = -6.854806
Det(Sigma_ml)  =  5.80e-07              SBIC           = -6.085752

Equation          Parms     RMSE     R-sq      F       P > F

 GDP                5     .031185   0.7524   2.278597   0.2623
 HDI                5     .071238   0.9317  10.22699    0.0428
```

	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP						
GDP						
L1.	-1.008674	.6967499	-1.45	0.244	-3.226043	1.208695
L2.	-1.449746	.6512755	-2.23	0.112	-3.522395	.6229037
HDI						
L1.	.2381443	.1188358	2.00	0.139	-.1400441	.6163328
L2.	.2061361	.1266911	1.63	0.202	-.1970515	.6093237
_cons	2.729351	.8263014	3.30	0.046	.0996909	5.359011
HDI						
GDP						
L1.	-2.066077	1.591616	-1.30	0.285	-7.131308	2.999154
L2.	-7.629069	1.487736	-5.13	0.014	-12.36371	-2.894428
HDI						
L1.	.7720247	.2714616	2.84	0.065	-.0918874	1.635937
L2.	.9389187	.2894059	3.24	0.048	.0178999	1.859937
_cons	7.92533	1.887556	4.20	0.025	1.918286	13.93237

Central African Republic (Turmoil)

H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 2.278597

Conclusion: The null is not rejected, hence, *HDI does not granger-cause GDP.*
GDP to HDI
F-critical: 5.79
F-cal: 10.22699

Conclusion: The null is rejected, hence, *GDP granger-causes HDI.*
Unilateral causality (GDP to HDI) exists.

Table 11

Sample: 2004 - 2011				No. of obs	=	8	
Log likelihood = 44.73417				AIC	= -8.683542		
FPE	=	8.95e-07		HQIC	= -9.353294		
Det(Sigma_ml)	=	4.77e-08		SBIC	= -8.58424		

Equation	Parms	RMSE	R-sq	F	P > F
GDP	5	.088515	0.9412	12.00718	0.0344
HDI	5	.007103	0.9836	45.00159	0.0052

		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP	GDP						
	L1.	.1830664	.5341464	0.34	0.754	-1.516826	1.882959
	L2.	.6030405	.6509148	0.93	0.423	-1.468461	2.674542
	HDI						
	L1.	6.958039	5.539151	1.26	0.298	-10.67001	24.58609
	L2.	-3.942224	4.633559	-0.85	0.457	-18.68828	10.80383
	_cons	-.7209652	.5814257	-1.24	0.303	-2.571321	1.129391
HDI	GDP						
	L1.	-.0790038	.0428651	-1.84	0.163	-.2154198	.0574122
	L2.	.0742584	.0522358	1.42	0.250	-.0919792	.240496
	HDI						
	L1.	.9008691	.4445158	2.03	0.136	-.5137785	2.315517
	L2.	.0006609	.3718421	0.00	0.999	-1.182707	1.184029
	_cons	.0616333	.0466593	1.32	0.278	-.0868574	.210124

Afghanistan (Turmoil)

H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 12.00718

Conclusion: The null is rejected, hence, ***HDI granger-causes GDP.***
GDP to HDI
F-critical: 5.79
F-cal: 45.00159

Conclusion: The null is rejected, hence, ***GDP granger-causes HDI.***
Bilateral causality exists.

Table 12

```
Sample:  2004 - 2011                        No. of obs      =        8
Log likelihood =  49.49013                  AIC          = -9.872533
FPE          =  2.73e-07                     HQIC         = -10.54228
Det(Sigma_ml) =  1.45e-08                    SBIC         = -9.773231
```

Equation	Parms	RMSE	R-sq	F	P > F
GDP	5	.11873	0.9702	24.40552	0.0126
HDI	5	.002768	0.9638	19.96934	0.0168

		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDP							
	GDP						
	L1.	.1329161	.3941221	0.34	0.758	-1.121356	1.387189
	L2.	-.3794606	.388953	-0.98	0.401	-1.617283	.8583615
	HDI						
	L1.	-2.977416	22.07767	-0.13	0.901	-73.23841	67.28358
	L2.	37.98479	24.58702	1.54	0.220	-40.26207	116.2317
	_cons	-14.0335	4.141639	-3.39	0.043	-27.21404	-.8529527
HDI							
	GDP						
	L1.	-.0017137	.0091875	-0.19	0.864	-.0309523	.0275249
	L2.	-.0048308	.009067	-0.53	0.631	-.0336859	.0240244
	HDI						
	L1.	.7944023	.5146577	1.54	0.220	-.8434681	2.432273
	L2.	.1287774	.5731536	0.22	0.837	-1.695253	1.952808
	_cons	.0906956	.0965467	0.94	0.417	-.2165592	.3979503

Syria (Turmoil)

H_o: Does not Granger-cause H_A: Does Granger-cause
HDI to GDP
F-critical: 5.79
F-cal: 24.40552

Conclusion: The null is rejected, hence, *HDI granger-causes GDP.*
GDP to HDI
F-critical: 5.79
F-cal: 19.96934

Conclusion: The null is rejected, hence, *GDP granger-causes HDI.*
Bilateral causality exists

CONCLUSIONS AND CONJECTURES

As is evident from the inferences drawn above, 1 out of 3 countries in the 'developed' category shows bilateral causality (U.S.A). The observation holds true for 2 out of 3 countries under constant turmoil (Afghanistan and Syria). However, 5 out of 5 countries in the developing category show statistically significant bilateral Granger causality. Developing countries thus show a highly tilted trend towards a bilateral causality between economic growth and economic development indicating that **the growth in one feeds into the growth of other.**

The authors thus claim that the synergies between economic growth and development (using trade and institutions) can be best utilized when the countries are in their developing stage vis-a-vis the developed and turmoil ridden stages.

The researchers have also tried to analyze the possible reasons for such causality-

When a country is in its developing stage,

1. Various factors (as pointed out in the literature review) come into action easily and any change in economic growth(as measured by a country's GDP) triggers economic development (as measured by the various factors covered under HDI.) which in turn alleviates economic growth creating a bilateral causal cycle of prosperity. The reason for the same may be the huge unutilized potential and its (the developing country's) openness for development even with a small catalyst.

2. In terms of trade and institutions: Developing countries like India are home to a ready domestic market owing to their fast burgeoning national incomes and high population growth rates. This serves to boost the size of both national markets and the level of imports. These countries are manufacturing hubs of the new world order under the umbrella of globalization and thus serve as massive exportrs.

3. Similarly, developing countries have a lot of potential for institutional improvement. Owing to these factors, it is viable for economic growth to get channelized into economic development via the mediums of trade and institutions.

4. Better trade and institutions, in turn, contribute to increased trade, production and productivity thereby creating a cycle of causality between economic growth (as measured by GDP) and economic development (as measured by HDI).

5. In terms of human and social capital: Institutions like health and education are directly linked to improvements in human and social capital. Such improvements further strengthen the two way causal relationship between economic growth and

development. Improved human and social capital means a more meaningful translation of economic growth into economic development and also a higher potential of the economy to generate income. At the same time, better institutions of health and education (arising out of a holistic economic development) in turn lead to high growth of human capital which is naturally followed by economic growth (due to now improved human resources) thus creating infinite loops of bilateral causality.

6. In terms of idea and object gaps: While improvement in trade and institutions contribute to a lessening of object gaps, the improvement in social and human capital leads to filling of idea gaps. Thus, the narrowing of these two gaps is another reason contributing to the bilateral causality between economic growth and economic development.

The above stated possible causes are drawn from observations of the current world order and examples all around us.

If the trend is to be believed (more rigorous research with a larger and wider data set can provide a clearer idea.), there is no reason for seeing economic growth and economic development as not being complementary to each other. Rather both support each other and as observed by the authors, **growth in one feeds into the growth of the other**.

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STRIDES – A STUDENTS' JOURNAL OF SHRI RAM COLLEGE OF COMMERCE

HISTORY OF THE JOURNAL

The idea to launch this Journal was discussed in December 2016 by the former Officiating Principal, **Dr. R.P. Rustagi** with **Dr. Santosh Kumari**, the Editor of the Journal. Since the idea appealed to **Dr. Santosh Kumari**, she took the initiative to contribute to SRCC by creating this new academic research Journal and took the responsibility for its Creation, Registration, License and ISSN (International Standard Serial Number) etc. along with *Editorship*. Therefore, **Dr. Santosh Kumari, Assistant Professor in the Department of Commerce, Shri Ram College of Commerce** was appointed as the Editor of the Journal vide. Office Order – SRCC/AD-158/2017 dated March 14, 2017. She meticulously worked hard in creating the concept and developing the structure of the Journal. She introduced the concept of COPE (Committee on Publication Ethics) to maintain high academic standards of publication.

On behalf of the college, **Dr. Santosh Kumari** made every effort in seeking License from Deputy Commissioner of Police (Licensing), Delhi to register the Journal at "The Registrar of Newspapers for India, Ministry of Information and Broadcasting, Government of India". The paper work for seeking license started under the former Officiating Principal, **Dr. R.P. Rustagi** on March 27, 2017. The foundation Issue of the Journal **"Strides – A Students' Journal of Shri Ram College of Commerce, Volume 1, Issue 1, 2016-17"** was successfully released on the 91st Annual Day of SRCC held on April 13, 2017 by **Shri Prakash Javadekar, Honb'le Union Minister of Human Resource Development, Government of India.** The title of the Journal got verified and approved by the Registrar of Newspapers for India, Ministry of Information and Broadcasting, Government of India on April 21, 2017. On September 1, 2017, **Prof. Simrit Kaur** joined SRCC as Principal and signed each and every legal document required for further processing and supported **Dr. Santosh Kumari**.

On December 18, 2017, the College got the license **"License No. - DCP / LIC No. F. 2 (S / 37) Press / 2017"** to publish 'Strides – A Students' Journal of Shri Ram College of Commerce'. Due to change of Printing Press, the License got updated on March 09, 2018. On April 26, 2018, the SRCC Staff Council unanimously appointed **Dr. Santosh Kumari** as the **'Editor of Strides'** for the next two academic years.

On April 27, 2018 (The Foundation Day of the College), **Dr. Santosh Kumari** submitted the application for the registration of the Journal. On May 04, 2018, the college received the 'Certificate of Registration' for Strides – A Students' Journal of Shri Ram College of Commerce and got the **Registration No. DELENG/2018/75093** dated May 04, 2018. *On behalf of SRCC, it was a moment of pride for Dr. Santosh Kumari to receive the 'Certificate of Registration' on May 04, 2018 at the Office of Registrar of Newspapers for India, Ministry of Information and Broadcasting, Government of India (website - www.rni.nic.in).*

On May 07, 2018, **Dr. Santosh Kumari** submitted the application for seeking ISSN (International Standard Serial Number) at "ISSN National Centre – India, National Science Library, NISCAIR (National Institute of Science Communication and Information Resources). Weblink - http://nsl.niscair.res.in/ISSNPROCESS/issn.jsp". Finally, the College received the International Standard Serial Number **"ISSN 2581-4931 (Print)"** on June 01, 2018.

We are proud that this journal is an add-on to the enriched catalogue of SRCC's publications and academic literature.

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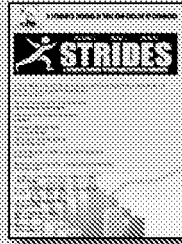
RELEASE OF FOUNDATION ISSUE OF STRIDES

Foundation Issue of the Journal *"Strides - A Students' Journal of Shri Ram College of Commerce, Volume 1, Issue 1, 2016-17"* was successfully released on the 91st Annual Day held on April 13, 2017 by Shri Prakash Javadekar, Honb'le Union Minister of Human Resource Development, Government of India.

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