Performance Evaluation of Growth Oriented Thematic Infrastructure Mutual Funds

A

Thesis submitted for the award of the Degree of

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In

Management

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DECLARATION

This is to certify that the thesis titled ***"Performance Evaluation of Growth oriented Thematic Infrastructure Mutual Funds"*** is submitted by me for the award of degree of ***Doctor of Philosophy (Ph.D.)*** in Management is a bon-a-fide work of undersigned, carried out under the supervision of ***Dr. R.K. Jain, Retd. Associate Prof., School of Commerce and Management***, **Vardhman Mahaveer Open University, Kota.**

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This is to certify that the thesis titled ***"Performance Evaluation of Growth oriented Thematic Infrastructure Mutual Funds"*** submitted for the award of Ph.D. degree in Management is a bon-a-fide work of ***Ms. Aditi Sharma***, carried out under my supervision and guidance.

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(Aditi Sharma)

EXECUTIVE SUMMARY

Mutual Fund industry constantly comes out with different schemes. A lot has been written about Large Cap, Small Cap Mid Cap and other various sectored funds but not much is known about the Infrastructure Funds and their performances. For any individual savings and investments are essential to fulfil their big future requirements. One has to make investment out his limited income thus he expects return on his sacrifices. That is why investment decision is called trade-off between risk and return. Mutual funds provide you many advantages like diversification, Professional management, low cost, and easy process. Investors are attracted towards equity because it comes with competitive returns.

The development of a country's infrastructure is vital to the growth of its sectors and the overall economy. Recognizing the adverse implications of poor development in some of the sub segments the Indian government has significantly increased its infrastructure spending over the last 10 years. It is also proactively encouraging private sector investments to speed up development. This move has enabled many private sector companies to intensify their focus on the development of urban infrastructure. Because of the huge interest of government and private sector towards the infrastructure sector it becomes mandate to study the performance of these funds.

Infrastructure Fund also has the flexibility to invest upto 20% in equities other than companies related to the infrastructure space and/or debt and/or money market instruments.

The fund will invest in stocks of companies involved in the following businesses– airports, banks, financial institutions & NBFCs, cement, coal, construction, electrical components, engineering, energy, industrial capital goods, metals & minerals, ports, power, road & railways, telecommunication, transportation, urban infra, housing, commercial vehicles, industrial manufacturing and logistics service provider etc. The fund's investment criteria would be to invest in equity stocks of those companies which are either directly or indirectly engaged in infrastructure growth in the Indian economy and aims at long term growth in capital.

Thematic Infrastructure Mutual funds not only holds equity it also includes debt and money market funds. Infrastructure funds became quite popular in 2006-07 when shares of companies in sector such as housing, cement and road building rose due to infrastructure boom. After that this area has been attracting to investors.

Return is an important aspect of Mutual fund. Investors, financial advisors and fund managers study the Return of a particular time period as it is the crucial indicator of the fund's performance. Financial market prediction is a difficult task because the data series is non-linear, dynamic, and chaotic in nature. Mutual funds are one type of investment scheme that investors manage.

Performance Evaluation of the selected mutual fund schemes is carried out in this section under the following heads:

- Risk – Return Analysis
- Risk-Adjusted Performance Analysis
- Sharpe Ratio
- Treynor Ratio
- Jensen's Alpha

Every single mutual fund has its particular venture objective such as wealth indebtedness, extraordinary existing revenue or money market earnings. A mutual fund commonly states its own venture objectives and stakeholders as a fragment of their individual venture strategies indicate the appropriate mutual fund for investment.

The performance of the mutual fund products develops more multifaceted in framework of accepting both hazard and return extent whereas benevolent due significance to investment objectives. The portfolio administrator deals with the progression of selecting securities from the amount of prospects accessible with dissimilar anticipated returns and booming different intensities of risk. The choice of securities is thru with a vision to afford the financiers the extreme revenue for a certain level of risk or safeguard slightest risk for a specified level of profit. Accordingly the portfolio administrator ought to have the aptitude to originate above ordinary returns for a certain risk class; entirely spread the assortment to exclude entirely disorderly risk.

The holistic research has been done in the area of performance evaluation of mutual funds, in terms of risk analysis and return analysis. In evaluation of risk the widely used measures are standard deviation and beta which is being done in this research as well. And return analysis has been done with the help of Sharpe Ratio, Treynor Ratio and Jensen's Alpha.

The study is helpful for investors, as it gives them insight in evaluating the performance of Mutual Funds. Investors must know the overall scenario of the particular sector before investing. One should identify his/her future requirements and accordingly chose the option of investment. It also provides the different parameters on which they should estimate their risk bearing capacity.

In the study performance evaluation of selected Mutual funds has been done on various parameters, one should choose wisely that which parameter is meeting his/her requirements and also matching the risk bearing capacity.

An attempt has taken through this study to make investors understand that only NAV can't be a basis of fund selection, they should give weightage not only to yearly, half yearly, or monthly returns but also they should give importance to the historical returns.

Investor should also keep in mind the kind of portfolio a company is offering , generally it's a combination of debt, equity, government securities and money market instruments. These are very important aspects to take into consideration before investing as it will affect the return of the security.

Infrastructure sector is a huge sector as in India. India's rapid economic development and urbanization has led to an ever-increasing need to provide basic infrastructure – particularly power, telecom, water, housing, sanitation, solid waste management, roads and urban transport including airports, ports, waterways etc. Urban roads are inadequate to meet growing traffic requirements.

The number of vehicles in India has increased 80-fold over the last 40 years but road length has increased by only 5%. Efficient roadway and urban transit networks are integral to the country's continued economic development. The housing shortage in India is estimated to be in the range of nearly 40 million dwelling units. India faces chronic power shortages due to underdeveloped generation capacity as well as a porous and inefficient transmission and distribution network. Tele density in spite of recent strides in increasing subscriber population still is low compared to the developed world.

It shows that sector has huge potential and government need bulk investment in the sector. As infrastructure gives return in long term, this sector will yield good return in future.

List of Research Publications and Paper Presentations

Paper Presented in National and International Conferences;

1. International Conference on Innovative Research in Science, Technology and Management. Modi Institute of Management and Technology Kota (Raj.) and presented a paper on "*Infrastructure Financing in India: A Road Ahead" on 2017*

Articles Published in International Refereed Journals

1. Dwivedi A. (2017) Infrastructure Financing in India: A Road Ahead. *International Journal of Science Technology and Management.ISSN No. (O): 2394-1537*
2. Jain R.K. and Sharma A. (2021) "Performance Evaluation of Growth Oriented funds: A study of selected thematic Infrastructural Mutual Funds in India "Shodh Shree International peer reviewed refereed journal. Volume – 39, issue – 2 April – June 2021, ISSN 2277-5587. Pg.no. 163-172.

Paper published in UGC Approved Journal

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AAI: Airport Authority of India
ADB: Asian Development Bank
AMC: Annual Maintenance Contract
AMFI: Association Of Mutual Fund of India
AMRUT: Atal Mission for Rejuvenation and Urban Transformation
ANN: Artificial Neural Network
ANNOVA: Analysis of Variance
AR: Auto Regression
BHEL: Bharat Heavy Electricals
BOB: Bank Of Baroda
BOOT: Build Own Operate Transfer
BOT: Build, Operate, Transfer
BSE: Bombay Stock Exchange
BU: Billion Units
CAGR: Compound Annual Growth Rate
CAPA: Centre for Asia Pacific Aviation
CAPM: Capital Asset Pricing Model
CCEA: Cabinet Committee on Economic Affairs
CDPQ: Caisse de depot et placement du Quebec (Lit, Quebec Deposit and Investment Fund)
CDSC: Contingent Deferred Sales Change
CEF: Cross Ended Fund
CLP India: China Light and Power India
CML: Capital Market Line
CNX-NIFTY: National Stock Exchange FIFTY
CONCOR: Container Corporation of India
CRISIL: Credit Rating Information Services Of India Limited
CRR: Cash Reserve Ratio
CRS: Commissioner Of Railway Safety
CWC: Central Warehousing Corporation
DBFOT: Design, Build, Finance, Operate, Transfer
DDT: Dividend Distribution Tax

DFCCIL: Dedicated Freight Corridor Corporation of India Ltd.
DGCA: Directorate General of Civil Aviation
DHL: Dalsey, Hillblom and Lynn
DIPP : Department of Industrial Policy and Promotion
DMICDC: Delhi Mumbai Industrial Corridor and Development Corporation
DPR : Detail Project Report
DTH: Direct To Home
DVC: Damodar Valley Corporation
EDFC: Eastern Dedicated Freight Corridor
ELSS: Equity Link Saving Scheme
ETCS: European Train Control System
ETF: Equity Traded Fund
EXIM: Export Import
FAO: Food and Agriculture Organisation
FCI: Food Corporation of India
FDI: Foreign Direct Investment
FOF: Fund of Funds
FTSE: Financial Times Stock Exchange
FY: Fiscal Year
GAIL: Gas Authority of India Ltd.
GARCH: Generalised Auto Regressive Conditional Heteroskdasticity
GDP: Gross Domestic Product
GE: General Electrical
GIC: Guaranteed Investment Certificate
GIZ: German Agency for International Cooperation
GJR: Glosten- Jagannathan-Runkle
GMB: Gujarat Maritime Board
GPS: Global Positioning System
GRPF: Grid Connected Roof Top Photo Voltaic
GST: Goods and Service Tax
HDFC : Housing Development Finance Corporation Limited
HLL: Hindustan Latex Limited

CAPEX: Capital Exchange
HNI: High Net Worth Investors
HUDCO: Housing and Urban Development Corporation
ICD/CFS: Container Freight Station/ Inland Container Depot
ICICI: Industrial Credit and Investment Corporation of India
ICRA: Investment Information and Credit Rating Agency of India Limited
IFC: International Finance Corporation
IIFCL: India Infrastructure Finance Company Limited
IIT: Indian Institute of Technology
ILW: Institute Of Labor Welfare
IMC: Integrated Marketing Communication
INR: Indian Rupee
INSAT: Indian National Satellite System
IPO: Initial Public Offering
IRDA :Insurance Regulatory & Development Authority
ISRO: Indian Space Research Organisation
IT: Information Technology
JERA: **J**APAN'S **E**NERGY FOR A NEW E**RA**
JICA: Japan International Corporation Agency
JNPT: JawaharLal Nehru Port Trust
JUSCO: Jamshedpur Utilities and Services Company
LA: Land Acquisition
LIC: Life Insurance Corporation of India
LOA: Letter Of Award
LSTM: Long Short Term Memory
MA: Moving Average
MAE: Mean Absolute Error
MF: Mutual Fund
MFF: Multitrench Financing Facility
MNC: Multi National Company
MNRE: Ministry of New and Renewable Energy
MOC: Memorandum Of Corporation

MoU: Memorandum of Understanding
MRO: Maintenance Repair and Overhaul
MRTS: Mass Rapid Transport System
MSEZL : Mundra Port and Special Economic Zone Limited
MT: Metric Ton
MTOE: Million or Mega Tonnes of Oil Equivalent
MU: Mega Unit
MW: Mega Watt
NASDAQ: National Association of Security Dealers Automated Quotation
NAV: Net Asset Value
NBFC: Non Banking Finance Companies
NECTAR: North East Centre for Technology Application and Research
NFO: New Fund Offer
NGHM: National Highway Authority of India
NH: National Highway
NMDP : National Maritime Development Programme
NRSC: National Remote Sensing Centre
NTPC: National Thermal Power Corporation Limited
ONGC: Oil and Natural Gas Corporation
P&O: Peninsular and Oriental Steam Navigation Company
PE: Private Equity
PFC: Power Finance Corporation
PIB : Press Information Bureau
PMEAC: Prime Minister Economic Advisory Council
PMGSY: Pradhan Mantri Gram SadakYojna
PNB:Punjab National Bank
PPP: Public Private Partnership
PRI: Panchayat Raj Institutions
PSA: Port of Singapore Authority
PSU: Public Utility Undertaking
RDSO: Research Design and Standard Organisation
REIT: Real Estate Investment Trust

REMF: Real Estate Mutual Fund
RIDF: Railways Of India Development Fund
RITES: Rail India Technical and Economic Services Limited
RMSE: Root Mean Squad Error
RO: regional Offices
SAIL: Steel Authority Of India Limited
SBI: State Bank Of India
SEBI: Securities and Exchange Board of India
SFC: State Financing Corporation
SIP: Systematic Investment Plan
SPV: Special Purpose Vehicle
SWC: State Warehousing Corporation
TAMP: Tariff Authority fot Major Ports
TCS: Tata Consultancy Services
TIMF: Thematic Infrastructure Mutual Fund
TNUDF: TamilNadu Urban Development Fund
TOT: Toll Operate Transfer
ULB: Urban Local Body
UNCTAD: United Nations Conference On Trade and Development
USD: United States Dollar
USTDA: United States Technical Development Agency
UTI: Unit Trust Of India
WDFC: Western Dedicated Freight Corridor

Chapter I

Introduction: History, Types and Mechanism of Mutual Funds

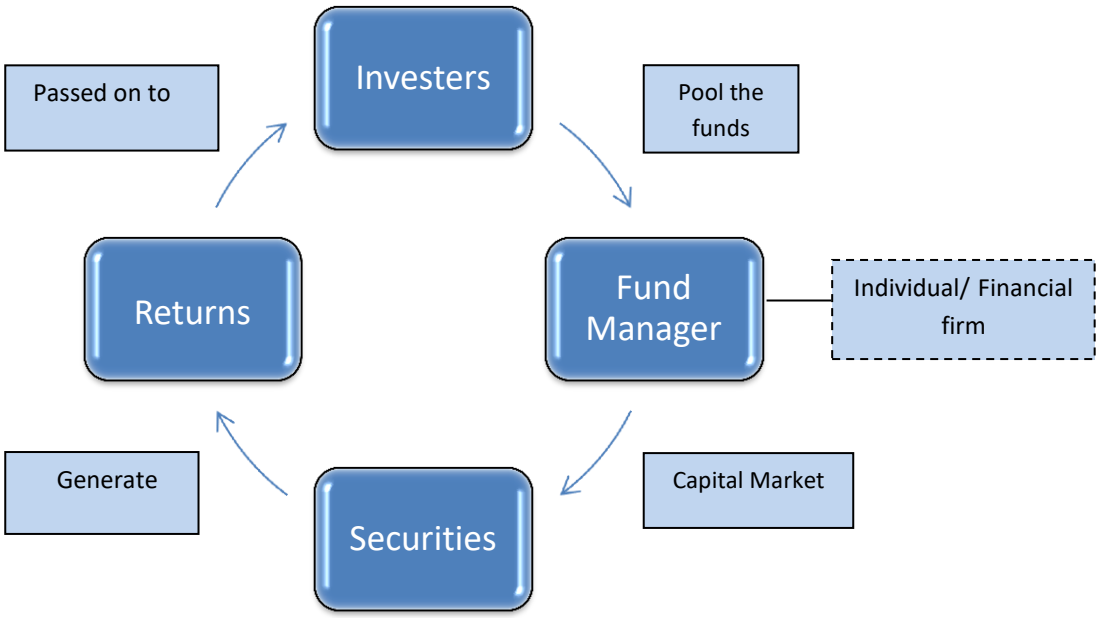
Chapter: 1

Introduction: History, Types and Mechanism of Mutual Funds

1.1 Introduction of Mutual Funds

According to the SEBI, a mutual fund is a collection of money collected from individual investors by professional units for the purpose of investing in the capital markets in order to meet specific goals. Invested funds are handled by experienced money managers on behalf of unit holders and subsequently distributed to investors in proportion to their investments in stocks, bonds, and other assets. When the value of a mutual fund rises,so does the return, and the reverse is also true. The net income and capital appreciation of the investment are distributed among the unit holders in proportion to the number of units they hold. Fund managers used to collect fees depending on the fund's value while administering and managing portfolios.

Figure : 1 Mutual fund cycle



1.1.1 History of Mutual Funds

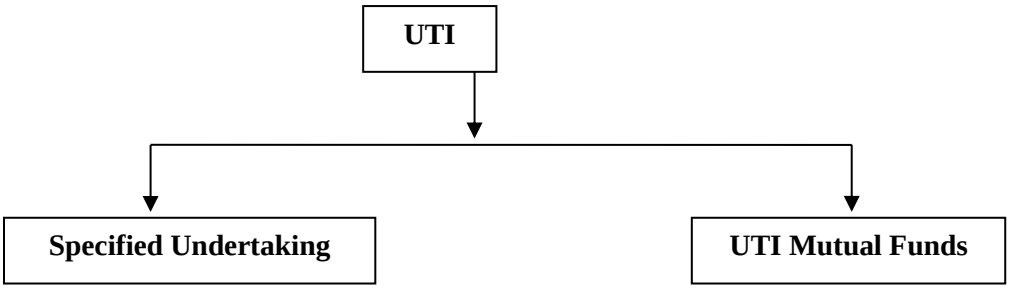
To understand weather investing in mutual funds is safe and secure, we need to understand the history of the mutual funds. The history of mutual funds can be divided into four phases:

1.1.1.1 ***The UTI Phase (1963-1987):*** Unit Trust of India introduced mutual funds in India. For the first Mutual Fund, the UTI Act of 1963 was passed; it was launched with the issue of units under the US-64 plan that year.

1.1.1.2 ***Entry of public sector banks and insurance companies (1987-1993):*** LIC and GIC, together with public sector banks such as State Bank of India, Punjab National Bank, Indian Bank and the Bank of India, formed mutual funds in the year 1987.

1.1.1.3 ***Entry of private sector and foreign mutual fund phase (1993-2003):*** The mutual fund industry has entered a new phase with the introduction of private sector funds, including foreign mutual funds [eg:- Reliance Mutual Fund, Deutsche Mutual Fund, ICICI Mutual Fund, HDFC Mutual Fund etc]. The first Mutual Fund Regulation was put in place by the government in 1993. SEBI (Mutual Fund) Regulations, 1996, govern the industry today.

1.1.1.4 ***UTI Act repealed:*** Until 2002, UTI ran its flagship programme ‘‘US64’’ successfully. There were no daily NAV announcements in this guaranteed return plan. Over a period of time, the fund's NAV was artificially set and the dividends were paid out of income and reserves, not from the underlying asset's earnings. By 2002, dividend payments were becoming increasingly difficult to maintain. In February 2003, the UTI Act was repealed and UTI was split into two separate units because of the fear of a run on UTI:

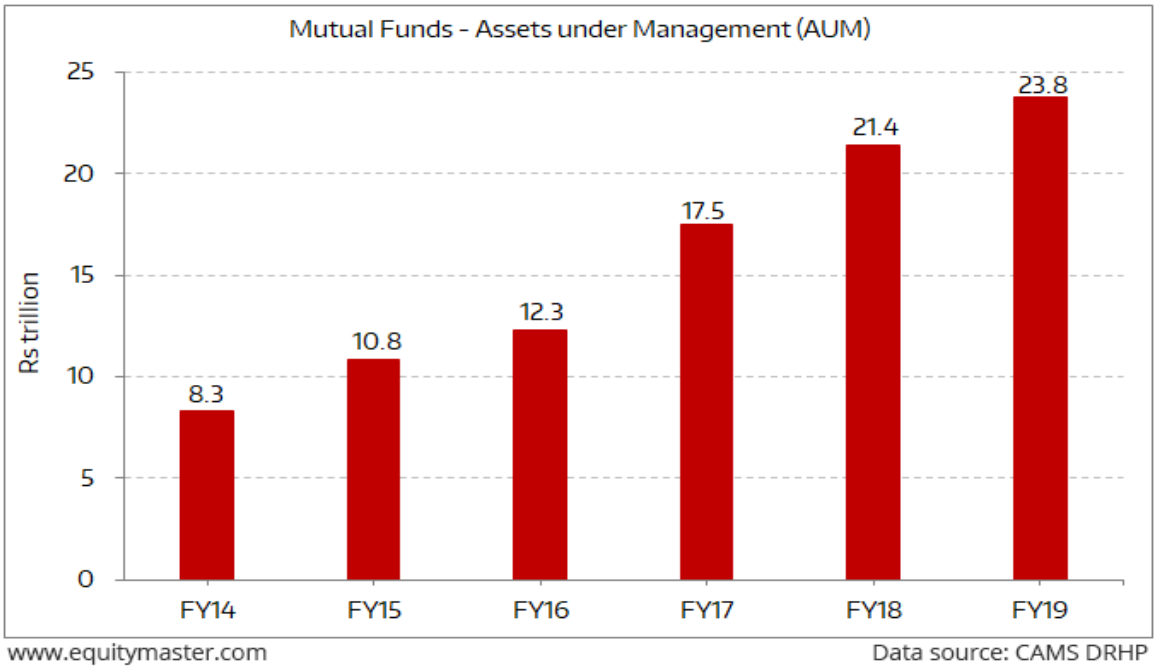


With assets under management of Rs. 29,835 crores at the end of Jan.2003. representing broadly the assets of US 64 scheme, assured return and other scheme. This functioned under the purview of Government of India and didn't come under Mutual Fund regulations. US 64 investors were not allowed to redeem their units but were instead issued 5 year bonds which carried an interest rate of 6.75% (Tax free)

These are sponsored by SBI, PNB, BOB and LIC. It is registered with SEBI and functions under the Mutual Fund Regulations.

As a result of these manoeuvres and related mergers, the mutual fund industry has entered its current period of consolidation and expansion.

Figure:2 Growth of Asset Under Management



Source: www.equitymaster/CAMS DRHP

1.1.2 Benefits of Mutual Funds

1.1.2.1 Professional Management: The most significant benefit of mutual funds is that fund managers have a greater understanding of the markets, regardless of whether they are dealing with the stock market or the debt market. On a daily basis, the Asset Management Company monitors the economy, companies, and the stock market, and makes investment decisions based on their extensive research and expertise.

1.1.2.2 Investment Flexibility: Some of the best options for growth and income can be found in mutual funds that offer a variety of schemes (equity, debt, hybrid, and so on). Our risk tolerance, return expectations, and overall investment goals can all be taken into consideration when making a decision.

1.1.2.3 Liquidity and Affordability: With as little as Rs. 500-100, we can begin investing in mutual funds. SIPs allow investors to invest as little as Rs. 50, Rs. 100, or Rs. 500 in the stock market. Mutual funds, on the other hand, are simple to redeem. Within 24 hours, we can withdraw our liquid funds, and it will take three days to withdraw the rest.

1.1.2.4 Convenient Administration: Because they provide services in a Demat format, which saves investors time and delays, there is no administrative risk associated with share transfers.

1.1.2.5 Low Cost of Management: No mutual fund can increase the cost as per their prescribed cost limit of 2.5%. Any increment in cost of management will be borne by AMC.

1.1.2.6 Economies of Scale: Because of the way mutual funds are set up, there is a distinct advantage to using them. When investors pool their money, the EoS is guaranteed, and it is less expensive than investing directly in the capital markets, which have higher fees. There will be more control over the costs for retail investors and they will be able to enter high entry-level markets like real estate because of this.

1.1.2.7 Diversification: With a simple investment in a mutual fund, we can obtain access to a large choice of instruments. It is true that individual investors cannot invest in several mutual funds because of their high investment thresholds, notably in the debt section. The Mutual Funds are able to mitigate risk by investing in a wide range of stocks and industries.

1.1.2.8 Transparency and Safety and well regulated: However, mutual funds do not guarantee returns, as they are subject to stringent transparency rules. All Indian mutual funds are governed by SEBI, which establishes consistent criteria for them all. It has a three-tier structure that makes it easy to spot any conflicts of interest between sponsors, trustees, and AMCs. Another organisation that seeks to promote mutual fund and unit holder interests is the Indian Association of Mutual Funds (AMFI). As part of its educational efforts, it regularly hosts Investor Awareness Programs.

1.1.2.9 Tax Benefits: Income from SEBI-registered mutual funds is largely tax-exempt. A Dividend Distribution Tax is imposed on dividends paid to unitholders by a debt fund (DDT). Depending on the type of investment and the length of time held, the investor is required to pay capital gains tax.

1.1.3 Disadvantages of Mutual Funds

1.1.3.1 Impact Cost: As a result of their massive buying and selling, mutual funds cause volatile market conditions. If funds are sold in large amounts, they tend to rise in price, which is why large volume funds are so expensive. It's called impact cost, and it can lead to higher costs when you're buying and lower prices when you're selling.

1.1.3.2 Lead Time: Because mutual funds are forced to keep a portion of their assets in cash in order to fulfil redemption pressures, the money invested in mutual funds is not fully invested. After that, there is a lag in making the actual investment after determining the ideal investment. A fund house, on the other hand, is not able to place investors' money in the market immediately after they've

invested. Returns on the corpus are reduced because of the time it takes for cash to be invested with mutual funds.

1.1.3.3 No guarantee of returns: There are three issues in providing returns of mutual funds;

- • It's not true that every penny goes to the right place. It is possible to find a fund that underperforms the benchmark index.
- It is possible that mutual funds may do better than the stock market, but it is possible that the market may have climbed while the MF has not, and it may provide a risk-free return.

However, if the principle is eroded, investors will not forgive returns.

1.1.3.4 Fund management costs or Expense Ratio: When buying or selling mutual fund units, there is an entrance and/or exit load (cost). The marketing and other expenditures are covered by these loads (which are a set percentage of the value of the units held). Expense ratios could include AMC charges, annual asset management fees and costs. In addition, investors must pay the fund manager regardless of whether the fund makes money or loses money.

1.1.3.5 Cost of churning /Turnover Ratio: Depending on whether the fund management favours long-term or short-term gains, certain schemes will frequently rebalance their portfolio. Transaction expenses (brokerage, custody, etc.) are high, which results in reduced returns (as a result).

1.2 Formation of Mutual Funds

Trust is the foundation of the mutual fund industry. SEC, Mutual Funds Regulations and the Indian Trust Act are in charge of regulating it. In order to avoid the appearance of a conflict of interest, it has implemented a three-tiered system.

The sponsor sets up the firm, which is invested by the Asset Management Company, and the Trustee manages the day-to-day activities. The creation and operation of funds is facilitated by five primary components and three market intermediaries:

1.2.1 Five Principle Constituents

1.2.1.1 Sponsor:

Both an individual and an artificial group of individuals can serve as mutual fund sponsors. A minimum of 40% of the investment must be made by the sponsor, who must also meet the eligibility conditions of the SEC (Mutual Funds) Regulations, 1996. The sponsor is not responsible or liable for any losses or deficits incurred as a result of the operation of the plans, beyond the initial investment it made to form the mutual fund.

1.2.1.2 Asset Management Company:

The Trustee has chosen the AMC. As an Asset Management Company (AMC) for a Mutual Fund, the AMC must be approved by the Securities and Exchange Board of India (SEBI). At least half of the directors in an AMC are independent directors who have no connection to the sponsor. In order for the AMC to remain solvent, it must always keep a cash reserve of at least Rs 10 crore. It's a legal body that's been set up under the Companies Act to manage the money invested in a mutual fund and to follow the rules that govern it. According to the risk tolerance of investors, the AMC appoints professional fund managers to oversee the investment portfolios of those who have entrusted it to them with their money. Three divisions make up AMC:

- Fund Management
- Operations and Accounting.
- Sales and Marketing

1.2.1.3 Trustees

The trust is managed by a board of trustees. Among their responsibilities is to ensure that the fund complies with all applicable legislation and to protect investors' interests. The trustees appoint custodians, banks, depositories, and transfer agents. As long as it's permitted by the Trust Deed, the AMC can help the mutual fund reach its targets. In order to guarantee that the AMC has proper mechanisms in place and appointed Fund Managers and Compliance Officers, it is the obligation of the board of trustees to do so.

1.2.1.4 The Unit Holder

If you're a mutual fund investor, you're likely familiar with the term ‘‘unit holder.’‘.

1.2.1.5 Mutual Fund Distributor

Investors buy mutual funds from distributors. In order to promote and sell schemes, they use their extensive network and charge commissions for their efforts. For their assistance in enabling fund house subscriptions, distributors are compensated with commissions. In addition, they assist with redemptions, investor complaints, asset allocation recommendations, and the like. The commission is paid in a fixed amount, although it might potentially fluctuate.

1.2.2 Three Market Intermediaries

1.2.2.1 Custodian:

SEBI (Securities and Exchange Board of India) Regulations, 1996, define a custodian as a person who is authorised to provide custodial services.

In addition to providing incidental services, these services entail safeguarding the assets of clients. Client’s account maintenance in which they manage securities together with respective benefits or rights accumulating to a client falls in the purview of custodial service. MF companies require custodian so that AMC can concentrate on investment and management of money.

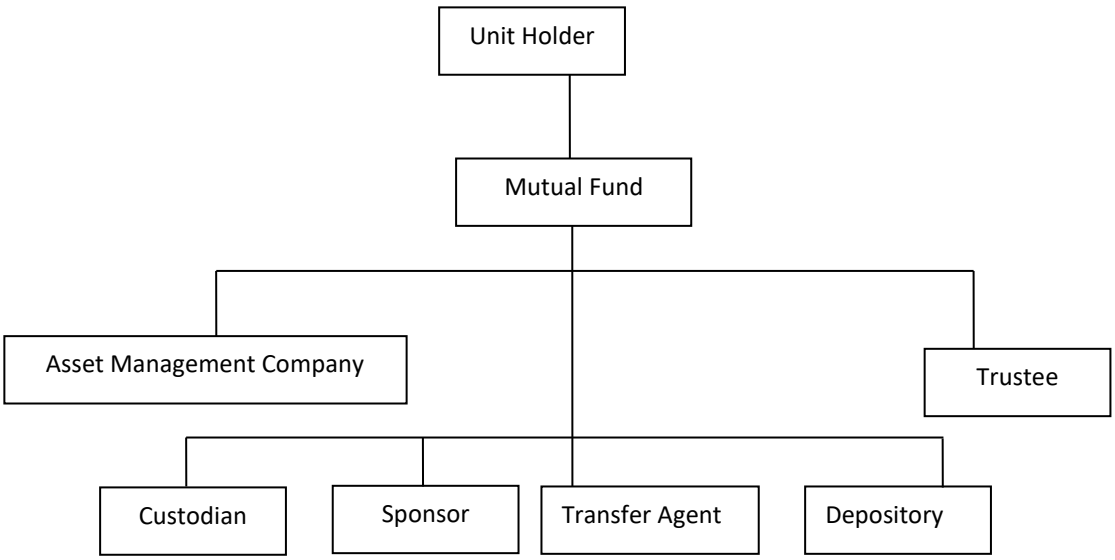
1.2.2.2 Transfer Agent:

A transfer agent is defined under the SEBI regulations Act 1993 as a person who has been authorised to act as a transfer agent. Additionally, Transfer Agents produce transfer papers and maintain up-to-date records of investments. Where depositories do not keep record, transfer agent take record of transfer units between investors.

1.2.2.3 Depository:

Depository's Act 1996 defines a depository as a corporation that transfers units to unit holders in dematerialized forms and maintains a record of such transfers, as defined by the act.

Figure:3 Formation of Mutual Funds



1.2.3 Basic Terms in Mutual Funds

1.2.3.1 Net Asset Value (NAV): NAV is a critical factor in determining whether to buy or sell a stock. Dividend income, interest earnings, and any losses or gains the company incurs in the market are included. The NAV of a fund is the price at which we purchase mutual fund shares now that entry loads have been eliminated. Net asset value shows a realizable value on liquidated date which the investor will get for every unit he is holding. It is calculated by as follows;

$$\frac{\text{Realizable value} - \text{All liabilities (except Unit Capital)}}{\text{No. of units outstanding}}$$

When is the NAV declared: Mutual Funds declare NAV for schemes daily. The NAV must be disclosed on a daily basis in accordance with SEBI regulations. All mutual fund schemes' per-unit NAVs must be updated by 11:00 PM every day on the AFMI website and the corresponding fund website. Monthly or quarterly

NAV reports might be issued for closed-end funds in a particular market segment or for monthly income plans in general.

1.2.3.2 Entry load: SEBI banned Entry loads on all mutual funds from 1st August 2009.

1.2.3.3 Exit Load: Redeeming or moving out of mutual funds incurs a fee ranging from 0% to 3% of the amount invested. There is an Exit load that is only effective for a limited time after a customer purchases the product. To pay for the fund's marketing and distribution costs, it charges this fee. Liquid funds don't impose an exit load, while other debt funds do, ranging from 0% to 3%. In most equity funds, the exit load is 1 percent if the units are redeemed within a year of purchase. A no-load mutual fund's departure cost is known as the Contingent Deferred Sales Charge, or CDSE for short.

1.2.3.4 Cut-off time: The deadline by which an investor must request a redemption or a fresh investment is known as the cut-off date. To get the current day's NAV, we need to trade before the scheme's cut-off time is reached. Orders received after the specified cutoff time will be subject to the net asset value as determined the following day (NAV). Payment must be made by 3:00 p.m. for non-liquid money and by 12:00 p.m. for liquid money (the cut off time for liquid funds vary among mutual funds from 12:00 pm to 2:00 pm).

1.2.3.5 Growth or Dividend options: If you're looking for mutual funds for your personal financial circumstances, you have these options when it comes to picking one out. Investors who want to see their money increase over a certain period of time may consider the Growth choice, while those looking for consistent income should consider the Dividend option. Subcategories of the dividend choice include dividend reinvestment and dividend pay-out.

Filling out the form will default to our fund's choice if we do not select one. Mutual funds pay out dividends whenever an investment creates a profit that the fund may distribute as a dividend. When a mutual fund announces a dividend, its NAV falls by that amount.

The options come with additional tax benefits. dividends from equity funds that invest at least 65% of their assets in stocks are currently tax-free. Surcharges and cess are included in the 28.325 percent tax rate on liquid fund dividends. Capital gains tax can be recouped if the investment is kept for more than a year in the Growth option.

1.2.3.6 Benchmark: India's Securities and Exchange Board of India (SEBI) mandates that mutual fund plans be evaluated against an index. So that they may determine whether their plan is reaching their financial objectives, investors can evaluate the performance of their scheme and compare it with another instrument (in this case, an index). The benchmark index for equity funds can be chosen by the fund manager based on what it thinks is a reasonable range of stocks to invest in. The usage of certain indexes is essential for debt funds, though. These indices are created and maintained by CRISIL Ltd. and ICICI Securities Ltd. In the fund's monthly factsheet, investors can see how their scheme performs in comparison to the benchmark (index).

1.2.3.7 Expense ratio: An annual fee or expense ratio is charged by the Asset Management Company to pay administrative costs, advertising costs, custodian fees, and other costs. This expense ratio is determined on a weekly or biweekly basis, however it is reflected in the NAV on a daily basis. SEBI has set a limit on the amount of expenses a fund can charge. For example, active equity funds are limited to a maximum of 2.5 percent (with an additional 0.3 percent for Tier II and Tier III cities). Debt funds and index funds can only invest up to a maximum of 2%, while mutual funds can only invest up to a maximum of 1.5%. The expenditure ratio of a fund is directly related to the size of the money it manages, and not to the results it has generated. Expense ratios aren't a big deal for Indian investors, who have enjoyed double-digit gains from their mutual funds, particularly in stock funds. Consider the fund's comparative success with other funds in its category while making investment decisions.

1.2.3.8 Direct plan: Investors can save money by purchasing schemes directly from the fund company with the direct plan option. Asset management firms in India must now provide separate direct plans for open-end schemes as mandated

by the Securities and Exchange Board of India (SEBI) as of the first of the year. The direct plan's NAV accounts for a lower expense because the investor approaches the AMC directly and there is no marketing or distribution expense. It's because of this difference in expense ratio, which can be anywhere from 0.5-0.75% per year, that the direct plan NAV is higher than the conventional plan NAV.

1.2.3.9 Turnover ratio: The annual percentage change in the portfolio securities of the fund. A fund's portfolio turnover rate is 100 percent if its assets total Rs 100 crore and the fund acquired and sold Rs 100 crore in securities that year. When compared to more cautious funds, aggressively managed funds tend to have higher portfolio turnover rates. The higher the turnover rate of a fund's portfolio, the higher will be the fund's expense ratio.

1.2.4 Types of Mutual Funds

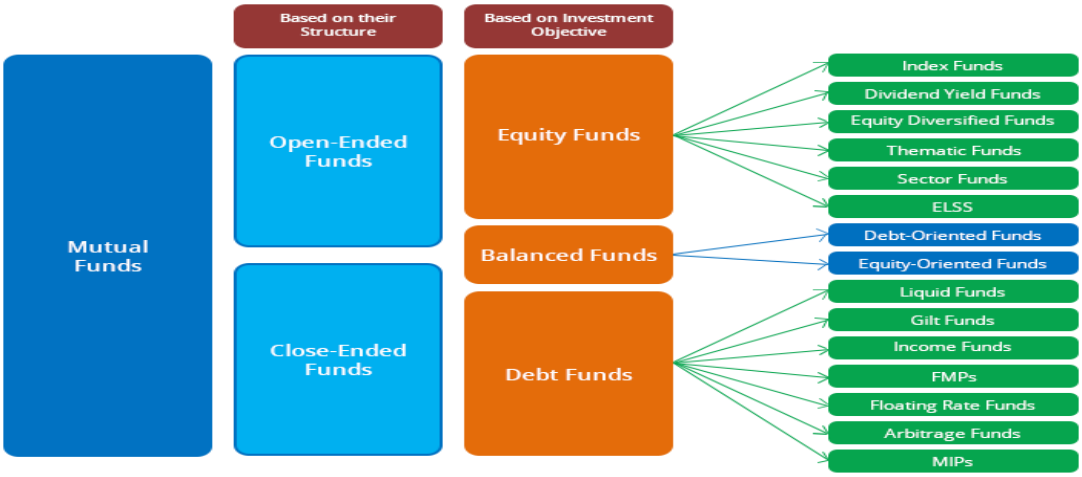
Typically, mutual funds are categorised based on the type of investments they own. Mutual funds come in three varieties: open-ended, closed-end, and interval.

Investors can contribute to an ***Open-ended fund*** at any time and the fund will refund their money. At any one time, investors can buy and sell shares in the fund at a price that is related to the fund's net asset value (NAV). In this instance, the AMC is always ready to collect money and repay money to investors as and when they request it.

For the duration of a ***Closed-Ended Fund*** (CEF), investors are required to keep their money locked up. In this case, the overall corpus is constrained by the first offer's size. Only during the ‘‘New Fund Offering‘‘ (NFO) period can he buy directly from the fund. Investing in mutual funds has strict entry and exit restrictions. The stock market, like any other scrip, must be used to accomplish any transaction related to purchasing or selling. In contrast to open-ended funds, a fund manager of a CEF can offer superior returns because he does not have to deal with constant redemptions.

The properties of both closed-end and open-ended funds are combined in ***Interval Funds***. A fixed length of time, such as 15 days or three months, is the only time during which the fund house's units can be acquired and sold.

Figure 4: Classification of Mutual Funds



Source: Karvy Value

1.2.5. Classification of Mutual Funds

There are two classifications (1) Portfolio classification and (2) Ownership classification. Both are mutually exclusive classification.

1.2.5.1 Portfolio classification: under this funds are classified as Equity funds, Debt funds and special funds.

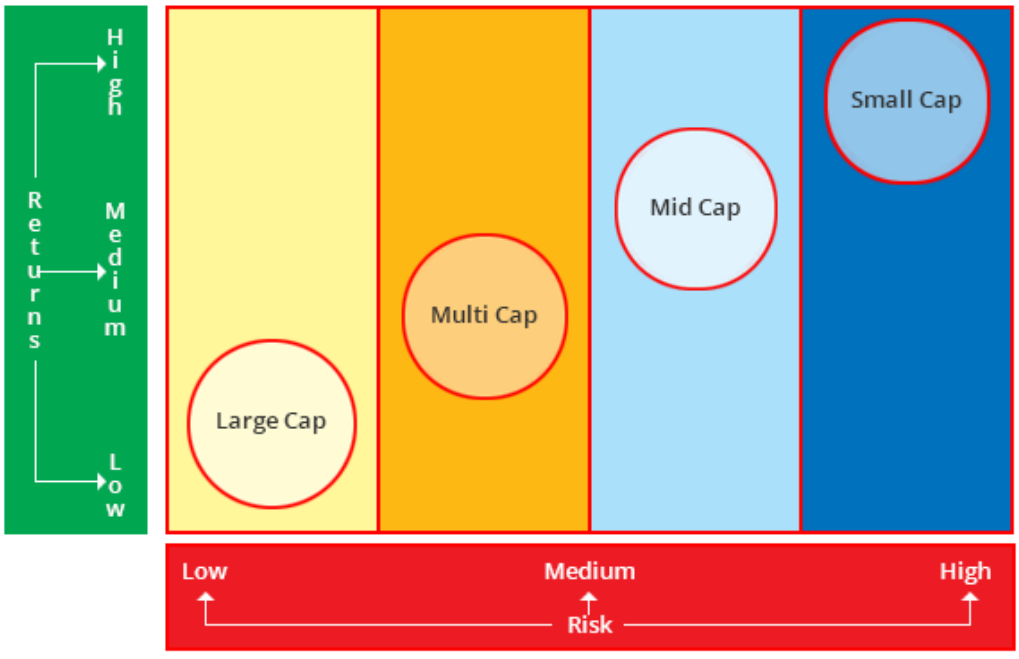
Investments in the stock market are made through ***Equity Funds***. By investing in this, we may be able to increase our portfolio over time. Shareholders can benefit from a company's success in two ways: either through an increase in the value of their stock, or by receiving dividends. Investors may lose all of their stock value if a firm collapses. In any case, he isn't accountable for any of the business's debts. These products are commonly referred to as "high risk, high return'' (HRHR). Investors that are willing to accept a degree of risk in exchange for high returns can benefit from the programmes.

1.2.5.1.1 Types of Equity Funds

1.2.5.1.1. (a) Diversified Equity: For example, they invest in a wide range of equities and sectors to ensure that their investments are well-diversified. The equities market's risks can be lessened by using this method of diversification. Large, medium, small, and multi-cap funds are separated based on their market capitalization. Investing in blue-chip stocks is the primary focus of large-cap funds, while mid-cap and small-cap funds dedicate their maximum assets to these types of stocks, respectively.

Similarly, regardless of the market capitalization, multi-cap funds invest in a wide range of businesses and industries. When it comes to equity-diversified subcategories, large cap funds carry the least risk, while mid-size funds produce higher long-term returns. Fund managers generally follow internal criteria that specify the maximum amount of exposure they can have to various industries and market segments.

Figure: 5 Diversified Equity



Source: Karvy Value

As the name implies, this is an **Index Fund** that seeks to track the performance of a specific market index, such as BSE's sensex or the S&P CNX Nifty. The fund's portfolio of securities is maintained in proportion to the components of this benchmark index in order to achieve the desired

outcome. ***Equity Traded Funds ETFs*** are more convenient than index funds since they may be traded on stock exchanges just like regular stock shares.

1.2.5.1.1. (b) Dividend yield funds: Invest in stocks with a high dividend yield. Dividend per share/market share is the formula for calculating dividend yield. There is less volatility in the price of these shares than there is in the price of growth stocks. A high dividend yield indicates that the company is well-capitalized.

It is possible to save money on taxes by investing in a ***tax-advantaged equity fund, or ELSS,*** which invests mostly in stocks. ELSS feature a three-year lock-in period, which gives the fund manager time to create a strong portfolio and boost returns. SIPs are an option for individuals interested in this (Systematic Investment Plan). Section 80C of the Income Tax Act allows you to save money on taxes by donating to a charity.

1.2.5.1.1. (c) Sector Fund: as the name implies, only invests in companies that fall within the scope of the offer document. They're all bets that are made in one go. Investing in these funds might yield high profits if the market cycle coincides with the correct time. For example, sectoral equity funds that focus on specific industries such as banking, technology or pharmaceuticals

1.2.5.1.1. (d) Thematic Funds: commonly known as ***Semi-Diversified Equity Funds***. Based on specific themes, these are available. In accordance with their stated goals, they only invest in a limited number of industries. Examples of these funds include Infrastructure Funds, MNC funds, Shariah funds, and so on. Semi-diversified investments include things like dividend yield and counter funds. These funds bring in a lot of money.

1.2.5.1.2 <u>Types of Debt Funds</u>

Bond and debenture investments, treasury bills, and other government securities are some common examples of the types of debt-oriented investments available to more traditional investors. They make money from the interest on the debt instruments that they seize. The relationship between the interest rate and the market value of the security is critical to comprehend. This instrument's value is inversely related to the general direction of interest

rates in the country. As a result of a debt instrument's capital appreciation, income can be accrued Debt funds face the most risk from changes in interest rates.

1.2.5.1.2 (a) Fixed/Floating-Rate Fund: As the name suggests, a Fixed/Floating-Rate Fund is one that invests in securities that have a fixed interest rate and fixed time. The mutual fund house will invest in floating-rate securities as part of the floating rate fund.

1.2.5.1.2 (b) Gilt Fund: One of the most common types of mutual funds is known as a ‘‘Gilt Fund,’‘ and it invests all of its assets in government bonds. The instruments that short-term and long-term gilt funds invest in can help further categorise them. There is a little amount of risk associated with these investments, but they are susceptible to fluctuations in the interest rate environment. The Gilt portfolio's value rises while interest rates are falling, resulting in higher returns. Gilt funds may produce low or negative returns when interest rates rise, depending on the market.

1.2.5.1.2 (c) Money Market/Cash/Liquid Funds are a suitable choice for short-term debt funds. When selecting these funds, keep in mind your portfolio's expense ratio and credit quality. Treasury bills, CDs, commercial paper, reverse repo, and other instruments have maturities of up to one year. These funds attempt to provide investors with a liquid investment channel that also offers the opportunity for good returns as opposed to a bank fixed deposit, which provides low fixed yields.

1.2.5.1.2 (d) Income Fund: As a rule, short-term income funds focus on investments that have less than three years of remaining maturity. They exclusively invest in bonds with maturities of one year or less for ultra-short-term income funds and 91 days or less for liquid funds.

1.2.5.1.2 (e) Fixed Maturity Plans: These funds invest in bonds with a longer maturity than money market bonds in order to provide current income rather than long-term capital appreciation. As a result, they are sensitive to both credit and interest rate risks (the danger that the bond's market value could fall below the

amount paid for it, if interest rates raise the prices of bonds fall, as these two factors are inversely related). Close-ended income plans with Variable Maturity: A reasonable range is from 15 days to at least 2 years. Fixed Maturity Plans invests in securities in accordance with the plan's maturity date so that the individual instruments mature on or before the scheme's maturity date.

1.2.5.1.3 <u>Special Funds</u>

1.2.5.1.3 (a) Hybrid or Balanced Funds: To put it another way, these are a mix of debt and equity investments. For this product, the primary goal is to combine the advantages of equities and debt mutual funds - set returns with fair capital gains. As a result, the fund's risk/return profile falls somewhere in the middle of those of debt and equities. These can also be classified as:

a. Equities must account for at least 65 percent of the fund's assets, with the remaining 35 percent in debt. a. These are equity funds, which means they are eligible for various tax advantages, such as a long-term capital gain tax exemption.
b. Bond funds, on the other hand, are more heavily weighted toward holding debt than equity.
c. Monthly income plans: This type of plan aims to generate a steady stream of income while also providing capital growth. Debt, money market, equity, and equity-oriented instruments are typically used to meet these objectives. Most of their money is placed in debt, with only 15 to 20 percent invested in equity.

1.2.5.1.3 (b) Arbitrage Funds: Arbitrage Funds: Equities-oriented schemes capitalise on arbitrage opportunities between cash and futures markets. In terms of short-term income, they are the finest alternatives to liquid and other short-term income categories. Investors with a modest appetite for risk can retain their investments for up to one year.

1.2.5.1.3 (c) Fund of Funds: Fund of Funds is a mutual fund which invests in other mutual fund schemes. Where a traditional mutual fund comprises of a portfolio of shares, a Fund of Funds comprises of a portfolio of different mutual

fund schemes. New or first time investors, who do not have a large capital for a diversified portfolio, could diversify from among thousands of funds and stocks, with a small amount of money. However, Expense fees and management costs are higher, as the cost structure will include the fees of the underlying mutual funds, as well as the FoF.

1.2.5.1.3 (d) Gold ETF: These open-ended funds can be exchanged on an exchange just like any other company's stock. In contrast to a single stock, each ETF unit represents a collection of securities. As a result, it is akin to an open-ended fund unit, but with a huge distinction. Gold exchange-traded funds (ETFs) invest in gold bullion with a purity level of 99.5% or above. They are traded on stock exchanges in order to allow investors to participate in the gold bullion market without having to take delivery of the metal. Investing in them yields returns that closely track those of the domestic gold market..

1.2.5.1.3 (e) Gold Fund of Funds: As a result, they largely invest in gold ETF units rather than becoming an ETF themselves. In terms of returns, they're very similar to the returns of the Gold ETF. These are gold-backed funds that allow investors to put money aside in a safe and tax-efficient manner. Investors have the option of making a one-time or recurring investment. Typically, the gold funds have a face value of Rs. 10.

Actively managed gold funds are more expensive than gold ETFs.. They are as follows;

- Modest value: Gold ETFs are a good option for retail investors who just wish to invest a small amount of money in gold. Depending on the scheme, investors can purchase a single unit, which can be as little as 0.5 grammes or as much as 1 gramme of gold.
- There is no limit to the number of times a Gold ETF can be purchased or sold during the trading day. The reason it is a liquid investment vehicle is for this very reason.
- A bid and ask price is available on the stock exchange for ETFs, so investors can buy and sell at the current market price. A discount

acquisition or sale does not need an investor to pay a premium. As in the case of jewellery, or even coins and bars at times.

- Security: Gold ETFs are effectively electronic gold purchases. As a result, the investor may rest easy knowing that he doesn't have to worry about protecting the gold. The AMC's selected custodian is responsible for the gold's safety.
- In order to comply with SEBI regulations, the underlying asset in Gold ETFs must be refined to at least 99.5% purity. As a result, investors are free to look for a reputable gold dealer.
- Investments in gold ETFs are tax-free. In addition, an investment is considered long-term if it is held for more than a year, as opposed to three years for actual gold.

1.2.5.1.3 (f) Global Funds: Direct investments in foreign markets, as well as fund of fund strategies, comprise the majority of the portfolios of the 34 funds classified as ‘‘Global funds.’‘ In addition to providing geographical diversification and the ability to participate in the world's developing economies and burgeoning stock markets, this asset class is regarded as an excellent alternative. The global uncertainty means that investors can choose investments based on their risk profile, such as those that provide a greater geographic and market diversification than others.

1.2.5.1.3 (g) Actively managed and Passively managed funds: Another distinction that is important for the investor is the difference between active and passive funds. This distinction is based Manager’s view on his role.

- **Active funds:** Active funds seek to outperform the broader market. The managers of actively managed funds believe that they can outperform the market (benchmark) by picking stocks and timing the market in such a way that their portfolio's returns are higher.
- **Passively Managed Funds:** Passively Managed Funds are funds that mimic the performance of a specific market index. An ETF or index fund is an example of passively managed investments. There is less work for the managers of these funds, and they do not have to make any investing decisions. Their investments are limited to those stocks that are included

in the Index. For investors who are new to the equity market, index funds are the ideal option.

An index fund investor should expect to earn just modest returns. A passively managed fund's costs are lower than those of an actively-managed fund, for example. Investors must also be aware of the specific proportions of each stock that will be in their portfolio at the time of investment and during the duration of the investment period. Thirdly, because it is based on an index, it is simple to monitor the performance of an index fund.

Chapter II

Infrastructure Sector of India and its Regulatory frame work

Chapter – 2

Infrastructure sector of India and its regulatory frame work.

2.1 Introduction of the Infrastructure Sector

Growth in any economy can only be achieved if the entire potential of specific key growth areas in the economy is fully realised. The Indian economy could be propelled to high and sustainable growth by a variety of growth drivers. To achieve 'comprehensive growth,' the economy will need to make significant investments in its physical, social, and agricultural infrastructure.

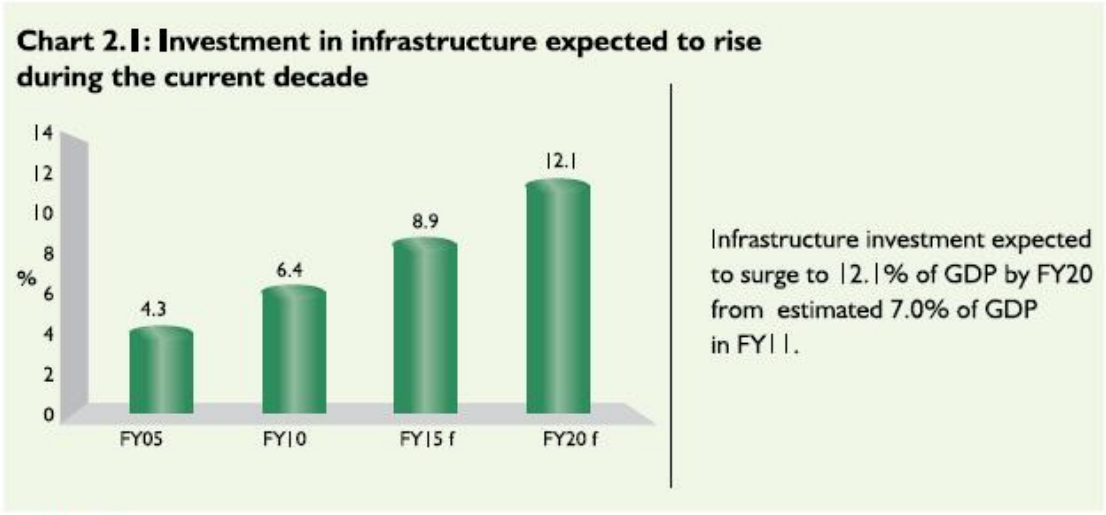
Indian economy is being considered as the fastest growing economies in the world. The government of India places a high value on improving the country's infrastructure. The success of transportation and logistics relies heavily on the quality of the infrastructure. Even while we expect these three elements will play a key role in the country's economic storey (2011-20), here we are only focusing on the physical (infrastructure) growth of the country. It is a joint effort by the government and the business sector to strengthen this sector.

One of the most important variables for sustaining robust growth in the current decade is likely to be a steady rise in infrastructure (2011-2020). Investment in physical infrastructure will lead to job creation, lower costs of doing business, higher production efficiency, and a better standard of life, all of which are essential for any country's economic progress.

In the previous several years, the growth rate of the infrastructure sector in India's GDP has increased. The country's economy has benefited greatly as a result of this growth, which has come about for a variety of reasons. Infrastructure development was stymied after independence when it was placed solely under the control of the public sector. Real estate, construction, power, transportation and telecommunications expenditures were not enough to keep India from achieving very high growth rates. In 2002, India spent about 6% of its GDP, which amounted to $31 billion in U.S. dollars. After it was made available to 100 percent foreign direct investment, India's GDP's infrastructure sector saw a rise in growth (FDI). This was the rationale behind the country's increased investment on

its infrastructure. The Infrastructure sector grew by 9% when the Private sector was opened. The infrastructure sector grew at an 8.5% annual rate from 2006 to 2010.

Figure: 6 : Expected rise in Infrastructure investment



f: D&B forecasts
Source: Planning Commission, D&B India

The Golden Quadrilateral, a major infrastructure project in India, connects the four major cities of Mumbai, Delhi, Chennai, and Kolkata via improved road connectivity. A six-lane road with a length of 1,500 kilometres also connects 24 smart cities, two power plants six airports, two ports, and 23 industrial hubs. After its completion, it will be the most important infrastructure project in the world. The Delhi-Mumbai Industrial Corridor (DMC) is modelled after Japan's Tokyo-Osaka Industrial Corridor and runs from Delhi all the way to Maharashtra. In 2007, the UPA government abstracted it, and it was approved by the Cabinet in 2011.

This is the most comprehensive region where we have the greatest potential for receiving monetary inflows from abroad. The population of India has already surpassed 1.2 billion, and it is expected to continue to rise. We must upgrade our infrastructure in light of growing global trade and industrialization. According to the World Economic Forum's Global Competitiveness Report of 2011-2012, India's infrastructure was ranked as the 89th most competitive in the world. To

meet the needs of a massive population, the Indian government has estimated that it will need to spend $1 trillion on infrastructure over the next five years.

Construction is India's second-largest economic sector, and it's expanding at a rapid pace. The Indian government is aware of this and plans to invest more than $500 billion in India's infrastructure by 2012 as part of its eleventh Five Year Plan.

Incompetent ports in India are being put under a lot of pressure by global trade. Electricity and water networks are under increasing stress as a result of rapid industrialisation. Despite the fact that the railway is already overcrowded, there is still a considerable demand for freight capacity. Large Indian cities like Delhi, Mumbai, Kolkata, and Bengaluru all have infrastructural needs that must be addressed. It's predicted that by 2017 we'll have a population of 375 million people living in metropolitan areas. Investment in everything from Metro stations to clean water supply to electricity generation will be needed to keep up with urbanization's rapid pace. The Indian government has estimated US$1 trillion in infrastructure spending over the next five years as a result of this information. An elevated rail line in Mumbai and two ports complete the primacies. Also included are 6000 miles of new roads and three airports. Road flaring will cost $120 billion, according to government estimates from the Ministry of Road Transport.

180 additional airports are predicted to be needed by Indian Niti Ayog by 2020. In order to supplement coal and gas-fired power, it has also established a goal to boost wind, nuclear, and solar power.

India's economy and quality of life will benefit greatly from huge investments in infrastructure. Most of the funding for this industry came from government budgets and internal resources at public infrastructure corporations. Long-term investments with low credit risk are sought after by insurance and pension funds, which are the main sources of long-term financing. The required level of public investment cannot be increased due to current economic restrictions. The Indian economy continues to grow at an alarming rate, and substantial investment in infrastructure is still required to keep the country's economic success going. More fundamental forms of infrastructure like energy, transportation, and water are

critical to a country's ability to absorb new technologies and reap the benefits of its businesses. Because infrastructure like roads, railroads, ports, and airports are nearing or have reached their maximum capacity in some places, further growth will necessitate their expansion.

This is a priority for the Indian Government. In the Eleventh Five Year Plan, India's infrastructure is expected to receive more than $500 billion in investment by 2012. The Engineering & Construction sector is one of the key beneficiaries of the infrastructure boom in India, with a large part of the proposed investments in construction projects.

The funding of infrastructure is a laborious and time-consuming process. It takes an enormous amount of money to execute any job. Infrastructure financing necessitates an understanding of where significant sums of money may be obtained for a lengthy period of time.

2.1.1 Projected Investment in Infrastructure during the Twelfth Five Year Plan

Table No. 1: Projected Investment in Infrastructure

Note: WPI inflation used to convert to current prices; FY12 inflation based on Prime Minister Economic Advisory Council (PMEAC) projection

Year	FY13	FY14	FY15	FY16	FY17	Total Twelfth Plan
GDP at FY07 Prices (INR Billion)	68,825	75,019	81,771	89,131	97,152	411,900
Infrastructure Investment as % of GDP	9.00%	9.50%	9.90%	10.30%	10.70%	9.95%
Infrastructure Investment (INR Billion in current prices)	8,885	10,734	12,803	15,245	18,125	65,794

Source: Mid-Term Appraisal Twelfth Five Year Plan, Planning Commission

Table No. 2: Sector-wise Investment Pattern: Eleventh and Twelfth Plan (INR Billion at current prices)

(2007-12)	Eleventh Plan		Twelfth Plan (2012-17)		Private Sector Participation Ratio	
Sectors	**INR Billion**	**As % GDP**	**INR Billion**	**As % GDP**	**Eleventh Plan**	**Twelfth Plan**
A. Energy (1 to 3)	8,802	2.6%	23,242	2.9%	56%	61%
1.Electricity	7,285	2.2%	17,724	2.2%	43%	48%
2.Renewable Energy	892	0.3%	3,760	0.5%	88%	88%
3.Oil & Gas Pipelines	625	0.2%	1,757	0.2%	37%	48%
B. Transport & Storage (4 to 9)	7,948	2.4%	22,446	2.8%	40%	56%
4.Raiways	2,012	0.6%	6,128	0.8%	5%	19%
5. MRTS	417	0.1%	1,466	0.2%	13%	42%
6.Ports	445	0.1%	2,335	0.3%	82%	87%
7.Airports	363	0.1%	1,035	0.1%	64%	80%
8.Roads & Bridges	4,531	1.3%	10,793	1.3%	20%	33%
9.Storage	179	0.1%	689	0.1%	55%	72%
10.Telecommunication	3,850	1.1%	11,140	1.4%	78%	92%
11. Irrigation	2,435	0.7%	5,953	0.8%	0%	0%
12. Water Supply & Sanitation	1,208	0.4%	3,013	0.4%	0%	3%
12. Grand Total (1 to 12)	**24,243**	**7.2%**	**65,795**	**8.2%**	**37%**	**48%**

Source: Planning Commission.

2.1.2 Infrastructure's financing needs

For the foreseeable future, infrastructure will require enormous sums of money. Construction is India's second-largest economic sector, and it's expanding at a rapid pace. Because of this, the Indian government has said that by 2012, it plans to invest more than $500 billion in India's infrastructure as part of its eleventh Five Year Plan.

2.1.3 Different sources of Infrastructure financing

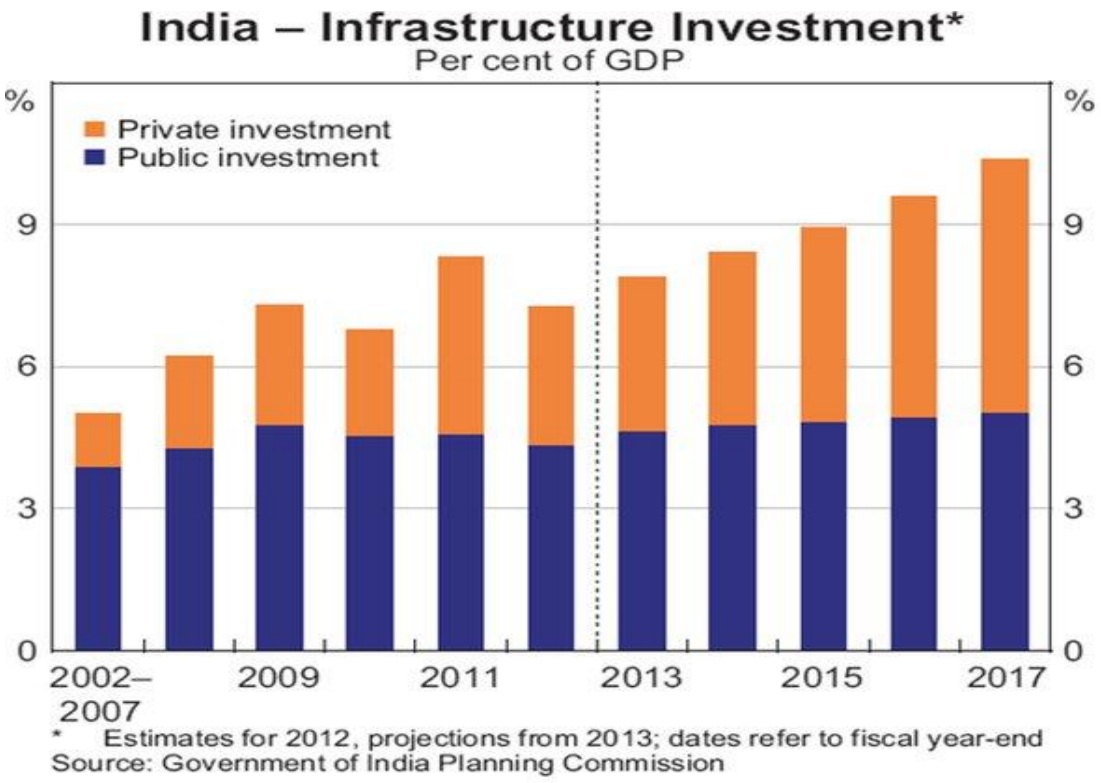
Public and private funding are the two most common avenues for funding infrastructure projects. Infrastructure projects have received substantial financial support from the federal government. There has been a lot of interest in private sector involvement in infrastructure projects. Public-private partnerships, equity and debt financing, foreign direct investment (FDI), and dedicated intermediaries are just a few of the innovative ways governments are receiving their funds.

2.1.3.1 Public-Private-Partnership

Initially, public budget allocation was used to fund infrastructure projects. Infrastructure development could not be completed because of a shift in economic patterns. PPP approach was used to close the gap between the private and public sectors. According to the definition of the term ‘‘public-private partnership,’‘ it is an agreement between the public and private sectors for the construction or management of infrastructure for the provision of public services over a predetermined time period on terms that are mutually beneficial to both parties.

As a result of the government's efforts, the private sector has been able to enter the market. Only 2.7% of GDP is currently invested in private infrastructure, the majority of which goes to new greenfield telecommunications and energy projects, with the vast majority of concessions going to transportation.

Figure 7: Public and Private Investment in Infrastructure



Through 2012, private infrastructure investment is expected to account for 2.8% of GDP, according to the eleventh five-year plan. Following the availability of private money, this sector's engagement will provide the government with these additional benefits:

1. A key benefit of PPPs is that they distribute risk to the party that is most equipped to handle it. Risks associated with project design and construction have traditionally been borne by the public sector; however, because these risks are now being moved to the private sector, governments can be better protected.
2. 2. PPPs expedite the completion of a project. In order to prevent inflationary costs, maintain project affordability, and speed up revenue, the private sector is motivated to expedite project delivery. The contract's conditions have changed as a result of the early completion incentive and the inclusion of construction duration in the concession period.
3. PPPs have the potential to bring novel methods to public infrastructure delivery because of the unique motivations and skills of the public and

private sectors, as well as the competitive bidding process for contracts. Using PPPs, the private sector can take advantage of more flexible funding, construction, development, operation, and maintenance methods.

4. As a result, PPPs projects are more likely to be completed on time and on budget. As soon as feasible, the private sector is eager to complete the project in order to keep expenses under control, so that the cash flow can begin.
5. Using PPPs, technology and training may be distributed more efficiently. These can attract foreign professionals and organisations that can be a material for the transmission and sharing of technology.
6. As a result, PPPs can provide access to foreign financial markets and serve as a replacement for the local capital markets. Foreign investment in PPPs is weak at best. Having access to the world's banking and capital markets as well as fostering a favourable national investment climate will be made possible as a result.

Local financial institutions must raise a major share of private financing for PPP projects since they lack the skills and instruments needed to provide long-term debt for projects (long payback period). A long gestation time is required for infrastructure projects, which necessitates long-term finance. PPP ventures must now deal with the issue of justified financing due to a scarcity of long-term loans accessible on the domestic market.

2.1.3.2 Debt Financing

A movement in the corporate bond market is necessary for movement in the infrastructure debt market, which is inextricably linked to it. While long-term investments from pension and insurance funds are necessary for bond financing of infrastructure, financial intermediaries with the necessary depth, negotiation skills, and construction expertise are also needed for PPP projects.

Infrastructure development was boosted by the engagement of commercial banks in supporting private investment. These banks are using non-banking financial companies (NBFCs) to invest in infrastructure (NBFCs). In the first year (2007-2008), there was a lot of growth, but a speedy expansion of these NBFCs may not

be justifiable because it increases the concentration of risks on bank balance sheets.

The short-term nature of bank liabilities increases these risks. With a growing proportion of long-term assets, short-term liabilities are becoming more likely to fund long-term assets. These specialised NBFCs have evolved to be a substantial source of infrastructure funding in the absence of alternative comprehensive funding sources, but their expansion is limited by their capacity to access bank financing. Bank lending to NBFCs in 2007 was adequately covered by prudential limits on bank lending. Banks are finding it more and more difficult to take on new borrowers since their projects are so large in comparison to their available capital. Fewer than a dozen Indian banks, all owned by the government, had equity in excess of $1 billion in 2007.

2.1.3.3 Pension and Insurance Funds

Despite the rapid expansion in insurance penetration in our country, insurance firms and pension funds are still a very minor source of funding for infrastructure, despite their long-term commitments. Because of this:

1. Even though it has increased from 1.9% in 2000 to 4.4%, insurance's percentage of GDP is still low in comparison to the 9.9% share in the US and Europe as well as Japan's 10.7 percent part of GDP..
2. Credit rating and seven-year dividend payment record are both required for debt instruments to meet this standard. As a result of their hasty conception and low credit rating, private infrastructure projects are currently in a precarious position.
3. As a result of their mandated minimum investment requirements for infrastructure and social sector investments, insurance companies spend more than required in government securities and invest primarily in the instruments of publicly listed infrastructure businesses rather than directly supporting infrastructure projects.
4. There has been a lack of investment in infrastructure because of the unit-linked nature of the plans sold by the private sector. Pension and provident funds, with the exception of LIC insurance companies, rarely invest in paper with a maturity of more than five to seven years.

Improving India's investment criterion was made official by the Insurance Regulatory and Development Authority of India (IRDAI) in August 2008. (IRDA). Even though these guidelines have expanded the definition of infrastructure and linked it to the RBI's definition (proposed in the Parekh committee), they have not relaxed the conditions sufficiently to allow insurers to theoretically hold a wide range of infrastructure projects in their investment portfolios. They. Find out more.

An asset-backed security backed by infrastructure assets and corporate debt with a minimum credit rating is a sanctioned investment option. Conventional infrastructure projects without recourse are given BBB ratings, whereas this one is given an AA. A minimum of 75% of an insurance company's debt instruments must be AAA-rated.

2.1.3.4 Equity Financing

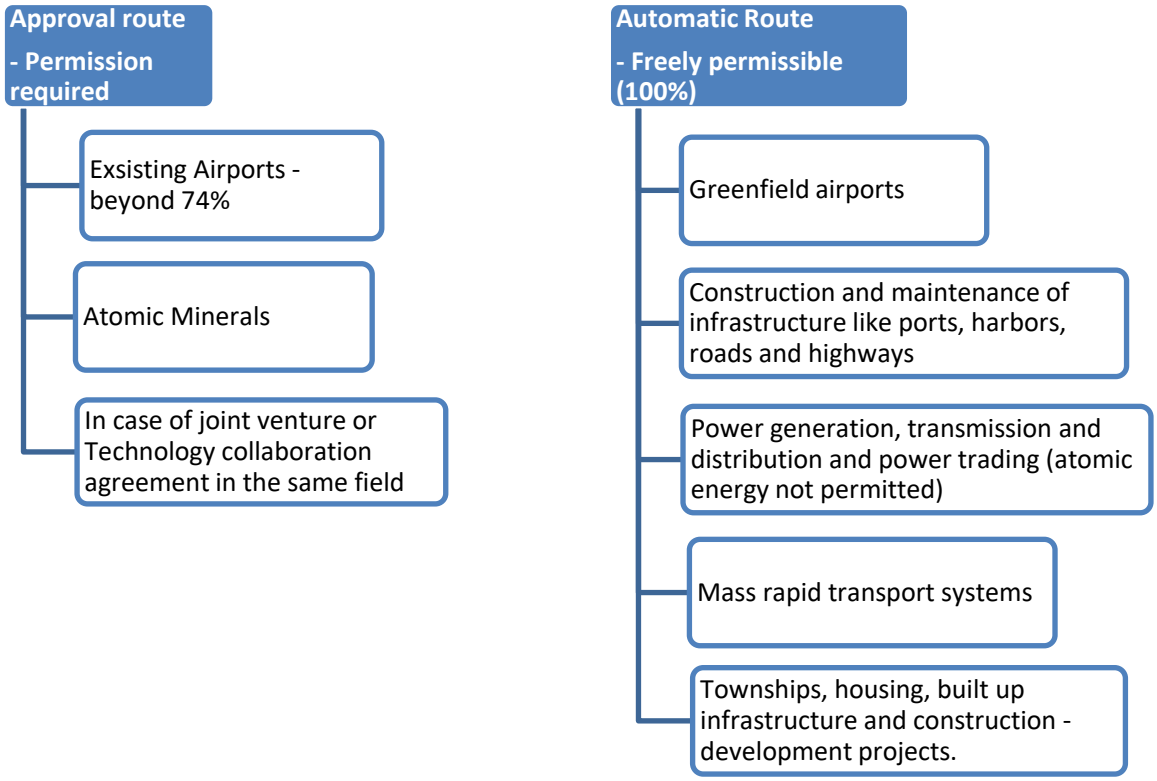
Infrastructure businesses have raised a significant amount of money through IPOs in recent years due to the booming secondary market. For each project, developers have a limited quantity of money and must hold on to it for a long time. Investors have showed a significant interest in equities in recent years. The number of private equity (PE) infrastructure projects in India was tracked. Financial investors who want more flexibility in their exit alternatives may be put off by strict rules for stock sell-downs. Unlike listed assets, sales of unlisted projects face the full weight of the capital gains tax. A major deterrent for equity investors is the fact that the vast majority of infrastructure projects are not publicly traded.

Expiry payments for government agency defaults are widely recognised by equity investors as being insufficient in many business agreements. When lenders get paid back while equity investors don't, it stimulates more borrowing. In order to grow the private equity industry in the country, there is a very small pool of investors to draw from. Private equity (PE) businesses around the world rely on a mix of institutional investors, including insurance companies and pension funds, as well as wealthy people (HNIs). Insurance and pension funds in India have a long way to go when it comes to participating in hedge funds and private equity..

2.1.3.5 Foreign direct investment (FDI)

Foreign and domestic investors are encouraged to invest in Indian infrastructure through the government's programmes. According to the UNCTAD's 2007 World Investment Report, India was the world's second-most attractive location for foreign direct investment (FDI). FDI into India currently amounts to only approximately $21 billion per year, a far cry from the $30 billion that the country hopes to attract. The government has implemented considerable policy adjustments in order to promote FDI inflows. For example, a wide range of industries can now accept 100 percent FDI via the automated approach. There are only a few pieces of information that must be provided. It can take up to six to eight weeks to secure FDI approval in some industries.

Figure 8: FDI Route in India



Source: rbi.org.in

Several new bodies have been established by the Indian government to expedite the approval process for foreign direct investment (FDI). With its US$ 4 billion global infrastructure fund set to invest a quarter of it in emerging markets, including India and China, Morgan Stanley is expected to face competition from

Macquarie (Australia), JPMorgan, Glodman Sachs (Germany), and Deutsche Bank. Some planned investments may be focused or delayed due to the present credit market climate, but India is still expected to receive large FDI. For example, if its economy is strong enough to keep growing throughout the global slump.

In order to boost the construction industry, the government has eased restrictions on the purchase of fixed property in India by foreign nationals and citizens, subject to specific procedures and requirements.

India has a well-developed legal system, yet this can be a problem for foreign nationals. India, like many other countries, lacks a central authority that sets the policy for all infrastructure development. Concession agreements for various types of infrastructure aren't uniform. With the lack of appropriate and coordinated planning, some areas of India's economy may be at risk.

For local businesses, these lucrative projects represent both a danger and a potential opportunity. There is a perception that international corporations have greater technological and financial resources and a wider range of experience than domestic ones.

2.1.3.6 India Infrastructure Finance Company Ltd. (IIFCL)

IIFCL was established in 2006 by the government. With their asset-liability mismatch, commercial banks could not provide long-term funding for infrastructure projects. A guarantee from an independent party allows IIFCL to raise financing both domestically and internationally. Because of this, the cost of borrowing was maintained to an absolute minimum. These loans were excluded from both net worth and equity criteria since they were backed by an independent guarantee. As with the World Bank, which has no true shareholders' callable capital, this arrangement is akin to the World Bank's market borrowings.

Long-term loans are the primary focus of IIFCL, just as they are at banks. As of March 2013, there were 18921 crores in total outstanding loans, of which 16351 crores were in direct lending, according to the information available at that time (almost 88 percent). Most of the loans were given to IIFCL's Lead Bank based on their evaluation of the situation.

IIFCL's Credit Enhancement project was launched with a pilot transaction with the help of ADB (Asian Development Bank in 2012). IIFCL will provide a fractional credit guarantee to infrastructure corporations in order to raise the ratings of their project bonds. Pension funds and insurance firms expect infrastructure project bonds to become more appealing investment options as a result of this credit upgrade. There must be at least two years of commercial operation for the projects under the loan to have a separate BBB+ bond rating without credit enhancement. The money earned in this way will be utilised to pay off bank loans ahead of time.

An essential part of IIFCL lending is extending the average maturity of project debt and encouraging commercial banks to embrace this model by providing a longer term of tenure. therefore becoming a significant tool for lengthening the debt duration on infrastructure projects and making them more financially viable as well as bankable.''

2.2 Different sectors of Infrastructure Theme

Defining the infrastructure sector is a difficult task. However, we utilise the Planning Commission of India's definition as a guide to determine whether or not a specific is associated with the sector. The following sectors are designated infrastructure by the Indian government's Planning Commission.;

- Electricity
- Renewable Energy
- Roads and Bridges
- Telecommunications
- Railways
- MRTS
- Irrigation (Including watersheds)
- Water supply and sanitation
- Ports (Including ILW)
- Airports
- Storage
- Oil and Gas pipeline

2.2.1 Power Sector in India

Economic prosperity and the welfare of the nation are critical factors. Renewable Energy Country Attractiveness by EY ranks India 3rd out of 40 countries. Non-conventional sources of power generation include wind, solar, agricultural waste, and home garbage. As India's demand for energy grows, so does the level of competition on both sides of the market and the supply chain (fuel, logistics, finances and manpower) As of February 2017, India's installed generation capacity was 315,426.32 megawatts (MW).

A 50 BU increase above the 2016-17 target has been established by the power ministry for 1,229.4 billion units of energy in 2017-2018. Then, the yearly growth rate in renewable energy generation is predicted to be 27%, and the conventional energy growth rate is 18%.

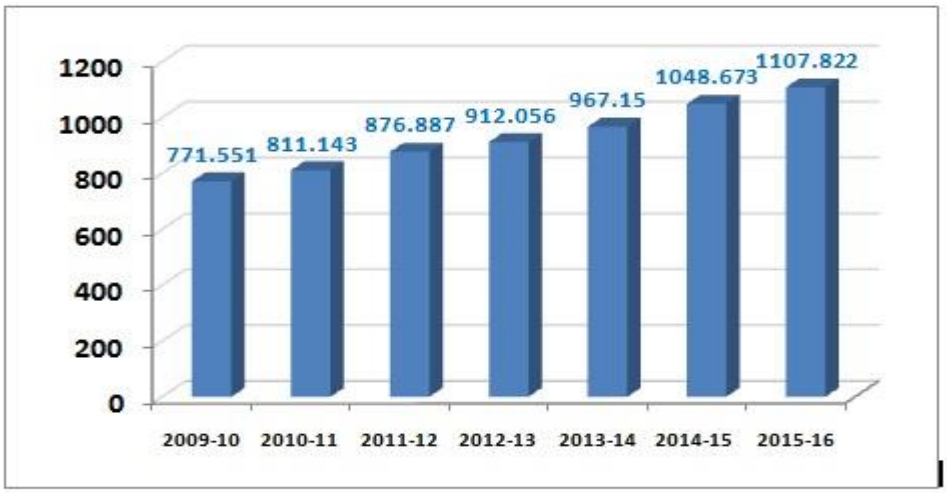
Table No. 3: Power Supply Position

Total Generation and growth over previous year in the country during 2009-10 to 2021-22 :-

Year	Total Generation (Including Renewable Sources) (BU)	% of growth
2009-10	808.498	7.56
2010-11	850.387	5.59
2011-12	928.113	9.14
2012-13	969.506	4.46
2013-14	1,020.200	5.23
2014-15	1,110.392	8.84
2015-16	1,173.603	5.69
2016-17	1,241.689	5.80
2017-18	1,308.146	5.35
2018-19	1,376.095	5.19
2019-20	1,389.102	0.95
2020-21	1,381.827	-2.49
2021-22 *	994.292	10.18

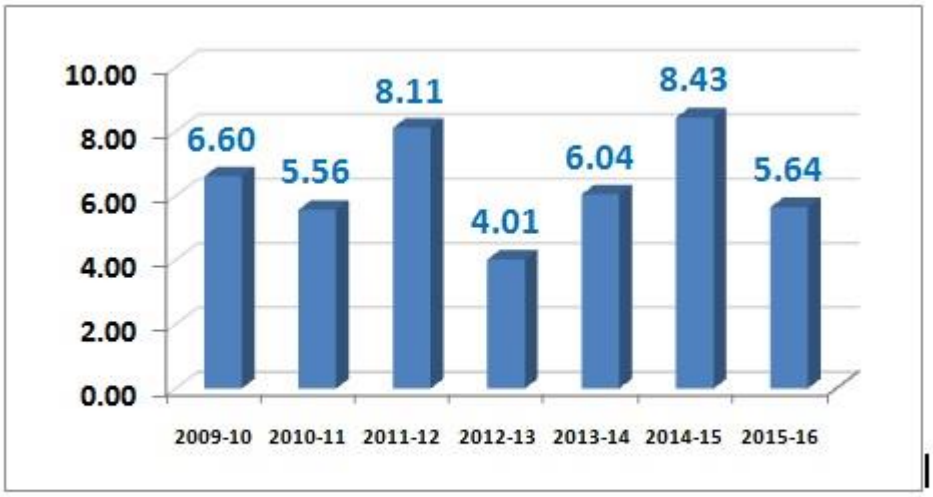
* Upto November 2021 (Provisional), Source : CEA (Central Electricity Authority)

Figure 9: Generation (Billion Units)



Source: CEA (Central Energy Authority)

Figure 10: Power Generation Growth (%)



Source: CEA (Central Electricity Authority)

2.2.1.1 Investment scenario

The Indian power sector attracted US$ 11.4 billion through FDIs from April 2000 – December 2016. Some major investments in Indian power sector are as follows:

- ReNew Power Ventures Pvt. Ltd.'s 10 percent share in the company, worth US$200 million, has been acquired by Japan's JERA Co.

- The Indian Railways has suggested a Rs. 8000 Crore (US$ 1.2 billion) country-wide electrical transmission network.
- To extend its 709 MW capacity across multiple Indian states, ReNew Power announced that it had secured US$ 390 million in loan financing from the Asian Development Bank.
- International Finance Corporation (IFC) and IFC Global Infrastructure Fund have announced a US$125 million equity investment in Hero Future Energies to assist the establishment of 1 GW of wind power stations and Greenfield solar energy.
- For the development of coal blocks in Orrisa, NTPC plans to invest US$ 397 million (Rs. 2648 crore).
- A total of US$126 million (Rs. 840 crore) would be invested by the International Finance Corporation (IFC) in Hero Future Energies for the building of solar and wind projects.
- Bloom Energy Corporation, a California-based company, is working with GAIL India to build natural gas-based fule cell power generation, which will result in low capital and soft infrastructure.
- US$ 630 million (Rs. 4200 crore) credit facility for financing grid-connected rooftop photovoltaic (GRPF) projects has been inked between SBI and the World Bank.
- A 45-million-dollar loan from Germany's KfW Development Bank, the ministry of New and Renewable Energy (Rs. 300 crore). Maharashtra and Kerela's floating solar projects are planned to produce 310MW.
- SE solara was established by Suzlon Group as a special purpose vehicle to generate 100 MW of solar energy in Telangana. CLP India, one of India's major foreign investors, purchased a 49 percent interest in SE for $11.12 million (Rs. 73.5 Crore).
- Integrated bio energy of US$ 1.5 billion (Rs. 10000 crore) will be launched from FY 2017-18 to 2021-22 by MNRE.
- For the Indian renewable energy sector, CDPQ has agreed to invest US$ 150 million in Canada's second largest pension fund.
- At a cost of $3 billion, Sembcorp Industries has begun construction in Nellore on a 2640 MW power plant.

Power generation has increased significantly as a result of the government's large investments and the assistance of FDIs. For fiscal year 2016, India's electricity production was 1107.8 BU, an increase of 5.64 percent over the previous fiscal year. The production increased at a CAGR of 6.21% from FY 2010 to FY 2016.

India produced 584.22 BU of power between April and September of this year. According to the 12th five-year plan, total domestic oil output will reach 669.6 MTOE million tones of oil equivalent by 2016-17 and 844 MTOE by 2021-2022..

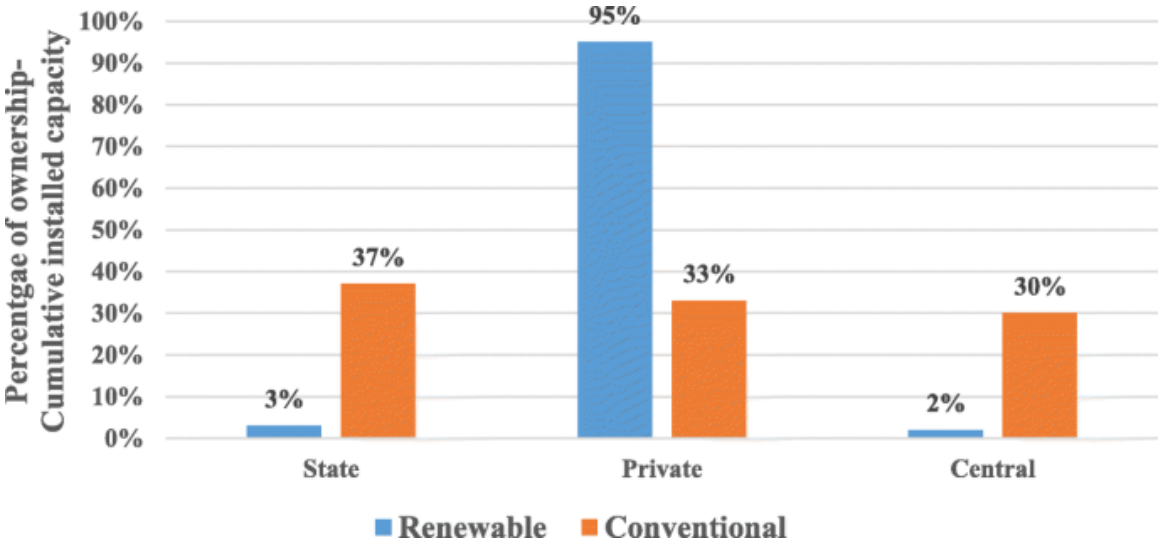
Table No. 4: Programme, actual achievement and growth in electricity generation in the country during 2009-10 to 2016-17 :-

Year	Energy Generation from Conventional Sources (BU)	% of growth
2009-10	771.551	6.6
2010-11	811.143	5.56
2011-12	876.887	8.11
2012-13	912.056	4.01
2013-14	967.150	6.04
2014-15	1048.673	8.43
2015-16	1107.822	5.64
2016-17*	1159.836	4.70

* Provisional (Upto March, 2017)

Source: http://powermin.nic.in/en/content/power-sector-glance-all-india

Figure 11: Gross renewable energy installed capacity (percentage)— Ownership wise as per the 31.12.2018



Source: https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0232-1

2.2.2 Roads and Bridges

With a total length of 4.7 million kilometres, India's road system ranks second worldwide. More than 60 percent of the country's goods and 85 percent of the country's total passenger traffic are moved by this road network.. As the country's cities, towns, and villages have become more interconnected, the number of people travelling by car has risen consistently over time.

Indian roads convey more than 60% of the country's total commodities and 85% of the country's total passenger traffic. The number of cars sold and the amount of freight transported by road in India is rapidly increasing. The Government of India has set aside 20% of the US$ 1 trillion investment for infrastructure in the 12th Five-Year Plan (2012–17) to expand the country's roadways, in light of the increased traffic and transportation of products..

2.2.2.1 Market size

The CAGR (compound annual growth rate) for India's road and bridge infrastructure is predicted to be 17.4% from FY12 to FY17. US$ 6.9 billion in

road and bridge infrastructure was valued in 2009, and it is expected to rise to US$ 19.2 billion by 2017 as a result of increased investment. The construction of roadways hit an all-time high of 6029 kilometres in the fiscal year 2015-16, and the increased rate of construction is likely to continue for the foreseeable future.

There was an average of 73 kilometres of road built per day under the Pradhan Mantri Gram Sadak Yojana (PMGSY), which was enhanced to 133 kilometres per day in 2016-17 under the PMGSY.

2.2.2.2 Key Investments/Developments

Corporate participation in the maritime and road sectors is being encouraged as well as familiarised with business-friendly practises that will ensure project completion while maximising profitability.

In Indian Road sector following are the key investments and developments:

- Abertis Infrastructures SA, a Spanish infrastructure business, has paid Rs 1,000 crore (US$ 150 million) to acquire two toll road assets in South India.
- National Green Highways (NGHM) programme ‘‘Adopt a Green Highways’‘ has received $1.94 million in financial assistance from Power Finance Corporation Limited (PFC) (PFC).
- According to a memorandum of understanding inked by IIT Kharagpur and NHAI, the two institutions will work together to create technologies to build India's first ever maintenance-free highways.
- A three-year investment goal of Rs 25 trillion (US$ 372.8 billion) has been set by Road Transport and Highways and Shipping Minister Nitin Gadkari, including the creation of 27 industrial clusters costing Rs 8 trillion (US$ 119.3 billion) and an additional Rs 5 trillion (US74.56 billion) for rail, road, and port connectivity projects.
- It's estimated that NHAI chairman Raghav Chandra will spend $250 billion over the next five or six years on 240 road projects totaling 50,000 miles (80,000 kilometres).

- It has been agreed that satellite data will be used to monitor and manage Indian highways by NECTAR, the Indian Space Research Organization (ISRO), the National Remote Sensing Centre (NRSC) and others.
- The government plans to award PPP contracts for 100 highway projects in 2016 as a result of recent regulatory changes and is counting on enhanced investor confidence in highway PPP projects. •
- According to estimates, the Bharat Mala Pariyojana programme will cost Rs 80,000 crore to build 7,000 kilometres of national highways, following consultations with state governments. The NHAI has begun requesting bids for the compilation of detailed project reports for the construction of highways that traverse borders and beaches (DPRs). It all falls under the umbrella of the Bharat Mala project.
- After two years, the Cabinet Committee on Economic Affairs (CCEA) has allowed private developers to sell their entire stake in all BOT projects, regardless of the year in which the project was awarded.
- According to a DBFOT agreement signed by the Indian government, the construction of approximately 1,000 kilometres of expressways will cost Rs 16.68 billion.
- Bengaluru to Chennai (334 kilometres), New Delhi to Jaipur (261 kilometres), Delhi to Chandigarh (249 kilometres), and Vadodara to Mumbai (240 kilometres) are among the four routes that have been given the green light (400 km). This includes the $5,763 million Eastern Peripheral Expressway, a 135-mile-long motorway that will be built by the government.

2.2.2.3 Government Initiatives

More than 6,000 miles of national highway construction had been completed by the end of February 2017, according to the Minister for Road, Transportation, and Highways.

The Indian government allocated Rs 64,000 crore (US$ 9.55 billion) to the National Highways Authority of India (NHAI) for road and highway construction, and Rs 27000 crore (US$ 4.03 billion) to the Pradhanmantri Gram Sadak Yojna (PMGSY) for rural development.

Following are some recent developments:-

- A total of Rs 3.17 trillion (US$ 47.55 billion) has been invested by the Road Transport & Highways Ministry in the last two-and-half years, while a total of Rs 80,000 crore (US$ 12.0 billion) has been invested by the Shipping Ministry.
- For overseas investors, the NHAI plans to offer a risk insurance policy. Investors that are willing to put their money into operating national roadways owned by the government.
- There are 75 publicly funded highway projects worth Rs 35,600 crore (US$ 5.34 billion) that can be monetized using the toll-operate transfer (TOT) system, which will collect enough money to finance 2,700 kilometres of road building.
- The Indian government plans to build 35,000 kilometres of roads worth $3 trillion (US$44.73 billion) across the country, including 21,000 kilometres of economic corridors and 14,000 kilometres of feeder routes, which will improve freight movement, ease traffic congestion, and improve inter-city connectivity.
- 16 highway projects totaling Rs 7,456 crore (US$ 1.11 billion) for 11 states have been approved by the Government of India's board, which includes the construction of new roads, flared and extended roadways, and the restoration and development of other projects.
- PPP contracts will be introduced by the Indian government, which will allow re-negotiations on specific sector issues, particularly for national highways and ports, and provide greater flexibility to the parties involved. — The government of India
- For highway projects, NHAI transferred authority to its Regional Officers (RO). By contracting workers and equipment to demolish structures that are part of the project, NHAI will be able to release impediment-free land to construction companies more quickly.
- State governments will be required to establish Land Acquisition (LA) cells across the country in order to deal with issues arising from land acquisition and ensure fast payment of compensation to landowners.

- By building five more Greenfield expressways, the Ministry of Road Transport and Highways estimates that travel times will be reduced and economic growth will be boosted.
- Road Transport and Highways Minister Nitin Gadkari stated that the government has accelerated highway development and expects infrastructure investments to contribute more than 2% of GDP in the next two years and create five million jobs.
- Highway projects in India are expected to be resurrected after CCEA approved a new hybrid annuity model for executing highway projects, which allocates risks between the government and private developer more clearly.
- India and Japan are proposing to form an infrastructure financing firm with a credit objective of Rs 2 lakh crore (US$ 30 billion) for Indian road projects.
- The Ministry of Roads and Highways is working on two additional strategies for pulling money to restore private involvement in road development. The first model involves bidding for a road project based on the lowest present value, whereas the second model envisions the sale of roads built with public funding.
- • The Indian government intends to form a joint venture with Japanese investors for a Rs 1 trillion (US$ 15 billion) financial corporation that will be used to fund infrastructure projects in India.

Table No. 5: Status of National Highways

STATUS OF NATIONAL HIGHWAYS

NHDP component Total	Total length (km)	Completed length (km) as on Dec 31, 2015	In progress (km)	Estimated cost (₹crore)
GQ under NHDP Phase I	5,846	5,846	0	30,300
NS-EW Corridors under Phase I & II)	7,142	6,422	463	(NHDP Phase I) + 34,339 (NHDP Phase II) =64,639
Port Connectivity under NHAI	431	379	52	
Other NHs with NHAI	1,844	1,578	266	
NHDP Phase III	12,608	6,734	3,402	80,626
NHDP Phase IV	20,000	2,877	7,483	27,800
NHDP Phase V	6,500	2,319	1,356	41,210
NHDP Phase VI	1,000	0	0	16,680
NHDP Phase VII	700	22	19	16,680
Sub Total (NHDP)	56,071	26,177	13,041	2,47,635

Source: Ministry of Road, Transport and Highway.

Source: *Media Reports, Press Releases, Ministry of Road Transport and Highways, NHAI website, Press Information Bureau (PIB),Union Budget 2017-18*

2.2.3 Telecommunications

As of May 2015, India is the second-largest telecommunications market in the world, with more than a billion members. The wireless industry dominates the market (97.36 per cent of total telephone subscriptions). It's also expanding quickly. Wireless subscribers grew at a CAGR of 24.78 percent between FY07 and FY15, reaching 969.8 million.. In terms of internet customers, India is the second-largest country in the world. There will be more than a billion mobile phone subscribers in the United States by 2020, making it the second largest smartphone market worldwide after only China.

In India's telecommunications market, non-voice revenue and more presence in rural areas are likely to drive future growth. By 2017, 70% of the rural market is expected to be covered by telecommunications. As the country's middle class grows, so does demand for mobile and internet services. For the growth of this industry, government support has been critical. In the telecom sector, foreign direct investment (FDI) has been boosted from 74% to 100%.

The telephone, internet, and television broadcasting sectors are some of the most important segments of the country's telecommunications business. Fiber-optics or microwave radio relay networks are being used to upgrade to a new generation of phone systems, including digital telephone exchanges and mobile switching centres, as well as media gateways and additional signalling gateways.

In India, the emergence of a privately owned FM radio station has given Indian radio a significant boost. India's INSAT system, one of the largest domestic satellite networks in the world, supports telecom services. Telephone, Internet, radio, television, and satellite all exist in India, as do many more forms of communication.

Indian telecom has undergone substantial market liberalisation and expansion since the early 1900s, making it one of the world's most competitive and fastest growing telecom sectors today. Over the course of a decade, the industry has risen from fewer than 37 million subscribers in 2001 to more than 846 million in 2011. With around 929.37 million mobile phone subscribers as of May 2012, India is the world's second-largest mobile phone market. And as of 2015, India has over 300 million Internet users, making it the second-largest Internet user base in the world.

Rural-urban digital divides have been bridged thanks to telecoms, which has also aided India's socioeconomic development. E-government in India has also contributed to improved governance transparency. For the sake of India's rural population, the government has harnessed modern telecommunications to conduct mass education programmes.

2.2.3.1 Investments

Compared to 2004–2005, telecom service sector income totalled 867.2 billion (US$12.9 billion) in 2005–2006, an increase of 21%, and is expected to reach 8.35 billion (US$120 million) in fiscal year 2011. To put it another way, the telecom services sector had an increase in investment of 2 billion yen ($29.8 billion) in 2005–06, compared to the previous year's 1 billion yen ($26.6 billion). The fast-growing IT industry relies on telecommunications for its survival. More than a billion individuals throughout the world have access to the Internet. The

Bharat Nirman yojna is an initiative by the Indian government to connect the country's remaining 66,822 revenue villages that do not yet have access to a Village Public Telephone (VPT). When comparing the number of Public Call Offices as of December 2005 to that of December 2004, it is clear that there is a great deal of opportunity for employment in the telecommunications sector.

The overall income of Indian telecom service providers is anticipated to exceed 2,000 billion (US$30 billion) in FY 11–12, based on FY 10–11 and the latest quarterly statistics. Bharti Airtel's international operations are included in these totals. The following are the primary sources of support for this revenue::

Airtel ₹65,060 (US$970)

Reliance Communications ₹31,468 (US$470)

Idea ₹16,936 (US$250)

Tata Communications ₹11,931 (US$180)

MTNL ₹4,380 (US$65)

TTML ₹2,248 (US$33)

BSNL ₹32,045 (US$480)

Vodafone India ₹18,376 (US$270)

Tata Teleservices ₹9,200 (US$140)

Aircel ₹7,968 (US$120)

SSTL ₹600 (US$8.90)

Uninor ₹660 (US$9.80)

Loop ₹560 (US$8.30)

Stel ₹60 (89¢ US)

HFCL ₹204 (US$3.00)

Videocon Telecom ₹254 (US$3.80)

DB Etisalat/ Allianz ₹47 (70¢ US)

Grand Total ₹2,019 billion (US$30 billion)

2.2.4 Railways

Currently, the largest rail system in the world is operated by the Indian Railways. The 108,706-kilometer network, which includes 6,853 stations, allows 11,000 trains to run each day. The Indian railway system is known for being one of the largest in the world to be run by a single company.

The railroad system is a cost-effective and environmentally friendly source of transportation. Long-distance travel and the transportation of large goods are also ideal uses for this type of vehicle. The Indian government is enacting laws that encourage private investment in railway infrastructure. Foreign Direct Investment (FDI) in railways has been promptly approved by the government to expand freight and high-speed train infrastructure. As a result, numerous domestic and international firms are considering investing in Indian railway projects..

2.2.4.1 Market size

The revenue generated by the Railways was expecting to grow at 10 per cent in the next fiscal year 2017-18 and 2018-19. But it has been dropped down by 30% in 2019-20. The Union Budget 2017-18 estimated that the overall earnings will rise to Rs 189,498.37 crore, compared to Rs 172,305 crore in the year 2016-17.

2.2.4.2 Investments/Developments

Foreign Direct Investment (FDI) inflows into Railways related components from April 2000 to December 2016 were US$ 789.03 million. And in 2019 it stood over 1.1 Billon.

Following are some of the major investments and developments in country's railways sector:

- At Steel Authority of India's (SAIL's) Bhilai Steel Plant, a Universal Rail Mill was inaugurated by Mr Birender Singh, Union Minister of Steel, which was worth Rs 1,200 crore (US$ 180 million).It will produce world's longest single rail of 130 meters.
- For its own investments, the Indian Railways intends to establish a RIDF (Railways of India Development Fund) valued at $5 billion.

- As part of the Indian Railways' plan to lower electricity rates, the agency is aiming to award six tenders costing Rs 8,000 crores (US$ 1.2 billion) for a country-wide electrical transmission network..
- Road Transport and Highways and Shipping Minister Nitin Gadkari indicated that India and Germany may cooperate together on projects worth Rs 1 trillion ($15 billion), intending to boost railway connection of Indian ports and discover environmentally acceptable technologies for dealing with outdated vehicles..
- Mr Suresh Prabhu, Railway Minister of India, has unveiled Mission 41k initiative, aimed at saving Rs 41,000 crore (US$ 6.15 billion) on the Indian Railways' expenditure on energy consumption over the next 10 years by doubling the annual rate of electrification from 2,000 km to 4,000 km in the next two years.
- On top of intentions to bid on Metro rail contracts in Mumbai, Nagpur, Pune, Bengaluru and Chennai, Canadian business Bombardier Incorporation's rail equipment division Bombardier Transportation aims to expand a line in Delhi in order to double its revenue from India to US$1 billion by 2020.
- At 2,175 stations across India, the Indian Railways will install 100,000 large digital screens, which are estimated to produce Rs 11,770 crore in revenue (US$ 1.76 billion) by 2022.
- In the next eight years, the Indian government aims to invest roughly Rs 330,000 crore (US$ 49.5 billion) in the establishment of three new DFC arms that will traverse the length and breadth of the country.
- A total of Rs 10,736 crore (US$ 1.6 billion) has been approved by the Union Cabinet for five railway projects aimed at decongesting the current network by the doubling and tripling of existing lines.
- As part of a five-year plan, Indian Railways intends to implement the European Train Control System (ETCS), which is designed to prevent trains from colliding head-on, on 28 projects around the country.
- A Memorandum of Understanding (MoU) between Indian Railways and the Indian Space Research Organization (ISRO) has been signed in order to develop various applications and services, including warning systems

for road users, mapping railway assets using geospatial technology, and real-time train information systems.

- As of April 2017, Toshiba Corporation of Japan intends to open a manufacturing facility in Hyderabad to develop railway systems electrical equipment and power conversion systems, and to employ over 100 people by 2020.
- India's Cabinet Committee on Economic Affairs (CCEA) has approved the construction of six railway lines and a railway bridge totaling more than Rs 10,700 crore (US$ 1.6 billion) to accommodate the growing demand for transportation of passengers and freight across many parts of the country.
- Bhopal and Indore Metro rail projects in Madhya Pradesh have received a $1.8 billion loan from JICA, the Japan International Cooperation Agency.
- For a diesel locomotive factory project in Marhowra, Indian Railways has given a Letter of Award to US-based General Electric (GE) and to French transport company Alstom for a Rs 20,000 crore (US$ 3 billion) electric locomotive project at Madhepur. Both are in the state of Bihar.
- After receiving a 30 year loan from LIC, the Government of India plans to spend Rs 850,000 crore (US$ 127.5 billion) over the next five years to modernise Indian Railways. The government has approved the construction of a separate freight lane of Rs 82,000 crore (US$ 12.3 billion) to ease congestion on the existing network.
- Mr Suresh Prabhu, in his first Railway Budget, combined public welfare with private investment to encourage private sector participation in the railways. Public-private partnerships (PPPs) saw an increase in investment to Rs 5,781 crore ($867.15 million), although a number of initiatives aimed at increasing the railroads' efficiency were left out.
- The Indian Railways has struck a bilateral power procurement deal with the Damodar Valley Corporation in order to reduce energy expenses (DVC). Indian Railways will purchase 50 megawatts of power from DVC at the Auraiya Grid Sub-station through the Railways Energy Management Co. Ltd joint venture with RITES, an Indian Railways public sector subsidiary. Freight train speeds of up to 100 kmph have been approved by

the Ministry of Railways for the Eastern Dedicated Freight Corridor and Western Dedicated Freight Corridor..

2.2.4.3 Government Initiatives:

Mr Arun Jaitley, Finance Minister of India, announced the following reforms in the Railway sector in the Union Budget 2017-18.

- The Government will provide Rs 55,000 crore (US$ 8.25 billion) towards capital and development expenditure of Railways
- A fund named Rashtriya Rail Sanraksha Kosh worth Rs 100,000 crore (US$ 15 billion) will be created, which will be directed towards passenger safety
- All the coaches of the Indian Railways will be fitted with bio toilets by the year 2019
- Railway lines of 3,500 kms will be commissioned in 2017-18.

The other initiatives taken up by the Government are:

- The first phase of renovation for India's A1 and A1-category stations includes the commercial redevelopment of 23 out of the country's 400 stations.
- It is estimated that an initial expenditure of between Rs. 50,000 and 70,000 crore (US$ 7.4 and 10.4 billion) is needed to build a rail link that will connect the entire state of Arunachal Pradesh.
- In order to work together on rail safety issues, the Italian Ministry of Railways and the Ferrovie Dello Stato Italiane Group signed a memorandum of understanding (MoU).
- In each of the SMART Cities and AMRUT cities, a Memorandum of Understanding (MoU) has been signed between the Railway Ministry and the Ministry of Urban Development to support transit-oriented development while also redeveloping the city's railway stations.
- An agreement has been made between the Indian government and the World Bank to lend the EDFC-III project US$ 650 million, which involves the creation of institutional capacity for Dedicated Freight Corridor Corporation of India Ltd (DFCCIL).

- Income mobilisation and capital expenditures will now commence at the start of the fiscal year as a result.
- It is hoped that the Cabinet Committee on Economic Affairs' approval of nine projects, totaling Rs 24,374.86 crore ($3.6 billion), will reduce traffic congestion and give new businesses in the region with more transportation capacity.
- Wi-Fi is now available to all commuters at eight stations of the Mumbai suburban railway network, allowing them to access a high-speed Internet network.
- A Special Purpose Vehicle (SPV) between Haryana and the Ministry of Railways has been set up to focus on the development of rail infrastructure, according to Railways Minister Suresh Prabhu and the Government of India.
- The Indian Railways have developed a plan to install solar power plants on the roofs of railway facilities, which will help lessen the country's dependency on fossil fuels.
- According to an agreement, Japan's government and national railways would work with the Ministry of Railways to build high-speed rail corridors, speed up existing lines, construct world-class stations and run heavy haul trains in Japan and Russia.
- As part of the Railway Ministry's plan to increase passenger traffic, bar-coded tickets, GPS information systems inside coaches, IT integration of all ticketing facilities, Wi-Fi facilities at the stations, super-fast long-route train service for unreserved passengers, and other developments are all included. During an event hosted by the Indian Institute of Logistics, Mr Sreekumar said the government aims to restructure the Railway Board. Foreseeing that India's whole logistics industry will be revolutionised by construction of the East-West Freight Corridor, he said.
- It was announced that the Indian Rail Ministry would undergo ‘‘watershed development,’‘ including the use of remote sensing technology to boost safety, mobile phone reservations for rail travel, and wi-fi in train stations. Maharashtra State Government founded this SPV, the Maharashtra

Railway Infrastructure Development Company, to oversee the timely completion of several development projects.

- During delegation-level meetings, the governments of India and China signed a Memorandum of Understanding (MoU) and an Action Plan to enhance railway sector technical cooperation. Xi Jinping, the Chinese president, and Indian Prime Minister Narendra Modi were in attendance at the signing ceremony.
- The Indian government has allowed the automatic route to allow 100% FDI in railway infrastructure, except for operations, to be implemented. For FDI, this alternative does not involve government approval. Railway Board is considering the High Level Safety Review Committee's 106 recommendations on the implementation of a wide range of issues relating to general safety (e.g. employee empowerment and job vacancies), organisational structure, critical safety spares shortage, and human resource development with a strong educational and training focus; (Kakodkar Committee).
- The Union Cabinet has approved the construction of a new rail coach manufacturing facility in Kolar, Karnataka. The facility is expected to build 500 coaches a year at an estimated cost of Rs 1,460.92 crore (US$ 219.13 million). The Karnataka government would offer land free of charge, and the Ministry of Railways will cover the remaining 50% of the project's cost with escalation.

2.2.5 MRTS (Mass Rapid Transit System)

2.2.5.1 Rapid transit in India consists of bus, metro, monorail and light rail systems. The Kolkata Metro was India's first mass transit system, debuting in 1984. After the Kolkata Metro and the Chennai Mass Rapid Transit System (Chennai MRTS), the Delhi Metro was India's first modern metro and the country's third rapid transit system overall when it began operations in 2002. As of November 2013, the Rapid Metro Rail Gurgaon is India's first privately-owned and operated metro. As of 7 February 2014, the Mumbai Monorail is India's first monorail since the Patiala State Monorail Trainways were shut down in 1927.

Every city with a population of more than 20,000 people should have a metro rail system, according to the National Urban Transport Policy of 2006. (2 million). Indian cities with populations of more than one million would receive financial assistance from the federal government to develop a metro rail system, according to M. Venkaiah Naidu, the Union Minister for Urban Development. A proposal by the Union Urban Development Ministry to put in metro rail systems in 50 cities was approved by Prime Minister Narendra Modi back in May of 2015. In order to carry out the majority of the proposed projects, the Union and the respective State Governments will form 50:50 joint ventures. Approximately $74 billion will be invested by the government of India. States are only to install metro rail as a ‘‘last resort’‘ after exhausting all other mass rapid transit options, according to the draught policy revealed in March 2017. It was decided because of the high expense of building metro rails.

Rapid transit systems are currently in operation in 15 Indian cities, while many more are either currently being built or are in the planning stages.

Because railways are included in the Union List of the Seventh Schedule of the Constitution, only Parliament has the right to enact laws in this area. Since the metro rail is a national issue, it has been agreed that all projects, whether in a single municipal region or across the country, will be handled by the Central Metro Acts.

It is defined by the ‘‘The Metro Railroads (Development of Works) Act, 1978’‘ as an act to provide for the development of metro railways in metropolitan cities and related topics. ‘‘Delhi Metro Railway (Operation and Maintenance) Act, 2002,’‘ oversees metro operations and maintenance. Amendments to both legislation were made in 2009 by the ‘‘Metro Railways (Amendment) Act, 2009.’‘ The amendments extended the applicability of both laws to all major Indian cities.

Tramways Acts from several states were initially used to establish metro rail projects. Metro rail projects are inspected by the Commissioner of Railways Safety (CRS), which is part of the Ministry of Civil Aviation. If the projects were not constructed under a Metro Act adopted by the state government and published in The Gazette of India, the CRS refused to issue safety certification. Another

railroad organisation, the Research Design and Standards Organization (RDSO), refuses accreditation to projects that do not meet the criteria. Following the passage of the Metro Act, a number of states have passed similar legislation.

2.2.6 Irrigation

2.2.6.1 Irrigation in India

India's irrigation system is made up of major and minor canals from Indian rivers, groundwater well-based irrigation systems as well as storage tanks and other rainfall-gathering projects The largest of these groundwater basins is referred to as During the year 2010, only 35% of India's agricultural land was reliably irrigated. About two thirds of India's farmland depends on monsoon rains for its production. Improved agricultural output and the creation of rural jobs are all made possible thanks to irrigation in India. Additionally, irrigation projects benefit from the usage of dams to generate energy and transportation infrastructure, as well as providing drinking water to a growing population.

Including canals and wells dug into the earth, India's irrigation system might cover 90 million hectares of cropland by the end of 1995, up from the country's 1951 total of 22.6 million hectares. Water pumps and upkeep require a steady supply of electricity, and the amount of net irrigated land has been relatively small. Irrigated land covered only 58.1 million hectares in India, according to the 2001/2002 Agriculture Census. Arable land covers 160 million hectares of India's surface area (395 million acres). According to the World Bank, over 35% of India's agricultural land was reliably irrigated in 2010.

139.5 million hectares of irrigation potential were estimated in a 1991 United Nations' FAO assessment, which included an additional 15.8 million hectares for minor irrigation canal systems, 66 million hectares for groundwater well-fed, and 58.5 million for big river-fed irrigation canal schemes.

In India, irrigation is almost exclusively reliant on groundwater wells. An irrigation system with 39 million hectares (67 percent of India's total area) of groundwater is the largest in the world (China with 19 mha is second, USA with

17 mha is third). India spent a total of 16,590 crore on irrigation projects between 1950 and 1985. Costs for India's water management projects are estimated to range from $1,03,315 billion in 2000 to $ 2,10,326 billion in 2010.

2.2.7 Water Supply & Sanitation

Water supply and sanitation are two of India's most pressing issues. Water and sanitation are still underinvested by international standards, but the government is working to improve the situation. The 2000s saw a rise in investments.

There were a number of innovative approaches to improving water and sanitation in India in the early 2000s. A community-led comprehensive sanitation programme, public-private partnerships to improve urban water delivery, and microcredits have been employed for water supply and sanitation in Karnataka to boost accessibility to water and sanitation in rural areas since 1999.

2.2.7.1 Sanitation

The vast majority of Indians rely on on-site sanitation. The Total Sanitation Campaign, promoted by the government in rural regions, is one community-led sanitation technique that has had some success. The Slum Sanitation Program in Mumbai is a good example of a successful urban sanitation programme that has improved the lives of more than a quarter of a million people. Sewage, if it exists at all, is often in a poor condition. In Delhi's sewer system, raw sewage frequently spills into open drains as a result of blockages, settlements, and a lack of pumping capacity brought on by decades of neglect. Less than half of Delhi's daily waste water production can be handled by the city's 17 existing wastewater treatment plants.

As a result of the caste system, ‘‘manual scavenging’‘ is also an issue in India, which involves the risky and undignified emptying of toilets and pits, and the handling of raw, untreated human excreta.

2.2.7.2 Policy and regulation

Water supply and sanitation are the responsibility of numerous federal and state departments. Rural water and sanitation were formerly the province's duty until

2011, when it was transferred to the Ministry of Housing and Urban Poverty Alleviation and the Ministry of Urban Development, which are all located in Beijing. Unless you live in Delhi or one of the other Union Territories, the federal ministries have only an advising and limited budgetary role. As a result, sector policies can be implemented by state governments.

2.2.7.3 National Urban Sanitation Policy. To achieve ‘‘completely sterilised cities,’‘ the Indian government established a nationwide urban sanitation programme in November 2008 with the goal of eliminating open defecation, collecting and treating all wastewater, eliminating manual scavenging, and collecting and disposing of solid waste securely.

State sanitation programmes based on the policy had been developed or were in the process of being completed in 12 states as of 2010. City sanitation plans are being drawn up in 120 cities across the United States. In addition, 436 cities evaluated their cleaning efforts, with help from the Ministry of Urban Development and other funders, to see how they compared to the national average.

There were 40 percent ‘‘red,’‘ more than 50 percent ‘‘black,’‘ and only a few ‘‘blue’‘ cities out of the total (recovering). It wasn't possible to include any cities in the ‘‘green category’‘ (healthy and clean city). Using the rating as a starting point, future progress and prioritisation can be measured.. In recognition of the best sanitation workers, the government will award a trophy named the Nirmal Shahar Puraskar.

2.2.7.4 Provision of Service

2.2.7.4. (a) In Urban areas. Planning and investment are typically the responsibility of a governmental agency, but operations and maintenance are the responsibility of local governments (Urban Local Bodies). Water and sanitation services in some of the country's larger cities have been established as distinct entities from the local government. However, the financial strength of these utilities is still lacking. Decentralization hasn't changed the fact that ULBs are still reliant on state governments for capital subsidies.

Unusual institutional systems exist in several states and municipalities. When it comes to oil and gas operations and maintenance, the state government is in charge in Rajasthan, but in Mumbai the local government is responsible for both planning and investing. Under performance-based contracts signed in 2012, the Delhi Jal Board outsourced operations and management in three of the city's seven districts to private corporations. Vasant Vihar-Mehrauli, Malviya Nagar, and Nangloi are operated by SMPL Infrastructure of India, Suez Environment, and Veolia Environment, respectively.

2.2.7.4 (b) Private Sector participation: In the operation and maintenance of urban water systems on behalf of ULBs, the private sector plays a limited but increasingly expanding role. The following are a few notable examples:

- A subsidiary of Tata Steel, the Jamshedpur Utilities & Services Company (Jusco), has a lease contract for Jamshedpur (Jharkhand), a management contract in Haldia (West Bengal), and a contract for the reduction of non-revenue water in sections of Bhopal since 2007. (Madhya Pradhesh).
- In 2005, the French water corporation Veolia was awarded a management contract in three Karnataka cities.
- In 2002, the Japan Bank for International Cooperation awarded a pilot contract to a consortium involving Thames Water to minimise non-revenue water use in sections of Bangalore. In 2004, the scope of the contract was expanded.
- For the city of Latur, Maharashtra, Cypriot Hydro-Comp secured a 10-year concession contract in 2007 alongside two Indian businesses.
- Contracts with operators and consultants in Madurai (Tamil Nadu).
- SPML, a private Indian infrastructure development firm, is working on BOT projects including Bhiwandi's large-scale water delivery system (Maharashtra).

2.2.7.4 (c) Rural areas. In India, there are over 100,000 rural water systems. Panchayati Raj Institutions (PRI) at the block or village level (there were around 604 districts and 256,000 villages in India in 2002, according to Subdivisions of India) are taking over some of the duty for service provision from State Water

Boards and district administrations in various states. At some point between districts and villages, there is a level called a block. Single-village water schemes appear to be more progressed in this transfer than more sophisticated multi-village water schemes. Rural water and sanitation services are provided in a limited capacity by Panchayati Raj Institutions as of 2006. Decentralization has had little success, in part due to the lack of emphasis given to it by some state governments. Latrines are a common form of rural sanitation provided by the residents themselves.

2.2.7.4. (d) Investment and financing

To date, there has been an increase in funding for urban water supply and sanitation projects as a result of increased central government grants under the Jawaharlal Nehru National Urban Renewal Mission under the Congress rule until 2014 and since then, as well as loans provided by Housing and Urban Development Corporation (HUDC) for these purposes.

Investment

The Eleventh Five-Year Plan (2007–2012) foresaw investments of ₹1,270.25 billion (US$18.9 billion) for urban water supply and sanitation, including urban (storm water) drainage and solid waste management.

Financing

Funding for water and sanitation initiatives comes from a variety of sources, including the federal government, individual states, and other stakeholders, with the percentage supplied by each varying from programme to programme and over time. 60 percent of financing for Clean India Mission and the National Rural Drinking Water Program comes from the states, while 40 percent is provided by the federal government. The federal government had a significant role in supporting the Clean India Mission up to 2015.

More than half of the 11th Plan's investments were to be backed by the federal government, 28% by state governments, 8% by ‘‘institutional funding,’‘ 8% by foreign agencies, and 1.5% by the private sector, according to the document.

Local governments had not been expected to make the investments. By the end of the year, investments were expected to climb from 0.5 percent of GDP to 0.7 percent. As a result, it marked a shift in federal spending away from states. While just 24% of investments were financed by the central government, 76% were sponsored by state governments under the 9th Plan. The federal government spent a lot of money on rural water supplies.

2.2.7.4. (e) Institutions

In the existing water and sanitation funding system, a number of different national and state programmes are used to make up the disparate parts. As a result, separate and conflicting policies in neighbouring areas are implemented simultaneously. Different initiatives in rural areas, for example, undermine each other, undermining demand-driven models that necessitate user cost sharing.

- Most of the money for water and sewage systems comes from the federal government's general fund. They play a crucial role in recommending how state tax income should be distributed between states and municipalities, the criteria for grants, and the measures that municipalities might take to improve their financial standing.
- The Planning Commission says that in certain situations, SFCs are not sufficiently transparent or competent, that their transactions are expensive, and that their recommendations are not always executed. Loans from the Housing and Urban Development Corporation Ltd (HUDCO), a government-owned financial institution, are a major source of financing. State governments must guarantee HUDCO loans to municipal entities. States can also borrow money from HUDCO, which lends money from foreign help, such as Japanese aid.
- An important role was performed by federal government funding in financing urban water supply and sanitation through the Jawaharlal Nehru National Urban Renewal Mission (2005–2014). In order to get financing from this mission, communities with a population of less than one million had to be located in 35 of the country's biggest cities and 28 additional designated cities. New Prime Minister Narendra Modi's primary urban

development programme, the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), superseded it. Also in 2014, the new administration established the high-profile Swachh Bharat Abhiyan (Clean India Mission), which aims to eradicate open defecation by 2019 in 4,041 cities and municipalities across the country. The Sarva Shiksha Abhiyan and Rashtriya Madhyamik Shiksha Abhiyan initiatives have received financing and technical help from the World Bank, companies, and the governments of India's states.

- More than $9.2 billion is estimated to be spent on the Swachh Bharat Abhiyan. In India's 2016 Union budget, 90 billion (US$1.3 billion) was set aside towards the project. A 0.5 percent service tax on air travel, phone calls, dining out, and banking was established by the government in 2015 to fund the Clean India Campaign. Because of the Clean India Campaign's emphasis on sanitation rather than water, a budget tracking study found that the government's funding for rural water supply was reduced. According to a report by the Parliamentary Standing Committee, the government will be unable to meet its 2017 goal of supplying piped water to 50% of rural homes. The Tamil Nadu Urban Development Fund (TNUDF) was established in 1996 as a public-private partnership by the Tamil Nadu government to distribute grants and loans to the state's cities.
- The World Bank, Japan's JICA, and Germany's KfW have all provided financial assistance to TNUDF. Additionally, the water and sanitation pooled fund, under which a number of towns joined together to issue a local market bond, brings in funds from the capital market. TNUDF is now the only state-level fund in India that lends money to local governments. Tamil Nadu's example has inspired the state of Orissa to create an Urban Development Fund.

2.2.7.4. (f) External cooperation

Water, sanitation, and water resource management are among the most common requests for OECDA development aid, and India receives nearly twice as much as any other country. In 2006–07, India received an average of US$830 million (€620 million) per year in water aid, which is more than double the amount China

received. The World Bank and Japan are India's two largest water and sanitation donors, each contributing US$130 million. For the period 2004–06, Japan provided US$293 million, while the World Bank contributed an additional US$87 million, bringing the annual average to US$448 million. Asian Development Bank (ADB) and Germany (Germany) are also key external partners in water supply and sanitation.

The Indian government made the decision in 2003 to receive aid solely from five countries on a bilateral basis (the United Kingdom, the United States, Russia, Germany and Japan). Nongovernmental organisations, United Nations agencies, or multilateral institutions such as the European Union, the Asian Development Bank, or the World Bank were requested by a further 22 bilateral donors to channel aid through them.

2.2.7.4 (g) Asian Development Bank

Indian loans to the Asian Development Bank have risen since the introduction of new financing modalities, such as the multitranche financing facility (MFF), which features a framework agreement with the national government under which financing is provided in flexible tranches for subprojects meeting established selection criteria. North Karnataka, Jammu and Kashmir, Rajasthan, and Uttarakhand were the focus of four MFFs in 2008, which invested 862 million US dollars each in urban development projects. In these MFFs, substantial sums are allocated to improving urban water and sewage systems.

2.2.7.4 (h) Germany

GIZ and the German Development Bank (KfW) provide financial and technical assistance to India in the areas of water and sanitation. They have been supporting rural Maharashtra watershed management since the 1990s, employing a participatory strategy first developed by the Ahmednagar Social Center, and this marked a significant departure from the traditional top-down, technical approach to watershed management that had generated little benefits.

The project's success depends on the participation of women in decision-making. Increased water supplies for rural water supply is a secondary advantage to the project, which is primarily focused on increasing agricultural production. The German Development Agency (GIZ) is also actively supporting the adoption of ecological sanitation concepts in India, including communal toilets and decentralised wastewater systems for schools and small and medium-sized industries. Water and fertiliser are often provided by these systems.

2.2.7.4 (i) Japan

In addition to financing a wide range of projects, the Japan International Cooperation Agency (JICA) is India's largest contributor in the sector, with a focus on capital-intensive urban water supply and sanitation projects.

Current projects. Projects approved between 2006 and 2009 include the Guwahati Water Supply Project (Phases I and II) in Assam the Kerela Water Supply Project (Phased II and III), the Hogenakkal Water Supply and Fluorosis Mitigation Project (Phases I and II) in Tamilnadu, the Goa Water Supply and Sewerage Project, the Agra Water Supply Project, the Amritsar Sewerage Project in Punjab, the Orrisa Integrated Sanitation Improvement Project, and the Banglore Water Supply and Sewerage Project (Phase II).

Evaluation of past projects. ‘‘Some 60 – 70 per cent of the targets were attained’‘ and ‘‘results were moderate,’‘ according to an ex-post study of the Urban Water Supply and Sanitation Improvement Program. During the period from 1996 to 2003, Housing and Urban Development Corporation Ltd. (HUDCO) implemented the programme in 26 cities. State government plans were not founded on sufficient demand research, including the research for citizens' willingness to pay, hence the demand for connections was overstated,’‘ according to the evaluation. There were also no increases in water tariffs despite recommendations to do so. The conclusion of the review is that ‘‘However, HUDCO's involvement in individual projects did not have a substantial impact on their efficacy, long-term viability, or high level of quality in general. The fact that state government guarantees made failure on the loans unlikely is possibly one of the reasons why this issue received so little attention.”

2.2.7.4 (j) World Bank

Current projects. The World Bank finances a number of projects in urban and rural areas that are fully or partly dedicated to water supply and sanitation. In urban areas the World Bank supported or supports among others the USD 1.55 bn National Ganga River Basin Project approved in 2011, the Andhra Pradesh Municipal Development Project (approved in 2009, US$300 million loan), the Karnataka Municipal Reform Project (approved in 2006, US$216 million loan), the Third Tamil Nadu Urban Development Project (approved in 2005, US$300 million loan) and the Karnataka Urban Water Sector Improvement Project (approved in 2004, US$39.5 million loan). In rural areas it supports the Andhra Pradesh Rural Water Supply and Sanitation (US$150 million loan, approved in 2009), the Second Karnataka Rural Water Supply and Sanitation Project (approved in 2001, US$151.6 million loan), the Uttarakhand Rural Water Supply and Sanitation Project (approved in 2006, US$120 million loan) and the Punjab Rural Water Supply and Sanitation Project (approved in 2006, US$154 million loan).

2.2.8 Ports

One of the world's largest peninsulas, India's coastline is 7516.6 kilometres long. It is estimated that roughly 95 percent of India's volume and 70 percent of its value are transported by sea. There are 13 main ports and 200 notified minor and intermediate ports that serve it. Maharashtra (48), Gujarat (42), Tamil Nadu (15), Karnataka (10), Kerala (17), Andhra Pradesh (12), Odisha (13), Goa (5), West Bengal (1), Daman and Diu (2), Lakshadweep (10), Pondicherry (2), and Andaman & Nicobar Islands (10) make up the total of the 200 non-major ports in India: (23).

The Indian government has approved a project called Sagarmala to modernise these ports. India's ports and shipping industry are critical to the country's economic development. The Indian government has granted 100% FDI in port and harbour building and maintenance projects via the automatic route. NMDP, the government's project to expand the maritime industry, will cost $11.8 billion when it is fully implemented.

The federal structure of Indian governance mandates that the central and state governments share responsibility for maritime transportation. The nine coastal states of Andhra Pradesh, Odisha, West Bengal, Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra, and Gujarat handle minor and intermediate ports, while the shipping ministry of the federal government oversees the larger ports. These 187 small and medium-sized ports will be developed in stages by the respective governments, with a large number of them including public-private partnerships.

2.2.8.1 Sector Overview

The western and eastern shelves of India's continent are bordered by a shoreline that stretches for 7,517 kilometres. One of the world's greatest merchant fleets, India has 12 major ports and 187 smaller ports, placing it 16th among maritime nations. The Ministry of Shipping estimates that 95% of the volume and 70% of the value of the country's trade is transported by sea, underscoring the importance of ports and their role in supporting India's economic growth and development.

EY-NMDC report titled Indian Coastline—A New Opportunity states that the increasing trend of Western countries moving their manufacturing functions to low-cost countries and the likely prospect that India will emerge as a manufacturing outsourcing hub is expected to contribute to the growth of the Indian marine industry. Indian ports handled 883 million metric tonnes of cargo in 2010-11, a rise from 850 million metric tonnes in 2009-10, according to data from the Ministry of Shipping.

More than Rs 1,80,626.23 crore is estimated to be invested in ports during the 12th Five-Year Plan (2012–2017), according to revised projections from the Planning Commission of India. According to the Department of Industrial Policy and Promotion (DIPP), which is part of the Ministry of Commerce and Industry and which formulates FDI policy in India, the ports sector received FDI worth USD 1,635.08 million between April 2000 and July 2011, which was 1.13 percent of the total FDI inflows into India.

The largest ports are Chennai, Ennore, Tuticorn, Cochin, Kandla, Kolkata, Mumbai Port, and Jawaharlal Nehru Port Trust (in Maharashtra), Mormugao (in

Goa), New Mangalore (in Karnataka), Paradip (in Orissa), Vishakhapatnam, and Port Blair (in the Andaman & Nicobar Islands).

Vishakhapatnam in Andhra Pradesh and Kandla in Gujarat are the two largest ports in India in terms of cargo volume (82 million tonnes in 2010–11). (68 million tonnes). All major ports saw a rise in cargo volume in 2010–11. Smaller ports like Gujarat's MSEZL (52 million tonnes in 2010–11) and Gujarat's Essar Ports (40 million tonnes) are the most active. MSEZL has two facilities in Gujarat, one each at Vadinar and Hazira.

In recent years, the Indian government has launched a number of projects to improve the quality of the port industry. First phase of certain important projects, such as the Vallarpadam (Kochi) mega container transshipment terminal and the bulk terminals at Dahej, Mundra, and Hazira were completed in 2010. (all in Gujarat). Greenfield port Dhamra (Orissa) finished its first phase in May 2011.

All of the country's major ports are well-served by road and rail. Furthermore, the existing connectivity is being bolstered to ensure that goods moves smoothly. Each major port should be linked by a four-lane road, according to a report by a Committee of Secretaries on Rail Road Connectivity of Major Ports.

2.2.8.2 Policy and Promotion

Ports are governed by the Ministry of Shipping, which oversees shipbuilding and maintenance, as well as inland water transportation. Foreign direct investment (FDI) is permitted in port development projects in accordance with government policy. Companies investing in port infrastructure are excluded from paying any income tax, which serves as an additional incentive for them to do so. An additional tax break of ten years has been granted to businesses involved in port development and maintenance, inland waterways, and inland ports.

The US$11.8 billion National Marine Development Program (NMDP) is a large ministry promotional project aimed at developing the maritime sector. Improving service quality, boosting competitiveness and encouraging private investment are all part of the policy's long-term goals. The Department of Shipping has compiled

a list of projects that will be implemented in key ports under the NMDP from 2011–12 in order to achieve this goal. These projects will cost a total of Rs. 55,804 crore to complete. In two stages, the initiative will be implemented by the public and private sectors.

Additional regulatory and policy initiatives have been implemented by the Indian Government to ensure the holistic development of the Indian port sector, including the National Maritime Agenda 2010–20 and the Draft Port Regulatory Authority Bill, 2011—the latter of which is currently under consideration.

An ambitious goal of over 3 billion tonnes in port capacity by 2020 is laid out in a national maritime strategy that mostly relies on private sector participation. Over the course of the next five years, the port industry is expected to receive a total of Rs. 2,774 billion in investment. According to the proposed investment, the non-major ports are expected to make up 61 percent of it, while the main ports will make up the rest.

Policy-related initiatives to improve port efficiency and competitiveness in India are also included in the agenda. Several of the world's busiest seaports will be converted to landlord ports by 2020, allowing the private sector to operate and maintain the port's operations.

For the regulation of port tariffs and the monitoring of port performance standards, the Port Regulatory Authority Bill, 2011, proposes the establishment of a regulatory authority. Port authorities and private operators will be tasked by the regulatory authority with setting rates for a variety of services. In addition to monitoring the performance of port authorities and private operators, the authority will set performance standards and quality requirements for them to meet. Facilities with a cargo handling capacity of less than 5 million tonnes per year are exempt from the authority's jurisdiction.

2.2.8.3 Major Players

Foreign investors are making significant BOT investments. For example, P&O Ports(Mumbai and Chennai), Dubai Ports International (Cochin and

Vishakhapatnam), Maersk (JNPT, Mumbai) are some of the overseas players (Tuticorin).

Ennore Port, Kakinada Seaports Limited, Krishnapatnam Port Company Limited, Dhamra Port Company Limited and Adani Petronet (Dahej) Port Private Limited are some of the most famous Indian port firms in the country. Port terminal operators include TM International Logistics Ltd., Chennai International Terminals Private Ltd., Nhava Sheva International Container Terminal Private Ltd., Chennai Container Terminal Private Limited, Mundra International Container Terminal Private Limited, Sical Iron Ore Terminals Limited, International Seaports Haldia Private Limited, Vizag Seaports Limited, and Ennore Tank Terminals Private Limit.

Major port service providers include Ocean Sparkle Limited, Seabird Marine, Sealion Sparkle Maritime Services Limited, Sealion Sparkle Port & Terminal Services (Dahej) Limited, IMC Limited, Polestar Maritime Limited, TM Harbour Services Private Limited, International Seaport Dredging Limited, Adani Logistics Limited, Navkar Corp. Limited, Pipavav Railway Corporation Limited, and Saurashtra Container Services Private Ltd., among others.

2.2.8.4 Sector Outlook

Cargo volumes in India are expected to reach 1 billion tonnes in 2011–12, 2 billion tonnes in 2016–17, and 2.5 billion metric tonnes in 2019–20, according to the Indian Ministry of Shipping. The Indian port sector's long-term cargo growth prospects are good, based on the existing level of activity in the primary end-user industries (ICRA Rating feature, September 2011).

Besides coal (due to an increasing number of thermal power projects that are dependent on imported coal) and containers (due to a lack of market penetration and potential savings), crude oil and POL, fertilisers, and steel (due to strong domestic demand and low self-sufficiency) are all expected to drive future growth in traffic at Indian ports (mega projects proposed in the eastern part of the country). Competition in India's port-related logistics and service operations is

expected to continue severe, but the country's traffic development will be supported by strong domestic demand drivers.

The increasing adoption of the landlord/asset ownership model for large ports, which gives the private sector a prominent role in capacity increases and port services and operations, is another positive development for private enterprises engaging in the ports industry. Ten greenfield sites for all-weather direct berth ports have been selected by Gujarat Maritime Board (GMB) using the BOOT concept. Upon completion of the 30-year BOOT period, these ports will be restored to GMB.

2.2.9 Airports

There are around 16 billion passengers flying in and out of India every year. It is predicted that domestic aviation traffic in India will exceed 100 million passengers by the end of FY2017, up from 81 million passengers in 2015. (CAPA). With 275 million new passengers, India is one of the world's top five fastest-growing aviation markets.

Domestic air passenger traffic increased by 23% in January 2016 to 7.66 million passengers, up from 6.25 million in the same month in 2015. Passenger traffic climbed by 20.3% to 81.1 million from 67.4 million in the same period in 2014, according to figures from January to December 2015.

156,048 aircraft movements were recorded in India in January 2016, a 15.9% increase over January 2015. Aeronautical traffic between the United States and other countries grew by 10.6% and 17.5% in January 2016.

2.2.9.1 Government Planning

- AAI proposes to create city-side infrastructure at 13 regional airports across India, with the support of private companies for the construction of hotels, carparks, and other facilities in order to increase non-aeronautical earnings.
- ‘‘India Aviation Safety Technical Assistance Phase II’‘ is an agreement between India's DGCA and the United States Technical Development

Agency (USTDA) targeted at systemic improvements in operation, airworthiness and licencing.

- A greenfield airport for public use near Bhiwadi in the Alwar district of Rajasthan has been given site clearance by the Government of India and 'in principle' approval has been granted to 13 other greenfield airport projects by the Delhi Mumbai Industrial Corridor and Development Corporation (DMICDC).
- For regional and remote aviation connectivity in India, the Airports Authority of India (AAI) has a 10-year plan to restore and operationalize roughly 50 airports.
- A draught civil aviation policy released by the Indian government for input from stakeholders proposes raising the current FDI limit of 49% to over 50% in domestic airlines, as well as other reforms like tax incentives for airlines, incentives for travellers to fly to small towns at affordable rates, and easing the norms for domestic carriers to operate abroad.
- A second international airport in Dholera, Gujarat, is slated to be built. It has been established by the state government that Dholera International Airport Co. Ltd. and is getting authorization from the federal government
- In addition, Air India's maintenance, repair, and overhaul (MRO) unit has been approved by the Directorate General of Civil Aviation (DGCA) and four Indian airports have been awarded management contracts by the Government of India. For these four airports, AAI has submitted a ‘‘Request for Qualification’‘ document.

With a booming civil aviation industry, India expects to spend more than $120 billion over the next decade developing airport infrastructure and providing aviation navigation services.

New economic corridors, 100 smart cities, more than 50 new airports, and expansion of existing airports appear to be putting India's aviation sector on a fast and sustainable growth path during the launch of India Aviation 2016.

Civil aviation in India has grown by 14% over the last decade. India is a popular choice for international investors in the civil aviation sector, as seen by the $570 million in FDI it has received in the last 15 years.

Foreign direct investment (FDI) has been approved through the automatic method to the tune of 100% in new airports, helicopter services, seaplanes, maintenance and repair firms, and flying instruction schools. For domestic scheduled passenger airlines and ground handling services, 49 percent FDI is permitted under the automatic route.

Making in India, Stand up India, and Start up India have put India on the verge of a big leap forward in the aviation sector. This is a golden opportunity that the Indian government is encouraging the world's leading companies to grab.

Currently, India's civil aviation market is ranked ninth in the world. India is expected to overtake the United States as the third largest market for civil aviation by the year 2020. In 2015, Indian airports handled 190 million passengers, with a network of domestic and 85 international airlines connecting 40 countries. In comparison to China's 0.3% and the United States' more than 2%, India has one of the world's lowest per capita air travel volumes, according to him.

Indian cities in Tier II and Tier III are still disconnected from the national grid despite the significant growth of India's civil aviation industry.

India's passenger traffic is expected to reach 421 million by 2020, and the government and other stakeholders should take advantage of this enormous business potential, he said.

2.2.10 Storage and Warehousing

In addition to traditional storage, Indian warehouses increasingly offer value-added services such as cargo consolidation and breaking up, packaging, labelling, bar coding, and reverse logistics, among other things.

The growth in warehousing in India is primarily being driven by the following factors:

- Growing manufacturing activity
- Rising domestic consumption,
- Increasing international trade
- Emergence of organised retail in the country
- Increasing private and foreign investments in infrastructure
- Easing of government regulations

The existing provider landscape is largely compromised and hence unable to create the desired integrated scaled proposition due to several factors, as listed:

- It's difficult to implement value-based pricing due to a lack of warehouse infrastructure and services that are large enough and of high enough quality, as well as the inability to align capacity with cargo flows.
- Inadequate capacity (and ability) to deal with multi-modal interactions
- A lack of understanding of the user's supply chain results in limited value addition specific to the user industry.
- Unsuitable degree of computerization

Logistics costs are not appropriately measured by end users, leading to the false impression that value can only be generated by cutting logistics (warehousing, transportation, and handling) expenses in pieces.

2.2.10.1 India’s warehousing industry

An estimated INR560 billion (excluding inventory carrying expenses of an additional INR4,340 billion) is the estimated size of the Indian warehousing industry. More than ten percent of the industry's growth is coming from organic sources. The complete logistics value chain relies heavily on warehousing. With inventory carrying expenses at an additional 30%, it only represents about 5% of the Indian logistics sector.

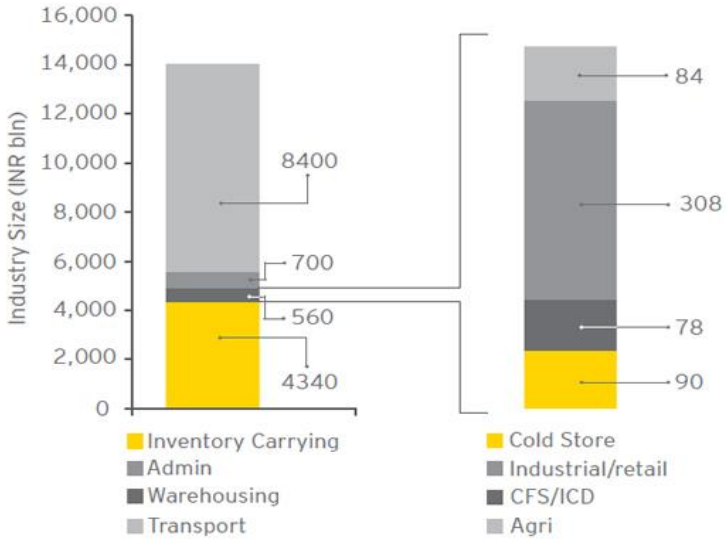
Multiple business models exist within the warehousing industry. The key segments can be represented as:

- Industrial/Retail warehousing: accounts for ~55% of the total market
- CFS/ICD: ~14% share

- Agri warehousing: 15% share
- Cold stores: ~16% share

Current warehouse industry size with sub segments in FY14

Figure 12: Warehousing Industry share of India



Source: EY Analysis, Crisil Report on Warehousing

2.2.10.1 (a) Industry/retail warehousing

Market size in FY13 was INR310 billion, with a CAGR of 10%–12% over the previous few years for industrial/retail warehousing. A CAGR of 6% is expected to have driven industrial warehousing space demand from 420 million square feet in FY11 to 475 million square feet in FY14.

Significant growth drivers:

- Growth in GDP and changing demographics
- Demand for high-end services and infrastructure
- Growing external trade
- Rising share of organized retail
- GST implementation

Key players:

DHL, Safexpress, Continental Warehousing, Indo Arya, MJ Logistics, Allcargo, Nippon Express, etc. are the major players in industrial warehousing.

2.2.10.1 (b) Liquid storage

Crude oil, petroleum products, chemical and edible oil are all examples of liquid bulk that can be stored using the phrase ‘‘liquid storage.’‘ Between FY10 and FY13, liquid bulk freight handled at ports grew at a CAGR of 5% to 6%. Because of the country's growing population and the country's limited supply of liquid storage facilities, demand is rising in India. Between 75 and 80 percent of India's commercial tank farms are now being utilised.

Significant growth drivers:

- Increased edible oil consumption
- Shifting consumer preferences
- Improved operational efficiencies
- High utilization levels for tank farms
- Development of private airports

Key players:

Major players in the commercial segment include IMC Ltd., Vopak India, Kesar Terminal, Ganesh Benzoplast, Indian Oil Tanking, Aegis Logistics, Sealord.

2.2.10.1 (c) Agri-warehousing

Agri warehousing accounts for ~15% of the warehousing market in India, or ~INR80–85 billion, in FY13. It has been growing at a 10%–12% rate over the last 3 years. Agri warehousing capacity in India is 110–120

million metric ton (MT), and it has been growing at a CAGR of 8%–10% over the last 5 years.

Significant growth drivers:

- Growing annual agriculture production
- Increased private sector intervention
- Improved agri warehousing infrastructure
- Standardized warehousing operations as per the Warehousing (Development & Regulation) Act
- Subsidy schemes
- Tax incentives

Key players:

The Food Corporation of India (FCI), the Central Warehousing Corporation (CWC), and the 17 State Warehousing Corporations (SWC) are important public sector players (SWCs). Small godown players, who account for about 30% of total capacity, occupy the majority of the remaining space.

Due to the available capital subsidy, a few significant national-level firms have arisen in this industry over the previous decade. Bulk Handling Corporation of India Ltd., Adani Agri Logistics, Star Agriwarehousing & Collateral Management Ltd., Shree Shubham Logistics, Ruchi Infrastructure Ltd., Guru Warehousing Corporation and LTC Commercial are just some of the companies that fall under the umbrella of the National Collateral Management Services.

2.2.10.1 (d) Cold stores

It is estimated that the warehousing business is worth an estimated INR90 billion in cold storage. Over the next five years, the cold storage business is predicted to grow at a steady 15% per year, with the organised market growing at a quicker 20% per year.

Significant growth drivers:

- Increase in organized retail
- Growing GDP
- Increasing population
- Improving per capita consumption
- Healthy growth of niche categories such as chemicals, pharmaceuticals, etc.
- Government incentives

Key players:

Snowman, Gati Kausar, Cold Star, ColdEx, Kelvin cold chain, RadhaKrishna Foodland, MJ Logistics, Dev Bhumi Cold Chain, Fresh and Healthy Enterprise, etc., are the major organized players in the industry. Supply chains in India are predicted to become more integrated as a result of the growth of organised industries such as retail, automotive, manufacturing, pharma, and agriculture.

2.2.10.1 (e) Container handling and storage

CFS/ICD accounts for ~14% of total warehousing market in India and is estimated at around ~Rs.75-80 bn in FY13 in India and has grown with a CAGR of 10-15% over last 3 years.

Significant growth drivers:

- Growth in containerized cargo
- Opening up of container rail transport
- Government incentives

Key players:

Government-owned Container Corporation of India (CONCOR) is the major player, operating 48 EXIM container ports, while 14 other terminals primarily handle domestic business.

Logistics has evolved from a simple mix of transportation and storage services into a strategic role that provides end-to-end solutions that increase efficiency.

Increased manufacturing, retail, and agricultural sectors in India are likely to result in more integrated supply chains. India's GST implementation will have a significant impact on the growth of the logistics and warehousing industries.

It's apparent that India is a developing country based on its infrastructure, which shows that the country's development is on the upswing. Sectors across the board are seeing increases in activity, and the vast majority of government programmes are receiving support from other countries. It is certain that the sector will profit in the near future if there is a large flow of FDIs in the sector.

Chapter III

Thematic Infrastructure Mutual Funds

Chapter – 3

Thematic Infrastructure Mutual Funds

3.1 Introduction

We can see from looking at India's infrastructure sector that the Indian government is working hard to keep up with international competition. This investment has resulted in rapid sector growth, which has allowed us to conduct research.

An investment vehicle called a ‘‘theme fund’‘ invests across many sectors linked to the common subject. To put it another way, an infrastructure-themed mutual fund may invest in stocks of companies like construction companies, cement companies, energy and electricity, railways as well as steel companies.

Multi-sector, foreign exposure, commodities exposure, etc., are all examples of thematic funds, which have a greater range to operate in compared to sector funds. Sector funds are sometimes misunderstood for theme-based funds. A theme fund's breadth is often greater than that of a sectoral fund, despite some broad comparisons..

3.2. Nuances of Thematic funds

Diversified equity mutual funds provide a wider range of investments than sector funds, although they are less diverse than diversified equity mutual funds. Due to their very nature, thematic funds are more susceptible to risk and volatility. Instead of following the broad markets, the performance of a diversified fund, these funds are tied to a certain sector or topic. Multi-Sector, International/Multi-Economy, Commodity, or a specific investing style are just a few examples of possible themes for thematic funds. Investors who are familiar with market movements and hence better able to make thematic calls might consider thematic funds.

3.2.1 Sectoral funds: These funds, as its name implies, concentrate their investments in a small number of industries, usually no more than three. In fact, the industries in which these funds invest are frequently intertwined. For example, several sectoral funds invest in IT and telecommunications because of their close association. Another example is a bank sector fund that invests in the stock of banks. Pharma funds that invest in pharmaceutical company stock. Investing in industries or areas with high growth potential is the goal of this strategy.

3.2.2 Thematic Funds: Thematic funds, as opposed to sectoral ones, focus on a single idea or concept rather than a specific industry. As an example, an infrastructure thematic fund invests in steel, cement, and other companies involved in infrastructure construction projects. The companies involved in this venture may come from a variety of industries, but they all share a common concept. Consequently, in comparison to sectoral funds, investments in thematic funds are broader and thus more diverse. Risk-wise, thematic funds are less risky than sectoral funds. The reason for this is that it focuses solely on two or three industries. If these industries succeed, so will the fund. However, because of its lack of diversification, the fund will be harmed if certain industries deteriorate. As a result, thematic funds are less hazardous than sectoral funds because of their greater diversification.

Thematic funds, unlike sector funds, are more diversified because the assets are spread across multiple sectors rather than focused in a single industry. Investors should be wary of sector funds because their performance is entirely dependent on the sector or sectors in which they choose to invest. In order to provide investors with a way to invest in industries with high development potential as a result of the industry's recent rise, themed funds were created.

3.3 Characteristics of Thematic Funds:

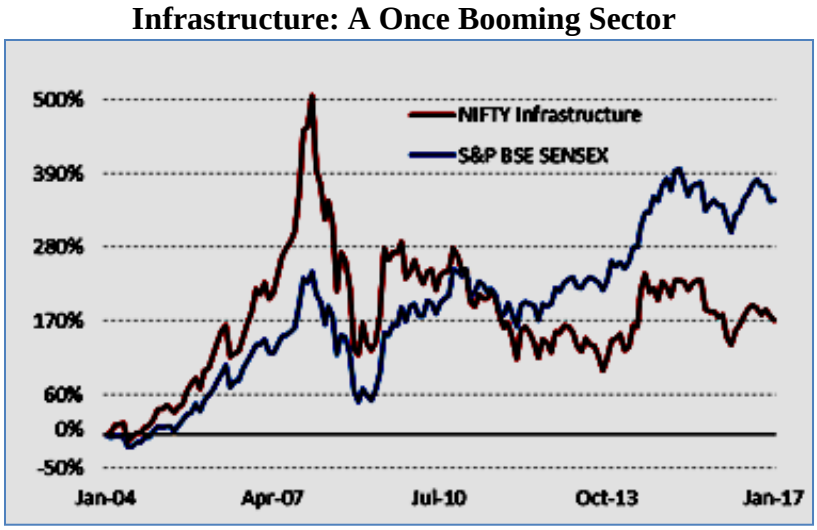
- Different segments of the stock market, but with a common theme, are the focus here.
- It's more volatile and hazardous than the overall market, but less dangerous than sectoral funds.

- Scattered across several fields that are interconnected by a common thread.

Investors who are ready to take a chance on thematic funds are the ones who use them. For example, if you believe that agriculture, for example, will increase in the near future and that its connected industries have a higher growth potential than in general, you may want to consider investing in themed funds. These assets are also purchased as a form of insurance against the risks associated with the rest of the portfolio.

Investment topics are often used by mutual funds. In good times, fund houses offer programmes based on that sector's success. Between 2004 and 2007, fund firms hurried to develop infrastructure funds in order to cash in on the burgeoning infrastructure sector. In the end, the investing theme didn't pan out as predicted by history. Unfortunately, investors who acquired these funds saw their investments plummet in 2008 (after the U.S. sub-prime mortgage crisis), and some have yet to recover their losses. The infrastructure-themed funds of many fund companies were combined with other schemes, while others began diversifying their portfolios with stocks that are indirectly associated with the sector of the infrastructure.

Figure 13: Infrastructure sector trend



Returns expressed in absolute terms
(Source: ACE MF, PersonalFN Research)

3.4 Past Performance

We can see from the following table that the past performance of some theme funds may not be comparable to one another, making it difficult to compare them to a standard. Thematic funds have a tendency to follow their own unique cycle of performance. When selecting the holdings for each fund, the fund manager considers numerous valuation details. To begin, they determine whether or not the fund is relevant to the theme. Post this they conduct a valuation based on which an appropriate position is initiated within the portfolio. Some of the funds below have done extremely well *CESC Ltd.,Tata Communications, NCC Ltd., Container corporation of india, Adani Port & SEZ Ltd.* to name a few.

Table No. 6: Past Performance of Thematic Infrastructure Mutual Funds

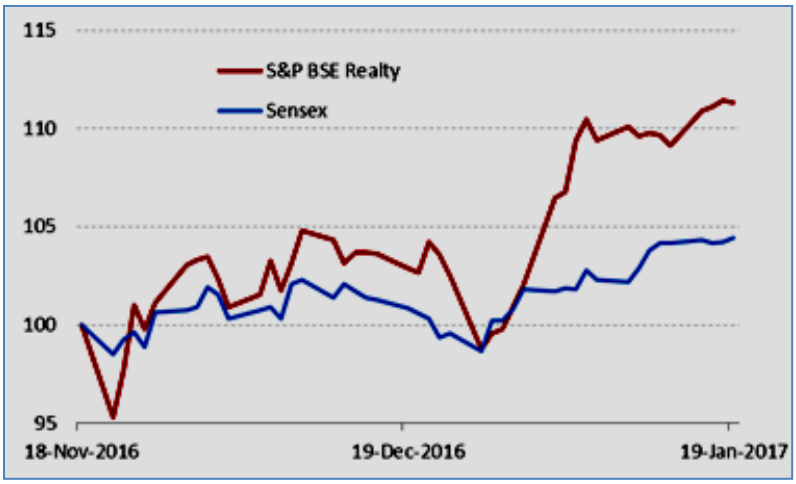
[Returns as on 20/4/2017]

Company	Sector	1-Month Return	1-Year Return	5-Year Return	10-Year Return
Adani Ports and Special Economic Zone Ltd.	Services	0.12	40.72	19.42	-
Adani Power Ltd.	Engineering	-16.31	-5.68	-14.15	-
Bharat Heavy Electricals Ltd.	Engineering	3.2	31.56	-7.02	-3.57
Bharti Airtel Ltd.	Communication	-1.99	-5.4	0.99	-1.84
Bharti Infratel Ltd.	Communication	11.95	-12.59	-	-
CESC Ltd.	Energy	7.38	76.08	27.02	8.91
CG Power & Industrial Solutions Ltd.	Engineering	8.66	44.15	-9.86	-4.04
Container Corpn. Of India Ltd.	Services	22.69	14.28	20.21	8.56
Engineers India Ltd.	Construction	4.68	86.64	4.72	15.21
GMR Infrastructure Ltd	Construction	-5.99	32.39	-11.42	-8.35
Idea Cellular Ltd.	Communication	-20.26	-28.52	-0.18	-1.85
IRB Infrastructure Developers Ltd.	Construction	3.46	14.44	5.43	-
JSW Energy Ltd.	Engineering	2.11	-8.92	2.83	-
Larsen & Toubro Ltd.	Diversified	7.6	33.22	13.71	11.66

National Thermal Power Corp. Ltd.	Energy	3.09	18.15	-0.39	0.3
NCC Ltd.	Construction	17.09	30.24	20.38	-1.38
NHPC Ltd.	Energy	2.45	31.83	9.66	-
Power Grid Corpn. Of India Ltd.	Energy	8.87	44.56	12.99	-
Reliance Communications Ltd.	Communication	-11.9	-37.74	-17.12	-22.55
Reliance Infrastructure Ltd.	Energy	-3.27	0.12	-0.14	1.07
Reliance Power Ltd.	Energy	-1.67	-9.5	-16.67	-
Siemens Ltd.	Engineering	2.12	9.21	9.17	9.36
Tata Communications Ltd.	Communication	-6.97	75.95	24.63	4.94
Tata Power Co. Ltd.	Energy	-0.81	22.99	-3.76	5.22

Source: Value Research.

Figure 14: Real Estate Stocks Rally



Returns expressed in absolute terms
(Source: ACE MF, PersonalFN Research)

Two years of economic stagnation have taken a toll on the infrastructure industry. Delays in land acquisitions and environmental clearances greatly hampered the project's progress. Slow announcements of new projects in all areas have slowed the order inflow.

Infrastructure enterprises were further hampered by a political gridlock, a high interest rate burden, and a lack of working capital.

According to the Care report, the order backlog to sales multiple was three times as high at the end of FY12. However, despite the fact that the order backlog to sales multiple appears to be acceptable, project execution remains critical. Fitch has also lowered its outlook for the industry to negative. Equity financing is becoming increasingly difficult for construction enterprises. In order to meet the financial responsibilities of BOT projects, several enterprises are increasingly choosing to borrow from their parents. With the exception of Build-Operate-Transfer projects, construction firms will be in a better position and can withstand pressures on working capital in this bleak environment.

A few of the major problems confronting the port industry include: long waits for approvals, tight budgets, and a poorly drafted and improperly administered tariff by TAMA (TAMP) Despite this, there are some encouraging signs for the industry. This will be aided by an expected recovery in the industrial capex cycle, a comeback in the equity market, and lower interest rates as a result of the CRR reduction.

As previously said, a fund's goal or real topic may be difficult to decipher from the fund name alone. The prospectus, investment aim, fund manager's background and historical performance in managing other funds all become relevant information to know before making an investment decision. Inexperienced investors may struggle to identify a suitable investment subject, so they should stick to diverse equities mutual funds when they first begin investing in the stock market.

The exposure to theme-based funds should be restricted to 10% -12% of a portfolio's total value, and only those themes that add value to it should be included.

Chapter IV

Literature Review

Chapter – 4

Literature Review

Literature means writings and a body of literature refers to all the published writings in a particular style on a particular subject. In research it is relevant as a collection of published information and data. The study of the literature helps the researcher in discovering or finding a gap between available researches. Literature also helps in generating original idea and justifies the relevance of one's proposed research.

4.1 Introduction

India's infrastructure has been underinvested, with a badly working metro system and electrical grids, putting the country's sluggish economy in jeopardy. According to the World Bank, growth slowed from 10.5 percent in 2010 to 4.8 percent in 2013. The World Economic Forum's most recent Global Competitiveness Report ranks India 85th out of 148 countries in terms of infrastructure. This has compelled India to invest in infrastructure development if it truly wishes to become a developed country.

"**Wojtek Buczynski, Fabio Cuzzolin, Barbara Sahakian**" in the research article named "**A review of machine learning experiments in equity investment decision making: why most published research findings do not live up to their promise in real life'' (2021)** proposes For executing the deal, middlemen (typically brokers) charge trading expenses. Brokers bring together a variety of market participants and find a "buy" for each "sell" and vice versa. Brokers receive a fee for their services. The cost of trading is an important factor to consider. They are getting smaller, but they are still not insignificant (especially for retail investors). The portfolio will lose money if the profit on a transaction is less (or equal) than the transaction cost (at best: break even). This logic will apply to every transaction and could mean the difference between a simulated profit (even if it looks stunning) and a real-life loss. The majority of the algorithms function with the implicit or explicit limitation of only going long (meaning that the weight w of any individual asset is 100 percent > = w >0 percent). Because the investor only makes money when the value of their portfolio (whether it is the entire market or a tailored portfolio) rises, profit chances are limited.

"**Giridhar Maji, Debomita Mondal, Nilanjan Dey, Narayan C. Debnath, Soumya Sen**" in research paper "**Stock prediction and mutual fund portfolio management using curve fitting techniques**" **(2021)** provides a revolutionary strategy for

constructing a mutual fund portfolio that will enhance profits over time while minimising risks. People that invest with the purpose of making a profit are usually looking for a higher rate of return over time. By examining historical data using regression analysis, the proposed methodology aids in the development of a stable portfolio over time. Experiments reveal that it outperforms or even outperforms India's top-performing mutual funds over long periods of time. The majority of research in this field focuses on predicting the price of particular stocks. We extend and reframe the problem by first identifying the various business sectors, then computing the price of each stock picked for these sectors, and finally grouping these stocks in such a cumulative manner that the investment risk is lowered while the percentage return improves. Portfolio managers can utilise the proposed method to benchmark mutual fund performance over a lengthy period of time. Though the experiment was conducted on data from the Indian stock market, it can be applied to other stock markets around the world. This paradigm has the advantage of being less reliant on skilled fund managers' buy/sell market timing. To increase profit margins, we have omitted the alternatives of purchasing on dips and selling on ups. Instead, we have focused on employing a buy-and-hold approach to make it more resilient to market volatility. Dividends are not re-invested in the framework for the sake of simplicity. We have proved that you may make a good profit with a lot less market timing and complicated financial indicator analysis.

"**Dr. R. K. Jain, Aditi Sharma**" in the study of "**Performance Evaluation of Growth oriented funds: A study of selected Thematic Infrastructural Mutual Funds in India**" **(2020)** stated Thematic mutual funds differ from sector funds in a few ways. It determines the theme and then invests in sectors and companies that fit that theme. Infrastructure funds gained popularity in 2006-07, when shares of corporations in sectors including housing, cement, and road construction soared as a result of the infrastructure boom. These Thematic Infrastructure Mutual Funds are a wonderful option for the average investor who wants to take a bigger risk while still getting a good return. The data used in the analysis included simple annual returns as well as the NAVs of direct investments across the study period. The research was conducted on the Nifty Infrastructure Index, which is the sector's specific index. Average Returns, Standard Deviation, Beta, Correlation, Sharpe Ratio, Treynor Ratio, and Jensen's Alpha were used to evaluate the performance of thematic infrastructure mutual funds.

According to article published in **Deloitte**, titled "**The Growing Private Equity Market'' (2020),** Further, the ability to meet infrastructure investment target of USD 1 trillion (INR 65,000 billion) will critically depend on successful reliance on an alternative

source of financing to bank loans (i.e. bond market) and implementation of fiscal consolidation as a means of freeing up bank lending and reducing upward pressure on interest rates. There are credible reasons to believe that the fundamentals of the Indian private equity market are sound. Our GDP continues on its upward trajectory, bringing continual increases in new investment opportunities in the infrastructure which would be required to maintain the growth momentum. Plenty of opportunities and long term potential in the infrastructure would keep attracting private equity to invest in it.

''Aditi Sharma , Dr. R.K. Jain, Neeraj Sharma'' in research article titled **''Forecasting returns and volatility of growth oriented thematic infrastructure mutual funds using Machine Learning and GARCH Neural Network Model'' (2020**) targeted at building a methodology for projecting Indian Mutual Funds' Net Asset Values and Volatility. For forecasting the NAVs, we used two separate machine learning approaches: auto regression (AR) and moving average (MA), as well as a deep learning strategy called stacked LSTM. For forecasting mutual fund volatility, we employed the Generalized Auto Regressive Conditional Heteroskedasticity (GARCH) model. The methods used for NAV forecasting are evaluated using Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), which show that when the time series data is less complex, i.e. the number of independent variables (impacting factors) is limited, machine learning-based approaches can provide better results.

"**Cyril Vanderhaeghen**" in his research paper titled "**Selecting Mutual Funds Using Machine Learning Classifiers**" **(2019)** A fund selection problem was solved using logistic regression, random forest, support vector machines, ensemble classifiers, and artificial neural networks. The probabilities produced by the models, which represent the models' prediction confidence in classifying the following time period returns as positive, were used to create a fund selection signal. Both previous returns-based features, volatility, consistency of returns and past returns, and alternative features to extract information from geography and investing style data, as well as capturing the length of existence of the funds, are among the explanatory variables we established. We used the models to back test a strategy for building a fund of funds portfolio on a universe of 10,415 funds from the Wharton Research Data Service's Survivor-Bias-Free US Mutual Fund database. Using characteristics computed prior to 04/2001, the models were trained to predict 3-month forward returns from 04/2001 to 07/2001; the accuracy on this training sample was quite high. They were then employed for a quarterly rebalanced approach for 15 years, from January 1, 2002 to December 31, 2017. The probabilistic signal was found to be useful in deciding which funds to invest in. When the models were tested without momentum-related variables, however, their accuracy could not be

statistically dismissed as random. As a result, the original models we created and trained could only collect momentum information within the explanatory variables, with no information coming from non-return-based features. Machine learning algorithms did not outperform a naive momentum fund selection technique statistically, but they did prove to be superior at correctly identifying funds that will provide positive returns over the following time period, regardless of the amount of the returns. Logical regression and artificial neural networks were the best-performing algorithms, probably because they both use the same mechanism to infer prediction confidence.

The support vector machine, on the other hand, performed the poorest; this could be because the method was not designed to produce a probabilistic result, making it less dependable. By strengthening the features engineering and selection aspect of the study, it can be extended and pushed even farther. The accuracy of the models may increase if less momentum-capturing features are used, and traditional financial indicators such as the fund's alpha or various financial ratios may add more information input. Incorporating the fees and transaction costs of the funds into the performance calculation or the features of the models would be an intriguing addition to the study. Although the alternative features we selected were unable to provide extra information, several studies in other fields demonstrate that non-financial data can include information. For example, because a fund's manager can change, a feature defining the fund manager's expertise and qualifications (Chevalier & Ellison, 1999) could be created as a time dependent variable. More cutting-edge machine learning techniques, such as generative models or reinforcement learning models, should also be considered, as they deviate from traditional finance models and have proven to be successful in other domains.

''Sunder Sankaran'' in book titled **''Indian Mutual Funds Handbook''** (2018) explains how mutual funds work, their operational and regulatory systems, the benefits and drawbacks of investing in them, as well as practical ways to personal financial planning. The author concentrated on mutual fund charges and burdens, as well as expenses and management fees. He also discussed NAV (Net Assets Value) in this book, including what it shows, how to calculate it, and how to analyse it.

In a blog published by "**Accenture'' (2018)** titled **''Construction and Industry X.0: Transform the core''** stated that the construction industry plays an important role in the development of a country’s infrastructure, which is a key engine of economic growth. Its significance to the Indian economy can be gauged by its growing contribution to gross domestic product (GDP)—from 5.1 percent in 2001–02 to 7.9 percent in 2010–11. Additionally, the construction industry creates an annual asset base of US$80 billion and

generates employment for more than 40 million people. By 2020, India is expected to emerge as the world's third-largest construction market. Large infrastructure investments and growing urbanization will fuel this growth. While the long-term outlook for the construction industry appears very positive, concerns have been raised about its immediate future. Rising interest costs, stagnating orders, a slowdown in new government projects and an increasing number of stalled projects are just some of the challenges the industry is facing. Against the backdrop of India's economic slowdown and the impediments to growth mentioned above, Accenture surveyed senior executives at leading engineering, procurement and construction companies, finance companies and developers. The objective was to identify the key priority areas, critical roadblocks and interventions expected from the government in the construction industry.

"**I. Jesibha Rani, Dr. S. Kumar Chandar**" in the paper titled "**A Study on Forecasting Mutual Fund Net Asset Value Using Neural Network Approach'' (2018)** focuses mainly on evaluating performance of the neural network model using NNtool simulation. In this model Feedforward Back propagation network was used to train the network and LM algorithm is used as the transfer function. Using LM algorithm the study gives a big impact to the mutual fund industry to forecast the NAV of the mutual fund for the unlimited data.

In a story published by *''***AakarRastogi'' (2017)** titled **''When will my Mutual Fund investment double?''** in **Economictimes.com** put insight in mutual fund and infrastructure sector. Infrastructure is the crucial part of the Indian economy; it's having a very large chunk in the GDP of the economy. The budget has a strong thrust on infra sector, especially roads and railways. Infrastructure mutual fund schemes investing in companies which are involved in construction work of roads, etc will definitely benefit. The budget has made a provision of Rs 2,41,387 crore in 2017-18 for transportation sector as a whole, including rail, roads, shipping. For 2017-18, the total capital and development expenditure of Railways has been pegged at Rs 1,31,000 crore. This includes Rs 55,000 crore provided by the government.

"**Kenneth D. Lawrence, Gary Kleinman, and Sheila M. Lawrence**" in the research paper "**Time Series Models to Predict the Net Asset Value (NAV) of an Asset Allocation Mutual Fund VWELX**" **(2015)** examines the use of various forms of time series models to predict the total NAV of an asset allocation mutual fund. In particular, the mutual fund case used is the Vanguard Wellington Fund. This fund maintains a balance between relatively conservative stocks and bonds. The purpose of this study is to develop a predictive time series model for the total NAV of a massive balanced asset

allocation mutual fund during a period of time when there is not a massive decline in the economy. The historical period chosen was the 24-month period beginning January of 201 and running through December 2011. The forecasting period is the first 3 months of 2012. The forecast of mutual funds with vast numbers of investments is certainly not the same as forecasting a single investment or a group of like investments. Forecasting net asset values of an investment structure consisting of a massive asset allocation of stocks in various industry groups, various types of bond investments, as well as both domestic and international investments presents a specialized type of financial forecasting problems.

"**Werner Kristjanpoller, Marcel C. Minutolo**" "**Gold price volatility: A forecasting approach using the Artificial Neural Network–GARCH model'' (2015)**. There are two primary contributions in this study. The first contribution is the confirmation of the ANN–GARCH hybrid model's capacity to forecast volatility. We were able to demonstrate improvements over traditional forecasting methods by looking at the method's forecasts of gold price volatility. Second, we developed a unique method for determining which financial variables had the most impact on gold spot and future price volatility. The results demonstrate that the ANN–GARCH model improves the forecast outcomes by 25% for gold spot price volatility and by 38% for gold future price volatility when compared to the GARCH model. When the Euro/Dollar, Yen/Dollar, FTSE variation, DJI variation, and oil price returns were used as input variables to the ANN, the best results were found in the 21-day volatility projections. Furthermore, when forecasting 14-day and 28-day future price volatility, the results reveal that including all variables in the model yields the greatest results.

"**Soheil Almasi Monfared, David Enke**" in the research paper titled "**Volatility Forecasting using a hybrid GJR-GARCH Neural Network Model'' (2014)** stated Volatility forecasting in the financial markets, along with the development of financial models, is important in the areas of risk management and asset pricing, among others. Previous testing has shown that asymmetric GARCH models outperform other GARCH family models with regard to volatility prediction.

''Singh Tribhuvan Pratap'' in research work titled **''*Performance Evaluation of Mutual Fund Segments in India: With Special reference to Sectoral Funds*'' (2014)** stated as a mobilise of savings for a layman, Mutual Funds really captured the public attention in the 1980s and 90s. As on March 2010 4.77 crores investors' accounts in India hold the investment in mutual funds. Instead of spending all your free time buried in the

financial pages of the Wall Street Journal, all you had to do was to buy a mutual fund and you'd be set on your way to financial freedom.

"**VivinaVishwanathan",** in an article published in **Live mint named "De-jargoned: S&P BSE India Infrastructure Index" (2014)** An infrastructure index cluster covers energy, transportation, telecommunications, and utilities, as mentioned globally. In India, however, Asia Index has added a fifth sector: non-banking financial companies (NBFCs). Only equities that fall into one of these five categories will be considered, and they will be further inspected. Only companies active in oil and gas drilling, equipment, services, storage, and transportation can be included in the index in the energy sector, for example. Similarly, airlines, airport services, motorways and rail tracks, and marine ports and services will be chosen in the transportation category. Only companies categorised as infrastructure finance companies by the Reserve Bank of India or companies that derive a significant portion of their revenue from infrastructure finance are included in the NBFC category. Equities with an average three-month daily value traded of less than 1 crore are omitted from the list of eligible stocks. The index is made up of the top 30 stocks by float-adjusted market capitalization (which only considers stocks that are widely available for trading), with a maximum of 10 stocks per cluster. When the number of components falls short of the target, the top non-constituent eligible stocks by float-adjusted market cap are added to bring the total number of constituents to 30. If the total number of eligible stocks falls short of 30, the next few non-constituent stocks are added. Because there are five sectors in the index, each one's weight is limited to 30% of the total. For example, the transportation sector will not account for more than 30% of the index's weight. In addition, at any given time, no single stock in the index will have more than a 10% weighting in the index. At each semi-annual rebalance, weight caps are applied. Investors, according to Asia Index, will pour money into infrastructure. And, because the BSE lacked an infrastructure index, a thematic index was created that included NBFCs that make money from infrastructure finance.

"Ro, S., Gallimore, P." in the paper "Real Estate Mutual Funds: Herding, Momentum Trading and Performance" (2014) The trading momentum and performance were assessed. For this study, data was collected from 159 Real Estate Mutual Funds during an 11-year period, from 1998 to 2008. Real Estate Investment Trust (REIT) equities, according to the study's findings, are more transparent than other stocks. The Centre for Research in Securities Pricing also provides monthly returns and month-end prices for stocks to the researcher. The CRSP/Ziman US Real Estate Data Series, which includes return series for individual REITs trading on the NASDAQ, New York

Stock Exchange, and American Stock Exchange, is used by the author for REIT equities. According to the findings, both rational and behavioural interpretations play a role in REMF investing decision-making."

''S. Narend'' in his research paper titled **''Performance of Exchange traded funds and Index Traded funds''** (**2014**) has done an empirical study in terms of three parameters- **i)** Tracking Error, **ii)** Active Returns and **iii)** Jensen's Alpha. The study shows that tracking error is higher for ETFs compared to Index funds. The Active return reveals that ETFs always outperformed their underlying index while the index funds have both Underperformed and outperformed. The study also reveals that Jensen's alpha is negative for both types of funds, which means that both ETFs and Index funds have not been able to provide excess return over the market however the Jensen's alpha is better for index traded funds than ETFs. The author examine both funds tracked S&P BSE SENSEX and CNX NIFTY. He has taken funds that have minimum 5 crore Rs. AUM that's why in this study only 3 ETFs have been examined. Those are:

- Goldman Sachs Nifty BeES
- Kotak Sensex ETF
- Kotak Nifty ETF.

The performance of ETFs and Index funds was measured by comparing their daily returns with the returns of the underlying indices. The tracking error of ETFs and Index funds was analysed to examine how closely the ETFs and index funds track their underlying indices. Tracking error was measured as the standard deviation of the difference between the returns of underlying index and the returns of the ETFs and Index funds. The further analysis was done to check whether ETFs and Index funds were able to generate better alphas. Jensen's alpha was used to measure the excess returns of a fund over the underlying index.

$$R_p - R_f = D_i + \beta\,(R_m - R_f) + e_t$$

''Narayanasamy, R. and Rathanamani, V.'' in article titled ***''Performance Evaluation of Equity Mutual Funds – On selected equity Large Cap funds'' (*** **2013)** The expansion and development of various mutual fund products in the Indian capital market has shown to be one of the finest catalytic instruments in creating significant capital market investment growth. Close monitoring and evaluation of mutual funds has become critical in this scenario. The main focus of this research was on the risk-return connection of a few large-cap equities mutual funds. The primary goal of this study is to examine the financial performance of chosen mutual fund schemes using statistical

characteristics such as (Alpha, Beta, Standard Deviation, R- squared and Sharpe ratio). This study paper's findings are useful in making future investment decisions.

''Nikhil Walavalkar'', (2013) in an article published in ''MoneyControl with ET Bureau'' titled **''Infrastructure Funds: Weak show, but many lessons for investors**'' stated that Infrastructure sector is in focus again. After being in the news for all depressing reasons, the sector has finally got some good news for investors: Be it the power tariff hikes in many states, allowing import coal price pass-through in power projects under public private partnership or the recent announcement of clearing projects worth Rs 1 lakh crore. Nobody can say that there is no positive news flow.

Edelen, R., Evans, R.Kadlee, G. in the research ''Shedding Light on ''Invisible'' Costs: Trading Costs and Mutual Fund Performance'' (2013) estimated that the expense ratio is one of the few reliable predictors of mutual fund performance and the growing market share of low cost index and exchange traded funds suggests that investors utilize this information when taking investment decisions. The vital question concerns how fund expenditures on trading costs relate to return performance. If funds are competent to recover these costs with better returns, these expenditures might improve overall performance. This however, does not appear to be the case. The researcher found a strong negative correlation between aggregate trading cost and fund return performance. The results of the study suggest that invisible trading costs have a negative effect on fund performance that is at least as material as that of the invisible expense ratio".

''Ferreira M., Keswani A., Miguel A., Ramos S.'' in this research paper **''The Determinants of Mutual Fund Performance: A cross Country Study'' (2013)** examined the performance and factors influencing the performance of mutual funds across the various countries. For this study data of open end actively actively managed equity mutual funds gathered from 27 countries. This research concluded that mutual fund underperform the market returns. The result of this study shows important differences in the determinants of fund performance in the USA and other countries across the globe. The US evidence of diminishing returns to scale is not a universal truth as the performance of funds located outside the USA and funds that invest overseas is not negatively affected by scale. The discoveries of this study recommend that the unfavourable scale effects in the USA are related to liquidity constraints faced by funds that, by virtue of their style, how to invest in small and domestic stocks. Country characteristics also make the difference in performance of the funds. Funds located in countries with liquid stock markets and strong legal institutions display better

performance. This study says that the performance of mutual funds depends on the style of mutual fund, the size of the stock invested by mutual fund companies and performance of mutual funds differ from country to country.

''Kumar, K.Phani, Rao, K.Sambasiva'' in research article **''A Study on Infrastructure Financing In India -International Global Research Analysis'' (2013)** Said Empirical research confirms that a country's economic advancement is dependent on the provision of adequate infrastructure. Infrastructure financing must be provided by both the public and private sectors, and the report underlines the role and potential of public-private partnerships in achieving the necessary goals. This article offers an analytical viewpoint on the pattern of infrastructure investment in a number of nations, with a focus on India. The paper discusses the various methods for funding infrastructure in India, with a focus on the Reserve Bank of India's aggressive engagement in the infrastructure finance sector. The requirement of rapidly scaling up infrastructure capacity – both in the public and commercial sectors (developers, contractors, consultants, financial intermediaries, and investors) – necessitates the development and implementation of large-scale projects in short time periods. Through project execution and new investment planning, the government's recent actions have begun to turn the tide in terms of private engagement. However, the Government's capacity to overcome regulatory ambiguity and clearance-related challenges in the infrastructure sector during the Plan term will be critical to meeting the private sector investment target. This would restore financial institutions' faith in infrastructure projects, alleviating their liquidity problems. It would also be beneficial to link government money to the effort of building PPP projects in order to incentivize the widespread usage of private sector participation in infrastructure. It would be necessary to establish a value for money framework that would be acceptable to the government and used to systematically benchmark private sector bids for each project.

Further, the ability to meet infrastructure investment target of USD 1 trillion (INR 65,000 billion) will critically depend on successful reliance on an alternative source of financing to bank loans (i.e. bond market) and implementation of fiscal consolidation as a means of freeing up bank lending and reducing upward pressure on interest rates.

"**Carhart, M.''** in the research "**On Persistence in Mutual Fund Performance'' (2012)** tested the performance of mutual funds with respect to expense to expense ratios, portfolio turnover, and load fees. The findings of this study enlightened that the expense ratios, portfolio turnover, and load fees are significantly and negatively related to

performance. Expense ratios appear to reduce performance a little more than one to one. Turnover reduces performance about 95 basis points for every buy and sells transactions. As per this study depict that the average load fund underperforms the average no load fund by approximately 80 basis points per year.The confirmation of this article recommends three important rules of thumb for wealth maximising mutual fund investors first, avoid funds with persistently poor performance; second, funds with high returns last year have higher-than-average expected returns, but not in years thereafter and the last, the investment costs of expense ratios, transaction costs, and load fees all have a direct, negative impact on performance."

An article published by **''Amar Pandit''** in **''Rediff.com''** on **''How to compare mutual funds'' (2012)** elaborated many concepts on the same. If we do an analysis of variety of stocks owned by the infrastructure funds, you will notice that most of these funds own same stocks. For example, all the funds in this category have invested in Reliance. For four of the five funds, Reliance is their preferred stock and has the highest investment as compared to the other stocks they have put their money in.

Some schemes, though, have concentrated holdings (this means they have invested in a fewer number of stocks, but have put more money in each stock) than the others. Prudential's infrastructure fund, for example, is the most concentrated with as few as 34 stocks. Tata and DSP ML's, in this order, are the most diversified and have more number of stocks. The common stocks that most of these infrastructure funds have invested in are Reliance, BHEL, Bharti and ONGC; Sundaram, in fact, is the only fund that does not have Bharti and ONGC in its portfolio. No mutual fund invests its corpus -- this is the total amount it has available for investment -- at one go. It always holds some of this money as cash so that it can buy stocks from good companies in case the stock market crashes.

The flip side, however, is when the market does not crash, these funds remain idle. That is, they don't earn any returns, which is the reason why investors put their money in mutual funds in the first place. The performance of such funds suffers if funds remain idle. In terms of cash holding (this refers to the amount of money a fund prefers to keep as cash) Prudential ICICI holds 16 per cent of its funds in cash. Tata has at 10 per cent of its funds in cash and DSP ML has 5 per cent of its funds in cash.

The first three funds are well diversified across different sectors and have more stocks belonging to the capital goods, housing and construction sectors. They also have banking stocks such as HDFC Bank, ICICI Bank and others. However, banking stocks do not find any place in Sundaram and UTI's portfolio. Although in small quantities, it's surprising to

see non-infrastructure or not even closely linked stocks such as TCS, HLL and HCL in Sundaram's CAPEX portfolio inspite of it being an infrastructure fund**.**

"**Bansal, S., Garg, D., Saini, S.** in the study "**Impact of Sharpe Ratio &Treynor's Ratio on selected Mutual Fund Schemes'' (2012)** discussed in his study about the Sharpe, Treynor's and Jensen's alpha renowned measures to evaluate the performance of mutual funds, out of these three measures author has selected the first two measures i.e. Sharpe and Treynor's ration the study. This paper examines the performance of selected mutual fund schemes, that the risk profile of the aggregate mutual fund universe can be accurately compared with a simple market index that offers comparative monthly liquidity, returns, systematic and unsystematic risk and complete fund analysis by using the special reference of Sharpe ratio and Treynor's ratio. The fluctuating characteristics of the mutual fund schemes in the benchmark portfolio allows to evaluate the appropriate required rate of return and switch it as of market returns. This investigation created a number of unique predictions about the cost of capital of different mutual fund schemes with the assistance of distinctive models and its impact on alternatives investment analysis for the investors in the most fluctuated capital market scenario.

"**Nanigian, D**. in the study "**Advice on Mutual Fund Selection'' (2012)** assess the variety of mutual funds. The excess of experimental studies has acknowledged that, unlike most other goods or services, the mutual funds with higher expenses are giving lower returns. This study makes investor believes that a passive investment strategy beats an active strategy and due to this belief popularity of index fund investing increase tremendously. The study examined the academic research findings on other features of mutual funds that extensively predict future performance."

"**Bhojraj, S., Cho, Y., Yehuda, A**. "**Mutual Fund Family Size and Mutual Fund Performance: The Role of Regulatory Changes'' (2012)** examines the previously documented positive association between fund family size and fund performance is affected by regulatory changes (i.e., Regulation Fair Disclosure (Reg FD), the Global Settlement (GS), and increased scrutiny as a result of trading scandals that have occurred in the most recent decade. Using Reg FD as a beginner point for these structural changes, author revealed that, while fund family size was positively associated with fund performance in the period prior to the regulatory changes, this advantage is weaker in the period subsequent to the regulatory changes.

''Dhanda, S.K., Batra, G.S. and Anjum, Bimal'' stated in his research paper named ***''Performance Evaluation of selected open ended mutual funds in India''*** (**2012)** he

performance evaluation of selected open ended schemes in terms of risk and return. Mutual fund industry is doing every effort to attract the investors to invest in mutual funds by offering innovative schemes. Moreover investors have great expectations from mutual fund industry. So, this paper is an attempt to study the performance of mutual funds in the frame work of risk and return during the period 1st April, 2009 to 31st March, 2011. The main focus of the study is to examine comparative performance of selected open ended schemes and BSE 30 in terms of risk and return and to know whether the mutual funds are able to provide reward to variability and volatility.

"**Sarish** in the study "**A study of Opportunities and Challenges for Mutual Fund in India : Vision 2020'' (2012)** done the definite investigation of mutual funds with respect to the benefits of investing in mutual funds and drawbacks of investing in mutual funds. This paper has relied on secondary data in order to recognize and examine the challenges and opportunities for mutual funds. According to the exploration done by author mutual fund sector is one of the quickest growing sectors in Indian Economy and have awesome potential for sustained future growth. Mutual funds make saving and investing simple, accessible and affordable. The merits of mutual funds include professional management, diversification, variety, liquidity, affordability, convenience and ease of recordkeeping as well as strict government regulation and full disclosure. Booming stock markets & innovative marketing strategies of mutual fund companies in India are influencing the retail investors to invest their surplus funds with different schemes of mutual fund companies with or without complete understanding of Mutual Funds.

"**Bihari, S., Shukla, S**. in the research "**Financial Literacy: Mutual Funds'' (2012)** elucidated about the financial literacy. As per this study the mutual funds offer a safer, easier and more convenient style of investment, yet at the same time the Indian investor doesn't like it at all, one of the primary reasons behind this lack of interest in mutual funds is the Financial Illiteracy of Mutual Funds among Indian Investors alongwith Low customer awareness levels. In developed financial markets, Mutual Funds have overtaken bank deposits and total assets of insurance funds. The mutual funds, instead, offer a style of investments, but still the Indian investor did not welcome it. In this research author has given more focus on the demographics of investors with reference to financial literacy."

"**Vasudevan, R., Peermohaideen**. In the study "Investors' **Perceptions of Mutual Fund Risks an Empirical Study'' (2012)** analysed the investors perceptions of mutual fund risks in the study. According to the findings of the research, 56.58% of the investors have opined that the mutual fund has moderate risk and 63.48% of the unmarried investors have opined that the mutual fund has low risk. The majority of the investors whose age

is more than 60 years, 63.33% opined that risk refers to both loss of principal and as well as income. According to this study, most of the investors were just satisfied with respect to the return on the Funds".

According to **HDFC, Retail Research Article (2012) ,** Indian Mutual Funds there are the thematic categories such as Contra, Dividend Yield, Infrastructure, MNCs, PSUs and Shariah that follow certain themes and their returns depends on the performance of the theme wherein they invest in, unlike a diversifies fund which moves in line with the broader markets. It is to be noted that thematic funds are more volatile than the diversified schemes as the risk in the latter is low due to the allocation in the securities in many industries. Thematic funds are good for a short to medium term investment especially when broader markets look weak. Hence thematic funds are high risk high return investment and suited only for higher risk profile investors.

"**E. Priyadarshini and A.Chandra Babu**" conducted a relevant study in "**A Comparative Analysis for forecasting the NAV's of Indian Mutual Fund using Multiple Regression Analysis and Artificial Neural Networks'' (2012)**. In this paper depicts the fact that Neural Networks outperforms Multiple Regression Analysis in forecasting the Net Asset Values of the mutual funds. The forecasting ability of models is accessed on the MAE, MSE, RMSE, MAPE and MPE. The field of neural networks has diverse opportunities for future research in the field of management. The future scope for the research is to improve further the performance of Neural Network, for this application, perhaps through better training methods, architecture selection, or input values.

''Deepa Venkatraghavan'' in book titled "**Step by step guide to start investing**" (**2011**) has explained what is mutual fund, its regulatory frame work, types of mutual funds and finally leads to building a portfolio. It covers all aspects of investing in mutual funds. It's a worth reading book for beginners in mutual funds industry.

"**Puri, H.** in the paper "**Performance Evaluation of Balanced Mutual Fund Schemes in Indian Scenario'' (2010)** evaluated the performance of Balanced Mutual Fund schemes. The Indian mutual fund Industry has developed massively. Now it has plethora of schemes, each and every scheme has different investment objectives and investor can select the scheme as per their knowledge and requirement. This present study has the aim of finding out the necessary facts regarding the performance of selected balanced growth and balanced dividend schemes, which can advantageously to the investors and fund managers. Return-Risk Analysis, Sharpe Measure, Treynor's Measure and Jensen Alpha these are the tools used by the researcher to evaluate the performance of Indian mutual

fund selected balanced schemes. Indian mutual funds investors have ambiguity related to the choice of investment in mutual funds due to the plethora of schemes are available in the market. To select a mutual fund scheme is as difficult as investing in the stock market. The study focused on the analysis of mutual fund performance. As per the study in the volatile market mutual fund is one of the best investment endeavour for the investors."

''Kayezad E. Adajania'' in the article titled **''Mutual Funds Network Strategies On New Plans'' (2010)** According to the statement, most mutual funds work on the premise of diversity since diversification allows us to distribute risk while also allowing us to make wise returns. These funds are called Sartorial funds if the diversification is done exclusively for a few (1-2) sectors, and Thematic funds if the diversification is done on the basis of a common topic.

Mishra, et al., published scholarly article on "**Role of Mutual Fund in India: An Empirical Analysis'' (2009)** measured mutual fund performance using lower partial moment. In this paper, measures of evaluating portfolio performance based on lower partial moment are developed. Risk from the lower partial moment is measured by taking into account only those states in which return is below a pre-specified. "target rate" like risk-free rate.

''Subha, M.V., Bharti, Jaya,S.'' In research paper titled **''An Empirical Study on the Performance of Selected Mutual Fund Schemes in India'' (2007)** stated **the** mutual fund industry has witnessed enormous growth in terms of size, operations, investor base and variety of schemes. It is further expanding in tune to the needs of the investors and market pressures. At this juncture there is a need for the mutual fund investors to evaluate the performance of schemes before deciding on investing. This paper attempts to evaluate select Indian open ended mutual funds schemes by using such measures to throw light on the risk and return of the schemes. A cross section of various types of schemes is taken for analysis by considering their NAVs. The main purpose of the paper is to determine the performance of selected open ended mutual funds schemes using various statistical measures like Sharpe Ratio, Tryenor Ration and Jensen's Differential measures.

''Acharya and Sidana'' (2007) published research article titled **''Classifying Mutual Funds in India: Some Results From Clustering''** to classify hundred mutual funds employing cluster analysis and using a host of criteria like the 1 year total return, 2 year annualized return, 3 year annualized return, 5 year annualized return, alpha, beta, R-

squared, Sharpe's ratio, mean and standard deviation etc. The data is obtained from Value research online. They do find evidences of inconsistencies between the investment style/objective classification and the return obtained by the fund.

"**Tae Hyup Rohd**" conducted research on "**Forecasting the volatility of stock price index'' (2007)**. This study proposed the hybrid model between the ANN and financial time series models to forecast volatilities of stock price index. It specified that ANN-time series models can enhance the predictive power for the perspective of deviation and direction accuracy. Experimental results showed that the proposed hybrid NN-EGARCH model could be improved in forecasting volatilities of stock price index time series. Of course, there are still many tasks to be done for the hybrid ANN-time series model. These NN-time series models should be further tested for robustness by applying them to other problem domains.

Rao, D. N. in the study "**Investment styles and Performance of Equity Mutual Funds in India**" **(2006)** 419 open-ended equity mutual fund schemes were chosen, and the financial performance of these 419 open-ended equity mutual fund schemes was compared to the two leading investing strategies from April 1, 2005 to March 31, 2006, to see if the differences in performance were statistically significant. Monthly compounded mean return, risk per unit return, and Sharpe ratio were chosen as the variables to examine financial performance. The preferred factors were used to evaluate the financial performance of the 21 Open-ended Equity growth plans and 21 Open-ended Equity dividend plans. Growth plans produced larger returns than dividend plans, but at a higher risk, according to the study. Furthermore, 17 Growth plans outperformed parallel Dividend plans offered by the same Asset Management Companies, while just one Dividend plan outperformed its corresponding Growth plan. When the Sharpe ratios of Growth plans and the comparable Dividend plans were compared, it was discovered that 18 Growth plans out of 21 9 (about 90%) had greater risk adjusted excess returns, indicating that growth plans are more likely to compensate investors for taking on more risk. The correlation coefficient between the returns of the two plans was found to be moderate, i.e. 0.5290, and the F-test (1-tailed test) suggested that the variances of the returns of the two plans had a low likelihood, i.e. 0.3753. Furthermore, at confidence levels ranging from 0.40 to 0.0005, Student's t-test (1-tailed test) resulted in the rejection of the null hypothesis and acceptance of the alternate hypothesis, implying that equity growth funds provide higher returns than equity dividend funds, and the differences were statistically significant."

"**Anand, S., Murugaiah, V**.in research "**Analysis of Components Of Investment Performance –An Empirical Study Of Mutual Funds In India''(2006)** made an attempt to evaluate the components and sources of investment performance in order to characterize it to specific activities of Indian fund managers. It also endeavours to recognize a part of observed return which is due to the capability to pick up the best securities at a given level of risk. For this reason author has adopted the Fama'smethodology. The data for this study taken for 4 years, i.e. the period between April 1999 to March 2003 and evaluates the performance of mutual funds based on 113 selected schemes having exposure more than 90% of the corpus to equity stocks of 25 fund houses. The experimental results reported here disclose the fact that the mutual funds were not able to compensate the investors for the additional risk that they have taken by investing in the mutual funds. The study concludes that the influence of market factor was more severe during negative performance of the funds. It can also be observed from the study that selectively, expected market risk and market return factors have shown a closer correlation with the fund return.

Rao, S. in the research "**Performance Evaluation of Indian Mutual Funds'' (2003)** evaluated the performance of Indian Mutual Fund Schemes during a bear market through relative performance index, risk-return analysis, Treynor's ratio, Sharpe's ratio, Sharp's measure, Jensen's measure, and Fama's measure. The data were taken for the study for 3 years and 8 months. Monthly Closing NAV's taken into consideration for the research. During that period, total 433 schemes were available and out of 433 researchers have taken 269 open ended schemes, The deviation is again due to the fact that Rm<Rf. The study came up with the logical conclusion that 58 out of 269 open ended mutual funds have provided better returns than the market during the bear period of September 98-April-2002, some of the funds provided excess returns over expected returns based on both premiums for systematic risk and total risk."

''G Raghuram et al'' in "**Infrastructure Development and Financing – Towards a Public Private Partnership** (**1999)** articulated Infrastructure development and financing have been recognized as key areas which need attention for enhancing the competitive advantage of India. Provision of infrastructure facilities, traditionally in the government domain, is now being offered for private sector investment and management in most countries. India has joined this trend, which has been reinforced by the resource crunch faced by government. The book aims to provide senior executives of organizations involved in infrastructure development and financing – including government, banks, financial institutions, infrastructure providing organizations, including sectors like power, telecommunications, transportation, urban system etc. – the perspectives, concepts, and

skills necessary to structure, unbundle appraise, finance, and implement infrastructure projects.

''Jayadev, M.'' in paper **''Mutual Fund Performance: An analysis of monthly returns'' *(*1996)** studied the performance of two growth oriented mutual funds [Master gain and Magnum (SBI)] has been evaluated on the basis of monthly returns compared to benchmark returns. Aim of the paper has been classified as follows:

i) Whether the growth oriented mutual funds are earning high returns than the benchmark returns in terms of risk.

ii) Whether the growth oriented mutual funds are offering the advantages of Diversification, Market Timing and Selectivity of securities to their investors.

In order to achieve these aims following measures have been adapted by the author.

- Jensen's Measure
- Reward to volatility and
- Reward to Variability

"**W-CChiang, TL Urbana**" stated in research paper "**Neural Network Fund Net Asset Approach to Mutual Value Forecasting'' (1995)** explained a back-propagation neural network has been applied to forecast the NAV for US mutual funds--specifically a three-layer network has been provided with 15 neurons in the input layer, 20 neurons in the hidden layer, and 1 neuron in the output layer. Bias neurons as well as the use of momentum have decreased the training time and improved the quality of the results. The parameters of the network were fine tuned to their best values.

''Barua and Varma'' in a report published an article on "**A Regulatory Framework for Mutual Funds'' (1991)** and evaluated the performance of master share (1987-1991) using CAPM approach from the view point of large investors, small investors and from fund management. The study had used ET Index as a proxy for market behavior. The risk adjusted performance is measured by using Sharpe, Jensen and Treynor measures. They used capital market line to study the risk return relationship of the fund from the prospective of large investors and security market line for small investors. The study concludes that the fund performed better than the market for small investors and fund management but the fund did not do well when compared to CML.

''T.E. Cranshaw'', in an article named "**The Evaluation of Investment Performance'' (1977)** presents a new way of viewing performance results. He attempted to rate the performance of mutual funds on a characteristics line graphically. The steeper the line, the more systematic risk or volatility a fund possesses. By incorporating various concepts, he developed a single line index, Tn, called Treynor index. The systematic risk is risk which is common to all securities of the same class in the market. His index measures the risk premium of the portfolio, where risk premium equals the difference between the return of the portfolio and the riskless rate. The risk premium is related to the amount of systematic risk assumed in the portfolio, the higher the value of Tn, the better the performance of fund.

''William F. Sharpe'', published renowned article on **''Mutual Fund Performance'' (1966)** illustrates how the expected return on an efficient portfolio and its associated risk (unsystematic risk) are linearly related in a modern portfolio theory framework. He created a Sharpe index by combining multiple notions. In this article, he attempted to rank the performance of the risky portfolio and the risk-free asset, with the risk-free asset having the highest reward-to-variability ratio. The unsystematic risk is linked to a lack of security as a result of ineffective management. He also looked at 34 open-end mutual funds (from 1954 to 1963) and discovered that the Sharpe ratio varies a lot, ranging from 0.78 to 0.43. He suggests that the cross-sectional variation is either random or related to excessive fund expenses, or that the difference is due to management skills.

Chapter V

Research Methodology

Chapter – 5

Research Methodology

5.1 Introduction

In this chapter the steps which will be taken for the study are clearly stated. The chapter is dealing with the Problem identification, Research Design, Title of the problem, Objectives of the proposed study, Significance of the study, Hypotheses to be tested, data collection methods, type of research, Sampling Frame, Tools and Techniques of research, Period of study, Financial Tools of Analysis, Scope and limitations of study, Research Gap identified in proposed field of investigation are discussed.

5.2 Problem Identification

In the all over the world it is being considered that which country's infrastructure is providing the best services that country is a developed country. Ours country is a developing country and still developing in the terms of infrastructure. Government is proactively encouraging private sector investments to speed up development. This move has enabled many private sector companies to intensify their focus on the development of urban infrastructure.

In the existing literature it has been found that there is no much holistic research has been done in the area of the performance of Thematic Infrastructural Mutual Funds in Indian market. Because of the huge interest of government and private sector towards the infrastructure sector it becomes mandate to study the performance of these funds.

5.3 Research Design

Descriptive research design is adopted for this research study. The research design is the outline within which research study is conducted and builds up the blueprint for the collection and measurement of data, statistical and financial tools for assessment and research variance. Research design, integrated a sketch out of what the researcher will do from writing the hypotheses and its operational

inference of the final analysis of data. The researcher decided a proper plan of action and discovers variables. Variables are also recognized as dependent or independent variable. Researcher, identify the research process and scrutinizing of the data.

5.4 Title of the problem

"PERFORMANCE EVALUATION OF GROWTH ORIENTED THEMATIC INFRASTRUTURE MUTUAL FUNDS"

5.5 Objectives of the proposed study

1. To evaluate and compare the performance of Infrastructure (G) funds of selected companies of Infrastructure sector.

2. To compare the *returns* of Growth oriented Thematic Infrastructure Mutual Funds Vis –a-Vis the Benchmark returns. With the help of Sharpe Model and Treynor's model, Jensen alpha model and R – squared ($R^{2)}$

3. To study the impact on fund's performance with reference to Nifty Infra Index. Which is the Benchmark of our study.

4. To evaluate the efficiency of TIMF in managing their investment portfolios in terms of input costs and output returns/net assets.

5. To provide an insight to a common investor in Infrastructure sector.

5.6 Significance of Research

A mutual fund is one of the most popular investment avenues now a day. After 2003 there is triumph growth in the mutual fund industry. The investor has less knowledge and exposure of capital market can reap more benefits through a mutual fund. Then too Infrastructure mutual funds are new to Indian investors, and its important to know about this new tool of investment so that our country can be independent on its own funds to develop our nation's infrastructure.

5.7 Hypotheses to be tested

H01: There is no significant difference in the average return (performance) of selected infrastructure thematic schemes during period 2014-19.

Ha1: There is significant difference in the average return (performance) of selected infrastructure thematic schemes during period 2014-19.

H02: There is no significant difference in the mean rank (performance) of selected infrastructure thematic schemes during period 2014-19.

Ha2: There is significant difference in the mean rank (performance) of selected infrastructure thematic schemes during period 2014-19.

H03: There is no significant correlation in various parameters related to evaluation of performance of selected infrastructure thematic schemes during period 2014-19.

Ha3: There is significant correlation in various parameters related to evaluation of performance of selected infrastructure thematic schemes during period 2014-19.

5.8 Data Collection

Data collected from secondary sources which includes indices, credit rating agencies, broking firms, Mutual Fund managers' blogs, Investment websites, Union Budget 2017, Planning commission report, SEBI , RBI, AMFI handbooks, News Papers (NAV), Trade Journals, Government agencies, websites of respective firms, moneycontrol, valueresearchonline, industry news and developments will be used to collect authentic information to substantiate the primary data and to reach one logical conclusion.

5.9 Type of Research: Descriptive Research

5.10 Period of the study: January 2014 -15 to December 2019 (5 years)

5.11 Sampling Frame:

Population: Equity Shares of companies which are listed in the stock market (NIFTY) under the category of Thematic Infrastructure Mutual Funds.

Sampling Unit: Thematic Infrastructure Mutual Funds (Equity)

Sampling Method: Multistage Sampling

Sample Size: Top (5 CRISIL Ranked) companies of the industry.

5.12 Tools and Techniques of Research

5.12.1 Method of Data Analysis

SPSS (Version 20) software is used for various techniques/tools of analysis, such as Correlation, Mean and Standard Deviation, Reliability Testing, Regression, ANOVA for the analysis of tabulated data. A 5% level of significance would be acceptable for establishing the strength of the hypothesis whether it holds or not.

5.12.2 Secondary Data Analysis

For the study, nineteen funds taken into consideration. The study throws light on the comparison of these 19 funds risk- return profile together with the benchmark risk return. The study is evaluating the performance of the nineteen funds with the help of evaluation tools such as Average return, Sharpe, Treynor, Jensen's Alpha, returns from 2014 to 2019, standard deviation and beta etc.For the study data is collected for 5 years, which starts from January 2014 to December 2019.

The filtering process of funds are as follows – first the funds are filtered as per the AUM managed by them, Second equity funds are selected for all the funds , third the study period is five years of all selected funds, fourth, growth in the selected funds, category of the funds is index, scheme benchmark – NIFTY for all funds. There are three type of risk profile risk profiles are available in funds, Low , medium and high.

For the study high risk is selected for all the funds. For the study data has been extracted from AMFI, NSE, respective funds company, moneycontrol, valuresearchonline, SEBI Handbook, RBI Handbook, AMFI Handbook, Newspapers (NAVs), trade journals, Government Agencies, monitoring industry news, and developments will be used to collect authentic information to substantiate the primary data and to reach on logical conclusion. Evaluating historical performance of mutual funds is significant for investors. It enables investor to access how much return has been generated by the fund manager and what risk level has been assumed in making such returns. Further an investor can also calculate the comparative performance of different schemes.

5.12.3 Financial Tools for Analysis

The study evaluates the performance of the nineteen funds with the help of evaluation tools such as Average Return, Standard Deviation, Beta, Sharpe Ratio, Treynor Ratio, Jensen's Alpha, Coefficient of variation and Returns from 2014.

5.13 Scope and the limitation of the proposed study

Data for this research is taken from five years. The study emphasis, only on performance of equity shares in Infrastructure sector's mutual funds. This study will be limited to India's Infrastructure mutual funds only. The study is based on the sample selected from Equity shares dealing in Infrastructure sector and the inferences or findings are applicable to the investors dealing in the sector and similar population.

5.14 Research gaps identified in proposed field of investigation

In the existing literature it has been found that there is no much holistic research has been done in the performance analysis part, the impact of fund management style on the performance of funds has not been considered, investor's, distributor's, or mediator's perspectives are also not being touched.

Chapter VI

Data Analysis and Interpretation

Chapter – 6

Data Analysis and Interpretation

6.1 Introduction

Investment decisions are prejudiced by numerous intentions like earning standard returns, capital appreciation, well-being of principal, to prevaricate against inflation, pride of owing something, to exhibit their wealth etc. Investors are generally predisposed by the primary financial motive of earning a return on their investment. For the sake of earning returns investors have to perpetually take some risk and investment decision consequently is a trade-off between risk and return. Assessment is an evaluation of performance. Whether the investment action is carried out by individuals or through mutual funds or portfolio managers, evaluation of the performance becomes essential. Performance Evaluation of the selected mutual fund schemes is carried out in this section under the following heads:

- Risk – Return Analysis
- Risk-Adjusted Performance Analysis
- Sharpe Ratio
- Treynor Ratio
- Jensen‟s Alpha

Every single mutual fund has its particular venture objective such as wealth indebtedness, extraordinary existing revenue or money market earnings. A mutual fund commonly states its own venture objectives and stakeholders as a fragment of their individual venture strategies indicate the appropriate mutual fund for investment.

The performance of the mutual fund products develops more multifaceted in framework of accepting both hazard and return extent whereas benevolent due significance to investment objectives. The portfolio administrator deals with the progression of selecting securities from the amount of prospects accessible with dissimilar anticipated returns and booming different intensities of risk. The choice of securities is thru with a vision to afford the financiers the extreme revenue for a

certain level of risk or safeguard slightest risk for a specified level of profit. Accordingly the portfolio administrator ought to have the aptitude to originate above ordinary returns for a certain risk class; entirely spread the assortment to exclude entirely disorderly risk.

Principal prerequisite can be accomplished either through loftier judgement or greater security assortment. A portfolio executive can pick extraordinary beta securities throughout a time when he ponders the market will accomplish glowing and truncated (or deleterious) beta stocks at a stretch while he considers the market will execute unwell in that way originating beyond ordinary risk-adjusted returns.

Contrariwise, a portfolio executive can attempt to select belittled stocks or bonds for a particular risk class. Subsequent prerequisite demands that one must be competent to entirely differentiate all disorganized risk. We can quantity the level of variation by work out the association between the returns of the portfolio and the market portfolio. The models concocted by Sharpe, Treynor and Jensen have been pragmatic to appraise the performance of sample mutual fund schemes. The performance amount proposed by Treynor (1965) is grounded on the perception of individualities ranks. It is construed as testifying the incentive (return minus the risk-free amount) in relative to a logical risk, i.e. beta risk.

The performance extent progressed by Sharpe (1966) is established on capital asset pricing model (CAPM). It is a superfluous return received in excess of risk free return per unit of risk convoluted i.e. per unit of standard deviation. The Sharpe size regulates portfolio performance by overall risk moderately than beta risk. Sharpe's lucidity for familiarizing overall risk instead of beta lies with the hypothesis behind the beta risk.

Beta risk undertakes that a portfolio is fine differentiated with no enduring diversifiable risk. Sharpe contends that a portfolio administrator who does not embrace a well-diversified portfolio should be reprimanded for uncovering returns to diversifiable risk. Henceforward, the Sharpe amount amends portfolio return for overall risk which embraces mutually organized (beta) risk and diversifiable risk.

In general, if mutual funds or other portfolios are diversified sound, the Sharpe and Treynor procedures will stretch them the identical grades. A below par diversified portfolio could have an upper grade under the Treynor measure than for the Sharpe measure.

The Jensen's classic study (1968) practices the specific line assessed by the market model where the CAPM is its standard. It is the regression of superfluous return of the scheme with additional return of the market, stand-in as dependent and independent variable correspondingly. The Jensen's alpha can be used to exuberant portfolios inside peer clusters. Advanced constructive value of alpha designates its improved performance. The Jensen alpha engenders very comparable rankings as does the Treynor index merely for a set of equivalent portfolio betas. In general, the Jensen alpha yields diverse rank than does the Treynor index.

Amid the above performance measures, Sharpe measure that contemplates whole risk accompanying with reserves is appropriate for minor investors, as the conventional investors lack the required expertise and possessions to expand. Nevertheless, Treynor measure and Jensen Model use organized risk grounded on the hypothesis that the disorderly risk is diversifiable. These models are appropriate for huge investors like organised investors with extraordinary risk taking aptitudes as they do not aspect scarcity of funds and can capitalise in a quantity of opportunities to thin some risks. Accordingly mutual fund schemes which underachieve bestowing to Sharpe measure may leave behind according to Treynor measure as Treynor measure takes into explanation only orderly risk where Sharpe measure has to ruminate whole risk.

6.2 Risk – Return Analysis

Return is the primary motivating force behind any investment decision. It represents the reward for undertaking the investment and the risk inherent therein. Since the game of investing is about returns (after allowing for risk), measurement of historical returns becomes very essential to judge the performance of the investment manager.

Return =

$$\frac{(\text{Value at the end of the period - Value at the beginning of the period}) + \text{Dividend}}{\text{Value at the beginning of the period}} \times 100$$

Risk:

It refers to the possibility that the actual outcome of an investment will differ from its expected outcome. Risk also refers to variability or dispersion. The wider the range of possible returns, the greater the risk. The widely used measures of risk in portfolio evaluation are Standard Deviation and Beta.

Standard Deviation:

The standard deviation, a measure of dispersion, is the square root of the mean of the square of deviations around the arithmetic mean.

Beta: Beta of a fund measures its past price volatility relative to a particular stock market index.

6.3 Historical Returns : Sectoral / Thematic Fund Performance

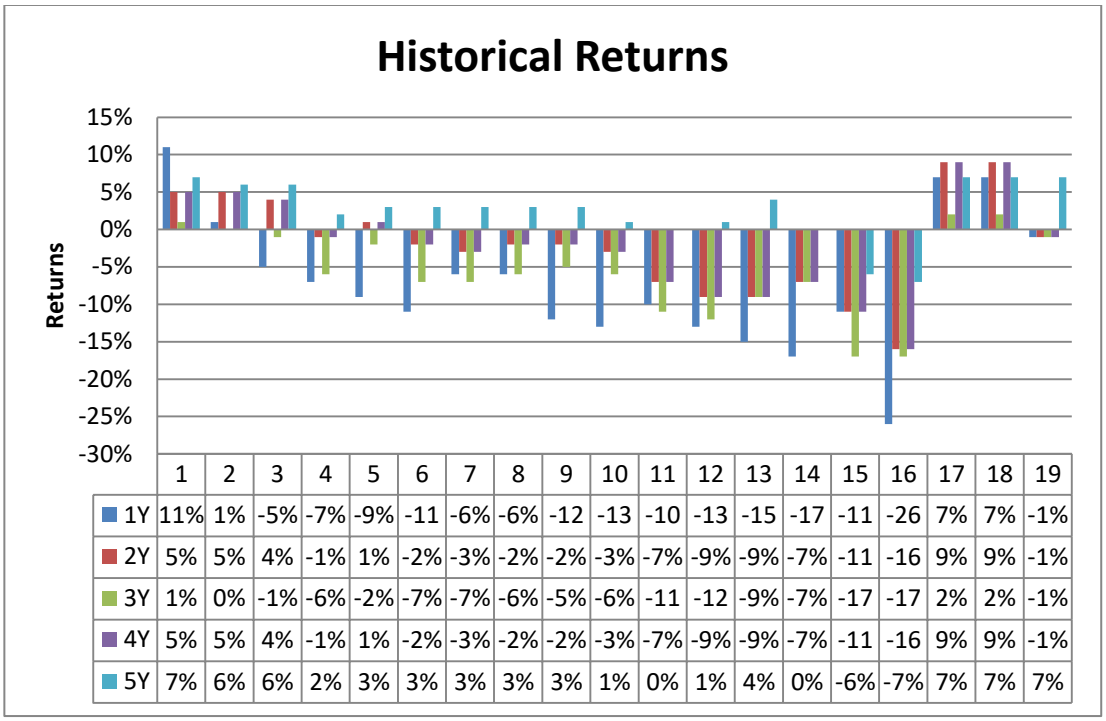
Following table presents historical returns of selected Thematic mutual fund schemes along with their Crisil rank, AUM values, return in different period of time i.e. one week, one month, quarterly and semi-annually basis and then annually basis. Further their returns in past two, three and five years have been also summarized in the table below.

Table No. 7: Historical Returns

Historic Returns - sectoral/thematic,sectoral thematic fund Performance in %												
	Crisil Rank	**AuM (Cr)**	**1 W**	**1 M**	**3 M**	**6 M**	**YTD**	**1Y**	**2Y**	**3Y**	**4Y**	**5 Y**
BOI AXA Manufacturing & Infrastructure Fund	5	38.76	-1	-6	11	25	9	11	5	1	5	7
Invesco India Infrastructure Fund	5	44.92	-1	-7	1	12	-4	1	5	0	5	6
SBI Infrastructure Fund	4	431.58	-1	-5	5	21	-8	-5	4	-1	4	6
Canara Robeco Infrastructure	4	88.18	-1	-5	3	14	-10	-7	-1	-6	-1	2

LIC MF Infrastructure Fund	4	46.39	-1	-1	6	20	-16	-9	1	-2	1	3
Kotak Infrastructure and Economic Reform Fund	4	235.29	-1	-5	3	17	-13	-11	-2	-7	-2	3
Nippon India Power & Infra Fund	3	1,068.37	-1	-7	2	22	-9	-6	-3	-7	-3	3
Sundaram Infrastructure Advantage Fund	3	428.34	-1	-5	6	24	-10	-6	-2	-6	-2	3
Tata Infrastructure Fund	3	408.25	-1	-4	5	14	-13	-12	-2	-5	-2	3
UTI Infrastructure Fund	3	972.01	-1	-3	1	9	-17	-13	-3	-6	-3	1
Aditya Birla Sun Life Infrastructure Fund	2	358.4	-2	-6	2	13	-14	-10	-7	-11	-7	0
IDFC Infrastructure Fund	2	469.55	-1	-4	3	15	-14	-13	-9	-12	-9	1
L&T Infrastructure Fund	2	1,105.62	-1	-5	2	13	-17	-15	-9	-9	-9	4
ICICI Prudential Infrastructure Fund	2	944.19	-2	-7	-1	11	-21	-17	-7	-7	-7	0
HSBC Infrastructure Equity Fund	1	70.68	-1	-6	6	22	-12	-11	-11	-17	-11	-6
HDFC Infrastructure Fund	1	408.87	-2	-6	3	9	-30	-26	-16	-17	-16	-7
Quant Infrastructure Fund	-	1.82	-3	0	25	44	6	7	9	2	9	
DSP India T.I.G.E.R Fund	-	1.82	-3	0	25	44	6	7	9	2	9	7
Taurus Infrastructure Fund	-	3.65	-1	-4	5	16	-4	-1	-1	-1	-1	7

Figure 15: Historical Returns of Selected Thematic Infrastructure Funds



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1Y	11%	1%	-5%	-7%	-9%	-11	-6%	-6%	-12	-13	-10	-13	-15	-17	-11	-26	7%	7%	-1%
2Y	5%	5%	4%	-1%	1%	-2%	-3%	-2%	-2%	-3%	-7%	-9%	-9%	-7%	-11	-16	9%	9%	-1%
3Y	1%	0%	-1%	-6%	-2%	-7%	-7%	-6%	-5%	-6%	-11	-12	-9%	-7%	-17	-17	2%	2%	-1%
4Y	5%	5%	4%	-1%	1%	-2%	-3%	-2%	-2%	-3%	-7%	-9%	-9%	-7%	-11	-16	9%	9%	-1%
5Y	7%	6%	6%	2%	3%	3%	3%	3%	3%	1%	0%	1%	4%	0%	-6%	-7%	7%	7%	7%

Crisil ranks reveal that HSBC Infrastructure Equity Fund and HDFC Infrastructure Fund stood on first rank followed by Aditya Birla Sun Life Infrastructure Fund, IDFC Infrastructure Fund, L&T Infrastructure Fund and ICICI Prudential Infrastructure Fund on second place.

Nippon India Power & Infra Fund, Sundaram Infrastructure Advantage Fund, Tata Infrastructure Fund and UTI Infrastructure Fund were on third place.

SBI Infrastructure Fund, Canara Robeco Infrastructure, LIC MF Infrastructure Fund, and Kotak Infrastructure & Economic Reform Fund were on fourth place.

BOI AXA Manufacturing & Infrastructure Fund and Invesco India Infrastructure Fund were on fifth place in the list of selected thematic mutual fund schemes.

6.4 Rank of the Selected Mutual Fund Schemes and their Returns

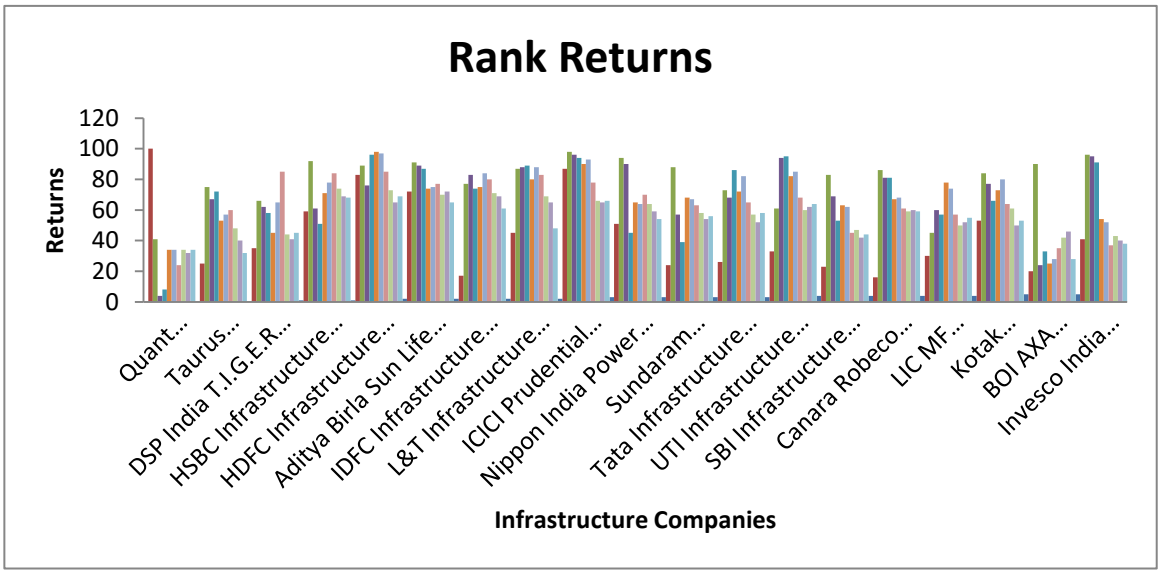
Following table presents Rank Returns – sectorial / thematic, sectorial thematic fund performance - Direct Plan – Growth Sectorial/Thematic schemes selected out of mutual funds.

Table No. 8 : Rank of Selected Mutual Funds

Rank Returns – sectorial / thematic, sectorial thematic fund Performance - Direct Plan – Growth Sectorial / Thematic											
	Crisil Rank	1W out of 101	1M out of 101	3M out of 101	6M out of 101	YTD out 99	1Y out of 97	2Y out of 85	3Y out of 74	4Y out of 72	5Y out of 69
Quant Infrastructure Fund	-	100	41	4	8	34	34	24	34	32	34
Taurus Infrastructure Fund	-	25	75	67	72	53	57	60	48	40	32
DSP India T.I.G.E.R Fund	-	35	66	62	58	45	65	85	44	41	45
HSBC Infrastructure Equity Fund	1	59	92	61	51	71	78	84	74	69	68
HDFC Infrastructure Fund	1	83	89	76	96	98	97	85	73	65	69
Aditya Birla Sun Life Infrastructure Fund	2	72	91	89	87	74	75	77	70	72	65
IDFC Infrastructure Fund	2	17	77	83	74	75	84	80	71	69	61
L&T Infrastructure Fund	2	45	87	88	89	80	88	83	69	65	48
ICICI Prudential Infrastructure Fund	2	87	98	96	94	90	93	78	66	65	66
Nippon India Power & Infra Fund	3	51	94	90	45	65	64	70	64	59	54
Sundaram Infrastructure Advantage Fund	3	24	88	57	39	68	67	63	58	54	56
Tata Infrastructure Fund	3	26	73	68	86	72	82	65	57	52	58
UTI Infrastructure Fund	3	33	61	94	95	82	85	68	60	62	64

SBI Infrastructure Fund	4	23	83	69	53	63	62	45	47	42	44
Canara Robeco Infrastructure	4	16	86	81	81	67	68	61	59	60	59
LIC MF Infrastructure Fund	4	30	45	60	57	78	74	57	50	52	55
Kotak Infrastructure and Economic Reform Fund	4	53	84	77	66	73	80	64	61	50	53
BOI AXA Manufacturing & Infrastructure Fund	5	20	90	24	33	25	28	35	42	46	28
Invesco India Infrastructure Fund	5	41	96	95	91	54	52	37	43	40	38

Figure No. 16: Rank Returns of the selected Thematic Infrastructure funds



On the basis of above computation it can be easily realized that HSBC Infrastructure Equity Fund and HDFC Infrastructure Fund were the leading schemes out of selected schemes as far as rank returns is concerned.

On the second place, Aditya Birla Sun Life Infrastructure Fund, IDFC Infrastructure Fund, L&T Infrastructure Fund and ICICI Prudential Infrastructure Fund exist.

Nippon India Power & Infra Fund, Sundaram Infrastructure Advantage Fund, Tata Infrastructure Fund and UTI Infrastructure Fund on third rank.

SBI Infrastructure Fund, Canara Robeco Infrastructure, LIC MF Infrastructure Fund and Kotak Infrastructure & Economic Reform Fund ranked fourth among the selected companies whereas BOI AXA Manufacturing & Infrastructure Fund and Invesco India Infrastructure Fund were on the bottom in the list.

6.5 Ranking of Selected Thematic Infrastructure Mutual Fund Schemes on the basis of their Annual Returns

Following table presents Rank on the basis of annual returns – sectorial / thematic, sectorial thematic fund performance - Direct Plan – Growth Sectorial/Thematic schemes selected out of mutual funds.

Table No. 9: Ranking on the basis of Average Returns

Annual Returns – sectorial / thematic, sectorial thematic fund Performance Tracker -- Direct Plan - Growth Sectorial / Thematic										
Scheme Name	**Crisil Rank**	**YTD**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**Average return**
BOI AXA Manufacturing & Infrastructure Fund	5	9%	3%	-22%	58%	2%	1%	55%	-8%	13%
Invesco India Infrastructure Fund	5	-5%	7%	-14%	51%	2%	-1%	85%	-5%	18%
Kotak Infrastructure and Economic Reform Fund	4	-14%	4%	-18%	48%	11%	1%	82%	-8%	17%
Canara Robeco Infrastructure	4	-10%	3%	-18%	42%	2%	7%	69%	-10%	14%
LIC MF Infrastructure Fund	4	-16%	13%	-13%	44%	-2%	-5%	50%	-5%	12%
SBI	4	-8%	10%	-17%	43%	9%	3%	47%	-14%	11%

Infrastructure Fund										
Nippon India Power & Infra Fund	3	-9%	-3%	-21%	63%	0%	1%	51%	-16%	11%
Sundaram Infrastructure Advantage Fund	3	-10%	2%	-21%	57%	-1%	5%	58%	-16%	12%
Tata Infrastructure Fund	3	-13%	3%	-15%	43%	5%	0%	64%	-13%	12%
UTI Infrastructure Fund	3	-18%	6%	-15%	42%	4%	-5%	61%	-13%	11%
IDFC Infrastructure Fund	2	-15%	-5%	-25%	62%	11%	0%	45%	-11%	11%
Aditya Birla Sun Life Infrastructure Fund	2	-14%	-4%	-21%	54%	2%	-1%	69%	-5%	13%
L&T Infrastructure Fund	2	-16%	-3%	-16%	63%	8%	7%	65%	-7%	17%
ICICI Prudential Infrastructure Fund	2	-21%	2%	-13%	42%	2%	-3%	56%	-6%	11%
HDFC Infrastructure Fund	1	-30%	-4%	-28%	44%	-3%	-2%	74%	-15%	9%
HSBC Infrastructure Equity Fund	1	-13%	-15%	-33%	55%	-3%	-5%	86%	-20%	9%
Quant Infrastructure Fund	-	5%	4%	-13%	53%	-7%	-3%	56%	-15%	11%
DSP India T.I.G.E.R Fund	-	-4%	0%	-12%	42%	-6%	-4%	64%	-12%	9%
Taurus Infrastructure	-	-5%	0%	-8%	46%	9%	-4%	59%	-12%	13%

Figure 17: Annual Returns of selected Thematic Infrastructure funds

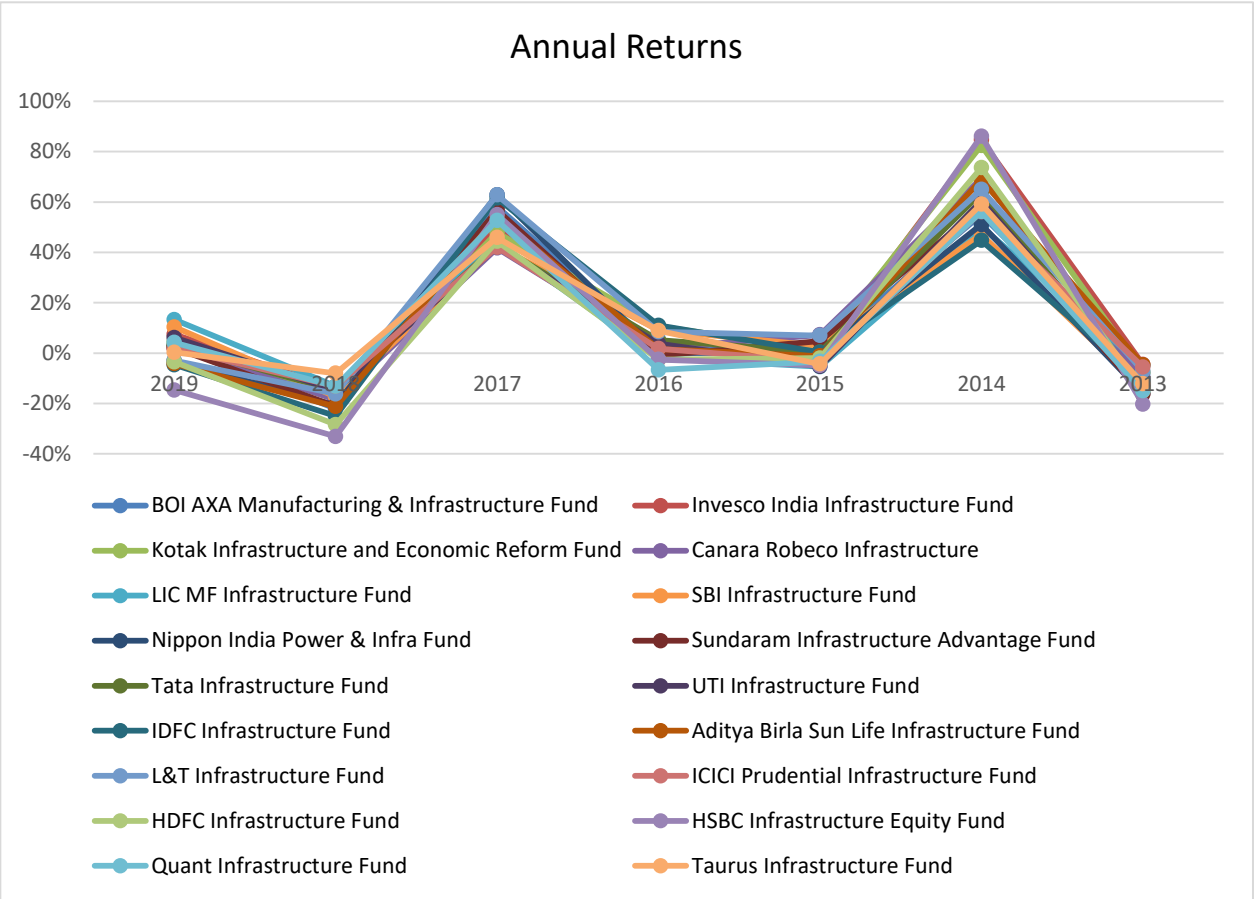
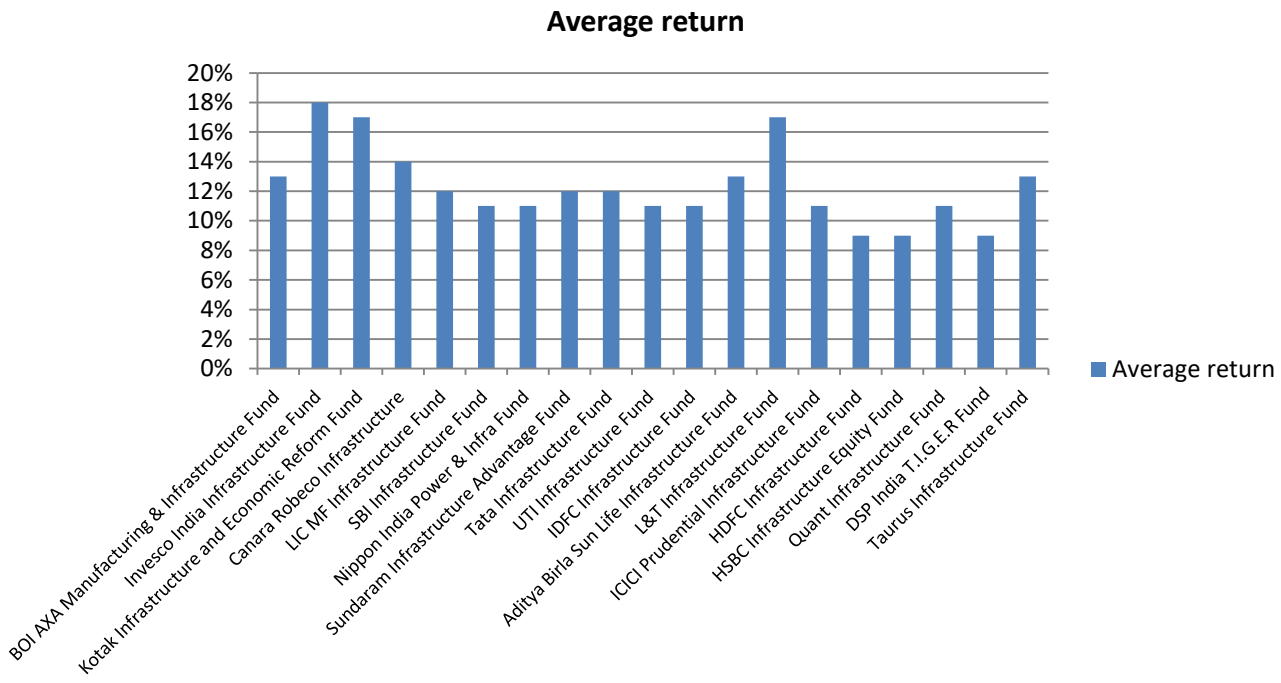


Figure 18: Average Returns of selected Thematic Infrastructure funds



On the basis of annual returns of the selected thematic infrastructure mutual fund schemes, it can be easily realized that HSBC Infrastructure Equity Fund and HDFC Infrastructure Fund were the leading schemes out of selected schemes as far as rank returns is concerned. On the second place, Aditya Birla Sun Life Infrastructure Fund, IDFC Infrastructure Fund, L&T Infrastructure Fund and ICICI Prudential Infrastructure Fund exist.

Nippon India Power & Infra Fund, Sundaram Infrastructure Advantage Fund, Tata Infrastructure Fund and UTI Infrastructure Fund on third rank. SBI Infrastructure Fund, Canara Robeco Infrastructure, LIC MF Infrastructure Fund and Kotak Infrastructure & Economic Reform Fund ranked fourth among the selected companies whereas BOI AXA Manufacturing & Infrastructure Fund and Invesco India Infrastructure Fund were on the bottom in the list.

6.6 Portfolio Assets – Sectorial / Thematic Fund Performance

Following table presents the status of Crisil Rank, Turnover ratio, % Equity Holding, No of stocks in portfolio, % Debt Holding, No of instruments in portfolio, % MF Holding, % Cash Holding and % Other Holding of selected mutual fund schemes.

Table No.10: Portfolio Assets

Portfolio Assets – sectorial / thematic, sectorial thematic fund Performance Tracker| Best Online Performance Tracker Tool - Moneycontrol.com									
Scheme Name	**Crisil Rank**	**Turnover ratio**	**% Equity Holding**	**No of stocks in portfolio**	**% Debt Holding**	**No of instruments in portfolio**	**% MF Holding**	**% Cash Holding**	**% Other Holding**
Invesco India Infrastructure Fund	5	66%	96%	32	0%	0%	0%	4%	0%
BOI AXA Manufacturing & Infrastructure Fund	5	-	96%	48	0%	0%	0%	4%	0%
Kotak Infrastructure and Economic Reform Fund	4	7%	99%	34	0%	0%	0%	1%	0%
SBI Infrastructure Fund	4	74%	98%	28	0%	0%	0%	2%	0%

Canara Robeco Infrastructure	4	-	98%	33	0%	0%	0%	2%	0%
LIC MF Infrastructure Fund	4	16%	89%	28	0%	0%	0%	11%	0%
UTI Infrastructure Fund	3	8%	100%	39	0%	0%	0%	0%	0%
Sundaram Infrastructure Advantage Fund	3	18%	98%	40	0%	0%	0%	2%	0%
Nippon India Power & Infra Fund	3	70%	98%	42	0%	0%	0%	2%	0%
Tata Infrastructure Fund	3	-	96%	28	0%	0%	0%	4%	0%
L&T Infrastructure Fund	2	12%	98%	45	0%	0%	0%	2%	0%
IDFC Infrastructure Fund	2	9%	97%	40	0%	0%	0%	3%	0%
Aditya Birla Sun Life Infrastructure Fund	2	-	97%	40	0%	0%	0%	4%	0%
ICICI Prudential Infrastructure Fund	2	75%	96%	47	0%	0%	0%	4%	0%
HSBC Infrastructure Equity Fund	1	-	99%	31	0%	0%	0%	1%	0%
HDFC Infrastructure Fund	1	18%	98%	31	0%	0%	0%	2%	0%
Quant Infrastructure Fund	-	761	97%	16	0%	0%	0%	3%	0%
DSP India T.I.G.E.R Fund	-	-	95%	42	0%	0%	0%	2%	0%
Taurus Infrastructure Fund	-	-	95%	45	0%	0%	0%	5%	0%

Figure 19: Portfolio Assets holding Cash and Equity

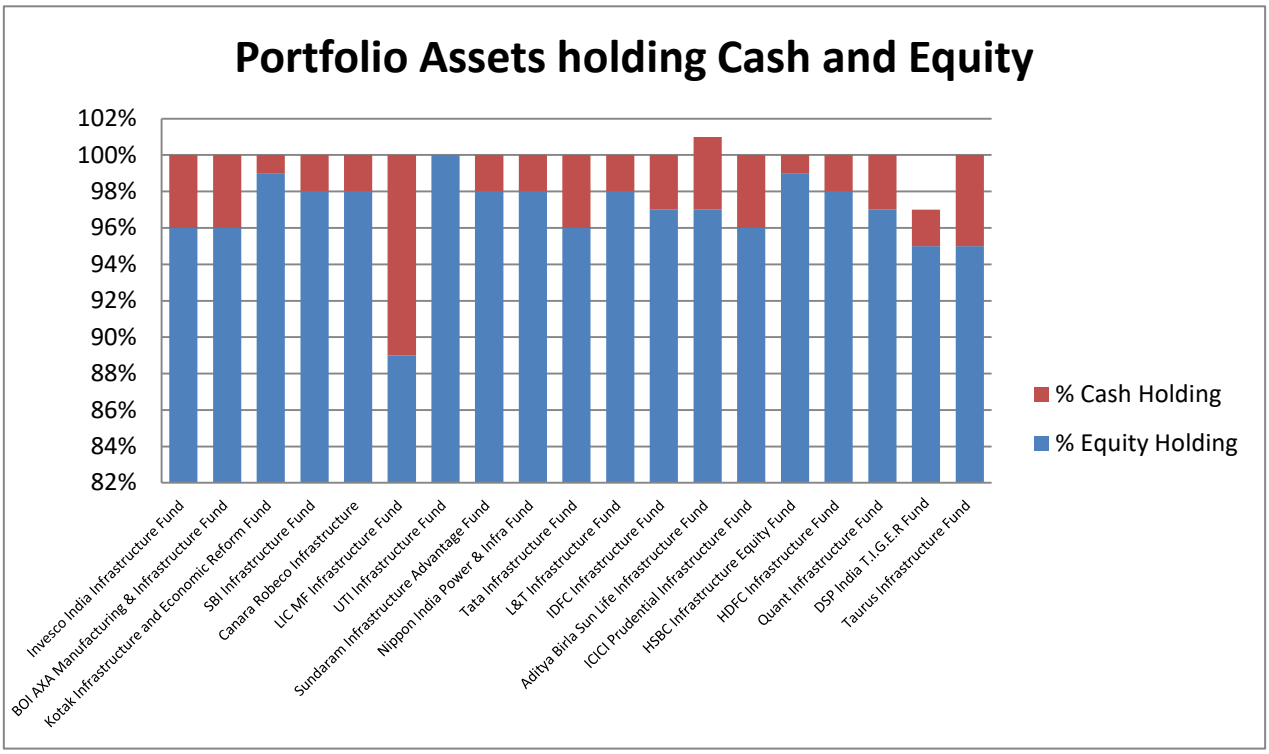
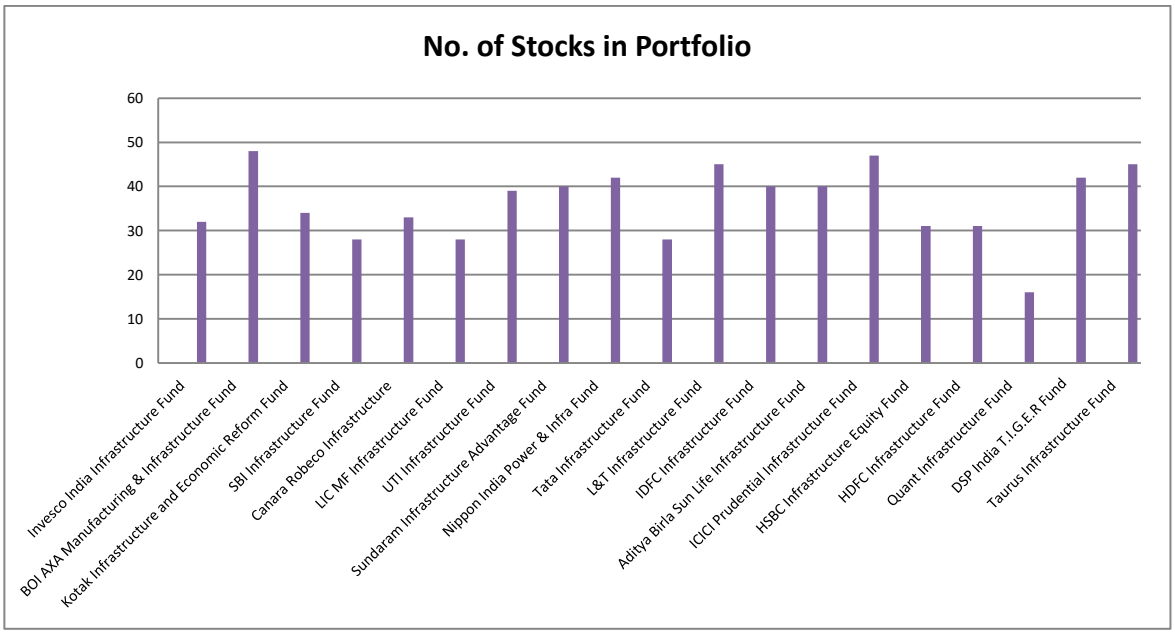


Figure 20: No. of stocks in portfolio



Turnover ratio of Invesco India Infrastructure Fund was found 66%, SBI Infrastructure Fund with 74%, Nippon India Power & Infra Fund with 70%, ICICI Prudential Infrastructure Fund was found with 75% turnover ratio and Quant Infrastructure Fund was found with 76.1% turnover ratio.

These are the leading mutual fund schemes as far as turnover ratio is concerned. Invesco India Infrastructure Fund, BOI AXA Manufacturing & Infrastructure Fund, Tata Infrastructure Fund and ICICI Prudential Infrastructure Fund have 96% of Equity Holding. Kotak Infrastructure and Economic Reform Fundand HSBC Infrastructure Equity Fund have 99% of Equity Holding.

SBI Infrastructure Fund, Canara Robeco Infrastructure, Sundaram Infrastructure Advantage Fund Nippon India Power & Infra Fund, L&T Infrastructure Fund and HDFC Infrastructure Fund have 98% of Equity Holding. IDFC Infrastructure Fund, Aditya Birla Sun Life Infrastructure Fund and Quant Infrastructure Fund have 97% of Equity Holding. LIC MF Infrastructure Fund has 89% of Equity Holding which was lowest among selected mutual fund schemes whereas UTI Infrastructure Fund has 100% of Equity Holding that was highest among all schemes. Taurus Infrastructure Fund was found having 95% of Equity Holding.

Invesco India Infrastructure Fund has 32 stocks in portfolio, BOI AXA Manufacturing & Infrastructure Fund has 48, Kotak Infrastructure and Economic Reform Fund have 34, Canara Robeco Infrastructure has 33, LIC MF Infrastructure Fund, SBI Infrastructure Fund and Tata Infrastructure Fund have 28, UTI Infrastructure Fund has 39, Sundaram Infrastructure Advantage Fund, IDFC Infrastructure Fund, and Aditya Birla Sun Life Infrastructure Fund has 40 stocks in portfolio.

Nippon India Power & Infra Fund has 42 stocks, L&T Infrastructure Fund has 45 stocks and ICICI Prudential Infrastructure Fund has 47 stocks in portfolio that was also highest among all schemes. HSBC Infrastructure Equity Fund and HDFC Infrastructure Fund have 31 stocks in portfolio. Quant Infrastructure Fund was found with least stocks (16) in its portfolio and Taurus Infrastructure Fund has 45 stocks in portfolio.

Percentage of Debt holding was found 0% for all selected schemes. Also number of instruments in portfolio and percentage of mutual fund holding was found to be nil. Invesco India Infrastructure Fund, BOI AXA Manufacturing & Infrastructure Fund, Tata Infrastructure Fund, Aditya Birla Sun Life Infrastructure Fund and ICICI Prudential Infrastructure Fund have 4% of Cash Holding. LIC MF

Infrastructure Fund has 11% of Cash Holding which was also highest in selected schemes.

Quant Infrastructure Fund and IDFC Infrastructure Fund have 3% of Cash Holding. Taurus Infrastructure Fund has 5% of Cash Holding. HDFC Infrastructure Fund, L&T Infrastructure Fund, Nippon India Power & Infra Fund, Sundaram Infrastructure Advantage Fund, Canara Robeco Infrastructure and SBI Infrastructure Fund have 2% of Cash Holding. HSBC Infrastructure Equity Fund and Kotak Infrastructure and Economic Reform Fund have 1% of Cash Holding. UTI Infrastructure Fund is the only scheme having 0% of cash holding among selected schemes. Percentage of other holding was found nil in all the selected schemes.

6.7 Analysis of the selected Thematic Infrastructure schemes on the basis of SIP Returns

Table No. 11: SIP Returns of Thematic Funds – Direct Plan- growth.

SIP Returns - sectorial/ thematic, sectorial thematic fund Performance - Direct Plan – Growth Sectorial/Thematic						
Scheme Name	**Crisil Rank**	**AuM (Cr)**	**1Y**	**2Y**	**3Y**	**5Y**
BOI AXA Manufacturing & Infrastructure Fund	5	38.76	11%	11%	5%	17%
Invesco India Infrastructure Fund	5	44.92	0%	2%	1%	12%
SBI Infrastructure Fund	4	431.58	2%	1%	-1%	7%
LIC MF Infrastructure Fund	4	46.39	0%	-3%	-5%	2%
Canara Robeco Infrastructure	4	88.18	-1%	-3%	-7%	-3%
Kotak Infrastructure and Economic Reform Fund	4	235.29	-1%	-5%	-9%	-2%
Sundaram Infrastructure Advantage Fund	3	428.34	2%	-3%	-8%	-1%
Nippon India Power & Infra Fund	3	1068.37	2%	-3%	-9%	-1%
Tata Infrastructure Fund	3	408.25	-2%	-5%	-9%	-3%
UTI Infrastructure Fund	3	972.01	-5%	-9%	-12%	-6%
IDFC Infrastructure Fund	2	469.55	-2%	-9%	-16%	-9%

Aditya Birla Sun Life Infrastructure Fund	2	358.40	-2%	-8%	-14%	-10%
L&T Infrastructure Fund	2	1105.62	-4%	-10%	-15%	-5%
ICICI Prudential Infrastructure Fund	2	944.19	-6%	-12%	-16%	-10%
HSBC Infrastructure Equity Fund	1	70.68	1%	-9%	-20%	-22%
HDFC Infrastructure Fund	1	408.87	-9%	-20%	-28%	-29%
Quant Infrastructure Fund	-	1.82	18%	15%	11%	21%
DSP India T.I.G.E.R Fund	-	2.65	2%	1%	1%	12%
Taurus Infrastructure Fund	-	3.65	3%	1%	-2%	10%

Figure 21: SIP returns of thematic funds for first year

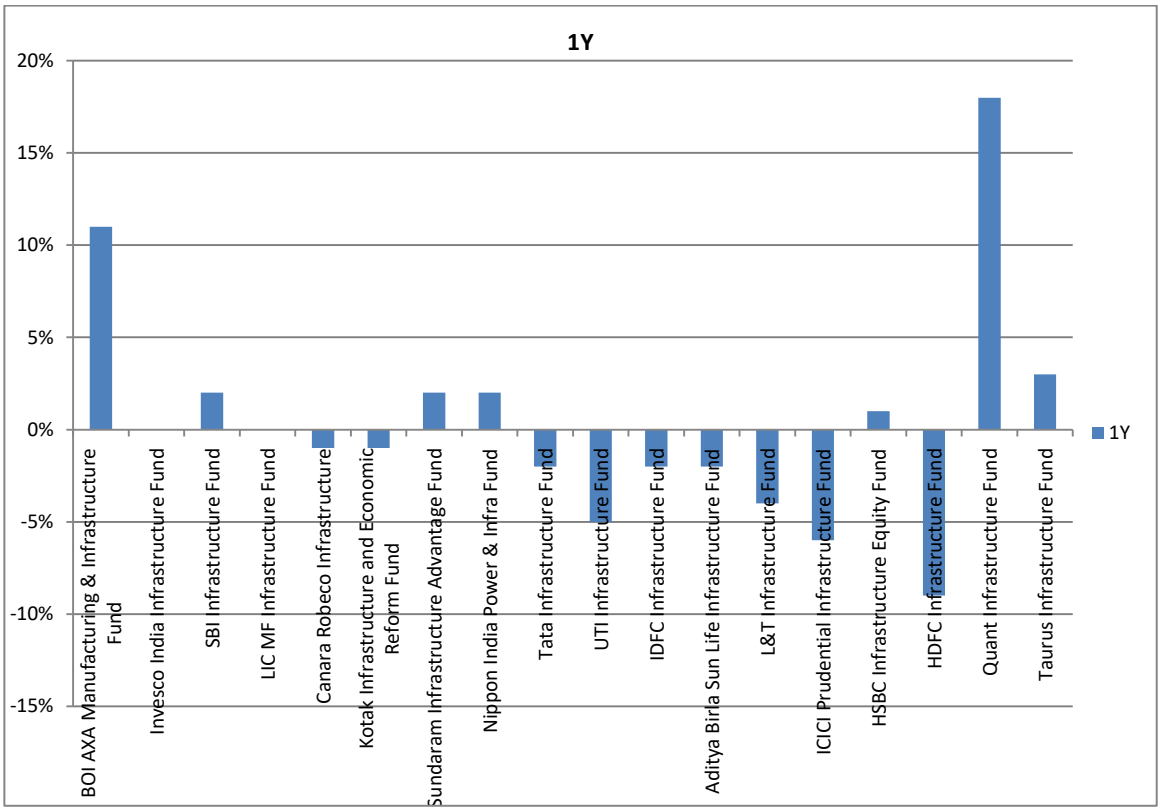


Figure 22: SIP Returns of thematic funds for second year

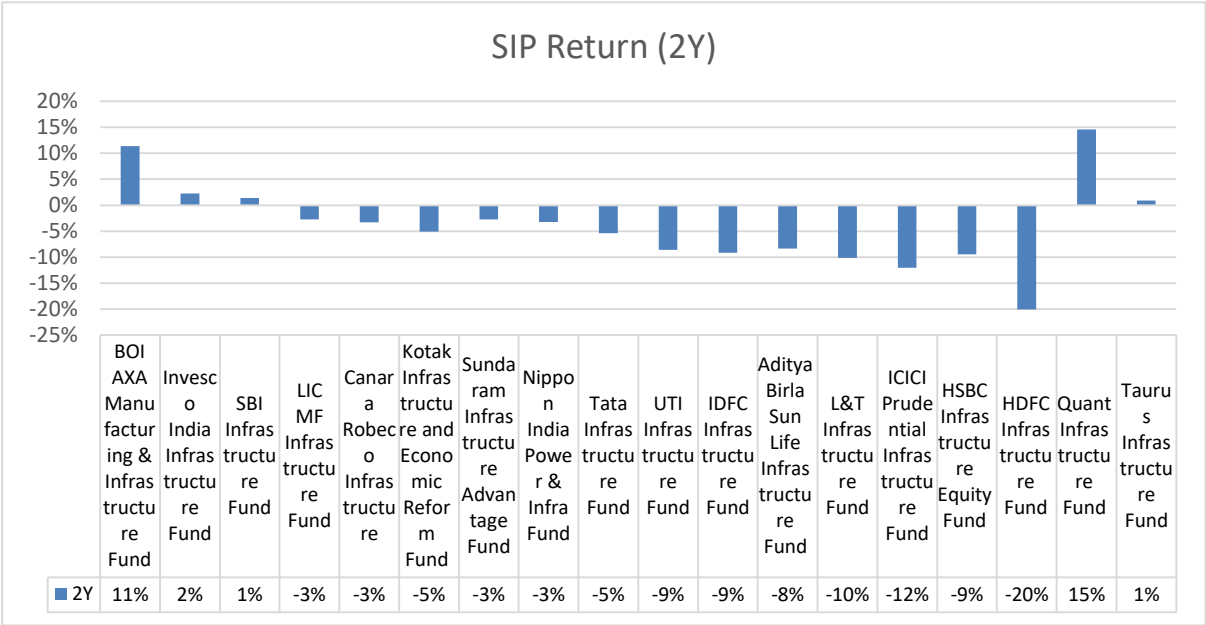


Figure 23: SIP returns for third year of thematic funds

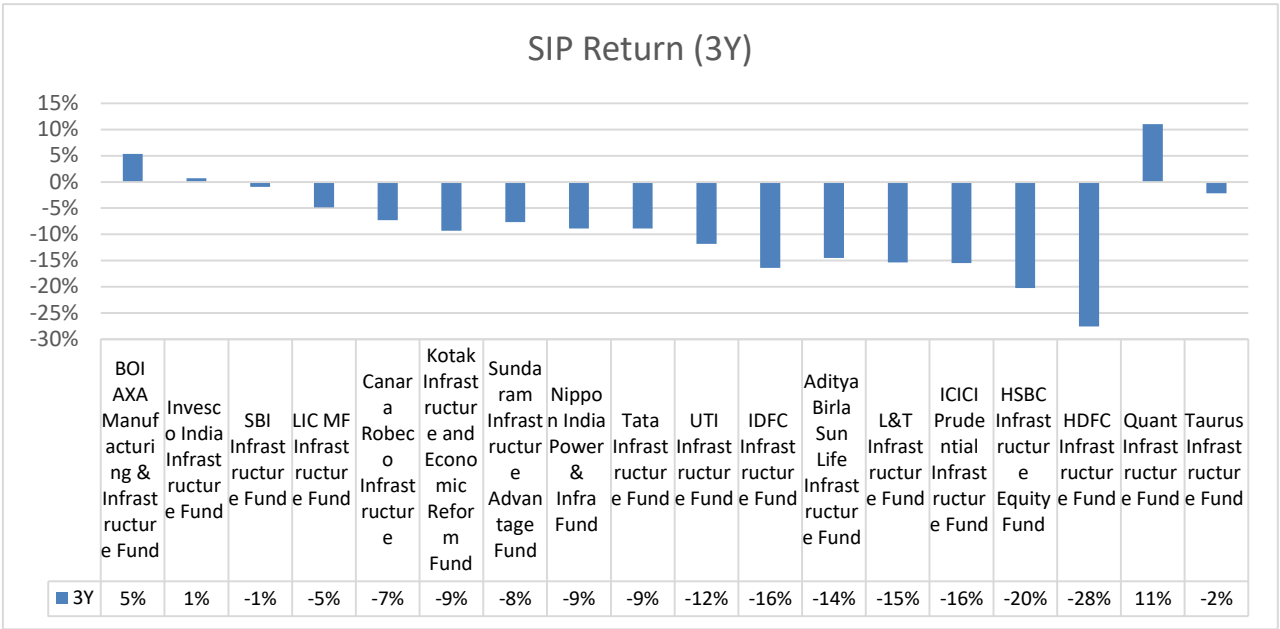
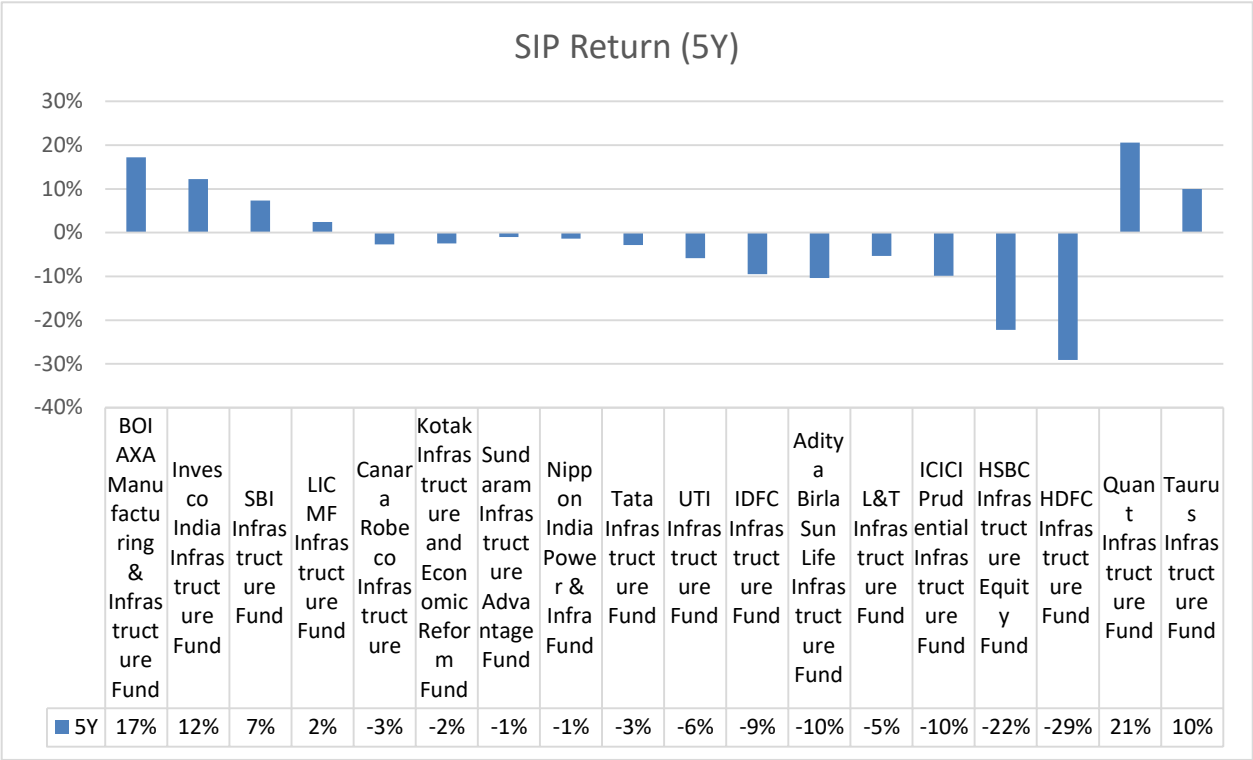


Figure 24: SIP returns for fifth year of thematic funds



In first year highest return was observed in Quant Infrastructure Fund with 18% followed by BOI AXA Manufacturing & Infrastructure Fund with 11%. SBI Infrastructure Fund, Sundaram Infrastructure Advantage Fund and Nippon India Power & Infra Fund have shown 2% of return in their first year of investment, Taurus Infrastructure Fund has given 3% whereas HSBC Infrastructure Equity Fund return in very first year was just 1%. Rest of the schemes have shown negative returns.

In second year highest return was observed in Quant Infrastructure Fund with 15% followed by BOI AXA Manufacturing & Infrastructure Fund with 11% has maintained its return as in the first year. Taurus Infrastructure Fund has given 1% return declined by 2% of first year return. SBI Infrastructure Fund has given 1% return whereas Invesco India Infrastructure Fund has given 2% of return. Rest of the schemes have shown negative returns even in second year.

BOI AXA Manufacturing & Infrastructure Fund has shown 5% return in 3rd year of operations, Invesco India Infrastructure Fund has 1% return whereas highest was in the case of Quant Infrastructure Fund with 11% of return.

BOI AXA Manufacturing & Infrastructure Fund has shown 17% of return in fifth year, Invesco India Infrastructure Fund has given 12%, SBI Infrastructure Fund has given 7%, LIC MF Infrastructure Fund has given 2% whereas highest was in Quant Infrastructure Fund with 21% and Taurus Infrastructure Fund has given 10% return in 5 years of time.

6.8 NAV Details – Sectorial / Thematic Fund Performance

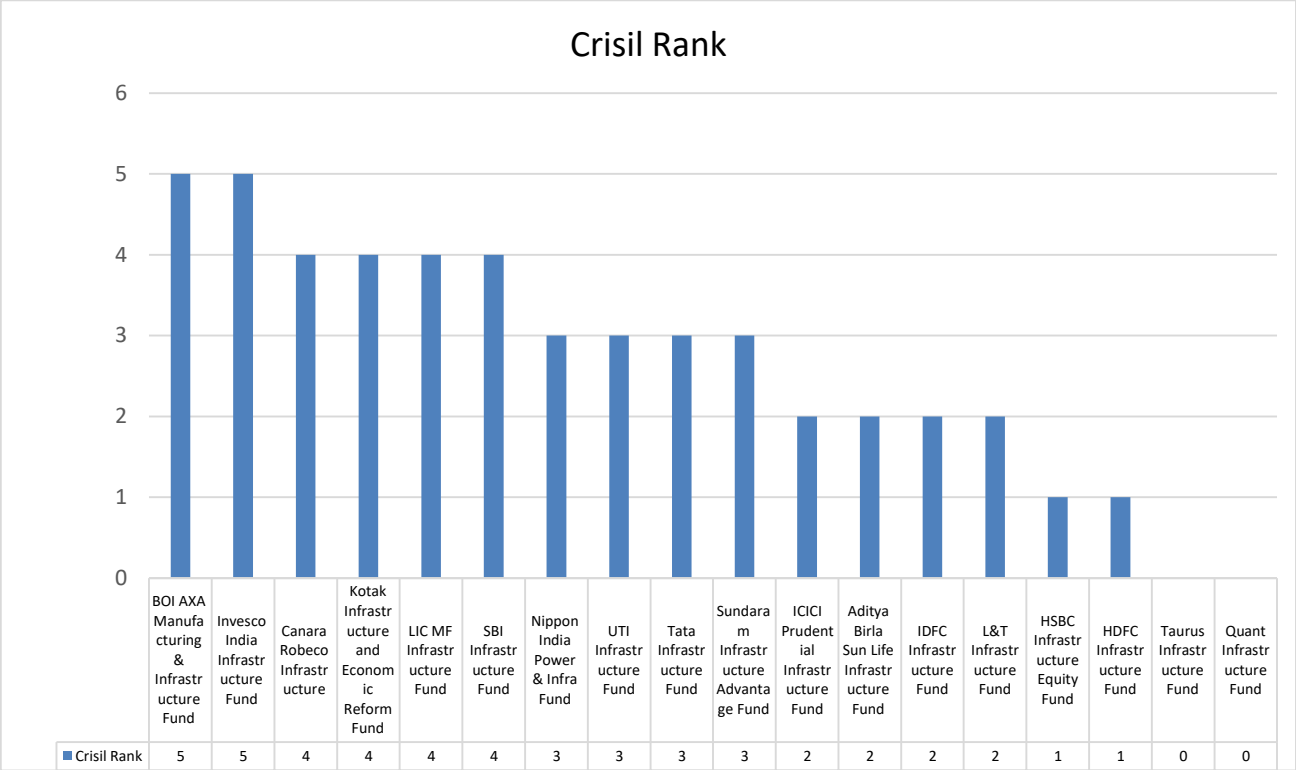
Following table presents Crisil Rank, AUM of selected schemes, NAV, 1 Day Change, 52Week High, 52WH as on, 52W Low and 52WL as on date for the selected Thematic Infrastructure schemes of mutual funds.

Table No. 12: Net Asset Value Details

Nav Details - sectoral/thematic,sectoralthematic fund Performance

Scheme Name	Crisil Rank	AuM (Cr)	NAV	1D Change	NAV Date	52W High	52WH as on	52W Low	52WL as on
BOI AXA Manufacturing & Infrastructure Fund	5	38.76	17.74	0%	16-Oct-20	18.88	15-Sep-20	11.96	23-Mar-20
Invesco India Infrastructure Fund	5	44.92	18.64	0%	16-Oct-20	21.59	20-Feb-20	13.78	24-Mar-20
Canara Robeco Infrastructure	4	88.18	42.43	1%	16-Oct-20	49.85	06-Feb-20	31.58	23-Mar-20
Kotak Infrastructure and Economic Reform Fund	4	235.29	18.844	0%	16-Oct-20	23.423	29-Jan-20	13.945	24-Mar-20
LIC MF Infrastructure Fund	4	46.39	13.6926	0%	16-Oct-20	16.8266	24-Jan-20	10.1671	23-Mar-20
SBI Infrastructure Fund	4	431.58	15.0881	0%	16-Oct-20	17.3247	24-Jan-20	10.5506	23-Mar-20
Nippon India Power & Infra Fund	3	1068.37	90.2381	1%	16-Oct-20	104.9448	24-Jan-20	62.4978	24-Mar-20
UTI Infrastructure Fund	3	972.01	45.4774	1%	16-Oct-20	58.7698	24-Jan-20	35.3798	23-Mar-20
Tata Infrastructure Fund	3	408.25	49.3605	0%	16-Oct-20	59.6604	24-Jan-20	37.9462	23-Mar-20
Sundaram Infrastructure Advantage Fund	3	428.34	29.41	0%	16-Oct-20	34.5428	24-Jan-20	20.3896	24-Mar-20
ICICI Prudential Infrastructure Fund	2	944.19	41.76	1%	16-Oct-20	55.1	15-Jan-20	32.04	23-Mar-20
Aditya Birla Sun Life Infrastructure Fund	2	358.4	27.02	0%	16-Oct-20	33.51	24-Jan-20	19.49	24-Mar-20
IDFC Infrastructure Fund	2	469.55	13	0%	16-Oct-20	16.37	24-Jan-20	9.33	24-Mar-20
L&T Infrastructure Fund	2	1105.62	13.47	0%	16-Oct-20	17.39	24-Jan-20	10.16	24-Mar-20
HSBC Infrastructure Equity Fund	1	70.68	13.8114	0%	16-Oct-20	16.6634	24-Jan-20	9.6474	23-Mar-20
HDFC Infrastructure Fund	1	408.87	11.467	0%	16-Oct-20	16.747	13-Jan-20	8.927	23-Mar-20
Taurus Infrastructure Fund	-	3.65	24.55	0%	16-Oct-20	27.28	06-Feb-20	18.08	23-Mar-20
Quant Infrastructure Fund	-	1.82	9.37	0%	16-Oct-20	9.6357	08-Oct-20	5.4069	24-Mar-20
DSP India T.I.G.E.R. Fund	-	2.65	8.95	0%	16-Oct-20	9.42	08-Oct-20	4.856	23-Mar-20

Figure 25: CRISIL ranking of selected thematic funds for FY 2014-19



It is clearly evident from the above table and graph that HSBC Infrastructure Equity Fund and HDFC Infrastructure Fund were top two schemes among the selected schemes as far as Crisil Ranking is concerned. Whereas, BOI AXA Manufacturing & Infrastructure Fund and Invesco India Infrastructure Fund were at bottom.

L & T infrastructure fund, Nippon India Power & Infra fund, UTI Infrastructure fund and ICICI Prudential Infrastructure Fund were the schemes found with highest AUM among selected schemes.

Figure 26: Asset Under Management of Selected Funds

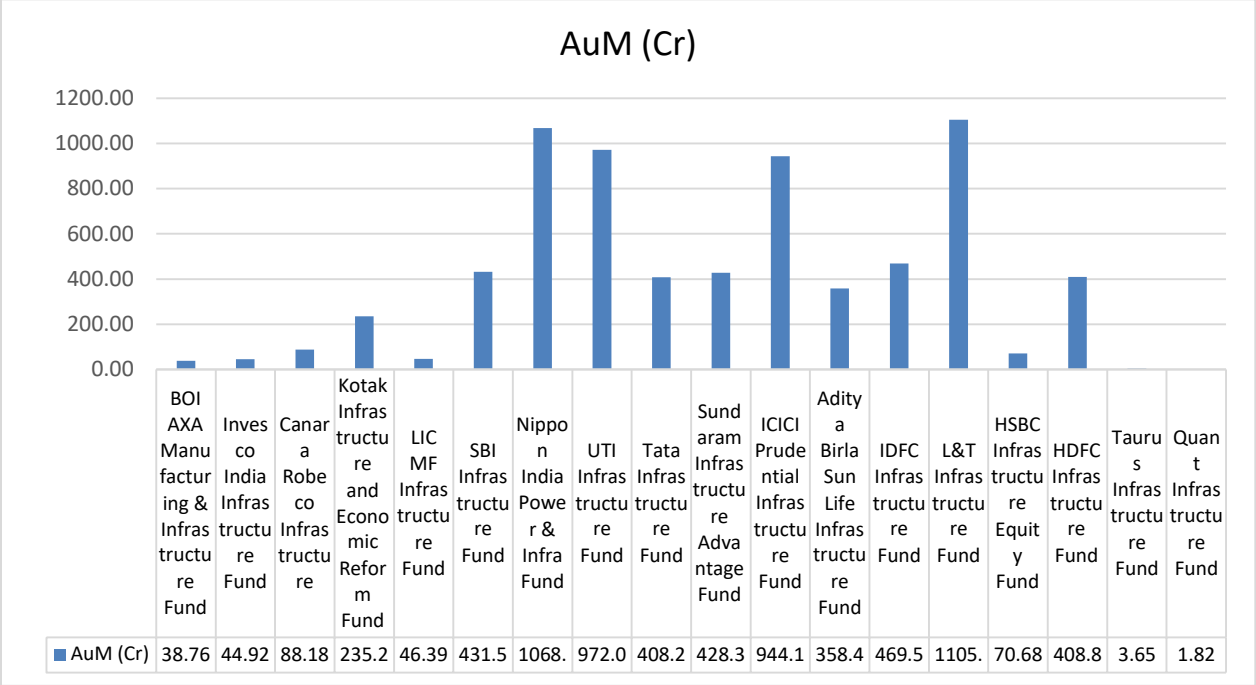


Figure 27: Net asset value of selected thematic funds

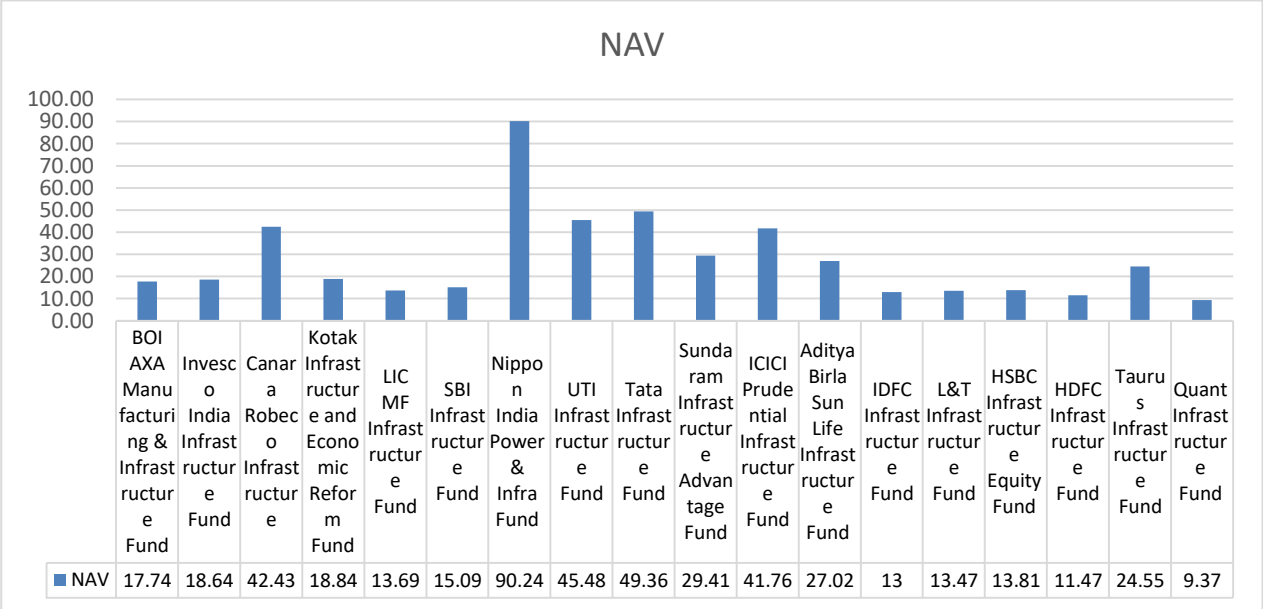
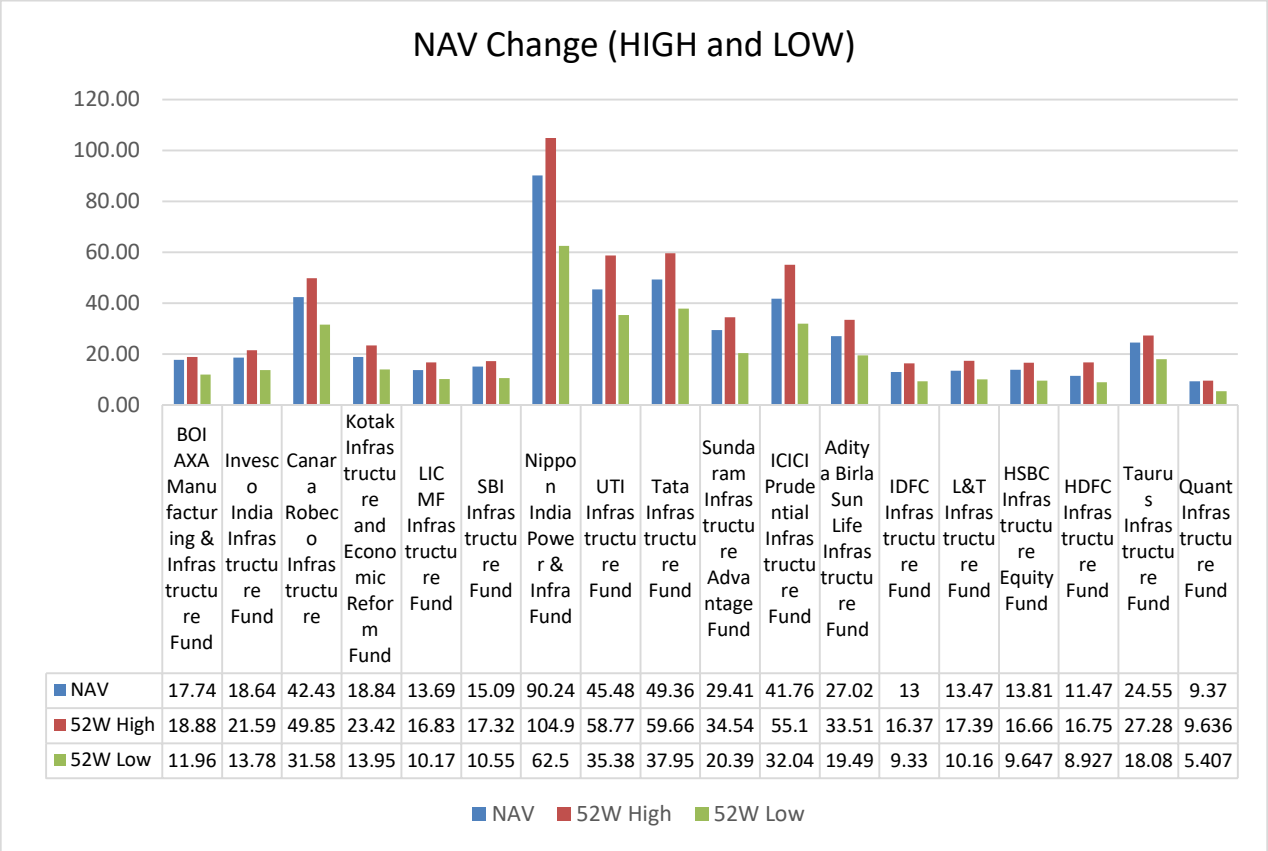


Figure 28: 52 week High-Low NAVs of selected thematic funds



	BOI AXA Manufacturing & Infrastructure Fund	Invesco India Infrastructure Fund	Canara Robeco Infrastructure	Kotak Infrastructure and Economic Reform Fund	LIC MF Infrastructure Fund	SBI Infrastructure Fund	Nippon India Power & Infra Fund	UTI Infrastructure Fund	Tata Infrastructure Fund	Sundaram Infrastructure Advantage Fund	ICICI Prudential Infrastructure Fund	Aditya Birla Sun Life Infrastructure Fund	IDFC Infrastructure Fund	L&T Infrastructure Fund	HSBC Infrastructure Equity Fund	HDFC Infrastructure Fund	Taurus Infrastructure Fund	Quant Infrastructure Fund
NAV	17.74	18.64	42.43	18.84	13.69	15.09	90.24	45.48	49.36	29.41	41.76	27.02	13	13.47	13.81	11.47	24.55	9.37
52W High	18.88	21.59	49.85	23.42	16.83	17.32	104.9	58.77	59.66	34.54	55.1	33.51	16.37	17.39	16.66	16.75	27.28	9.636
52W Low	11.96	13.78	31.58	13.95	10.17	10.55	62.5	35.38	37.95	20.39	32.04	19.49	9.33	10.16	9.647	8.927	18.08	5.407

Nippon India Power & Infra fund was found with highest NAV and highest change in 52 week high and 52 week low among selected schemes. Quant Infrastructure fund was at the least position shown found with lowest NAV and least change in 52 week high and 52 week low among selected schemes in this regard.

6.9 Risk Return Analysis of Selected Open ended Thematic Infrastructure Mutual Fund Schemes

India's rapid economic development and urbanization has led to an ever-increasing need to provide basic infrastructure – particularly power, telecom, water, housing, sanitation, solid waste management, roads and urban transport including airports, ports, waterways etc. Urban roads are inadequate to meet growing traffic requirements.

The number of vehicles in India has increased 80-fold over the last 40 years but road length has increased by only 5%. Efficient roadway and urban transit networks are integral to the country's continued economic development. The

housing shortage in India is estimated to be in the range of nearly 40 million dwelling units. India faces chronic power shortages due to underdeveloped generation capacity as well as a porous and inefficient transmission and distribution network. Tele density in spite of recent strides in increasing subscriber population still is low compared to the developed world.

According to Mr. M Rajamani, Joint Secretary to the government of India, Ministry of Urban Development, at the 2nd Conference on financing municipalities and sub-national governments, Washington DC, September 2004, India has embarked upon an ambitious economic reform program aimed at correcting these imbalances and ensuring a balanced growth for all sections of the population on a sustained basis. Economic reform has also led to increased requirements of various goods and services essential for the sustained growth envisaged by various estimates of GDP growth.

The financial resources required to expand these basic amenities are enormous, resulting in a significant resource gap that cannot be met from traditional central and state government grants and loans. Recognition of this funding gap has resulted in a near-universal acceptance that the private sector can and should play a larger role in the financing of infrastructure in partnership with the public sector.

This section provides descriptive statistics of selected Thematic Infrastructure mutual fund schemes related to their Net Asset Values and returns as well.

6.9.1 Net Asset Value and returns of Open Ended Schemes of Aditya Birla Sun Life Infrastructure, HDFC Infrastructure Fund and Franklin Build India Fund-Thematic Infrastructure Mutual Funds (Growth Oriented)

Following table presents Net Asset Value of open ended schemes of Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan, HDFC Infrastructure Fund - Direct Plan - Growth Option and Franklin Build India Fund along with their returns for the time period of 2014 to 2019. Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan has 96.5% investment in Indian stocks of which 29.37% is in large cap stocks, 18.43% is in mid cap stocks, 46.32% in small cap stocks. It

is suitable for the investors who have advanced knowledge of macro trends and prefer to take selective bets for higher returns compared to other Equity funds.

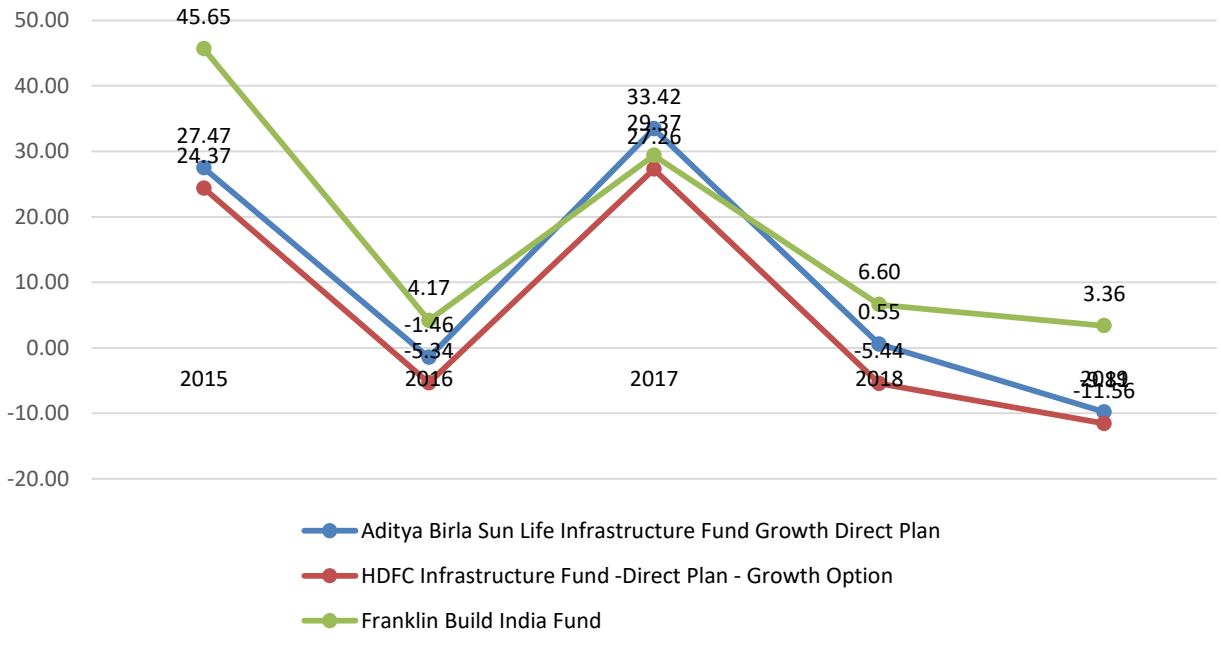
At the same time, these investors should also be ready for possibility of moderate to high losses in their investments even though overall market is performing better. The HDFC Infrastructure Fund -Direct Plan - Growth Option scheme aims to invest predominantly in a diversified portfolio of equity and equity related securities of companies which are either engaged in or expected to benefit from the growth and development of infrastructure. The scheme may also invest up to 35% of the fund in non-infrastructure related companies. The scheme shall invest across all market capitalization. Minimum investment in equity & equity related instruments of a particular sector/ particular theme is 80% of total assets. Hdfc Infrastructure Fund - Growth Option AUM is 17% lower than other schemes in the category. Hdfc Infrastructure Fund - Growth Option Expense Ratio is 89% lower than other schemes in the category. Turnover Ratio is 89% lower than other schemes in the category.

Franklin Build India Fund is an equity fund that invests in stocks of infrastructure and allied sectors. Franklin Build India Fund invests in companies engaged, either directly or indirectly, in infrastructure related activities. The fund's investment is oriented towards structural themes and not cyclical themes comprising of companies across the market capitalization range. The recommended investment horizon is "5 years or more". Top 10 companies and sectors where the fund has invested as on 30/09/2020 are State Bank of India (Banks), Axis Bank Ltd. (Banks), Bharti Airtel Ltd. (Telecommunication Services), NTPC Ltd. (Utilities), Bharat Petroleum Corp. Ltd. (Energy), ICICI Bank Ltd. (Banks), UltraTech Cement Ltd. (Materials), ACC Ltd. (Materials), Indian Oil Corp. Ltd. (Energy) and InterGlobe Aviation Ltd., Reg S (Transportation). The fund is suitable for Retirement Corpus, Long Term Wealth Creation and Education Corpus.Descriptive statistics of the same has been also computed and presented as under.

Table No. 13: Calculations Based on Simple Returns for Aditya Birla, HDFC, Franklin Build India Fund.

Calculations based on Simple Annual Returns)							
Net Asset Value of Open Ended Schemes-Thematic Infrastructure Mutual Funds (Growth Oriented)							
TIME	**Risk free Return**	Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	Return (Rp)	HDFC Infrastructure Fund - Direct Plan - Growth Option	Return (Rp)	Franklin Build India Fund	Return (Rp)
2014	8.85	20.86	-	13.28	-	20.32	-
2015	8.25	26.59	27.47	16.52	24.37	29.60	45.65
2016	7.25	26.20	-1.46	15.64	-5.34	30.83	4.17
2017	5.82	34.96	33.42	19.90	27.26	39.89	29.37
2018	6.11	35.15	0.55	18.82	-5.44	42.52	6.60
2019	6.15	31.70	-9.81	16.64	-11.56	43.95	3.36
Average	7.07	29.24	10.04	16.80	5.86	34.52	17.83
G.M	6.98	28.76	#NUM!	16.66	#NUM!	33.37	10.44
S.D (Risk)	1.26	5.66	19.15	2.35	18.42	9.18	18.90
C.V	17.81	19.36	190.80	13.96	314.44	26.59	106.00
CAGR	-7.02	8.73		4.61		16.68	

Figure 29: Simple Returns from 2014-19 of Aditya Birla, HDFC, Franklin Build India Fund.



Net Asset Value of Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan was highest in year 2018 with Rs. 35.15 whereas it was lowest in year 2014 with Rs. 20.86. Average Net Asset Value for the scheme during year 2014 to year 2019 was Rs. 29.24. CAGR for the NAV of this scheme was found 8.73%.

Return from this scheme was found highest with 33.42% in year 2017 however overall average return realized was 10.04% during year 2014 to year 2019. Some of the years have shown even negative figures as well as an indication of high volatility in returns of this scheme with C.V. 190.80%.

Average NAV of HDFC Infrastructure Fund -Direct Plan - Growth Option was Rs. 16.80 with 13.96% of C.V and 4.61% of CAGR during year 2014 to year 2019. Average return out of this scheme was 5.86% whereas it was highest (27.26%) in year 2017. Negative returns during some of the years have created high volatility in returns as indicated by C.V. of 314.44%. Average NAV of Franklin Build India Fund was Rs. 34.52 and average return was found 17.83% during year 2014 to year 2019. CAGR for the NAV was 16.68% during the study period.

CAGR of Franklin Build India Fund was found much higher as compared to Net Asset Value of Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan and HDFC Infrastructure Fund -Direct Plan - Growth Option. With Average Return (Rp) of 17.83% Franklin Build India Fund was much ahead than the ABSL and HDFC Infra Fund during the study period. Also less volatility was also realized in the returns of Franklin Build India Fund.

6.9.2 NAV of Open ended Schemes of Canara Robeco Infrastructure, INVESCO India Infrastructure fund and IDFC Infrastructure fund – Thematic Infrastructure Mutual Funds (Growth Oriented)

Following table presents Net Asset Value of open ended schemes of Canara Robeco Infrastructure-Direct Plan – Growth, Invesco India Infrastructure Fund - Direct Pan - Growth Option and IDFC Infrastructure Fund - Direct Plan - Growth along with their returns for the time period of 2014 to 2019.

Canara Robeco Infrastructure-Direct Plan – Growth objective is to generate income / capital appreciation by investing in equities and equity related

instruments of companies in the infrastructure sector. Canara Robeco Infrastructure Fund is a Equity - Sectoral Fund - Infrastructure fund and belongs to Canara Robeco Mutual Fund. It was launched on 01-Jan-2013 and currently has an AUM of ₹88.18 crore.

Canara Robeco Infrastructure Fund is benchmarked against S&P BSE India Infrastructure Index - TRI as primary index and S&P BSE SENSEX - TRI as secondary index. The NAV of Canara Robeco Infrastructure Fund ended down ₹-0.3(-0.7%) yesterday to ₹42.39. Among its top 3 holdings the fund has exposure to Larsen & Toubro Ltd, Reliance Industries Ltd and NTPC Ltd. The fund is having 13.33% holding in Engineering – Construction, 12.64% in Engineering - Industrial Equipment, 10.96% in Cement & Construction Materials, 9.61% in Refineries, 8.41% in Power Generation/Distribution, 6.95% in Air Conditioners, 6.93% in Logistics, 6.62% in Consumer Durables – Electronics, 5.37% in Industrial Gases & Fuels and 3.68% in Bearings sector.

Investment Objective of Invesco India Infrastructure Fund - Direct Pan - Growth Option is to generate capital appreciation by investing in a portfolio that is predominantly constituted of Equity and Equity Related Instruments of infrastructure companies.

Key Features of the Fund are:

- Investors seeking participation in infrastructure related investments and Investors looking for wealth creation over the long term. Top stock holdings of the fund are National Thermal Power Corp. Ltd.(7.66%), Bharti Airtel Ltd.(5.67%), Balkrishna Industries Ltd.(4.11%) and Bharat Electronics Ltd.(3.89%).
- Allocation of the fund by market cap is Large Cap (22.18%), Mid Cap (42.87%) and Small Cap (31.16%). Allocation of the fund by sector is Energy (20.16%), Construction (16.36%), Engineering (14.03%) and Metals (13.85%).

The investment objective of the IDFC Infrastructure Fund - Direct Plan - Growth scheme is to seek to generate long-term capital growth through an active diversified portfolio of predominantly equity and equity related instruments of

companies that are participating in and benefiting from growth in Indian infrastructure and infrastructural related activities.

However, there can be no assurance that the investment objective of the scheme will be realized. Asset Type of the scheme is Cash and equivalent (4.09%) and Equity with (95.91%). Market Cap Distribution of the scheme is in Small Cap 42.87 %, Mid Cap (23.21 %), Large Cap (29.82%) and Others (4.09%).

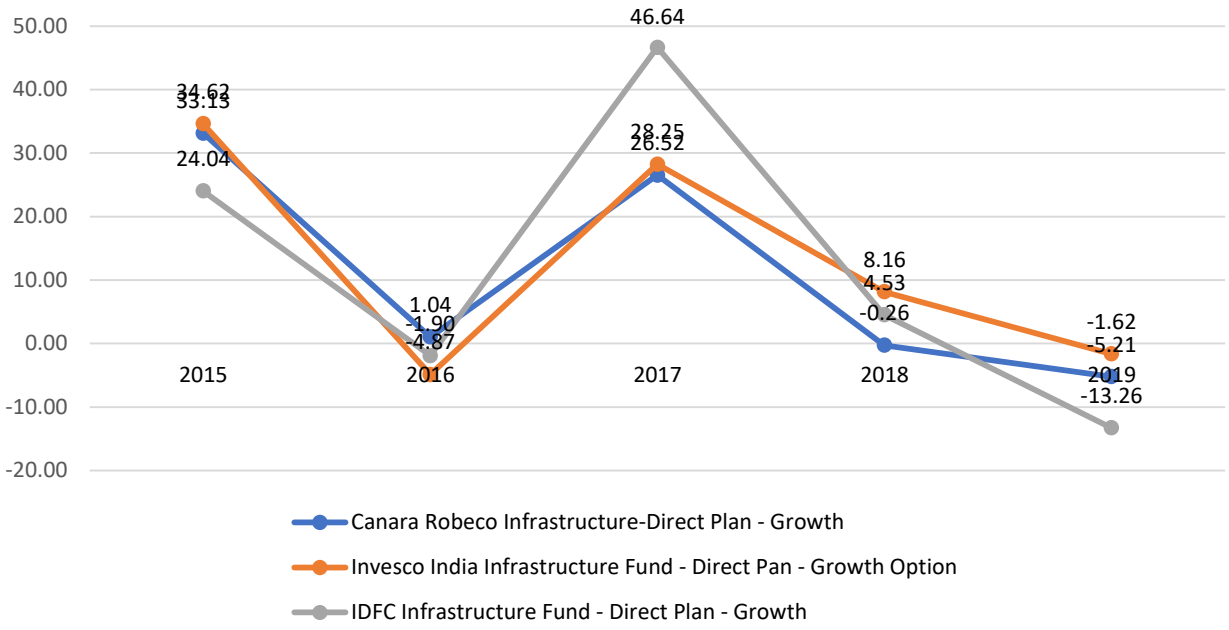
Fund sector distribution is in different sectors like Construction (27.35%), Cement13.98%,Transportation12.66%,Gas9.57%,Telecom9.36%,Cash/Deposits/ Margins/Treps/Repo/Swaps 6.84%, Industrial Products 4.79%, Ferrous Metal 4.68 %, Industrial Capital Goods 4.53 % and Power with 4.2%.

Descriptive statistics of the same has been also computed and presented as under.

Table No. 14: Calculations of Returns of Canara Robeco, Invesco and IDFC Infrastructure Funds

Calculations based on Simple Annual Returns)							
Net Asset Value of Open Ended Schemes-Thematic Infrastructure Mutual Funds (Growth Oriented)							
TIME	**Risk free Return**	Canara Robeco Infrastructure-Direct Plan – Growth	Return (Rp)	Invesco India Infrastructure Fund - Direct Pan - Growth Option	Return (Rp)	IDFC Infrastructure Fund - Direct Plan – Growth	Return (Rp)
2014	8.85	28.50	-	10.52	-	9.60	-
2015	8.25	37.95	33.13	14.16	34.62	11.91	24.04
2016	7.25	38.34	1.04	13.47	-4.87	11.69	-1.90
2017	5.82	48.51	26.52	17.28	28.25	17.14	46.64
2018	6.11	48.38	-0.26	18.68	8.16	17.91	4.53
2019	6.15	45.86	-5.21	18.38	-1.62	15.54	-13.26
Average	7.07	41.26	11.04	15.41	12.91	13.97	12.01
G.M	6.98	40.58	#NUM!	15.11	#NUM!	13.62	#NUM!
S.D	1.26	7.83	17.46	3.23	17.72	3.36	23.62
C.V	17.81	18.98	158.13	20.98	137.28	24.08	196.68
CAGR	-7.02	9.98		11.81		10.10	

Figure 30: Simple Returns of Canara Robeco, Invesco and IDFC Infrastructure Funds



All three schemes mentioned above have not shown much difference in terms of CAGR; however Invesco India Infrastructure Fund - Direct Pan - Growth Option has highest CAGR of 11.81% followed by IDFC Infrastructure Fund - Direct Plan – Growth (CAGR, 10.10%) and Canara Robeco Infrastructure-Direct Plan – Growth with CAGR of 9.98% for their respective NAVs during the study period.

With average Net Asset Value of Rs. 41.26, Canara Robeco Infrastructure-Direct Plan – Growth scheme was much ahead of Invesco India Infrastructure Fund - Direct Pan - Growth Option (Rs. 15.41) and IDFC Infrastructure Fund - Direct Plan – Growth (Rs. 13.97).

Average Return (Rp) of 12.91% was found for Invesco India Infrastructure Fund - Direct Pan - Growth Option higher as compared to IDFC Infrastructure Fund - Direct Plan – Growth (12.01%) and Canara Robeco Infrastructure-Direct Plan – Growth (11.04%) during the study period. IDFC Infrastructure Fund - Direct Plan – Growth has shown highest volatility with C.V. of 196.68% followed by Canara Robeco Infrastructure-Direct Plan – Growth (C.V., 158.13%) and Invesco India Infrastructure Fund - Direct Pan - Growth Option with C.V. of 137.28%.

6.9.3 NAV of Open ended Schemes of ICICI Prudential Infrastructure fund – Growth, ICICI Prudential Infrastructure fund – Direct Plan – Growth and

Nippon India Power & INFRA fund - Direct Plan Growth Plan – Growth option –Thematic Infrastructure Mutual funds (Growth Oriented)

Following table presents Net Asset Value of open ended schemes of ICICI Prudential Infrastructure Fund – Growth, ICICI Prudential Infrastructure Fund - Direct Plan – Growth and Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option along with their returns for the time period of 2014 to 2019.

The ICICI Prudential Infrastructure Fund is an open-ended equity scheme following the infrastructure theme. It seeks to generate long-term capital appreciation and income distribution to the unit holders by investing predominantly in equity and equity-related instruments from the infrastructure sector.

Since infrastructure is one of the thrust areas for the overall growth of the economy today, this scheme invests in companies which are expected to receive a favourable impact due to large-scale investments in the infrastructure sector. As on September 30, 2018, the scheme is ranked 2 under CRISIL's Sectoral/ Thematic Fund category. Further, it has generated returns of 10.56% per year over the last 10 years (as on January 04, 2018). The scheme was launched on 31 August 2005 by ICICI Prudential Mutual Fund.

The scheme is suitable for investors looking at long-term capital appreciation and primarily invests companies from the infrastructure and allied sectors. It has a High risk-level. The minimum redemption amount is Rs. 500. Further, the redemption proceeds are dispatched within 10 business days of the receipt of a valid redemption request. There is no entry load in this scheme. If the units are redeemed within 1 year from the date of allotment of the units, then the exit load is 1% of the applicable NAV 2. If the units are redeemed after 1 year from the date of allotment of the units, then the exit load is Nil.

Top 5 holdings of ICICI Pru Infrastructure Fund (G) as of 12/10/2020 are NTPC Ltd with 9.71%, Bharti Airtel Ltd with 9.41%, Hindalco Industries Ltd with 6.17%, and TREPS with 5.62% and Tata Power Company Ltd with 5.28%. Top 5 sectors of ICICI Pru Infrastructure Fund (G) are Power Generation/Distribution with 15.9%, Metal - Non Ferrous with 9.51%, Telecommunication - Service

Provider with 9.41%, Engineering – Construction with 6.82% and Refineries with 6.33%.

ICICI Prudential Infrastructure Fund – Direct Plan – Growth is one of 15 equity schemes offered by ICICI Prudential Mutual Fund. It is a great investment option for those who want to create wealth in the long term through investment in equity and equity-related securities of companies that belong to the infrastructure and allied sectors.

The investment objective of ICICI Prudential Infrastructure Fund – Direct Plan – Growth is to generate capital growth along with income distribution through investment mainly in equity and equity-related instruments of companies that operate in the infrastructure sector. **Some of the key Features of ICICI Prudential Infrastructure Fund - Direct Plan – Growth are:**

- It is an Open-ended equity scheme following infrastructure theme, plans available are 'ICICI Prudential Infrastructure Fund – Direct Plan' and 'ICICI Prudential Infrastructure Fund' under this scheme.
- Options under each plan are Growth Option and Dividend Option. The Dividend Option has two sub-options: Dividend Pay-out and Dividend Reinvestment. Systematic Investment Plan, Transfer Plan and Withdrawal Plan are available.
- Asset Allocation for ICICI Prudential Infrastructure Fund - Direct Plan – Growth is in Equity and equity-related instruments of companies involved in infrastructure theme (80% to 100%), in Equity and equity-related instruments of companies apart from those involved in the infrastructure theme (0% to 20%), in units of REITs (Real Estate Investment Trusts) and InvIT (Infrastructure Investment Trusts) (0% to 10%) and in Money market and debt securities (0% to 20%).

The major investment restrictions of ICICI Prudential Infrastructure Fund - Direct Plan – Growth are that it cannot invest over 10% of its Net Asset Value in debt securities that consist of money market and non-money market securities issued by a single issuer if the securities are rated not under investment grade, it cannot invest over 10% of its Net Asset Value in un-rated debt securities issued by a

single issuer and the overall investment in these securities cannot be more than 25% of the scheme's Net Asset Value.

Transfer of units from one fund to another can only be done if the transfers are made at the current market price for quoted securities on spot basis. ICICI Prudential Infrastructure Fund – Direct Plan – Growth is a good option for investors who wish to create wealth in the long term through investment mainly in companies that belong to the infrastructure and allied structures.

Nippon India Power & Infra Fund is a Equity - Sectoral Fund - Energy & Power fund and belongs to Nippon India Mutual Fund. It was launched on 01-Jan-2013 and currently has an AUM of ₹1,068.37 crore. Nippon India Power & Infra Fund is benchmarked against NIFTY INFRA as primary index and NIFTY INFRA - TRI as primary index and S&P BSE SENSEX - TRI as secondary index.

The investment objective of the scheme Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option is to seek long term capital appreciation by investing in equity/equity related instruments of the companies that are engaged in or allied to the power and infrastructure space in India. There is no assurance or guarantee that the investment objective of the scheme will be achieved.

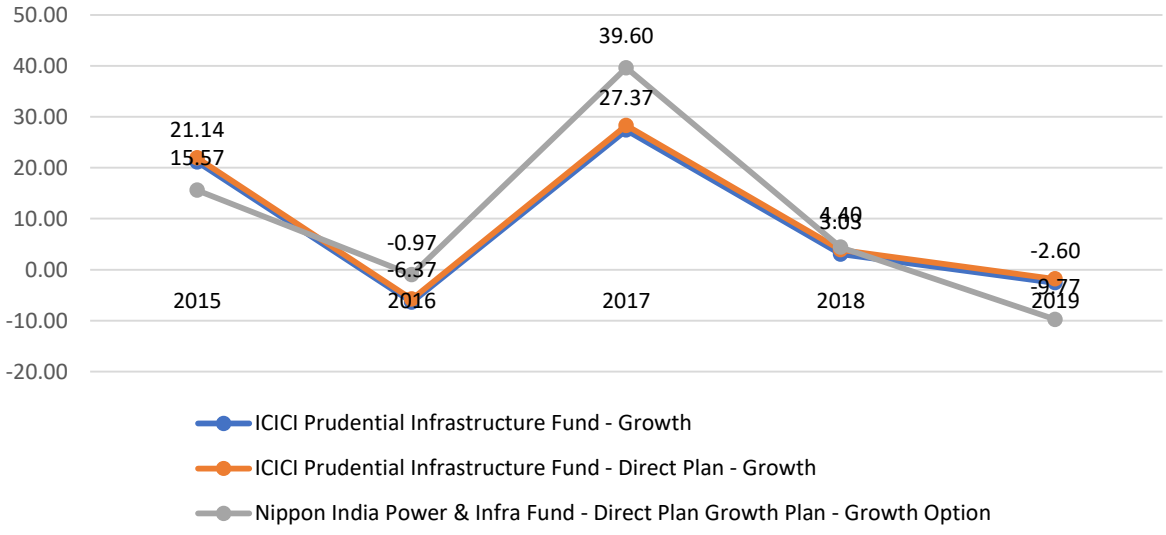
Fund holdings of the scheme are as Larsen & Toubro Limited with 9.28%, Reliance Industries Limited with 8.78%, Bharti Airtel Limited with 7.29%, Bharat Electronics Limited with 5.38%, UltraTech Cement Limited with 5.12%, NTPC Limited with 4.78%, GE Power India Limited with 4.28%, KEC International Limited with 4.03%, Power Grid Corporation of India Limited with 3.50% and Tata Power Company Limited with 2.99%. Sector holdings are in Engineering – Construction with 24.04%, Refineries with 12.98%, Power Generation/Distribution with 12.32%, Cement & Construction Materials with 11.45%, Telecommunication - Service Provider with 7.29%, Engineering - Industrial Equipment with 6.35%, Electric Equipment with 3.40%, Transmission Towers / Equipment with 2.84%, Miscellaneous with 2.37% and Cable with 2.25%.

Descriptive statistics of the same has been also computed and presented as under.

Table No. 15: Calculations of Returns of ICICI Pru (G), ICICI Pru (D) and Nippon India

Calculations based on Simple Annual Returns)							
Net Asset Value of Open Ended Schemes-Thematic Infrastructure Mutual Funds (Growth Oriented)							
TIME	**Risk free Return**	ICICI Prudential Infrastructure Fund - Growth	Return (Rp)	ICICI Prudential Infrastructure Fund - Direct Plan – Growth	Return (Rp)	Nippon India Power & Infra Fund - Direct Plan	Return (Rp)
2014	8.85	34.08	-	34.40	-	65.50	-
2015	8.25	41.28	21.14	41.93	21.90	75.69	15.57
2016	7.25	38.65	-6.37	39.51	-5.78	74.96	-0.97
2017	5.82	49.23	27.37	50.69	28.29	104.64	39.60
2018	6.11	50.73	3.03	52.66	3.90	109.25	4.40
2019	6.15	49.41	-2.60	51.70	-1.83	98.57	-9.77
Average	7.07	43.90	8.52	45.15	9.30	88.10	9.77
G.M	6.98	43.43	#NUM!	44.59	#NUM!	86.50	#NUM!
S.D	1.26	6.87	14.92	7.58	15.00	18.26	19.04
C.V	17.81	15.66	175.18	16.80	161.37	20.73	194.93
CAGR	-7.02	7.71		8.49		8.52	

Figure 31: NAV returns returns of ICICI Pru (G), ICICI Pru (D) and Nippon India from 2014-19



Net Asset Value of ICICI Prudential Infrastructure Fund - Growth was highest in year 2018 with Rs. 50.73 whereas it was lowest in year 2014 with Rs. 34.08. Average Net Asset Value for the scheme during year 2014 to year 2019 was Rs. 43.90.

CAGR for the NAV of this scheme was found 7.71%. Return from this scheme was found highest with 27.37% in year 2017 however overall average return realized was 8.52% during year 2014 to year 2019. Some of the years have shown even negative figures as well as an indication of high volatility in returns of this scheme with C.V. 175.18%.

Average NAV of ICICI Prudential Infrastructure Fund - Direct Plan - Growth was Rs. 45.15 with 16.80% of C.V and 8.49% of CAGR during year 2014 to year 2019. Average return out of this scheme was 9.30% whereas it was highest (28.29%) in year 2017. Negative returns during some of the years have created high volatility in returns as indicated by C.V. of 161.37%. Average NAV of Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option was Rs. 88.10 and average return was found 9.77% during year 2014 to year 2019. CAGR for the NAV was 8.52% during the study period.

CAGR of Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option was found much higher as compared to Net Asset Value of ICICI Prudential Infrastructure Fund - Growth and ICICI Prudential Infrastructure Fund - Direct Plan - Growth. With Average Return (Rp) of 9.77% Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option was much ahead than the ICICI Prudential Infrastructure Fund - Growth and ICICI Prudential Infrastructure Fund - Direct Plan - Growth during the study period.

Volatility to a great extent was also realized in the returns of Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option highest with 194.93% followed by ICICI Prudential Infrastructure Fund - Direct Plan – Growth with 175.18% and ICICI Prudential Infrastructure Fund – Growth with 161.37%.

6.9.4 NAV of Open ended Schemes of LIC MF Infrastructure fund-Direct Plan -Growth, L&T Infrastructure fund –Direct Plan –Growth and Kotak Infrastructure & Economic reform fund – Direct Plan – Growth option – Thematic Infrastructure Mutual fund (Growth oriented)

Following table presents Net Asset Value of open ended schemes of LIC MF Infrastructure Fund-Direct Plan-Growth, L&T Infrastructure Fund -Direct Plan-Growth and Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option along with their returns for the time period of 2014 to 2019.

Established in 20th April 1989, it is an associate company of one of the most reputed brands of India, LIC. LIC Mutual funds aim to create financial discipline and corporate governance and are chosen by many investors, due to it being a pioneering brand. The motto of LIC is to create value for its investors by adopting an investing strategy that is innovative, yet stable for a dynamic environment, such as ours. It targets to cater to all segments of the society and creating an investment experience which is unparalleled. It offers a large variety of funds, starting from equity, debt, hybrid, solution oriented and index funds. Investors of different risk appetites and investment duration can build a strong portfolio through LIC mutual funds.

LIC MF Infrastructure Fund-Direct Plan-Growth is a fund that invests mainly in shares of companies engaged in infrastructure-related activities or are expected to benefit from them. The investors should avoid funds that have a narrowly defined investment mandate such as this one. Instead, they should invest in multi-cap funds which provide complete freedom to the fund management team to invest in companies from which it expects maximum gains. Asset allocation of the scheme is Equity with 88.96%, Debt 0.00% and Others11.04%.

Top holdings of the scheme are Reliance Industries in Energy sector with 9.20%, The Ramco Cements in Construction sector with 7.16%, Ultratech Cement in Construction with 6.97%, HDFC Bank in Financial sector with 6.65%, Bharti Airtel in Communication sector with 5.52%, SKF India in Engineering sector with 5.49%, ICICI Bank in Financial sector with 5.33%, KNR Constructions in Construction sector with 5.10%.

The investment objective of the scheme is to generate long-term growth from a portfolio of equity / equity related instruments of companies engaged either directly or indirectly in the infrastructure sector. However, there is no assurance that the investment objective of the Schemes will be realized.

Allocation in different sectors is as Financial Services with 32%, Basic Materials with 17%, Industrials with 15%, Cash - Repurchase Agreement with 15% and Energy with 11%. L&T Infrastructure Fund is an Equity - Sectoral fund launched on 27 Sep 07. It is a fund with High risk and has given a CAGR return of 1.8% since its launch. Return for 2019 was -3.1%, 2018 was -17.1% and 2017 was 61.1%.

Scheme objective is to generate capital appreciation by investing predominantly in equity and equity related instruments of companies in the infrastructure sector. Asset allocation of the scheme is in Cash 1.74% and in Equity 98.26%. Sector allocation of the scheme is: Industrials 53%, Basic Materials 24.64%, Communication Services 7.03%, Energy 6.91%, Real Estate 3.25% and Utility 3.25%.

Top securities holdings of the scheme are Ramco Cements Ltd (Basic Materials) with 8%, Larsen & Toubro Ltd (Industrials) with 7%, Bharti Airtel Ltd (Communication Services) with 7%, Reliance Industries Ltd (Energy) with 6%, Honeywell Automation India Ltd (Industrials) with 4%, Orient Refractories Ltd (Industrials) with 4%, Engineering Ltd (Industrials) with 4%, ACC Ltd (Basic Materials) with 4%, Grasim Industries Ltd (Basic Materials) with 3% and UltraTech Cement Ltd (Basic Materials) with 3%.

The investment objective of the Kotak Infrastructure & Economic Reform Scheme is to generate long-term capital appreciation from a diversified portfolio of predominantly (at least 65%) equity and equity-related securities of companies involved in economic development of India as a result of potential investments in infrastructure and unfolding economic reforms. Kotak Infrastructure & Economic Reform Fund will invest primarily in equity and equity related instruments either through primary or secondary purchases of companies involved in this development as a result of such potential investments in infrastructure and unfolding economic reform to take advantage of this opportunity as it appears on the economic landscape of India.

Under normal market conditions and depending on the fund manager’s views, the assets of the Scheme would be invested across stocks that represent a broad range of sectors of the economy as mentioned below in order to ensure adequate

portfolio diversification. Infrastructure companies operating in but not limited to power, oil and gas, telecom, water, housing, real estate, construction, roads, ports, airports, shipping & ship building, logistics, etc. and sectors that will benefit from the development in infrastructure such as but not limited to cement, metals, capital goods and banking and financial services.

Economic reform oriented sectors that will benefit from the on-going liberalization in the Indian economy including relaxation in foreign exchange controls, FDI in banking and financial services and any other industry or sector where there is a trend to moving toward a freer market based model like retail, media and entertainment, mining, etc. The fund manager may use selective derivative strategies with a view to optimize the overall performance of the Scheme. The Scheme may invest in listed/unlisted equity shares as per the extant SEBI (Mutual Funds) Regulations, 1996 and amended by SEBI from time to time.

The scheme may invest in companies coming out with the IPO and whose post issue market cap (based on the issue price) would fall under above-mentioned criteria. The scheme may invest in another scheme of the Kotak Mahindra Mutual Fund or any other Mutual Fund without charging any fees, provided that aggregate inter-scheme investment made by all schemes under the management of Kotak Mahindra Asset Management Company Limited or in schemes under the management of any other asset management company shall not exceed 5% of the net asset value of Kotak Mahindra Mutual Fund.

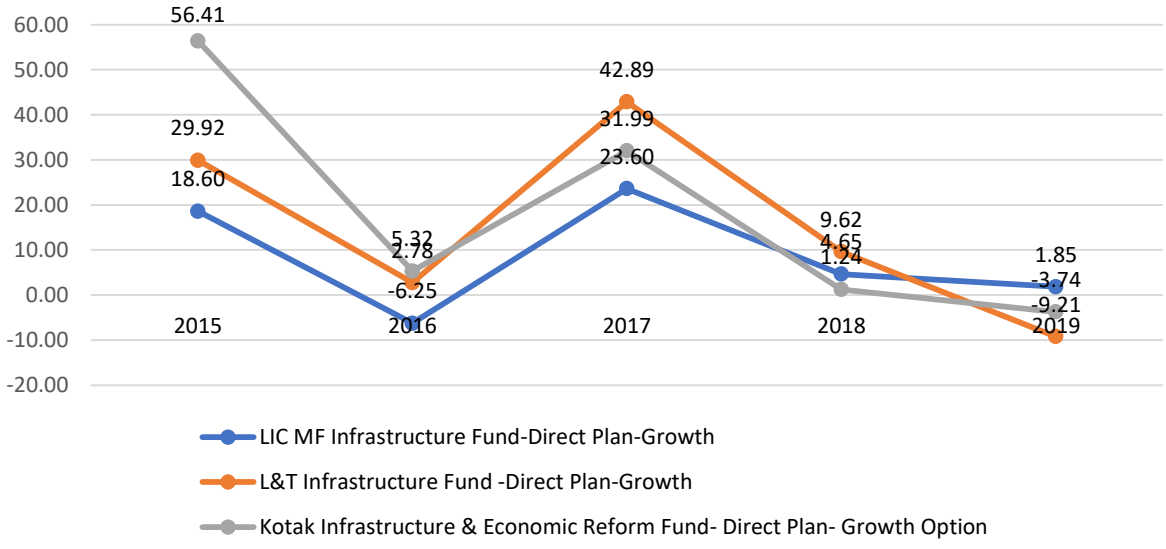
Sector allocation of the scheme is in Industrial Manufacturing with 25.07%, Construction with 22.53%, Energy with 17.84%, Cement & Cement Products with 13.96%, Metals with 6.8%, Chemicals with 5.5 %, Telecom with 4.03%, Services with 3.1%, Cash & Cash Equivalent with1.18% and Automobile 0%. This open ended fund scheme is suitable for investors seeking long term capital growth and long term capital appreciation by investing in equity and equity related instruments of companies contributing to infrastructure and economic development of India.

Descriptive statistics of the same has been also computed and presented as under.

Table No. 16: Calculations of Returns of LIC MF, L&T and Kotak Infra

Calculations based on Simple Annual Returns)							
Net Asset Value of Open Ended Schemes-Thematic Infrastructure Mutual Funds (Growth Oriented)							
TIME	**Risk free Return**	LIC MF Infrastructure Fund-Direct Plan-Growth	Return (Rp)	L&T Infrastructure Fund - Direct Plan-Growth	Return (Rp)	Kotak Infrastructure & Economic Reform Fund-Direct Plan	Return (Rp)
2014	8.85	10.26	-	8.45	-	10	-
2015	8.25	12.17	18.60	10.98	29.92	15.64	56.41
2016	7.25	11.41	-6.25	11.29	2.78	16.47	5.32
2017	5.82	14.10	23.60	16.13	42.89	21.74	31.99
2018	6.11	14.75	4.65	17.68	9.62	22.01	1.24
2019	6.15	15.03	1.85	16.05	-9.21	21.19	-3.74
Average	7.07	12.95	8.49	13.43	15.20	17.84	18.24
G.M	6.98	12.82	#NUM!	12.98	#NUM!	17.23	#NUM!
S.D	1.26	1.96	12.31	3.68	21.00	4.73	25.42
C.V	17.81	15.10	145.01	27.37	138.19	26.53	139.35
CAGR	-7.02	7.94		13.68		16.20	

Figure 32: NAV returns of LIC MF, L&T and Kotak Infra from 2014-19



As far as CAGR of above mentioned schemes is concerned, Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option has highest CAGR of 16.20% followed by L&T Infrastructure Fund -Direct Plan-Growth (CAGR, 13.68%) and LIC MF Infrastructure Fund-Direct Plan-Growth with CAGR of 7.94% for their respective NAVs during the study period.

LIC MF Infrastructure Fund-Direct Plan-Growth has highest NAV in year 2019 with Rs. 15.03 whereas with Rs. 10.26 it was lowest in year 2014. 23.60% of returns were all time highest returns during the study period that was realized in year 2017 for this scheme.

L&T Infrastructure Fund -Direct Plan-Growth had least NAV (Rs. 8.45) in year 2014 and highest (Rs. 17.68) was realized in year 2018. 42.89% of the returns were realized in year 2017 which was highest among the study years. Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option with least NAV (Rs. 10) in year 2014 and highest NAV of Rs. 22.01 in year 2018 has given highest returns in year 2015 with 56.41%.

With average Net Asset Value of Rs. 17.23, Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option was much ahead of L&T Infrastructure Fund -Direct Plan-Growth (Rs. 13.43) and LIC MF Infrastructure Fund-Direct Plan-Growth (Rs. 12.95). Average Return (Rp) of 18.24% was found for Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option higher as compared to L&T Infrastructure Fund -Direct Plan-Growth (15.20%) and LIC MF Infrastructure Fund-Direct Plan-Growth (8.49%) during the study period.

LIC MF Infrastructure Fund-Direct Plan-Growth has shown highest volatility with C.V. of 145.01% followed by Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option with C.V. of 139.35% and L&T Infrastructure Fund -Direct Plan-Growth (C.V., 138.19%).

6.9.5 NAV of Open Ended Schemes of Tata Infrastructure Fund -Direct Plan Growth, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth and SBI Infrastructure Fund - Direct Plan – Growth -Thematic Infrastructure Mutual Funds (Growth Oriented)

Following table presents Net Asset Value of open ended schemes of Tata Infrastructure Fund -Direct Plan Growth, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth and SBI Infrastructure Fund - Direct Plan – Growth along with their returns for the time period of 2014 to 2019.

The investment objective of the Tata Infrastructure Fund -Direct Plan Growth scheme is to generate long term capital appreciation by investing predominantly in equity and equity related instruments of companies engaged in infrastructure and infrastructure related sectors and which are incorporated or have their area of primary activity, in India and other parts of the world.

The investment focus would be guided by the growth potential and other economic factors of the countries. Looking at the current global economic outlook and estimates of infrastructure spending, the fund managers expect to have a focus on investment opportunities in Asia Pacific Region including India, Europe and Latin America and other growing economies.

Portfolio of Overseas/Foreign securities shall be managed by a dedicated Fund Manager, while selecting the securities the Fund Manager may rely on the inputs received from internal research or research conducted by external agencies in various geographies. It is one of the high risk equity fund plans offered by Tata Mutual Fund.

The plan was launched on November 12, 2010 and has a current Net Asset value (NAV) of Rs 10.11. The minimum investment required for this plan is Rs 5,000 with SIP investing starting at Rs 500.0. Top holdings of the scheme are in Larsen & Toubro Ltd with 9.53%, Astral Poly Technik Ltd with 8.31%, KNR Construction Ltd with 6.94%, Bharti Airtel Ltd with 5.67%, Ultratech Cement Ltd with 5.63% and Reliance Industries Ltd with 5.58%. As on 30th Sep, 2020 96.05% Net Assets were in Domestic Equities and 3.95% in Cash & Cash Equivalents and Net Assets.

Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth is a sectorial fund to play the India infrastructure development story. Fund focuses on the infrastructure and heavy

engineering sectors and also ancillary sectors supporting the same. The fund invests across cap curves in infrastructure and related stocks.

This product is suitable for investors who are seeking consistent long-term returns by investing predominantly in equity/equity related instruments of companies engaged either directly or indirectly in infrastructure and infrastructure related activities or expected to benefit from the growth and development of infrastructure.

This product is suitable for investors who are seeking long term capital growth and investment in equity and equity related instruments of companies engaged either directly or indirectly in infrastructure and infrastructure related activities or expected to benefit from the growth and development of infrastructure.

Fund objective is to generate long-term returns by investing predominantly in equity / equity-related instruments of companies engaged either directly or indirectly in infrastructure and infrastructure related activities or expected to benefit from the growth and development of infrastructure.

Top holdings of the fund as on 30th September, 2020 are Reliance Industries Ltd with 8.35%, The Ramco Cements Ltd with 6.38%, Honeywell Automation India Ltd with 5.59%, Grindwell Norton Ltd with 5.15%, Timken India Ltd with 5.03%, ICICI Bank Ltd with 4.89%, Larsen & Toubro Ltd with 4.21%, Kansai Nerolac Paints Ltd with 3.86%, Bharti Airtel Ltd with 3.38% and Ultratech Cement Ltd with 3.26%.

Top sector holdings of the scheme are in Cement & Construction Materials with 12.13%, Engineering - Industrial Equipments with 9.53%, Refineries with 9.38%, Bank – Private with 7.15%, Bearings with 6.08%, Consumer Durables – Electronics with 5.59%, Abrasives with 5.15%, Construction - Real Estate with 4.58%, Engineering – Construction with 4.21% and Cable with 4.16%.

Cash holding is 2.07%, Equity is 97.60% and holding per cent in Rights is 0.33%. SBI Infrastructure Fund aims to provide investors with opportunities for long-term growth in capital through an active management of investments in stocks of companies directly or indirectly involved in the infrastructure growth in the Indian economy. The fund invests minimum of 80% in stocks of companies

related to the infrastructure sector. SBI Infrastructure Fund also has the flexibility to invest up to 20% in equities other than companies related to the infrastructure space and/or debt and/or money market instruments.

The fund will invest in stocks of companies involved in the following businesses– airports, banks, financial institutions & NBFCs, cement, coal, construction, electrical components, engineering, energy, industrial capital goods, metals & minerals, ports, power, road & railways, telecommunication, transportation, urban infra, housing, commercial vehicles, industrial manufacturing and logistics service provider etc. The fund's investment criteria would be to invest in equity stocks of those companies which are either directly or indirectly engaged in infrastructure growth in the Indian economy and aims at long term growth in capital.

Top 10 sectors with holding percentage are Construction with 24.1%, Energy with 23.51%, Engineering with16.07%, Services with 12.42%,Communication with 9.8%, Financial with 5.27%, Metals with4.5%, Others with 2.51%, Consumer Durable with 1.07% and undefined with0.75%. Top 10 sectors are Crude Oil & Natural Gas with 17.86%, Infrastructure with9.8%, Telecom Services with 9.8%, Industrial Machinery with5.86%, Cement with4.33%, Machine Tools with 3.49% and Shipping with 3.15%.

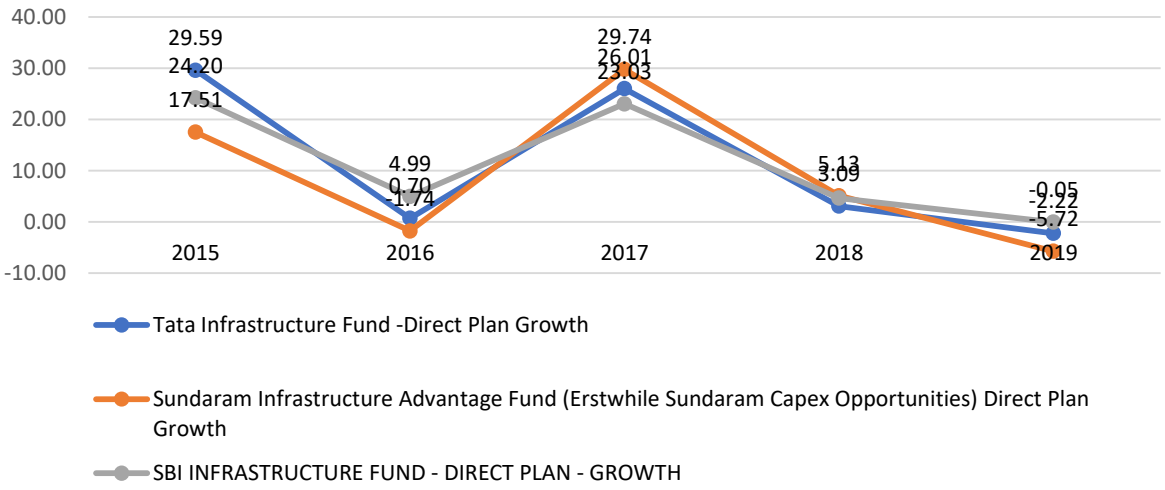
Descriptive statistics of the same has been also computed and presented as under.

Table No. 17: Calculations of Returns of Tata Infra, Sundaram and SBI Infra.

Calculations based on Simple Annual Returns)							
Net Asset Value of Open Ended Schemes-Thematic Infrastructure Mutual Funds (Growth Oriented)							
TIME	**Risk free Return**	Tata Infrastructure Fund - Direct Plan Growth	Return (Rp)	Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Growth	Return (Rp)	SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	Return (Rp)

2014	8.85	33.62	-	21.81	-	9.25	-
2015	8.25	43.57	29.59	25.63	17.51	11.49	24.20
2016	7.25	43.87	0.70	25.18	-1.74	12.07	4.99
2017	5.82	55.29	26.01	32.67	29.74	14.85	23.03
2018	6.11	56.99	3.09	34.35	5.13	15.54	4.66
2019	6.15	55.73	-2.22	32.38	-5.72	15.53	-0.05
Average	7.07	48.18	11.44	28.67	8.98	13.12	11.37
G.M	6.98	47.36	#NUM!	28.28	#NUM!	12.90	#NUM!
S.D	1.26	9.35	15.11	5.11	14.57	2.58	11.37
C.V	17.81	19.41	132.15	17.82	162.22	19.68	100.01
CAGR	-7.02	10.64		8.23		10.91	

Figure 33: NAV returns of Tata Infra, Sundaram and SBI Infra from 2014-19.



As depicted from the above computation, SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH has highest CAGR of 10.91% followed by Tata Infrastructure Fund -Direct Plan Growth (CAGR, 10.64%) and Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth with CAGR of 8.23% for their respective NAVs during the study period.

Tata Infrastructure Fund -Direct Plan Growth has highest NAV in year 2018 with Rs. 56.99 whereas with Rs. 33.62 it was lowest in year 2014. 29.59% of returns

were all time highest returns during the study period that was realized in year 2015 for this scheme.

Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth had highest NAV (Rs. 34.35) in year 2018 and least (Rs. 21.81) was realized in year 2014. 29.74% of the returns were realized in year 2017 which was highest among the study years.

SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH with least NAV (Rs. 9.25) in year 2014 and highest NAV of Rs. 15.54 in year 2018 has given highest returns in year 2015 with 24.20%.

With average Net Asset Value of Rs. 48.18, Tata Infrastructure Fund -Direct Plan Growth Option was much ahead of Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth (Rs. 28.67) and SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH (Rs. 13.12).

Average Return (Rp) of 11.44% was found for Tata Infrastructure Fund -Direct Plan Growth Option higher as compared to SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH (11.37%) and Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth (8.98%) during the study period.

LIC MF Infrastructure Fund-Direct Plan-Growth has shown highest volatility with C.V. of 145.01% followed by Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option with C.V. of 139.35% and L&T Infrastructure Fund -Direct Plan-Growth (C.V., 138.19%). With lowest C.V. of 100.01%, SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH has shown most consistency in returns during the study period.

6.9.6 NAV of Open Ended Schemes of Quant Infrastructure Fund, Tata Infrastructure Fund -Direct Plan Growth, UTI Infrastructure Fund-Growth Option- Direct and DSP India T.I.G.E.R. Fund - Direct Plan - Growth - Thematic Infrastructure Mutual Funds (Growth Oriented)

Following table presents Net Asset Value of open ended schemes of Quant Infrastructure Fund, Tata Infrastructure Fund -Direct Plan Growth, UTI

Infrastructure Fund-Growth Option- Direct and DSP India T.I.G.E.R. Fund - Direct Plan - Growth along with their returns for the time period of 2014 to 2019.

The primary investment objective of the Quant Infrastructure Fund scheme is to seek to generate capital appreciation & provide long-term growth opportunities by investing in a portfolio of Infrastructure focused companies. This is a fund that invests mainly in shares of companies engaged in infrastructure-related activities or are expected to benefit from them. Investors should avoid funds that have a narrowly defined investment mandate such as this one. Instead, they should invest in multi-cap funds which provide complete freedom to the fund management team to invest in companies from which it expects maximum gains.

Fund has 97.09% investment in Indian stocks of which 18.31% is in large cap stocks, 18.71% is in mid cap stocks, 59.95% in small cap stocks. It is suitable for investors who have advanced knowledge of macro trends and prefer to take selective bets for higher returns compared to other Equity funds. At the same time, these investors should also be ready for possibility of moderate to high losses in their investments even though overall market is performing better.

Equity holding of the fund is 97.09%, F&O holdings are 0.00% and Foreign Equity Holdings are 0.00%. Stock invested in PTC India Financial Services Ltd with 9.84%, Adani Enterprises Ltd with 9.69%, Majesco Ltd with 9.56%, Stylam Industries Ltd with 9.45%, Linde India Ltd with 9.07%, Prestige Estates Projects Ltd with9.02%, Uflex Ltd with 8.07%, Bharti Airtel Ltd with 8.02%, Deepak Fertilisers & Petrochemicals Corp. Ltd with 6.46% and Adani Ports And Special Economic Zone Ltd with 4.85%.

Tata Infrastructure Fund Growth is one of the high risk equity fund plans offered by Tata Mutual Fund. The plan was launched on January 21, 2005 and has a current Net Asset value (NAV) of Rs 47.53. The minimum investment required for this plan is Rs 5,000 with SIP investing starting at Rs 500.

The investment objective of the scheme is to provide income distribution and / or medium to long term capital gains by investing predominantly in equity / equity related instruments of the companies in the infrastructure sector.

Top 5 holdings of Tata Infrastructure Fund-Reg(G) are Larsen & Toubro Ltd with 9.53%, Astral Poly Technik Ltd with 8.31%, Knr Constructions Ltd with 6.94%, Bharti Airtel Ltd with 5.67% and Ultratech Cement Ltd with 5.63%.

Top 5 sectors of Tata Infrastructure Fund-Reg(G) are Engineering – Construction with 16.91%, Cement and Construction Materials with 12.47%, Power Generation/Distribution with 9.26%, Plastic Products with 8.31% and Electric Equipment with 6% as of 14/10/2020.

UTI Mutual Funds are managed by UTI Asset Management Company Ltd. (UTI AMC). The AMC was established on November 14, 2002 and started functioning in the investment domain from February 1, 2003. The fund attempts to provide an effective combination of the domain leadership in the capital markets coupled with state-of-the-art technological expertise. Efforts are made to offer investing solutions which match the risk-return needs of the clients.

UTI Infrastructure Fund-Growth Option is a Equity Scheme - Sectoral/ Thematic launched by UTI Asset Management Company Ltd.The Latest NAV of UTI Infrastructure Fund-Growth Option as of 08-Oct-2020 is Rs. 44.2. UTI Infrastructure Fund-Growth Option scheme was made available to investors on 02-Jan-2003.

The Fund would predominantly invest in stocks of companies engaged either directly or indirectly in the Infrastructure areas of the India economy. Infrastructure sector is a key driver for the economy, playing an important role in propelling India’s overall development. The Fund emphasis on bottom-up strategy for stock selection and is positioned to profit from the early revival in the investment cycle.

The Fund would be agnostic to market capitalization, however may take concentrated exposure to certain stocks or sectors. This product is suitable for investors who are seeking long term capital appreciation and investment predominantly in equity and equity related securities of companies forming part of the infrastructure sector.

The scheme offers subscription and redemption of units on all business days on an on-going basis. Ordinarily no dividend distribution will be made under this

option. All income generated and profits booked will be ploughed back and returns will be reflected through the NAV. Direct Plan is only for investors who purchase/subscribe units directly with the Fund and is not available for investors who route their investments through a Distributor.

All categories of Investors (whether existing or new Unit holders) are eligible to subscribe under Direct Plan. Investments under the Direct Plan can be made through various modes (except all Platform(s) where investor's applications for subscription of units are routed through Distributors). The Fund may use derivative instruments like Stock/Index Futures or such other derivative instruments as may be introduced from time to time for the purpose of hedging and portfolio balancing, or to undertake any other strategy within a limit of 50% of the Net Assets of the scheme. The Scheme can take exposure up to 20% of its net assets in stock lending. The fund will be largely invested in the sectors like Engineering where revenue and profit margins were impacted by slow moving orders and delay in finalization of fresh orders.

Higher interest rates and lack of policy decision has impacted overall investment climate. The scheme expects gradual correction in interest rate and improved decision making at government level to lift sentiment and revive the investment climate which would reflect in improved stock performance of these companies in coming quarters. Another sector is Steel which has seen large capacity additions over last 2 years led by debt-funded capex. The weak steel prices, sluggish domestic demand and raw material issues has further stretched balance sheet of companies after a large capex cycle.

Given the weak financial health of many companies, the consensus in the government points to continued industry support through import restrictions including anti-dumping duties, quality checks. Also, the Indian steel sector spans a broad spectrum of cost structures ranging from large inefficiencies for PSEs such as SAIL to companies that are as cost competitive as those in China.

The government's efforts to protect companies with lowest efficiencies works to the advantage of efficient domestic steel companies. Next is Cement sector where demand has been muted since the last few years mainly on account slowdown in housing and infrastructure investment. The group expects demand growth to

improve going forward led by focus of new government on infrastructure investment, 7th Pay Commission and a favourable low base. Cement prices, which had fallen to low levels in the last fiscal, have started improving and we expect this price trend to sustain with improved demand and thus ability of players to pass on rising costs.

Long term cement demand growth is at 1.2 times GDP growth and with improving GDP growth estimates; capacity utilization levels will see gradual improvement. Also, structurally industry looks good with rising entry barriers to incremental capacity, greater industry consolidation and healthier balance sheets for large cement manufacturers. Another sector is Aluminium where the global aluminium markets are in deficit in CY2016 due to large capacity closures in China towards end of CY2015 which has affected supplies in CY2016 and strong volumes growth in China led by government spending. Of the closed smelters, about 1.5 mtpa have already restarted after some recovery in China aluminum prices (+20%) over the past 6 months. The restarts are gradual and only limited volumes were reported in 2QCY16.

Moreover, additional 2.5 mn tons of volumes are expected in China from new projects in 2HCY16—higher volumes will lead to surplus aluminum markets in 2HCY16. We also highlight that world ex-China inventories are still significantly high at more than 120 days of consumption and increase in interest rates by the U.S. Federal Reserve Bank can lead to unwinding of positions and pressure on prices. UTI is cautious on pure-play aluminium names due to China overcapacity and large global aluminium inventories tied up in cash & carry trades. Another sector is Power which is currently facing issues related to demand.

Despite sufficient base load capacity, India is facing demand issues due to poor health of state electricity board (SEB). Government has taken some positive steps to address these issues. UTI expects these steps to help SEBs set their balance sheet right and help them enter into long term power purchase agreements.

The 12th Five Year Plan has projected a generation capacity augmentation of almost one hundred gigawatts (GW). The outlay on generation, transmission and distribution, including modernization, has been estimated to be about Rs.

10,00,000 crores. If all of these plans are executed efficiently, the power sector will see a massive transformation.

UTI believes that all of this should be positive for the sector in the medium term. Next is Oil and Gas which has been for years a 'regulated' sector with cyclical returns. The cyclicality was more due to policy changes, than business fundamentals. Against a background of high crude prices, currency depreciation and the compulsions of coalition politics, the earnings potential of these companies has been under pressure.

The broad investment strategy of the fund will be to invest in equity and equity related securities of companies that are engaged either directly or indirectly in the infrastructure growth of the Indian economy, including those in derivative segment. The scheme aims to build and maintain a diversified portfolio of equity stocks that has the potential to appreciate in the long run.

The scheme will invest in companies broadly within the areas / sectors of the economy namely Airports & related services, Banking & other related financial services, Construction & related industry, Electrical & Electronic components, Energy including Coal, Oil & Gas, Petroleum, Pipelines etc, Engineering, Industrial Capital Goods & Products, Irrigation & Water Management Services, Metals, Minerals & Construction Materials, Mining, Ports, Power & Power Equipments, Road & Railways, Telecom, Transportation & Logistics and Urban Infrastructure including Housing & Commercial Infrastructure.

The primary investment objective of the DSP India T.I.G.E.R. Fund - Direct Plan - Growth scheme is to seek to generate capital appreciation, from a portfolio that is substantially constituted of equity securities and equity related securities of corporates, which could benefit from structural changes brought about by continuing liberalization in economic policies by the Government and/or from continuing investments in infrastructure, both by the public and private sector. One should invest in this scheme as it invests in companies which will gain from the government's policies on infrastructure growth and economic reforms. The scheme portfolio is to obtain benefit from increased government spending on infrastructure and increased private participation and revival in the corporate Capex cycle and the portfolio is well diversified across sectors, market

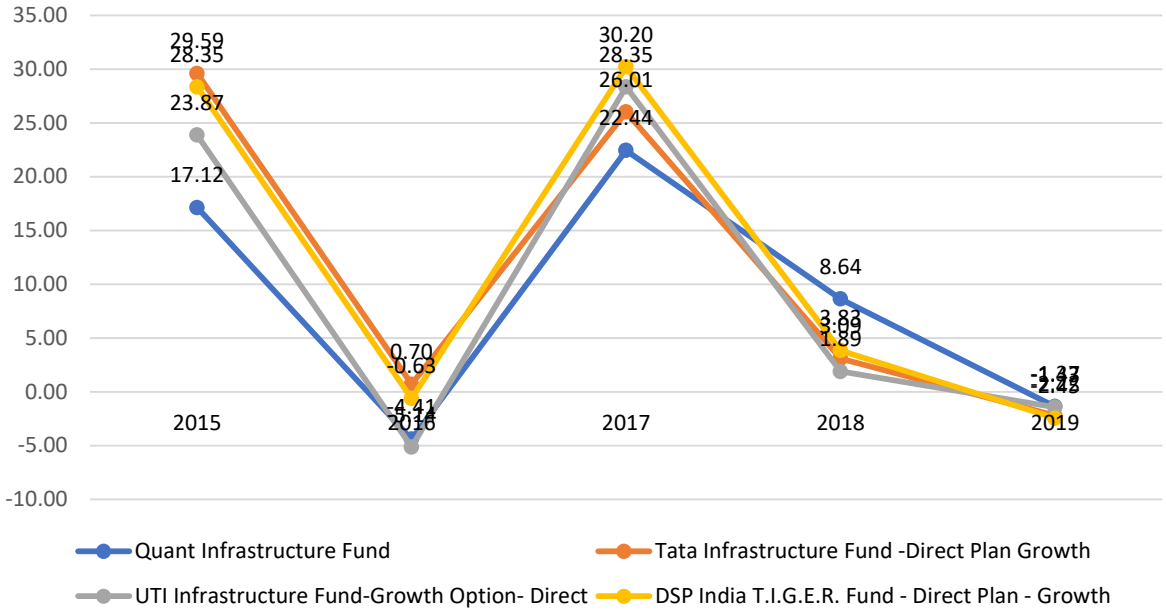
capitalisation and between private and PSU companies. Also it has a track record of over 10 years. Top 5 stocks by holding are ICICI Bank Ltd with 9.14%, Bharti Airtel Ltd with 7.3%, HDFC BANK LTD with 5.64%, State Bank of India with 3.5% and KNR Constructions Ltd with 3.22%. Current asset allocation as of Sep 30, 2020 is Equity & equity related securities with 97.85%, Debt Instruments with 1.07%, Cash & cash equivalents with 1.08%.

Descriptive statistics of the same has been also computed and presented as under.

Table No. 18: Calculations of Returns of Quant, Tata, UTI and DSP India TIGER

Calculations based on Simple Annual Returns)									
Net Asset Value of Open Ended Schemes-Thematic Infrastructure Mutual Funds (Growth Oriented)									
TIME	**Risk free Return**	Quant Infrastructure Fund	Return (Rp)	Tata Infrastructure Fund - Direct Plan Growth	Return (Rp)	UTI Infrastructure Fund-Growth Option-Direct	Return (Rp)	DSP India T.I.G.E.R. Fund - Direct Plan - Growth	Return (Rp)
2014	8.85	5.91	-	33.62	-	35.10	-	54.74	-
2015	8.25	6.92	17.12	43.57	29.59	43.48	23.87	70.26	28.35
2016	7.25	6.62	-4.41	43.87	0.70	41.25	-5.14	69.82	-0.63
2017	5.82	8.10	22.44	55.29	26.01	52.94	28.35	90.90	30.20
2018	6.11	8.80	8.64	56.99	3.09	53.94	1.89	94.39	3.83
2019	6.15	8.68	-1.37	55.73	-2.22	53.17	-1.43	92.07	-2.45
Average	7.07	7.51	8.48	48.18	11.44	46.65	9.51	78.70	11.86
G.M	6.98	7.43	#NUM!	47.36	#NUM!	46.07	#NUM!	77.23	#NUM!
S.D	1.26	1.19	11.54	9.35	15.11	7.85	15.44	16.11	16.08
C.V	17.81	15.87	136.06	19.41	132.15	16.82	162.35	20.47	135.55
CAGR	-7.02	7.99		10.64		8.66		10.96	

Figure 34: NAV returns of Quant, Tata, UTI and DSP India TIGER from 2014-19



Average Net Asset Value of DSP India T.I.G.E.R. Fund - Direct Plan – Growth was found highest with Rs. 78.70 followed by Tata Infrastructure Fund -Direct Plan Growth with Rs. 48.18, UTI Infrastructure Fund-Growth Option- Direct with Rs. 46.65 and Quant Infrastructure Fund with Rs. 7.51 for the time duration of year 2014 to year 2019.

CAGR (NAV) of 10.96% was highest for DSP India T.I.G.E.R. Fund - Direct Plan – Growth followed by Tata Infrastructure Fund -Direct Plan Growth (10.64%), UTI Infrastructure Fund-Growth Option- Direct (8.66%) and Quant Infrastructure Fund with 7.99%. Average Return (Rp) during the study period was found highest for DSP India T.I.G.E.R. Fund - Direct Plan – Growth with 11.86% followed by Tata Infrastructure Fund -Direct Plan Growth (11.44%), UTI Infrastructure Fund-Growth Option- Direct (9.51%) and lowest for Quant Infrastructure Fund with 8.48% average return.

6.10 Ranking on the basis of Average Return of Selected schemes

Following table presents summary of descriptive statistics of selected schemes for their average NAVs and then ranking has been presented on the basis of average return during study period.

Table No. 19: Summary of Risk calculations

SUMMARY							
Groups	***Count***	***Sum***	***Average***	***Variance***	***S.D***	**Rank on the basis of average return**	**Rank on the basis of S.D**
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	5	50.18	10.04	366.68	19.15	11	16
HDFC Infrastructure Fund -Direct Plan - Growth Option	5	29.29	5.86	339.34	18.42	19	13
Franklin Build India Fund	5	89.15	17.83	357.22	18.90	2	14
Canara Robeco Infrastructure-Direct Plan – Growth	5	55.22	11.04	304.93	17.46	10	11
Invesco India Infrastructure Fund - Direct Pan - Growth Option	5	64.54	12.91	314.05	17.72	4	12
IDFC Infrastructure Fund - Direct Plan – Growth	5	60.06	12.01	558.10	23.62	5	18
ICICI Prudential Infrastructure Fund – Growth	5	42.58	8.52	222.57	14.92	16	5
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	5	46.48	9.30	224.98	15.00	14	6
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	5	48.83	9.77	362.40	19.04	12	15
LIC MF Infrastructure Fund-Direct Plan-Growth	5	42.46	8.49	151.65	12.31	17	3
L&T Infrastructure Fund -Direct Plan-Growth	5	75.99	15.20	441.11	21.00	3	17

Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	5	91.22	18.24	646.32	25.42	1	19
Tata Infrastructure Fund -Direct Plan Growth	5	57.18	11.44	228.38	15.11	7	7
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	5	44.92	8.98	212.42	14.57	15	4
SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	5	56.83	11.37	129.18	11.37	9	1
Quant Infrastructure Fund	5	42.41	8.48	133.20	11.54	18	2
Tata Infrastructure Fund -Direct Plan Growth	5	57.18	11.44	228.38	15.11	7	7
UTI Infrastructure Fund-Growth Option-Direct	5	47.55	9.51	238.34	15.44	13	9
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	5	59.30	11.86	258.47	16.08	6	10

On the basis of average return Kotak Infrastructure & Economic Reform Fund-Direct Plan- Growth Option was ranked first, Franklin Build India Fund stood on second place, L&T Infrastructure Fund -Direct Plan-Growth placed on third position, Invesco India Infrastructure Fund - Direct Pan - Growth Option was on fourth place and IDFC Infrastructure Fund - Direct Plan – Growth was the fifth in top schemes. Quant Infrastructure Fund, LIC MF Infrastructure Fund-Direct Plan-Growth, ICICI Prudential Infrastructure Fund – Growth, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth and ICICI Prudential Infrastructure Fund - Direct Plan – Growth were at the bottom in the list.

6.11 Performance Evaluation of Thematic Infrastructure Mutual Funds (Growth oriented) on the basis of Sharpe, Treynor and Jenson Ratios

6.11.1 Performance evaluation of Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan, HDFC Infrastructure Fund -Direct Plan - Growth Option and Franklin Build India Fund on the basis of Sharpe, Treynor and Jensen ratios

Table No. 20: Performance Evaluation of Aditya Birla, HDFC and Franlin Build

Calculations based on Simple Annual Returns)					
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)					
	Infrastructure Index Returns	Risk free Return	Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	HDFC Infrastructure Fund - Direct Plan - Growth Option	Franklin Build India Fund
2015	8.82	8.25	27.47	24.37	45.65
2016	-4.78	7.25	-1.46	-5.34	4.17
2017	31.64	5.82	33.42	27.26	29.37
2018	-2.17	6.11	0.55	-5.44	6.60
2019	-11.47	6.15	-9.81	-11.56	3.36
Average Return	4.41	6.72	10.04	5.86	17.83
Total Risk (S.D)	16.89	1.02	19.15	18.42	18.90
Variance (S.D^2)	285.12	1.03	366.68	339.34	357.22
Beta	1.00	-0.01	1.05	0.98	0.76
Correlation(r)	1.00	-0.14	0.93	0.90	0.68
Sharpe ratio	-0.14	0.00	0.17	-0.05	0.59
Treynor	-2.31	0.00	3.16	-0.87	14.64
Jensen alpha			5.74	1.40	12.87

Table No. 21: Outperformed/Underperformed - Aditya Birla, HDFC and Franklin Build

Calculations based on Simple Annual Returns			
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)			
	Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	**HDFC Infrastructure Fund -Direct Plan - Growth Option**	**Franklin Build India Fund**
2015	O	O	O
2016	O	U	O
2017	O	U	U
2018	O	U	O
2019	O	U	O
Average Return	O	O	O

O- Outperformed respective benchmark index
U- Underperformed respective benchmark index

Average annualized risk free return was found highest for Franklin Build India Fund with 17.83% and lowest for HDFC Infrastructure Fund -Direct Plan - Growth Option Return with 5.86%. As far as total risk is concerned, it was highest in the case of Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan Return (S.D., 19.15%) and lowest for HDFC Infrastructure Fund -Direct Plan - Growth Option Return (S.D., 18.42%).

Hence it can be stated that HDFC Infrastructure Fund -Direct Plan - Growth Option Return with lower value of standard deviation is having a higher chance to be continued with similar returns in future whereas other schemes with higher standard deviation values may vary.

It is well confirmed from Beta values that volatility or systematic risk was found very less in Franklin Build India Fund (Beta, 0.76), HDFC Infrastructure Fund -

Direct Plan - Growth Option (Beta, 0.98) and Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan (Beta, 1.05).

Franklin Build India Fund (Sharpe ratio, 0.59) and Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan (Sharpe ratio, 0.17) schemes with higher Sharpe ratio have been given preference as they have given higher risk-adjusted return in comparison to HDFC Infrastructure Fund -Direct Plan - Growth Option during the study period.

Higher value of Treynor's ratio of Franklin Build India Fund (14.64) and Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan (3.16) during the year 2010-2019 reveals that the fund could yield better returns on the level of risk carried as compared to HDFC Infrastructure Fund -Direct Plan - Growth Option hence have been preferred by the investors.

Franklin Build India Fund (Jensen ratio, 12.87) and Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan (Jensen ratio, 5.74) were the two schemes during the study period which have beaten the nifty returns and that is why they are considered better as compared to other schemes.

6.11.2 Performance evaluation of Canara Robeco Infrastructure-Direct Plan – Growth, Invesco India Infrastructure Fund - Direct Pan - Growth Option and IDFC Infrastructure Fund - Direct Plan - Growth on the basis of Sharpe, Treynor and Jensen ratios

Table No. 22: Performance Evaluation of Canara Rebeco, Invesaco and IDFC Infra

Calculations based on Simple Annual Returns)					
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)					
	Infrastructure Index Returns	Risk free Return	Canara Robeco Infrastructure	Invesco India Infrastructure Fund	IDFC Infrastructure Fund
2015	8.82	8.25	33.13	34.62	24.04
2016	-4.78	7.25	1.04	-4.87	-1.90
2017	31.64	5.82	26.52	28.25	46.64
2018	-2.17	6.11	-0.26	8.16	4.53
2019	-11.47	6.15	-5.21	-1.62	-13.26
Average Return	4.41	6.72	11.04	12.91	12.01

Total Risk (S.D)	16.89	1.02	17.46	17.72	23.62
Variance (S.D^2)	285.12	1.03	304.93	314.05	558.10
Beta	1.00	-0.01	0.83	0.82	1.38
Correlation(r)	1.00	-0.14	0.80	0.78	0.99
Sharpe ratio	-0.14	0.00	0.25	0.35	0.22
Treynor	-2.31	0.00	5.23	7.52	3.84
Jensen alpha			6.24	8.09	8.48

Table No. 23: Outperformed/Underperformed - Canara Rebeco, Invesaco and IDFC Infra

Calculations based on Simple Annual Returns)			
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)			
	Canara Robeco Infrastructure-Direct Plan – Growth	Invesco India Infrastructure Fund - Direct Pan - Growth Option	IDFC Infrastructure Fund - Direct Plan – Growth
2015	O	O	O
2016	O	U	O
2017	U	U	O
2018	O	O	O
2019	O	O	U
Average Return	O	O	O

O- Outperformed respective benchmark index
U- Underperformed respective benchmark index

Not much difference was found in average annualized risk free return in Canara Robeco Infrastructure-Direct Plan – Growth, Invesco India Infrastructure Fund - Direct Pan - Growth Option and IDFC Infrastructure Fund - Direct Plan – Growth schemes. Though it was found highest for Invesco India Infrastructure Fund - Direct Pan - Growth Option with 12.91% and lowest for Canara Robeco Infrastructure-Direct Plan – Growth with 11.04%.

As far as total risk is concerned, it was highest in the case of IDFC Infrastructure Fund - Direct Plan – Growth (S.D., 23.62%) and lowest for Canara Robeco Infrastructure-Direct Plan – Growth (S.D., 17.46%).

Hence it can be stated that Canara Robeco Infrastructure-Direct Plan – Growth with lower value of standard deviation is having a higher chance to be continued with similar returns in future. Volatility or systematic risk was found very less in Canara Robeco Infrastructure-Direct Plan – Growth, Invesco India Infrastructure Fund - Direct Pan - Growth Option with almost equal Beta value of 0.82 and 0.83 respectively.

Invesco India Infrastructure Fund - Direct Pan - Growth Option with higher Sharpe ratio (0.35) found most preferred as compared to other two mentioned schemes due to higher risk-adjusted during the study period.

Higher value of Treynor's ratio of Invesco India Infrastructure Fund - Direct Pan - Growth Option (7.52) during the year 2015-2019 reveals that the fund could yield better returns on the level of risk carried as compared to other two schemes.

With high Jensen ratio Invesco India Infrastructure Fund - Direct Pan - Growth Option and IDFC Infrastructure Fund - Direct Plan – Growth were most preferred than Canara Robeco Infrastructure-Direct Plan – Growth scheme.

6.11.3 Performance evaluation of ICICI Prudential Infrastructure Fund – Growth, ICICI Prudential Infrastructure Fund - Direct Plan – Growth and Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option on the basis of Sharpe, Treynor and Jensen ratios

Table No. 24: Performance Evaluation of ICICI Pru (G), ICICI (D) and Nippon India

Calculations based on Simple Annual Returns)					
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)					
	Infrastructure Index Returns	**Risk free Return**	ICICI Prudential Infrastructure Fund	ICICI Prudential Infrastructure Fund	Nippon India Power & Infra Fund
2015	8.82	8.25	21.14	21.90	15.57

2016	-4.78	7.25	-6.37	-5.78	-0.97
2017	31.64	5.82	27.37	28.29	39.60
2018	-2.17	6.11	3.03	3.90	4.40
2019	-11.47	6.15	-2.60	-1.83	-9.77
Average Return	4.41	6.72	8.52	9.30	9.77
Total Risk (S.D)	16.89	1.02	14.92	15.00	19.04
Variance (S.D^2)	285.12	1.03	222.57	224.98	362.40
Beta	1.00	-0.01	0.81	0.81	1.12
Correlation(r)	1.00	-0.14	0.91	0.91	1.00
Sharpe ratio	-0.14	0.00	0.12	0.17	0.16
Treynor	-2.31	0.00	2.24	3.19	2.71
Jensen alpha			3.66	4.45	5.64

Table No. 25: Outperformed/Underperformed - ICICI Pru (G), ICICI (D) and Nippon India

Calculations based on Simple Annual Returns)			
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)			
	ICICI Prudential Infrastructure Fund – Growth	ICICI Prudential Infrastructure Fund - Direct Plan - Growth	Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option
2015	O	O	O
2016	U	U	O
2017	U	U	O
2018	O	O	O
2019	O	O	O
Average Return	O	O	O

O- Outperformed respective benchmark index

U- Underperformed respective benchmark index

Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option and ICICI Prudential Infrastructure Fund - Direct Plan – Growth were the schemes among above mentioned schemes which have highest average annualized risk free return of 9.77% and 9.30% respectively.

As far as total risk is concerned, it was highest in the case of Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth (S.D., 19.04%) and other two schemes have shown almost equal total risk nearly 15%. Hence it can be stated that ICICI Prudential Infrastructure Fund – Growth and ICICI Prudential Infrastructure Fund - Direct Plan - Growth with lower value of standard deviation were having a higher chance to be continued with similar returns in future in comparison to Nippon India Power & Infra Fund - Direct Plan Growth Plan.

Nippon India Power & Infra Fund - Direct Plan Growth Plan fund with a beta (1.12) of more than one will rise more than the market and also fall more than market. To beat the market on the upside, investors found this fund best to invest as compared to other two funds.

The Sharpe's ratio uses standard deviation to measure a mutual fund's risk adjusted returns to make an investor understands the mutual fund portfolio performance in excess of the risk-free return. ICICI Prudential Infrastructure Fund - Direct Plan – Growth and Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option with higher Sharpe ratio of 0.17 and 0.16 respectively preferred more as compared to ICICI Prudential Infrastructure Fund - Growth with Sharpe ratio of 0.12 during the study period.

Higher value of Treynor’s ratio of ICICI Prudential Infrastructure Fund - Direct Plan - Growth (3.19) during the year 2015-2019 reveals that the fund could yield better returns on the level of risk carried as compared to other two schemes.

With high Jensen ratio Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option (5.64) was most preferred than ICICI Prudential Infrastructure Fund – Growth and ICICI Prudential Infrastructure Fund - Direct Plan - Growth.

6.11.4 Performance evaluation of LIC MF Infrastructure Fund-Direct Plan-Growth, L&T Infrastructure Fund -Direct Plan-Growth and Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Optionon the basis of Sharpe, Treynor and Jensen ratios

Table No. 26: Performance Evaluation of LIC MF, L&T and Kotak Infra

Calculations based on Simple Annual Returns)					
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)					
	Infrastructure Index Returns	**Risk free Return**	LIC MF Infrastructure Fund-Direct Plan-Growth	L&T Infrastructure Fund -Direct Plan-Growth	Kotak Infrastructure & Economic Reform Fund-Direct Plan-Growth Option
2015	8.82	8.25	18.60	29.92	56.41
2016	-4.78	7.25	-6.25	2.78	5.32
2017	31.64	5.82	23.60	42.89	31.99
2018	-2.17	6.11	4.65	9.62	1.24
2019	-11.47	6.15	1.85	-9.21	-3.74
Average Return	4.41	6.72	8.49	15.20	18.24
Total Risk (S.D)	16.89	1.02	12.31	21.00	25.42
Variance (S.D^2)	285.12	1.03	151.65	441.11	646.32
Beta	1.00	-0.01	0.63	1.19	0.98
Correlation(r)	1.00	-0.14	0.87	0.96	0.65
Sharpe ratio	-0.14	0.00	0.14	0.40	0.45
Treynor	-2.31	0.00	2.81	7.13	11.71
Jensen alpha			3.24	11.23	13.80

Table No. 27: Outperformed/Underperformed - LIC MF, L&T and Kotak Infra

Calculations based on Simple Annual Returns)			
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)			
	LIC MF Infrastructure Fund-Direct Plan-Growth	L&T Infrastructure Fund -Direct Plan-Growth	Kotak Infrastructure & Economic Reform Fund-Direct Plan-Growth Option
2015	O	O	O
2016	U	O	O
2017	U	O	O
2018	O	O	O
2019	O	O	O
Average Return	O	O	O

O- Outperformed respective benchmark index

U- Underperformed respective benchmark index

Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option and L&T Infrastructure Fund -Direct Plan-Growth were the schemes among above mentioned schemes which have highest average annualized risk free return of 18.24% and 15.20% respectively.

As far as total risk is concerned, it was highest in the case of Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option (S.D., 25.42%) and lowest for LIC MF Infrastructure Fund-Direct Plan-Growth 12.21%. Hence it can be stated that LIC MF Infrastructure Fund-Direct Plan-Growth with lowest value of standard deviation was having a higher chance to be continued with similar returns in future in comparison to Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option and L&T Infrastructure Fund -Direct Plan-Growth.

L&T Infrastructure Fund -Direct Plan-Growth with a beta (1.19) of more than one will rise more than the market and also fall more than market. To beat the market on the upside, investors found best to invest as compared to other two funds.

Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option with highest Sharpe ratio of 0.45 preferred most as compared to L&T Infrastructure Fund -Direct Plan-Growth and LIC MF Infrastructure Fund-Direct Plan-Growth.

Higher value of Treynor's ratio of Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option (11.71) during the year 2015-2019 reveals that the fund could yield better returns on the level of risk carried as compared to other two schemes.

With high Jensen ratio Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option (13.80) was most preferred fund.

6.11.5 Performance evaluation of Tata Infrastructure Fund -Direct Plan Growth, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth and SBI Infrastructure Fund - Direct Plan – Growth on the basis of Sharpe, Treynor and Jensen ratios

Table No. 28: Performance Evaluation of Tata Infra, Sundaram and SBI Infra

Calculations based on Simple Annual Returns)					
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)					
	Infrastructure Index Returns	**Risk free Return**	Tata Infrastructure Fund - Direct Plan Growth	Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	SBI Infrastructure Fund - Direct Plan – Growth
2015	8.82	8.25	29.59	17.51	24.20
2016	-4.78	7.25	0.70	-1.74	4.99
2017	31.64	5.82	26.01	29.74	23.03
2018	-2.17	6.11	3.09	5.13	4.66
2019	-11.47	6.15	-2.22	-5.72	-0.05
Average Return	4.41	6.72	11.44	8.98	11.37
Total Risk (S.D)	16.89	1.02	15.11	14.57	11.37
Variance (S.D^2)	285.12	1.03	228.38	212.42	129.18
Beta	1.00	-0.01	0.74	0.84	0.58
Correlation(r)	1.00	-0.14	0.83	0.98	0.86
Sharpe ratio	-0.14	0.00	0.31	0.16	0.41
Treynor	-2.31	0.00	6.35	2.69	8.06
Jensen alpha			6.43	4.21	5.98

Table No. 29: Outperformed/Underperformed- Tata Infra, Sundaram and SBI Infra

Calculations based on Simple Annual Returns)			
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)			
	Tata Infrastructure Fund -Direct Plan Growth	Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	SBI INFRASTRUCTURE FUND - DIRECT PLAN - GROWTH
2015	O	O	O
2016	O	O	O
2017	U	U	U
2018	O	O	O
2019	O	O	O
Average Return	O	O	O

O- Outperformed respective benchmark index.

U- Underperformed respective benchmark index

Tata Infrastructure Fund -Direct Plan Growth and SBI Infrastructure Fund - Direct Plan – Growth were the schemes among above mentioned schemes which have highest average annualized risk free return of 11.44% and 11.37% respectively.

As far as total risk is concerned, it was highest in the case of Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth (S.D., 14.57%) and lowest for SBI Infrastructure Fund - Direct Plan – Growth 11.37%.

Hence it can be stated that SBI Infrastructure Fund - Direct Plan – Growth with lowest value of standard deviation was having a higher chance to be continued with similar returns in future.

All three funds found with a beta < 1.00 reflect less chance to rise more than the market and also fall more than market. However with highest Beta among the

three funds, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth (0.84) found best to invest as compared to other two funds.

SBI Infrastructure Fund - Direct Plan – Growth with highest Sharpe ratio of 0.41 preferred most. Higher value of Treynor's ratio of Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth (2.69) during the year 2015-2019 reveals that the fund could yield better returns on the level of risk carried as compared to other two schemes.

With high Jensen ratio Tata Infrastructure Fund -Direct Plan Growth (6.43) was most preferred fund.

6.11.6 Performance evaluation of Quant Infrastructure Fund, Tata Infrastructure Fund -Direct Plan Growth, UTI Infrastructure Fund-Growth Option- Direct and DSP India T.I.G.E.R. Fund - Direct Plan - Growthon the basis of Sharpe, Treynor and Jensen ratios

Table No. 30: Performance Evaluation of Quant, Tata, UTI and DSP Infra TIGER

Calculations based on Simple Annual Returns)						
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)						
	Infrastructure Index Returns	**Risk free Return**	Quant Infrastructure Fund	Tata Infrastructure Fund - Direct Plan Growth	UTI Infrastructure Fund-Growth Option-Direct	DSP India T.I.G.E.R. Fund - Direct Plan – Growth
2015	8.82	8.25	17.12	29.59	23.87	28.35
2016	-4.78	7.25	-4.41	0.70	-5.14	-0.63
2017	31.64	5.82	22.44	26.01	28.35	30.20
2018	-2.17	6.11	8.64	3.09	1.89	3.83
2019	-11.47	6.15	-1.37	-2.22	-1.43	-2.45
Average Return	4.41	6.72	8.48	11.44	9.51	11.86
Total Risk (S.D)	16.89	1.02	11.54	15.11	15.44	16.08
Variance (S.D^2)	285.12	1.03	133.20	228.38	238.34	258.47
Beta	1.00	-0.01	0.61	0.74	0.82	0.85

Correlation(r)	1.00	-0.14	0.89	0.83	0.90	0.89
Sharpe ratio	-0.14	0.00	0.15	0.31	0.18	0.32
Treynor	-2.31	0.00	2.91	6.35	3.41	6.07
Jensen alpha			3.17	6.43	4.68	7.10

Table No. 31: Outperformed/Underperformed- Quant, Tata, UTI and DSP Infra TIGER

Calculations based on Simple Annual Returns)			
Absolute Returns of Thematic Infrastructure Mutual Funds (Growth Oriented)			
	Quant Infrastructure Fund	Tata Infrastructure Fund -Direct Plan Growth	UTI Infrastructure Fund-Growth Option- Direct
2015	O	O	O
2016	O	O	U
2017	U	U	U
2018	O	O	O
2019	O	O	O
Average Return	O	O	O

O- Outperformed respective benchmark index

U- Underperformed respective benchmark index

DSP India T.I.G.E.R. Fund - Direct Plan – Growth and Tata Infrastructure Fund - Direct Plan Growth were the schemes among above mentioned schemes which have highest average annualized risk free return of 11.86% and 11.44% respectively.

As far as total risk is concerned, it was highest in the case of DSP India T.I.G.E.R. Fund - Direct Plan - Growth (S.D., 16.08%) and lowest for Quant Infrastructure Fund 11.54%. Hence it can be stated that Quant Infrastructure Fund with lowest value of standard deviation was having a higher chance to be continued with similar returns in future.

All three funds found with a beta < 1.00 reflect less chance to rise more than the market and also fall more than market. However with highest Beta among the

three funds, DSP India T.I.G.E.R. Fund - Direct Plan – Growth (0.85) and UTI Infrastructure Fund-Growth Option- Direct (0.82) found best to invest.

DSP India T.I.G.E.R. Fund - Direct Plan – Growth and Tata Infrastructure Fund - Direct Plan Growth with higher Sharpe ratio of 0.32 and 0.31 respectively preferred most.

Higher value of Treynor's ratio of Tata Infrastructure Fund -Direct Plan Growth (6.35) during the year 2015-2019 reveals that the fund could yield better returns on the level of risk carried. With high Jensen ratio DSP India T.I.G.E.R. Fund - Direct Plan - Growth (7.10) was most preferred fund.

6.12 Ranking of the selected schemes on various statistical parameters

6.12.1 Ranking of the selected mutual fund schemes on the basis of their average return during the study period 2014-2019

Table No. 32: Ranking on the basis of Average Return

Scheme	Average Return	Rank
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	10.04	11
HDFC Infrastructure Fund -Direct Plan - Growth Option	5.86	19
Franklin Build India Fund	17.83	2
Canara Robeco Infrastructure-Direct Plan – Growth	11.04	10
Invesco India Infrastructure Fund - Direct Pan - Growth Option	12.91	4
IDFC Infrastructure Fund - Direct Plan – Growth	12.01	5
ICICI Prudential Infrastructure Fund – Growth	8.52	16
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	9.30	14
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	9.77	12
LIC MF Infrastructure Fund-Direct Plan-Growth	8.49	17
L&T Infrastructure Fund -Direct Plan-Growth	15.20	3
Kotak Infrastructure & Economic Reform Fund-Direct Plan- Growth Option	18.24	1
Tata Infrastructure Fund -Direct Plan Growth	11.44	7

Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	8.98	15
SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	11.37	9
Quant Infrastructure Fund	8.48	18
Tata Infrastructure Fund -Direct Plan Growth	11.44	7
UTI Infrastructure Fund-Growth Option- Direct	9.51	13
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	11.86	6

With 18.24% of average return, Kotak Infrastructure & Economic Reform Fund-Direct Plan- Growth Option was at first place among the selected schemes during year 2015 to year 2019. Then Franklin Build India Fund with 17.83% was on second place followed by L&T Infrastructure Fund -Direct Plan-Growth with 15.20% of average return on third position, Invesco India Infrastructure Fund - Direct Pan - Growth Option with 12.91% average return stood on fourth position and IDFC Infrastructure Fund - Direct Plan – Growth fund was on fifth place among above mentioned schemes with average return of 12.01% during the study period.

HDFC Infrastructure Fund -Direct Plan - Growth Option has given least average return during the study period (5.86%) stood on 19th rank followed by Quant Infrastructure Fund has given average return (8.48%) and stood on 18th place, LIC MF Infrastructure Fund-Direct Plan-Growth was on 17th place with 8.49% average return, ICICI Prudential Infrastructure Fund – Growth ranked 16th with 8.52% of return, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth with average return of 8.98% was on 15th place and ICICI Prudential Infrastructure Fund - Direct Plan – Growth was ranked 14th with an average return of 9.30%.

6.12.2 Ranking of the selected mutual fund schemes on the basis of total risk associated with them during the study period 2014-2019

Table No. 33: Ranking on the basis of Risk (SD)

	Total Risk (S.D)	**Rank**
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	19.15	16
HDFC Infrastructure Fund -Direct Plan - Growth Option	18.42	13
Franklin Build India Fund	18.90	14
Canara Robeco Infrastructure-Direct Plan – Growth	17.46	11
Invesco India Infrastructure Fund - Direct Pan - Growth Option	17.72	12
IDFC Infrastructure Fund - Direct Plan – Growth	23.62	18
ICICI Prudential Infrastructure Fund – Growth	14.92	5
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	15.00	6
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	19.04	15
LIC MF Infrastructure Fund-Direct Plan-Growth	12.31	3
L&T Infrastructure Fund -Direct Plan-Growth	21.00	17
Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	25.42	19
Tata Infrastructure Fund -Direct Plan Growth	15.11	7
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	14.57	4
SBI Infrastructure Fund - Direct Plan – Growth	11.37	1
Quant Infrastructure Fund	11.54	2
Tata Infrastructure Fund -Direct Plan Growth	15.11	7
UTI Infrastructure Fund-Growth Option-Direct	15.44	9
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	16.08	10

With 11.37 of standard deviation, SBI Infrastructure Fund - Direct Plan – Growth was at first place among the selected schemes during year 2015 to year 2019.

Then Quant Infrastructure Fund (S.D. 11.54) was on second place followed by LIC MF Infrastructure Fund-Direct Plan-Growth with (S.D. 12.31) on third position, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth with (S.D. 14.57) stood on fourth position and ICICI Prudential Infrastructure Fund – Growth was on fifth place among above mentioned schemes with (S.D. 14.92) during the study period.Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option (S.D. 25.42%) with highest risk was on 19th place followed by IDFC Infrastructure Fund - Direct Plan – Growth (S.D. 23.62%) stood on 18th place, L&T Infrastructure Fund -Direct Plan-Growth was on 17th place with (S.D. 21%), Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan ranked 16th with (S.D. 19.15%), Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option (S.D. 19.04%) was on 15th place and Franklin Build India Fund was ranked 14th (S.D. 18.90%).

6.12.3 Ranking of the selected mutual fund schemes on the basis of variance during the study period 2015-2019

Table No. 34: Ranking on the basis of Variance

Scheme	Variance (S.D^2)	Rank
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	366.68	16
HDFC Infrastructure Fund -Direct Plan - Growth Option	339.34	13
Franklin Build India Fund	357.22	14
Canara Robeco Infrastructure-Direct Plan – Growth	304.93	11
Invesco India Infrastructure Fund - Direct Pan - Growth Option	314.05	12
IDFC Infrastructure Fund - Direct Plan – Growth	558.10	18
ICICI Prudential Infrastructure Fund – Growth	222.57	5
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	224.98	6
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	362.40	15

LIC MF Infrastructure Fund-Direct Plan-Growth	151.65	3
L&T Infrastructure Fund -Direct Plan-Growth	441.11	17
Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	646.32	19
Tata Infrastructure Fund -Direct Plan Growth	228.38	7
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	212.42	4
SBI Infrastructure Fund - Direct Plan – Growth	129.18	1
Quant Infrastructure Fund	133.20	2
Tata Infrastructure Fund -Direct Plan Growth	228.38	7
UTI Infrastructure Fund-Growth Option-Direct	238.34	9
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	258.47	10

With 129.18% of lowest variance, SBI Infrastructure Fund - Direct Plan – Growth was at first place among the selected schemes during year 2015 to year 2019. Then Quant Infrastructure Fund (S.D^2, 133.20%) was on second place followed by LIC MF Infrastructure Fund-Direct Plan-Growth with (S.D^2, 151.65%) on third position, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth with (S.D^2, 212.42%) stood on fourth position and ICICI Prudential Infrastructure Fund – Growth was on fifth place among above mentioned schemes with (S.D^2, 222.57%) during the study period.

Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option (S.D^2, 646.32%) with highest variance was on 19th place followed by IDFC Infrastructure Fund - Direct Plan – Growth (S.D^2, 558.10%) stood on 18th place, L&T Infrastructure Fund -Direct Plan-Growth was on 17th place with (S.D^2, 441.11%), Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan ranked 16th with (S.D^2, 366.68%), Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option (S.D^2, 362.40%) was on 15th place and Franklin Build India Fund was ranked 14th (S.D^2, 357.22%).

6.12.4 Ranking of the selected mutual fund schemes on the basis of Beta value during the study period 2015-2019

Table No. 35: Ranking on the basis of Beta

Scheme	Beta	Rank
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	1.24	16
HDFC Infrastructure Fund -Direct Plan - Growth Option	1.20	14
Franklin Build India Fund	1.22	15
Canara Robeco Infrastructure-Direct Plan – Growth	1.15	13
Invesco India Infrastructure Fund - Direct Pan - Growth Option	1.15	12
IDFC Infrastructure Fund - Direct Plan – Growth	1.40	18
ICICI Prudential Infrastructure Fund – Growth	0.94	6
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	0.95	7
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	1.06	11
LIC MF Infrastructure Fund-Direct Plan-Growth	0.75	3
L&T Infrastructure Fund -Direct Plan-Growth	1.30	17
Kotak Infrastructure & Economic Reform Fund-Direct Plan- Growth Option	1.61	19
Tata Infrastructure Fund -Direct Plan Growth	1.00	9
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	0.88	5
SBI Infrastructure Fund - Direct Plan – Growth	0.75	2
Quant Infrastructure Fund	0.69	1
Tata Infrastructure Fund -Direct Plan Growth	1.00	9
UTI Infrastructure Fund-Growth Option- Direct	0.99	8
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	0.85	4

With 0.69 of Beta value, Quant Infrastructure Fund has shown least volatility and was at first place among the selected schemes during year 2015 to year 2019. Then SBI Infrastructure Fund - Direct Plan – Growth (0.75 Beta value) was on second place followed by LIC MF Infrastructure Fund-Direct Plan-Growth with (0.75 Beta value) on third position, DSP India T.I.G.E.R. Fund - Direct Plan -

Growth with (0.85 Beta value) stood on fourth position and Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth was on fifth place among above mentioned schemes with (0.88 Beta value) during the study period.

Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option (1.61 Beta value) with highest risk was on 19th place followed by IDFC Infrastructure Fund - Direct Plan - Growth (1.40 Beta value) stood on 18th place, L&T Infrastructure Fund -Direct Plan-Growth was on 17th place with (1.30 Beta value), Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan ranked 16th with (1.24 Beta value), Franklin Build India Fund (1.22 Beta value) was on 15th place and HDFC Infrastructure Fund -Direct Plan - Growth Option was ranked 14th (1.20 Beta value).

6.12.5 Ranking of the selected mutual fund schemes on the basis of correlation value during the study period 2015-2019

Table No. 36 Ranking on the basis of Correlation

Scheme	Correlation(r)	Rank
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	0.98	14
HDFC Infrastructure Fund -Direct Plan - Growth Option	0.99	15
Franklin Build India Fund	0.97	12
Canara Robeco Infrastructure-Direct Plan – Growth	1.00	17
Invesco India Infrastructure Fund - Direct Pan - Growth Option	0.98	13
IDFC Infrastructure Fund - Direct Plan – Growth	0.90	3
ICICI Prudential Infrastructure Fund – Growth	0.96	9
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	0.95	8
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	0.84	1
LIC MF Infrastructure Fund-Direct Plan-Growth	0.92	6
L&T Infrastructure Fund -Direct Plan-Growth	0.93	7

Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	0.96	10
Tata Infrastructure Fund -Direct Plan Growth	1.00	18
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	0.91	5
SBI Infrastructure Fund - Direct Plan – Growth	0.99	16
Quant Infrastructure Fund	0.91	4
Tata Infrastructure Fund -Direct Plan Growth	1.00	18
UTI Infrastructure Fund-Growth Option-Direct	0.97	11
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	0.89	2

With 0.84 of correlation, Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option was at first place among the selected schemes during year 2015 to year 2019. Then DSP India T.I.G.E.R. Fund - Direct Plan - Growth (r, 0.89) was on second place followed by IDFC Infrastructure Fund - Direct Plan - Growth with (r, 0.98) on third position, Quant Infrastructure Fund with (R, 0.91) stood on fourth position and Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth was on fifth place among above mentioned schemes with (R, 0.91) during the study period.

Tata Infrastructure Fund -Direct Plan Growth (R, 1) with highest correlation was on 18th place followed by Canara Robeco Infrastructure-Direct Plan - Growth was on 17th place with (R, 1), SBI Infrastructure Fund - Direct Plan – Growth ranked 16th with (R, 0.99), HDFC Infrastructure Fund -Direct Plan - Growth Option (R, 0.99) was on 15th place and Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan was ranked 14th (R, 0.98).

6.12.6 Ranking of the selected mutual fund schemes on the basis of Sharpe ratio during the study period 2014-2019

Table No. 37 Ranking on the basis of Sharpe Ratio

Scheme	Sharpe ratio	Rank
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	0.03	9
HDFC Infrastructure Fund -Direct Plan - Growth Option	-0.20	1
Franklin Build India Fund	0.44	19
Canara Robeco Infrastructure-Direct Plan – Growth	0.09	10
Invesco India Infrastructure Fund - Direct Pan - Growth Option	0.19	15
IDFC Infrastructure Fund - Direct Plan – Growth	0.11	11
ICICI Prudential Infrastructure Fund – Growth	-0.07	4
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	-0.01	6
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	0.01	8
LIC MF Infrastructure Fund-Direct Plan-Growth	-0.08	3
L&T Infrastructure Fund -Direct Plan-Growth	0.27	16
Kotak Infrastructure & Economic Reform Fund-Direct Plan- Growth Option	0.34	18
Tata Infrastructure Fund -Direct Plan Growth	0.13	12
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	-0.04	5
SBI Infrastructure Fund - Direct Plan – Growth	0.16	14
Quant Infrastructure Fund	-0.09	2
Tata Infrastructure Fund -Direct Plan Growth	0.13	12
UTI Infrastructure Fund-Growth Option- Direct	0.00	7
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	0.32	17

With -0.20 Sharpe ratio, HDFC Infrastructure Fund -Direct Plan - Growth Option was at first place among the selected schemes during year 2015 to year 2019.

Then Quant Infrastructure Fund (Sharpe ratio -0.09) was on second place followed by LIC MF Infrastructure Fund-Direct Plan-Growth with (Sharpe ratio -0.08) on third position, ICICI Prudential Infrastructure Fund - Growth with (Sharpe ratio -0.07) stood on fourth position and Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth was on fifth place among above mentioned schemes with (Sharpe ratio -0.04) during the study period.

Franklin Build India Fund (Sharpe ratio 0.44) with highest ratio was on 19th place followed by Kotak Infrastructure & Economic Reform Fund- Direct Plan-Growth Option (Sharpe ratio 0.34) stood on 18th place, DSP India T.I.G.E.R. Fund - Direct Plan - Growth was on 17th place with (Sharpe ratio 0.32), L&T Infrastructure Fund -Direct Plan-Growth ranked 16th with (Sharpe ratio 0.27), Invesco India Infrastructure Fund - Direct Pan - Growth Option (Sharpe ratio 0.19) was on 15th place and SBI Infrastructure Fund - Direct Plan – Growth was ranked 14th (Sharpe ratio 0.16).

6.12.7 Ranking of the selected mutual fund schemes on the basis of Treynor ratio during the study period 2015-2019

Table No. 38: Ranking on the basis of Treynor Ratio

Scheme	Treynor	Rank
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	0.43	9
HDFC Infrastructure Fund -Direct Plan - Growth Option	-3.03	1
Franklin Build India Fund	6.84	19
Canara Robeco Infrastructure-Direct Plan – Growth	1.33	10
Invesco India Infrastructure Fund - Direct Pan - Growth Option	2.97	15
IDFC Infrastructure Fund - Direct Plan – Growth	1.79	11
ICICI Prudential Infrastructure Fund - Growth	-1.05	4
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	-0.23	6
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	0.24	8

LIC MF Infrastructure Fund-Direct Plan-Growth	-1.36	3
L&T Infrastructure Fund -Direct Plan-Growth	4.39	16
Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	5.41	17
Tata Infrastructure Fund -Direct Plan Growth	1.93	12
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	-0.60	5
SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	2.48	14
Quant Infrastructure Fund	-1.48	2
Tata Infrastructure Fund -Direct Plan Growth	1.93	12
UTI Infrastructure Fund-Growth Option- Direct	0.00	7
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	6.07	18

With -3.03 Treynor ratio, HDFC Infrastructure Fund -Direct Plan - Growth Option was at first place among the selected schemes during year 2015 to year 2019. Then Quant Infrastructure Fund (Treynor ratio -1.48) was on second place followed by LIC MF Infrastructure Fund-Direct Plan-Growth with (Treynor ratio -1.36) on third position, ICICI Prudential Infrastructure Fund - Growth with (Treynor ratio -1.05) stood on fourth position and Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth was on fifth place among above mentioned schemes with (Treynor ratio -0.60) during the study period.

Franklin Build India Fund (Treynor ratio 6.84) with highest ratio was on 19th place followed by DSP India T.I.G.E.R. Fund - Direct Plan - Growth (Treynor ratio 6.07) stood on 18th place, Kotak Infrastructure & Economic Reform Fund-Direct Plan- Growth Option was on 17th place with (Treynor ratio 5.41), L&T Infrastructure Fund -Direct Plan-Growth ranked 16th with (Treynor ratio 4.39), Invesco India Infrastructure Fund - Direct Pan - Growth Option (Treynor ratio 2.97) was on 15th place and SBI Infrastructure Fund - Direct Plan – Growth was ranked 14th (Treynor ratio 2.48).

6.12.8 Ranking of the selected mutual fund schemes on the basis of Jensen alpha ratio during the study period 2015-2019

Table No. 39: Ranking on the basis of Jenson Ration

Scheme	Jensen alpha	Rank
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	-1.86	8
HDFC Infrastructure Fund -Direct Plan - Growth Option	-5.97	1
Franklin Build India Fund	5.98	18
Canara Robeco Infrastructure-Direct Plan – Growth	-0.68	10
Invesco India Infrastructure Fund - Direct Pan - Growth Option	1.19	15
IDFC Infrastructure Fund - Direct Plan – Growth	-0.20	11
ICICI Prudential Infrastructure Fund – Growth	-2.81	2
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	-2.04	6
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	-1.78	9
LIC MF Infrastructure Fund-Direct Plan-Growth	-2.46	3
L&T Infrastructure Fund -Direct Plan-Growth	3.19	16
Kotak Infrastructure & Economic Reform Fund-Direct Plan- Growth Option	5.63	17
Tata Infrastructure Fund -Direct Plan Growth	0.00	12
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	-2.22	5
SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	0.41	14
Quant Infrastructure Fund	-2.36	4
Tata Infrastructure Fund -Direct Plan Growth	0.00	12
UTI Infrastructure Fund-Growth Option- Direct	-1.91	7
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	7.10	19

With -5.97 Jensen alpha ratio, HDFC Infrastructure Fund -Direct Plan - Growth Option was at first place among the selected schemes during year 2015 to year 2019. Then ICICI Prudential Infrastructure Fund - Growth (Jensen alpha ratio -2.81) was on second place followed by LIC MF Infrastructure Fund-Direct Plan-Growth with (Jensen alpha ratio -2.46) on third position, Quant Infrastructure Fund with (Jensen alpha ratio -2.36) stood on fourth position and Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth was on fifth place among above mentioned schemes with (Jensen alpha ratio -2.22) during the study period.

DSP India T.I.G.E.R. Fund - Direct Plan - Growth (Jensen alpha ratio 7.10) with highest ratio was on 19th place followed by Franklin Build India Fund (Jensen alpha ratio 5.98) stood on 18th place, Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option was on 17th place with (Jensen alpha ratio 5.63), L&T Infrastructure Fund -Direct Plan-Growth ranked 16th with (Jensen alpha ratio 3.19), Invesco India Infrastructure Fund - Direct Pan - Growth Option (Jensen alpha ratio 1.19) was on 15th place and SBI Infrastructure Fund - Direct Plan – Growth was ranked 14th (Jensen alpha ratio 0.41).

6.13 Hypothesis Testing

Hypothesis testing has been done to check whether difference in average return, mean rank (performance) of selected thematic schemes is significant or not. To test the hypothesis, ANOVA test has been applied as under.

H01: There is no significant difference in the average return (performance) of selected infrastructure thematic schemes during period 2014-19.

Ha1: There is significant difference in the average return (performance) of selected infrastructure thematic schemes during period 2014-19.

Table No. 40: Hypothesis (H1) testing

Groups	***Count***	***Sum***	***Average***	***Variance***
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	5	50.17945452	10.0358909	366.6811
HDFC Infrastructure Fund -Direct Plan - Growth Option	5	29.29145729	5.858291458	339.3356

Franklin Build India Fund	5	89.15190468	17.83038094	357.2161
Canara Robeco Infrastructure-Direct Plan – Growth	5	55.21552321	11.04310464	304.9308
Invesco India Infrastructure Fund - Direct Pan - Growth Option	5	64.54228419	12.90845684	314.0467
IDFC Infrastructure Fund - Direct Plan – Growth	5	60.05823125	12.01164625	558.1031
ICICI Prudential Infrastructure Fund – Growth	5	42.58202053	8.516404105	222.5743
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	5	46.4753147	9.29506294	224.976
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	5	48.82904098	9.765808196	362.3951
LIC MF Infrastructure Fund-Direct Plan-Growth	5	42.46064852	8.492129704	151.6464
L&T Infrastructure Fund -Direct Plan-Growth	5	75.99272586	15.19854517	441.1063
Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	5	91.22097496	18.24419499	646.3209
Tata Infrastructure Fund -Direct Plan Growth	5	57.17651477	11.43530295	228.3756
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	5	44.92132969	8.984265938	212.4206
SBI INFRASTRUCTURE FUND - DIRECT PLAN - GROWTH	5	56.82513276	11.36502655	129.1831
Quant Infrastructure Fund	5	42.41331938	8.482663876	133.2001
Tata Infrastructure Fund -Direct Plan Growth	5	57.17651477	11.43530295	228.3756
UTI Infrastructure Fund-Growth Option- Direct	5	47.54750787	9.509501573	238.3389
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	5	59.30449407	11.86089881	258.4667

Table No. 41: ANOVA result of H1

ANOVA						
Source of Variation	***SS***	***Df***	***MS***	***F***	***P-value***	***F crit***
Between Groups	894.97	18.00	49.72	0.16522	0.99995	1.74119
Within Groups	22870.77	76.00	300.93			
Total	23765.74	94.00				

If calculated F value in ANOVA test is larger than F statistic (F crit), the null hypothesis is termed as rejected. Here in the above table F statistic (1.741) is greater than F value (0.165) which inferred as acceptance of null hypothesis.

Therefore it can be stated that there is no significant difference in the average return (performance) of selected infrastructure thematic schemes during period 2015-19.

H02: There is no significant difference in the mean rank (performance) of selected infrastructure thematic schemes during period 2014-19.

Ha2: There is significant difference in the mean rank (performance) of selected infrastructure thematic schemes during period 2014-19.

Table No. 42: Hypothesis (H2) testing

Anova: Single Factor	**for Ranks**			
Groups	***Count***	***Sum***	***Average***	***Variance***
Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	8.00	99.00	12.38	12.27
HDFC Infrastructure Fund -Direct Plan - Growth Option	8.00	77.00	9.63	54.55
Franklin Build India Fund	8.00	113.00	14.13	30.70
Canara Robeco Infrastructure-Direct Plan – Growth	8.00	92.00	11.50	6.00
Invesco India Infrastructure Fund - Direct Pan - Growth Option	8.00	98.00	12.25	13.07
IDFC Infrastructure Fund - Direct Plan – Growth	8.00	95.00	11.88	34.41
ICICI Prudential Infrastructure Fund - Growth	8.00	51.00	6.38	19.13
ICICI Prudential Infrastructure Fund - Direct Plan – Growth	8.00	59.00	7.38	7.70
Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	8.00	79.00	9.88	20.70
LIC MF Infrastructure Fund-Direct Plan-Growth	8.00	41.00	5.13	24.13
L&T Infrastructure Fund -Direct Plan-Growth	8.00	109.00	13.63	29.70
Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	8.00	120.00	15.00	40.86
Tata Infrastructure Fund -Direct Plan	8.00	84.00	10.50	14.57

Growth				
Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	8.00	48.00	6.00	13.43
SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	8.00	71.00	8.88	42.98
Quant Infrastructure Fund	8.00	35.00	4.38	31.41
Tata Infrastructure Fund -Direct Plan Growth	8.00	84.00	10.50	14.57
UTI Infrastructure Fund-Growth Option-Direct	8.00	71.00	8.88	4.70
DSP India T.I.G.E.R. Fund - Direct Plan – Growth	8.00	86.00	10.75	43.64

Table No. 43: ANOVA result of H2

ANOVA						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Between Groups	1334.08	18.00	74.12	3.07	0.00	1.68
Within Groups	3209.50	133.00	24.13			
Total	4543.58	151.00				

If calculated F value in ANOVA test is larger than F statistic (F crit), the null hypothesis is termed as rejected. Here in the above table F statistic (1.68) is less than F value (3.07) which inferred as rejection of null hypothesis.

Therefore it can be stated that there is significant difference in the mean rank (performance) of selected infrastructure thematic schemes during period 2015-19.

H03: There is no significant correlation in various parameters related to evaluation of performance of selected infrastructure thematic schemes during period 2014-19.

Ha3: There is significant correlation in various parameters related to evaluation of performance of selected infrastructure thematic schemes during period 2014-19.

Table No. 44: Hypothesis testing (H3)

Correlations										
			Average Return	Total Risk (S.D)	Variance (S.D^2)	Beta	Correlation(r)	Sharpe ratio	Treynor	Jensen alpha
Spearman's rho	Average Return	Correlation Coefficient	1	-.600**	-.600**	-.582**	-0.133	-.967**	-.958**	-.942**
		Sig. (2-tailed)		0.007	0.007	0.009	0.588	0	0	0
		N	19	19	19	19	19	19	19	19
	Total Risk (S.D)	Correlation Coefficient	-.600**	1	1.000**	.937**	-0.071	.471*	.456*	0.436
		Sig. (2-tailed)	0.007			0	0.772	0.042	0.05	0.062
		N	19	19	19	19	19	19	19	19
	Variance (S.D^2)	Correlation Coefficient	-.600**	1.000**	1	.937**	-0.071	.471*	.456*	0.436
		Sig. (2-tailed)	0.007			0	0.772	0.042	0.05	0.062
		N	19	19	19	19	19	19	19	19
	Beta	Correlation Coefficient	-.582**	.937**	.937**	1	0.178	0.429	0.403	0.357
		Sig. (2-tailed)	0.009	0	0		0.465	0.067	0.087	0.133
		N	19	19	19	19	19	19	19	19
	Correlation(r)	Correlation Coefficient	-0.133	-0.071	-0.071	0.178	1	0.175	0.161	0.103
		Sig. (2-tailed)	0.588	0.772	0.772	0.465		0.474	0.511	0.676
		N	19	19	19	19	19	19	19	19
	Sharpe ratio	Correlation Coefficient	-.967**	.471*	.471*	0.429	0.175	1	.998**	.986**
		Sig. (2-tailed)	0	0.042	0.042	0.067	0.474		0	0
		N	19	19	19	19	19	19	19	19
	Treynor	Correlation Coefficient	-.958**	.456*	.456*	0.403	0.161	.998**	1	.989**
		Sig. (2-tailed)	0	0.05	0.05	0.087	0.511	0		0
		N	19	19	19	19	19	19	19	19
	Jensen alpha	Correlation Coefficient	-.942**	0.436	0.436	0.357	0.103	.986**	.989**	1
		Sig. (2-tailed)	0	0.062	0.062	0.133	0.676	0	0	
		N	19	19	19	19	19	19	19	19
**. Correlation is significant at the 0.01 level (2-tailed).										
*. Correlation is significant at the 0.05 level (2-tailed).										

Average Return of selected thematic infrastructure schemes was found negatively correlated with Total Risk (S.D), Variance (S.D^2), Beta value, Correlation(r), Sharpe ratio, Treynor ratio and Jensen alpha ratio.

Total Risk (S.D) was found strongly correlated with Beta values (0.937) and moderately correlated with Sharpe ratio (0.471), Treynor (0.456) and Jensen alpha (0.436). However this correlation was not much significant except with Jensen alpha.

Variance was found strongly correlated with Beta values (0.937) and moderately correlated with Sharpe ratio (0.471), Treynor (0.456) and Jensen alpha (0.436). This was found significant for Correlation (r) and Jensen alpha.

Beta was found strongly correlated with Total Risk and Variance. It was moderately correlated with Correlation, Sharpe ratio, Treynor ratio and Jensen alpha. Correlation between Beta and Sharpe ratio, Treynor ratio & Jensen alpha was found significant as well. Correlation between Jensen alpha and Total Risk, Variance, Beta, & Correlation was found significant.

Chapter VII

Conclusion

Chapter – 7

Conclusion

7.1 Conclusion

The holistic research has been done in the area of performance evaluation of mutual funds, in terms of risk analysis and return analysis. In evaluation of risk the widely used measures are standard deviation and beta which is being done in this research as well. And return analysis has been done with the help of Sharpe Ratio, Treynor Ratio and Jensen's Alpha.

The performance extent progressed by Sharpe (1966) is established on capital asset pricing model (CAPM). It is a superfluous return received in excess of risk free return per unit of risk convoluted i.e. per unit of standard deviation. The Sharpe size regulates portfolio performance by overall risk moderately than beta risk. Sharpe's lucidity for familiarizing overall risk instead of beta lies with the hypothesis behind the beta risk. Sharpe amount amends portfolio return for overall risk which embraces mutually organized (beta) risk and diversifiable risk.

The performance amount proposed by Treynor (1965) is grounded on the perception of individualities ranks. It is construed as testifying the incentive (return minus the risk-free amount) in relative to a logical risk, i.e. beta risk.

The Jensen's classic study (1968) practices the specific line assessed by the market model where the CAPM is its standard. It is the regression of superfluous return of the scheme with additional return of the market, stand-in as dependent and independent variable correspondingly.

The whole analysis has been done on selected Thematic Infrastructural Mutual Fund schemes along with their CRISIL Rank, AUM values return in different period of time i.e. one week, one month, quarterly, half yearly , annually, and in past two, three and five years.

The research has been done on Thematic Infrastructural mutual funds these mutual funds has been selected through Trendlyne.com. Trendlyne is 'Retail Bloomberg Platform' which helps retail investors , research analytics and

portfolio advisors with real time data analytics. From there top five CRISIL Ranked funds has been selected for the purpose of study. These funds has largest chunk of AUM in the sector. Total 19 Infrastructure Mutual Funds are there to study and to see the performance of these funds they were analysed with the benchmark i. e. NIFTY Infrastructure Index.

- In study first of all historical returns were analysed and found that according to CRISIL rank HSBC Infrastructure, Aditya Birla Sun Life Infrastructure , IDFC Infrastructure , L&T Infrastructure funds are on top of list.
- To study the Rank returns Rank has been given to according to their returns. On the basis of computation it can be easily said that HSBC Infrastructure Equity Fund and HDFC Infrastructure Fund were the leading schemes out of selected schemes as far as rank returns is concerned.
- Another Ranking of funds has been done on the basis of Annual Returns. And found that HSBC Equity Infrastructure and HDFC Infrastructure Equity Fund were on lead.
- Performance evaluation also done on the Portfolio Assets. Which shows the different components of portfolio this includes Turnover ratio, equity holding in portfolio, No. of stocks, debt, no. of instruments Mutual fund holding in other companies, cash holdings and other holdings in terms of percentage of their respective weight. It is one of the important aspects of decision making regarding mutual fund investment.
- Further analysis has been done on the basis of SIP (systematic Investment plan) return. After seeing five years performance the highest return was given by Quant Infrastructure Fund.
- Most importantly Net Asset Value (NAV) is the primary indicator of any Mutual fund performance. So it’s essential to quote the NAV details, in this study researcher presented CRISIL Ranked mutual funds NAV of 52 weeks and their lowest and highest values were also shown.
- After doing all the fundamental performance analysis study , performance evaluation has been done through Sharpe, Treynor and Jenson Ratios. In these evaluations comparison being done with the benchmarks to see the

actual performance. The benchmark is NIFTY Infrastructure Index. The evaluation consists of Standarx deviation, variance, Beta, Correlation, and all three ratios.

  - In evaluation it is found that lower value of standard deviation is having a higher chance to be continued with similar returns.
  - Higher standard deviation values shows variety in average rturns.
  - Beta is the measure of market volatility or systematic risk. Lower the value of beta less chances of securities to change the returns. Beta <1.00 reflect less chance to rise more than the market and also fall more than the market.
  - The Sharpe ratio uses standard deviation to measure a mutual fund's riask adjusted returns to make an investor understand the mutual fund portfolio performance in excess of the risk free return. Higher Sharpe ratio means higher risk adjusted return of the scheme.
  - Higher values of Treynor ratio reveals that fund could yield better returns on the level of risk.

- Further ranking has been done on the basis of Average returns, Total risk(S.D.) , Variance, Beta, Correlation(r), Sharpe ratio, Treynor ratio, and Jensen Alpha ratio.
- In this research three Hypothesis were used to check whether difference in average retrn, mean rank (performance) of selected thematic schemes is significant or not? For this purpose ANOVA has been applied and concluded the following results :
    1. There is no significant difference in the Average return of selected thematic schemes during 2015-19.
    2. There is significant difference in the mean rank of the selected funds.
    3. Average return were negatively correlated with total risk, total risk and variance was strongly correlated with Beta and moderately correlated with the all three tests.
- As per the analysis done, it is being observed that these mutual funds have performed well despite of slowdown in economy in 2019. The common

investor who is willing to take more risk, having good knowledge of the Infrastructure sector and good return can try these Thematic Infrastructure Mutual Funds. The data employed in the study consisted of simple annual returns and as well as the study period's NAVs of direct investment.

- After taking an analysis of Average returns it shows that 100% funds have performed better than the benchmark returns. And by analysing Sharpe Ratio its being found that only one out of 19 funds was bad in performance, in the same way Treynor Ratio's only 5.26% funds were under – performed. Lastly Jensen's alpha shows 8 out of 19 funds i.e.42.91% funds have given good performance to their investors.
- The forecasting of returns and volatility of funds were touched also done in the study to see the future prospect of the sector. An attempt was made to predict the return of Mutual funds of Infrastructure sector (equity) of India and analysing the volatility of the funds at the same time. Predictions were done using different machine learning techniques including autoregression, moving average as we also employ deep learning approach using stacked LSTM, we have presented a comparative study of the different methods used for predictions. Finally, we are also able to predict the volatility of the mutual fund with the help of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) Model.
- We aimed at developing a framework for forecasting the Net Asset Values and Volatility of Indian Mutual Funds. We used two different machine learning approaches namely Autoregression (AR) and Moving Average (MA) and a deep learning approach stacked LSTM for forecasting the NAVs. We used the Generalized Auto Regressive Conditional Heteroskedasticity (GARCH) model for forecasting the volatility of the mutual funds. Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) are used for evaluating the methods used for NAV forecasting results of which prove that whenever, the time series data is less complex i.e. the number of independent variables (impacting factors) are limited then, machine learning based approaches can provide better results in those cases.

- The GARCH model when compiled suggests the optimal values of the coefficients for the equation:

$$var(Yt \mid Yt-1) = \omega + \alpha 1 * \varepsilon_{t-1}^2 + \beta 1 * \sigma_{t-1}^2$$

Looking at the results of the ADF Tests for different Mutual Funds of India presented from tables 4 through 8 it is clearly evident that all the coefficients are highly significant and we are getting a high likelihood as well therefore, this model becomes the front runner for measuring volatility.

7.2 Scope for the further research

- The ideas and empirical findings reported in this research suggest future researchers to identify the optimal level of performance evaluation of other Growth Oriented Thematic Mutual Funds by using various parameters in further studies.

- It would be very captivating to carry out another study with in the same area of research with comparative study with the other Thematic Mutual Funds and different aspects of performance evaluation, which will provide unified outcomes to the research topic and greater efficacy to the investors, specialists, fund managers and Government.

- Future studies should analyse additional interventions that will enhance the level of performance evaluation of Mutual Funds. The new idea should be investigated so that a numerous innovative alternatives are available to evaluate the performance of other sector's Mutual Funds Industry.

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INFRASTRUCTURE FINANCING IN INDIA: A ROAD AHEAD

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ABSTRACT

Indian economy is being considered as the fastest growing economies in the world. The priority of government of India is to develop the nation's infrastructure because it's the area where we are lacking in the world's competition. The infrastructure is a key for the successful transportation and logistics.

This is the widest area in which we are having a big space for foreign cash flows. India's population is already 1.2 billion and it continuous to grow. Global trade and industrialization are making pressure on India's infrastructure for development. In the world economic forum's Global competitiveness Report for 2011-2012, India ranked 89th out of 142 countries for its infrastructure. For fulfilling the demand of such a huge population the government of India has called for $ 1 trillion in infrastructure spending in the five years through 2017.

This paper will discuss about various sources for such a huge investment. What government of India is doing for this? What are the different options have been created for funding infrastructure. Infrastructure includes road networks to water, electricity, railways, ports, airports, telecom and gas. This paper will also focus on foreign investments and their growth in infrastructure of the country.

Keywords: Foreign Direct Investments, Global Trade, Infrastructure, Logistics, Transportation,.

I. INFRASTRUCTURE'S FINANCING NEEDS

Infrastructure is the sector which needs huge funds for long term. Construction is the second largest economic activity in India after agriculture and has been growing rapidly. The Indian government recognizes this and as per eleventh Five Year Plan more than US$ 500 billion worth of investment is plan to flow into India's infrastructure by 2012.

Global trade is placing acute pressure on India's inefficient ports. Rapid industrialization is intensifying the strain on the unreliable electricity and water networks. The railway system is already overcrowded and facing high demand of freight capacity. The need to upgrade Indian infrastructure is in huge cities like Delhi, Mumbai, Kolakata and Bangluru. We have 375 million urban population which is projected to rise upto 500 million by 2017. This rate of urbanization will require massive investment in everything from Metro station to clean water supplies and from power generation to affordable housing. By recognizing these requirements the Indian government has called $ 1 trillion in infrastructure spending in the five years through 2017. The priorities

include three airports, two ports, an elevated rail corridor in Mumbai, and 6000 miles of new roads. The ministry of road transport outlined plans for US $120 billion worth of road widening.

The Indian planning commission has estimated that the country will need 180 additional airports in the next decade. Government has also set ambitious goal for wind, solar and nuclear energy all will be needed to supplement power from coal and gas.

India needs large investments in infrastructure for accelerating growth of economy and improvement in quality of life. It was not so long ago that this sector was financed almost entirely by the public sector – from government budgetary allocations and internal resources of public sector infrastructure companies. The main sources of long term financings are insurance and pension funds who seek long term investments with low credit risk. Given the fiscal constraints that leave little room for expanding public investment at the scale required.

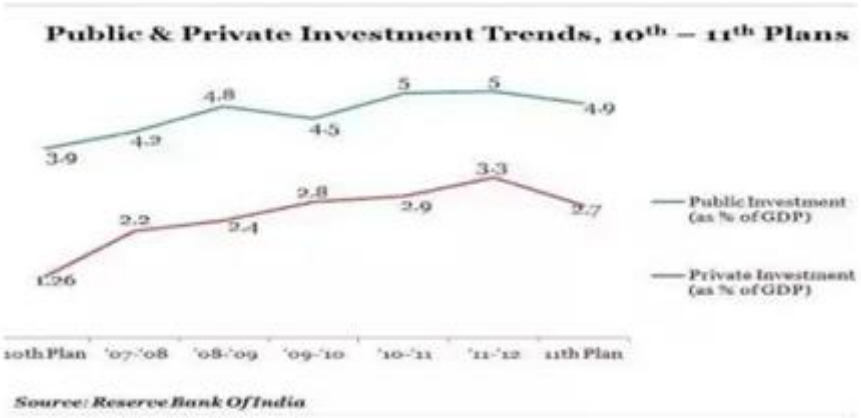
II. DIFFERENT SOURCES OF INFRASTRUCTURE FINANCING

There are mainly two sources of infrastructure financing -Public Finance and Private finance. The government has been a major source of financing for infrastructure projects. Participation of Private sector has been sought in various infrastructure sectors. Governments have adopted innovative procurement route like Public-Private-Partnership, Debt financing, equity financing, FDIs and devoted intermediaries.

III. PUBLIC-PRIVATE-PARTNERSHIP

Initially infrastructure projects were financed through public funding in the form of budget allocation. But due to economic paradigm shift it wasn't enough to develop the infrastructure. In order to fill this gap private sector participation has been sought through PPP mode. PPP defined as an arrangement between a government/government owned entity on one side and a private sector entity for the creation and /or management of infrastructure for provision for services to public for a specified period of time on commercial terms.

Figure 1: Public & Private Investment Trends in GDP



To attract the private sector the government has been putting in place the appropriate regulatory and institutional framework. At present private investment in infrastructure is barely 2.7 % of GDP and most of the investments are in Greenfield projects in telecom and energy with concessions mainly on transport.

The eleventh five year plan predicts private infrastructure investment to rise to 2.8 % of GDP by 2012. In addition to the availability of private capital private sector participation brings in the following benefits to the government:

1. PPPs allow for allocation of risks to the party best able to manage them. Risk related with the design and constructions of the projects were traditionally borne by the public sector, now they are transferred to private sector, this in turn protects the governments from such risks.
2. PPPs enable faster delivery of projects. Private sector has the incentive to accelerate the project delivery in order to avoid inflationary cost increase, keep the project cost low and bring forward the revenue stream. Contractual conditions like early completion bonus and inclusion of construction period within concession period further provide the incentive to private sector speed up the project delivery.
3. The combination of public and private sector is unique motivations and skills, and the competitive process for contract award provides high potential for innovative approaches to public infrastructure delivery with PPPs. PPPs facilitate greater flexibility to private sector to maximize the use of new and innovative approaches to financing, development, construction, operation and maintenance.
4. PPPs projects can be completed more reliably on time and within budget. Private sector is strongly motivated to complete the project as early as possible to control its costs so that payment flow can commence.
5. PPPs can facilitate transfer of technology and training. These can attract experts and organizations with international standing and experience which can be a catalyst for technology transfer and exchange.
6. PPPs can provide access to international finance and foster the local capital markets. PPPs provide the medium for investment from abroad. This will help them access the global bank and capital markets and develop domestic investment environment.

However much of the private capital required for PPP projects has to be raised from domestic financial institutions that do not have the capacity or instruments to provide long term debt for projects having a long payback period. Infrastructure projects typically bear a long term of gestation, which need to be supported by debt of a longer tenure. Inadequate availability of long term debt from domestic market therefore added a challenge for sustainable financing of PPPs projects.

IV. DEBT FINANCING

The market for infrastructure debt basically belongs to the corporate bond market and without movement on the later movement in the former is not likely. Bond financing of infrastructure requires not only the availability of long term savings with pension and insurance funds but also the presence of specialized financial intermediaries with due diligence, negotiations and structuring capabilities for PPP Projects.

The private investment has been increase in infrastructure development because of essential role played by the commercial banks. Commercial banks are providing funds to infrastructure through specialized Non -banking Financial Companies (NBFCs). The first year of the plan (2007-2008) recorded high growth but a continued rapid expansion of such finance may not be sustainable as it is leading to a growing concentration of risks on bank's balance sheets.

These risks arise because financing is done for long term from the short term nature of bank's liabilities. The increasing share of long term assets comes at a time when the maturity of deposits has been shortening, thus exacerbating the liquidity risk of financing long term assets with short term liabilities. Therefore specialized NBFCs have become a significant source of infrastructure finance but their growth is constrained by their access to bank finance, in the absence of alternate wholesale funding sources. Tighter prudential limits on bank lending to NBFCs in 2007 have effectively capped the latter's access to commercial bank funds. Many banks are reaching exposure limits to infrastructure related borrowers because of large size of project relative to bank capital. Indian banks are small; only 11 banks had equity above $1Billion in March 2007, of which two were private sector banks.

V. PENSION AND INSURANCE FUNDS

Pension funds and Insurance companies are most suitable to fund infrastructure because of their liabilities but in India they are still a small source of fund for infrastructure despite the rapid growth in insurance penetration. This is because:

1. Insurance has grown from 1.9% in 2000 to around 4% of GDP it still remains low compared to 9% of GDP in USA and Europe and 10.7% of GDP of Japan.
2. There are some restrictions and limits imposed by government to limit investments in infrastructure, which includes minimum credit rating for debt instruments and minimum dividend payment record for seven years of equity. These are difficult conditions for private infrastructure projects as they have been set up recently and do not have high credit rating.
3. Insurance companies invest more than required in government securities and they invest mostly in the paper of publically listed infrastructure companies towards meeting their mandate minimum infrastructure and social sector requirements rather than funding infrastructure projects.
4. Rapid growth in private sector is not reflected in greater investment in infrastructure because 85% of the policies sold by them are unit linked. Finally with the exception of LIC insurance companies' pension and provident funds rarely invest in paper with a maturity longer than five to seven years.

In August 2008 new investment guidelines were issued by the insurance Regulatory Authority of India (IRDA). While these guidelines have broadened the definition of infrastructure and aligned it with RBIs definition (as proposed in the Parekh committee) they have not relaxed the conditions sufficiently to permit insurers to potentially hold a wide range of infrastructure projects in their investment portfolio.

Approved category of investment includes such as Asset Backed Securities with Underlying Infrastructure Assets and Corporate Debt Based on a minimum rating criteria the rating quality is not less than AA whereas a typical non - recourse infrastructure project is rated BBB. Moreover 75% of all debt instruments in an insurance company's portfolio must now have AAA rating.

VI. EQUITY FINANCING

Substantial resources were raised by infrastructure companies from IPO with the secondary market boom in recent years. Developers have limited amount of capital and have to tie it up for a significant length of time for each project. In recent years investors have shown keen interest in India. India witness the number of private equity (PE) infrastructure formed. Rules for sell down of equity can be quite stringent and act as a deterrent to the entry of more financial investors who would like greater flexibility in exit options. Moreover, sales of unlisted projects, unlike listed investment are subject to the full weight of the capital gain tax. Since most infrastructure projects are unlisted this acts as a disincentive to equity investors on infrastructure.

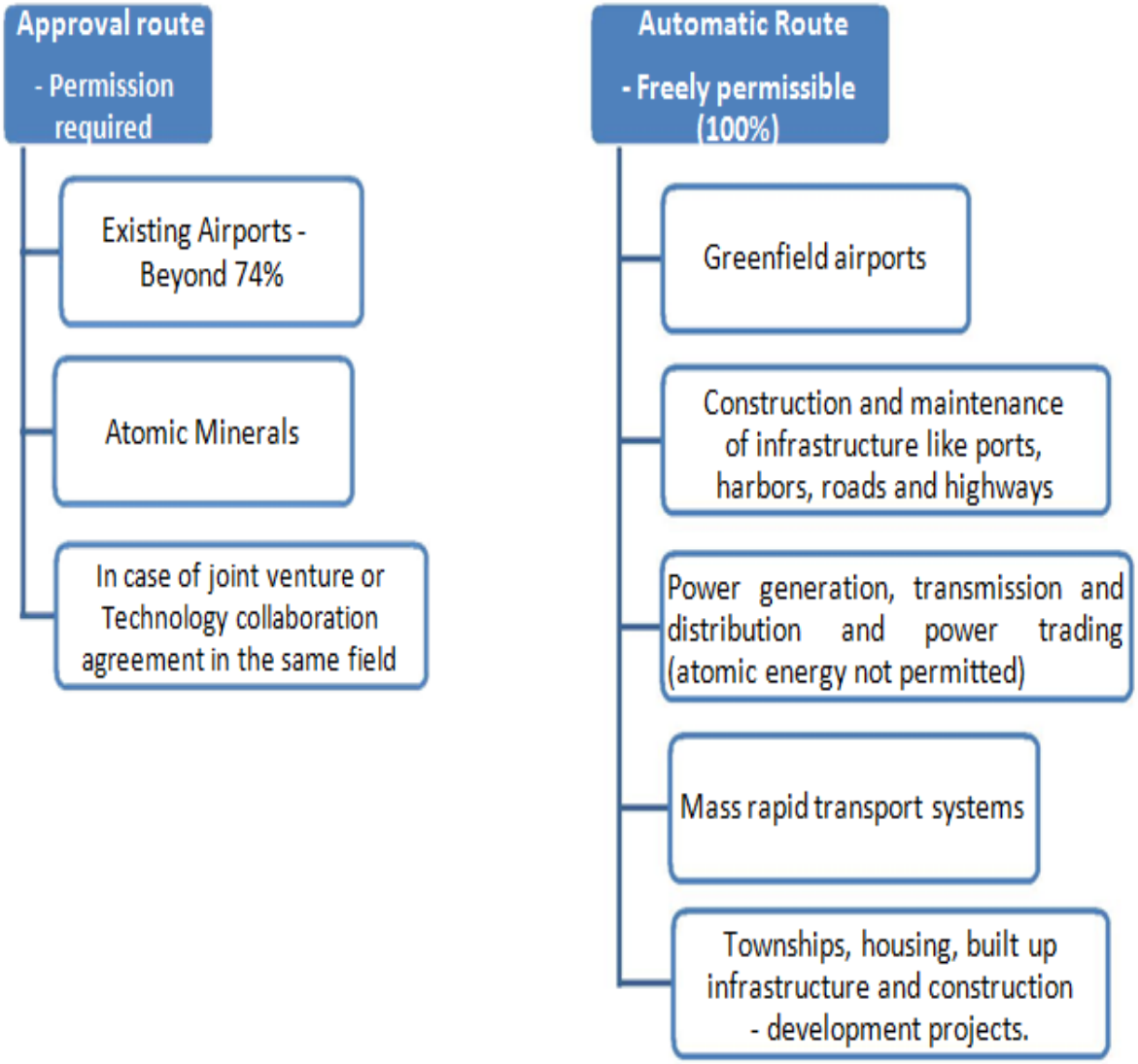
Equity investors perceive termination payments for government agency defaults to inadequate in many concession agreements. In some cases the lenders are repaid whereas the equity holders suffer, this encourages a greater use of debt. The biggest constraint in development of PE industry in India is the very narrow base of investors. Globally PE firms rely on a mix of institutional investors such as pension funds and insurance companies and contributions from high net worth investors (HNIs). In India the ability of insurance companies and pension funds to invest in alternative asset classes is still quite restricted and HNIs will take time to take up this asset class.

VII. FOREIGN DIRECT INVESTMENT (FDI)

The policies of the Indian government seek to encourage investments in domestic infrastructure from both local and foreign private capital. As per the World Investment Report of the UNCTAD, India was rated the second most attractive location (after China) for global FDI in 2007. Presently India has FDI of about US$21 billion per year, well below the targeted US$ 30 billion. To increase the FDI inflows government has introduced significant policy reforms. For example it now permits 100% FDI under the automatic route for a broad range of sectors. Only certain post information is required. For FDI in a few sectors, a prior approval is required which takes around 6-8 weeks.

Indian government is constantly simplifying the approval route process, including setting up several agencies to expedite FDI approval. In August 2008, a press report stated that Morgan Stanley was looking to invest up to a quarter of its US$ 4 billion global infrastructure fund in emerging markets, notably India and China – and that in India, Morgan Stanly would face competition from Australia's Macquarie Group, JP Morgan, Glodman Sachs and Deutsche Bank, all looking to channel foreign investors' money into Indian infrastructure. While some of these planned investment may be reduced or delay given the current environment in the credit markets, India is still likely to acquire substantial FDIs. Particularly if its economy is able maintain a strong growth rate in the face of global recession.

Figure 2: FDI route



In order to promote the construction sector the Indian government has relaxed some of the exchange controlled restrictions and is now allowing foreign nationals/ citizens to acquire immovable properties in India, subject to certain conditions and procedures.

Although India is having a well developed legal system but sometimes it becomes hurdle for foreign nationals. As case in the many countries there is no single regulator which formulates the policy for all infrastructure projects. There is no standardization in the concession agreements across the different infrastructure sectors. As a result, the development of certain sectors in India may be hampered due to lack of adequate and co ordinate planning.

Considering the liberal FDI guidelines, these lucrative projects present both opportunity as well as threat to local players. In many cases, foreign players are believed to have greater technological expertise, large pockets and more extensive experience compared o domestic companies.

VIII. INDIA INFRASTRUCTURE FINANCE COMPANY LTD. (IIFCL)

IIFCL was establish by the government in 2006 to provide long term finance for infrastructure projects, since the commercial banks were unable to do so on account of their asset liability mismatch. IIFCL was allowed to raise funds from domestic and overseas market on the strength of sovereign guarantee and not on the strength of banks' balance sheet. This helped to keep borrowing cost low. Moreover, such borrowings did not have to meet the net worth and an equity requirement, as their repayment was backed by a sovereign guarantee. This arrangement was similar to the World Bank, which raises market borrowings on the strength of callable capital from its shareholders, without actual subscription of such capital.

IIFCL mainly provides long term loans to project companies in association with banks. As on march 2013 the total outstanding loans were Rs. 18921 crores out of which Rs. 16351 crores was in the form of direct lending. Initially IIFCL sanctioned loans based on the appraisal of the Lead bank.

IIFCL launched its Credit Enhancement initiative with a pilot transaction with the support of ADB (Asian Development Bank 2012). Under this scheme IIFCL plans to provide partial credit guarantee to enhance the ratings of project bonds issued by infrastructure companies. With credit enhancement, infrastructure project bonds are expected to become attractive investments for insurance companies and pension funds. The projects under the facility will be expected to have a minimum stand alone bond rating without credit enhancement of BBB+ and should have completed at least 2 years of commercial operation. The funds raised through this process will be used to prepay bank debt before its scheduled maturity.

An important aspect of IIFCL lending is the longer tenure of its loans, which helps in extending the average maturity of the project debt and also encourages the commercial banks to follow suit. Thus IIFCL has become an important instrument in extending the average tenure of debt for infrastructure projects, making them more bankable and financially viable.

IX. CONCLUSION

It is now generally accepted that infrastructure projects need long term financing and these can be fulfilled by insurance companies and pension funds. Banks provide short term financing during construction. Pension funds and insurance funds don't have their due diligence capabilities for infrastructure projects, Infrastructure Finance Companies and Infrastructure debt funds can provide such services. If the infrastructure projects do not meet the minimum rating requirements then the IIFCL can provide credit enhancement to the bonds issued by such projects. The success of these initiatives will be depending on the government to generate a supply of PPP projects in an environment of policy certainty. Government is also opening doors for foreign nationals to join hands in development of Indian Infrastructure.

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Abstract:
Mutual Funds have become a prime choice among other investment options for investors. It helps a small investor to get access to the large cap, Mid Cap, Blue chip companies holding. Now investor has become rational and smart before making choices, so the analysis of performance is not only analysed by the fund managers but by investors as well, and both make decisions to invest or not in a particular scheme. Volatility refers to some numeric measurement of uncertainty which depends on the volume of changes in the prices or returns of said securities portfolios or market indices. Investors prefer stability therefore if two portfolios provide equal returns but one boasts lower volatility, we choose the latter. Investors are inclined towards the mutual funds that offer descent returns and are stable at the same time.
This paper is an attempt to predict the return of Mutual funds of Infrastructure sector (equity) of India and analysing the volatility of the funds at the same time. Predictions are done using different machine learning techniques including autoregression, moving average as we also employ deep learning approach using stacked LSTM, we have presented a comparative study of the different methods used for predictions. Finally, we are also able to predict the volatility of the mutual fund with the help of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) Model.
Keywords: Net asset value, LSTM, Time series, Regression, Neural Networks, Moving Average, Volatility, GARCH.

1. Introduction

Mutual funds are professionally managed investment schemes that offer both benefits and risks. Common investors, brokers, business owners, and speculators find it difficult to predict changes in mutual funds. The ability of investors to invest the appropriate amount, in the appropriate type of investment scheme, and at the appropriate time is the key to successful investment strategies. To ensure benefit, capital appreciation, and financial requirements, a well-planned investment strategy is required. With the increased popularity of mutual funds as a tool of investing, the Indian capital market has been maturing of late. With the return on fixed income instruments nearing a low and the equities market seen to be risky, individual investors are increasingly turning to mutual funds to manage their assets. What has previously been seen in industrialised economies is now being reproduced in India. There is little doubt that mutual funds are becoming increasingly important in terms of the overall economy. Mutual funds are quickly becoming India's preferred investment instrument. Mutual Funds are considered as a hassle-free investment in India. It has a vide scope in investment avenues like Equity, Debt securities, Money market etc. An investor can opt any of these available option as per his fund requirement or investment objective. The collected funds are managed by fund manager who is an expert in handling funds and has knowledge to predict the expected return.
The mutual fund industry was started in 1963 and unit scheme 1964 was the first scheme launched by UTI. At the end of 1988 it had Rs. 6700 crores of AUM and today this industry has Rs.33.67 trillion AUM as on 30th June 2021. After seeing the diverse interest of investors AFMI has introduced different schemes to attract more and more investors in the field. These include stock market, Debt funds, sectoral funds, thematic funds etc.
Thematic Infrastructure Mutual funds not only holds equity it also includes debt and money market funds. Infrastructure funds became quite popular in 2006-07 when shares of companies in sector such as housing, cement and road building rose due to infrastructure boom. After that this area has been attracting to investors.
Return is an important aspect of Mutual fund. Investors, financial advisors and fund managers study the Return of a particular time period as it is the crucial indicator of the fund's performance. Financial market prediction is a difficult task because the data series is non-linear, dynamic, and chaotic in nature. Mutual funds are one type of investment scheme that investors manage.

Given the economic and financial importance of mutual fund returns, forecasting their volatility is a tedious task. In this environment, the capacity to forecast mutual fund return volatility with higher accuracy is critical for commodity markets and the global economy. Volatility is a numerical measure of uncertainty that is based on the magnitude of price or return movements in securities portfolios or market indices. Investors desire consistency, so if two portfolios offer the same returns but one has lower volatility, we favour the latter. Investors want mutual funds that provide decent returns while also remain stable at the same time.

In this paper we have proposed a machine learning based framework which predicts the Net Asset Values for the mutual funds of five different companies namely Tata Infrastructure, HDFC, Nippon India, ICICI Prudential and Aditya Birla Sun Life Infrastructure. We have created various machine learning models like linear regression persistence model, autoregressive model, moving average model and stacked LSTM for predicting the Net Asset Values of the mutual funds of above-mentioned companies. Since volatility is also of utmost importance for an investor, we have also employed the GARCH model to predict the volatility in the returns of the mutual funds.

1. Background

A time series analysis is a discipline of research in machine learning that deals with studying a collection of data points over a period of time. Instead of capturing data points intermittently or arbitrarily, time series analysts record data points at constant intervals over a predetermined length of time. To maintain consistency and validity, time series analysis often requires a high number of data points. A large data collection ensures that your sample size is representative and that your analysis can cut through noisy data. It also guarantees that any trends or patterns found aren't outliers and that seasonal variation is taken into account.

2.1 Machine Learning Based Time Series Analysis

2.1.1 Autoregression

To create forecasts, an autoregressive model uses a linear combination of the target's past values. Naturally, the regression is performed against the target. An AR(p) model can be stated mathematically as:

$$Yt = C + \emptyset 1 * Yt - 1 + \emptyset 2 * Yt - 2 + \cdots + \emptyset p * Yt - p + \in t$$

Where:

p = order

c = constant

$\in =$ Error at instance t

The AR(p) model is extremely versatile, and it may be used to describe a wide range of time series patterns. Autoregressive models are often used only on stationary time series. This limits the range of the Φ parameters. An AR(1) model, for example, will limit Φ to a value between -1 and 1. As the model's order grows, the restrictions become more complex, yet when modelling in Python, they are taken into account automatically.

Stationarity The concept of stationarity implies that taking consecutive samples of data with the same size should have identical covariances regardless of the starting point. This characteristic of the data is also called weak-form stationarity or covariance stationarity. A time series can be said to have co-variance stationarity if it satisfies three key assumptions: (i) constant mean (ii) constant variance (iii) consistent covariance between periods at an identical distance from one another

2.1.2 Moving Average

Moving average smoothing is a simple yet efficient time series forecasting technique. It can be used to prepare data, engineer features, and even make predictions directly. When you calculate the moving average of a time series, you have to make some assumptions about the data. Both trend and seasonal components are presumed to have been eliminated from your time series. This indicates that your time series is either stationary or lacks obvious trends. In a walk-forward fashion, the moving average model for forecasts can be applied. The model can be updated and a prediction for the next instance can be generated as past observations become available.

2.2 Deep Learning Based Time Series Analysis

2.2.1 Stacked LSTM

Time series forecasting can be done using Long Short-Term Memory networks, or LSTMs for short. For each sort of time series forecasting problem, there are a variety of LSTM models that can be applied. In our work for the purpose of forecasting Net Asset Values of Mutual Funds we have made use of Stacked LSTM. A Stacked LSTM model is created by piling multiple hidden LSTM layers one on top of the other. An LSTM layer requires a three-dimensional input, and by default, LSTMs produce a two-dimensional output as a result of the sequence's end.

2.3 GARCH Model

GARCH (Generalized Auto Regressive Conditional Heteroskedasticity) is a statistical model for evaluating time-series data that assumes the variance error is serially autocorrelated. Although GARCH models can be used to analyse a variety of financial data, such as macroeconomic data, they are most commonly employed by financial institutions to assess the volatility of stock, bond, and market indexes returns. They utilise the data to help decide pricing and estimate which assets are likely to produce higher returns, as well as to forecast the returns of present investments to aid in asset allocation, hedging, risk management, and portfolio optimization.

2. Related Work

2.1 Forecasting the Net Asset Value of Mutual Funds

Here is a brief overview of related work. Anish et al.[1] have proposed a feedback functional link artificial neural network (FFLANN) for predicting the net asset value (NAV) of Indian mutual funds that has a low computational burden and can forecast quickly. However, the research work is solely concentrated on the neural network approaches for forecasting and provides the results of forecasting for only four companies and hence the sample space is limited.

The purpose of the research work proposed by Ray et al.[2] is to investigate the relationship between economic variables and mutual fund performance in the Indian context. The paper examines monthly data on a variety of economic variables such as national output, interest rate, inflation, exchange rate, money supply, and aggregate equity market in order to determine the relative influence of these variables on the net asset values of various mutual fund schemes.

In another work by Lawrence et al.[4] the use of different types of time series models to predict the total NAV of an asset allocation mutual fund is investigated. The Vanguard Wellington Fund is the mutual fund used in this example. Again, as only the data from only one mutual fund is considered it can be concluded that the sample space is limited to justify the results presented.

2.2 Forecasting Volatility Using the GARCH Model

In their work Kristjanpoller et al. [10] constructed an ANN–GARCH by applying an Artificial Neural Network (ANN) to the GARCH approach. To forecast gold price volatility, the hybrid ANN–GARCH model is used.

In another work, Donaldson et al. [11] built a seminonparametric nonlinear GARCH model based on the Artificial Neural Network ANN literature and test its ability to anticipate stock return volatility in London, New York, Tokyo, and Toronto.

Roh et al.[12] in their work, offers neural network and time series models as hybrid models for forecasting stock price index volatility. The stock price index taken into account in this research is KOSPI (Korea Composite Stock Price Index)

After reviewing the above work, we found that the majority of them used neural network-based approaches for forecasting the Net Asset Values of Mutual Funds but, from [1] and [4] it is evident that some specific and limited number of companies are analysed. Furthermore, coming to the domain of volatility forecasting [10] uses the GARCH model for forecasting volatility in gold prices whereas, [11] has used the model for forecasting the volatility in stock returns of London, New York, Tokyo and Toronto and [12] has forecasted the volatility in the Korea Composite Stock Price Index. Hence it can be concluded that the Indian Mutual Funds remain unexplored from the volatility forecasting point of view also as compared to the previews works this paper provides a comparison of performances of the machine learning approaches and deep learning approaches in forecasting the Net Asset Values of Indian Mutual Funds.

3. Methodology

4.1 Data Collection

Our goal is to forecast the net asset value (NAV) of various mutual fund schemes as well as their volatility for which long-term data is available. We chose the period January 2015 to December 2018 because daily NAV data for all of the selected schemes is available for this time frame and we can obtain normalised, credible data for the same time frame. We've chosen five schemes for you (as given in Table I) All the historical Net Asset Value data for different schemes is taken from the official website of Association of Mutual Funds in India[14]. For machine learning based (Auto Regression (AR), Persistence and Moving Average (MA)) experiment purposes data from January, 2015 to December, 2017 is taken as training data and predictions of different models are evaluated for the year 2018. Whereas, for the stacked LSTM approach 65% of the total data is taken as training data and the rest 35% is taken as test data for making predictions and evaluating them against the actual values.

Table I Selected Mutual Funds Scheme

Name of the Mutual Fund Scheme	
Aditya Birla Sun Life Infrastructure	Direct Plan Growth Option
HDFC Infrastructure Fund	Direct Plan Growth Option
ICICI Prudential Infrastructure Fund	Direct Plan Growth Option
Nippon India Power and Infra Fund	Direct Plan Growth Option
Tata Infrastructure Fund	Direct Plan Growth Option

4.2 Persistence Model (Baseline Algorithm)

In the case of classification, this algorithm predicts the majority class, whereas in the case of regression, it predicts the average outcome. This might be used with time series, but it ignores the serial correlation pattern found in time series datasets. The persistence algorithm is a similar technique for use with time series datasets. The persistence method predicts the expected outcome at the next time step (t+1) using the value from the previous time step (t-1).

4.3 Autoregression Model

To create forecasts, an autoregressive model uses a linear combination of the target's past values. Naturally, the regression is performed against the target. An AR(p) model can be stated mathematically as:

$$Yt = C + \emptyset 1 * Yt - 1 + \emptyset 2 * Yt - 2 + \cdots + \emptyset p * Yt - p + \in t$$

While using autoregression for predicting the net asset value as with our desired output, the components of the above equation will have the following description.

Yt = Net Asset Value of the mutual fund at the required instance (to be predicted)

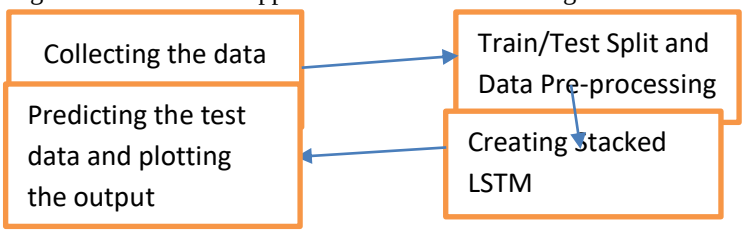
Yt-1 = Net Asset Value of the mutual fund at the previous instance

$\in t$ = Error in the predicted value of the mutual fund's Net Asset Value

4.4 Stacked LSTM

Fig.1 represents the pictorial representation of the NN (Stacked LSTM) Approach:

Fig 1. Stacked LSTM approach for NAV Forecasting



(i) As mentioned in 4.1 the data for the experiment has been collected from [14].

(ii) 65% of the data is used as training and the rest is used as testing data and is unseen for the model.

(iii) Pre-processing involves deciding the number of timesteps. Number of timesteps tell you how many previous instances will the model refer to make the next prediction. In our experiments we have found that the model has performed optimum at 100 timesteps. i.e. to make a new prediction the model refers to previous 100 instances.

4.4.1 Model Summary

11Fig.2 Stacked LSTM Model Summary

Model: "sequential"

Layer (type)	Output Shape	Param #
lstm (LSTM)	(None, 100, 50)	10400
lstm_1 (LSTM)	(None, 100, 50)	20200
lstm_2 (LSTM)	(None, 50)	20200
dense (Dense)	(None, 1)	51

Total params: 50,851
Trainable params: 50,851
Non-trainable params: 0

Sequential model with 4 layers has been used with 50 neurons in each layer, 100 represents the timesteps as mentioned earlier. The metrics for evaluation and performance of different methods are discussed in the next section.

4.5 GARCH Model (Volatility Forecasting)

The GARCH Model can be represented with the following mathematical equation:

$$var(Yt \mid Yt - 1) = \omega + \alpha 1 * \varepsilon_{t-1}^2 + \beta 1 * \sigma_{t-1}^2$$

$var(Yt \mid Yt - 1)$ = The variance in NAV today is conditional on the values of the variables yesterday

ω = constant

α1 = Numeric coefficient for the squared residual for the past period

ε_{t-1}^2 = Squared residual of the past period

$\beta 1$ = Numerical coefficient for the conditional variance from the last period

σ_{t-1}^2 = Conditional variance from the last period

4. Evaluation and Results

5.1 Evaluation Metrics

- **Mean absolute error**: This is the average of absolute errors of all the data points in the given dataset.
- **Mean squared error**: This is the average of the squares of the errors of all the data points in the given dataset.

5.2 Results

5.2.1 NAV Forecasting

The performance of different approaches discussed in the paper based on the above evaluation metrics are tabulated in this section. Moreover, graphical representations of the outputs obtained during experimentation are also provided.

Table 2. Mean Absolute Error of different methods used for NAV Forecasting

Mutual Fund Scheme	Persistence Model (Baseline)	Autoregression Model	Moving Average Model
Aditya Birla Sun Life Infrastructure	0.07	0.07	0.12
HDFC Infrastructure Fund	0.02	0.02	0.03
ICICI Prudential Infrastructure Fund	0.03	0.02	0.03
Nippon India Power and Infra Fund	0.01	0.01	0.03
Tata Infrastructure Fund	0.05	0.06	0.03

Fig. 3 Instances Of the Nippo India Power and Infrastructure Fund of Forecasted NAVs (Test Data)

```
predicted=20.430600, expected=20.417400
predicted=20.425000, expected=20.441100
predicted=20.429500, expected=20.454500
predicted=20.437667, expected=20.467200
predicted=20.454267, expected=20.505200
predicted=20.475633, expected=20.532600
predicted=20.501667, expected=20.532700
predicted=20.523500, expected=20.598800
predicted=20.554700, expected=20.637000
predicted=20.589500, expected=20.646000
predicted=20.627267, expected=20.652700
predicted=20.645233, expected=20.669300
predicted=20.656000, expected=20.646400
predicted=20.656133, expected=20.650200
```

Table 3. Root Mean Squared Error of different methods used for NAV Forecasting

Mutual Fund Scheme	Persistence Model (Baseline)	Autoregression Model	Moving Average Model	Stacked LSTM
Aditya Birla Sun Life Infrastructure	0.082	0.078	0.030	65.44
HDFC Infrastructure Fund	0.026	0.024	0.019	33.30
ICICI Prudential Infrastructure Fund	0.019	0.027	0.017	22.36
Nippon India Power and Infra Fund	0.010	0.012	0.010	13.42
Tata Infrastructure Fund	0.68	0.72	0.01	53.72

5.2.2 Volatility Forecasting

Table 4 ADF Test for Aditya Birla Sun Life Infrastructure Fund

	Coef	**std err**	**T**	**P>|t|**	**95.0%Conf. Int.**
Omega	9.5102e-06	4.113e-05	0.231	0.817	[-7.111e-05,9.013e-05]
alpha[1]	0.0712	2.765e-02	2.574	1.005e-02	[1.697e-02, 0.125]
beta[1]	0.9288	2.791e-02	33.282	7.087e-243	[0.874, 0.984]

Table 5 ADF Test for HDFC Infrastructure Fund

	Coef	**std err**	**T**	**P>|t|**	**95.0%Conf. Int.**
Omega	1.8965e-05	1.680e-05	1.129	0.259	[-1.396e-05,5.189e-05]
alpha[1]	0.0439	1.974e-02	2.226	2.602e-02	[5.250e-03,8.264e-02]
beta[1]	0.9505	1.965e-02	48.372	0.000	[0.912, 0.989]

Table 6 ADF Test for ICICI Prudential Infrastructure Fund

	Coef	**std err**	**T**	**P>|t|**	**95.0%Conf. Int.**
omega	3.1282e-03	1.433e-03	2.184	2.900e-02	[3.203e-04,5.936e-03
alpha[1]	0.2799	0.166	1.687	9.168e-02	[-4.537e-02, 0.605]
beta[1]	0.4922	0.135	3.654	2.582e-04	[0.228, 0.756]

Table 7 ADF Test for Nippon India Power and Infrastructure Fund

	Coef	**std err**	**T**	**P>|t|**	**95.0%Conf. Int.**
Omega	1.5530e-04	2.663e-04	0.583	0.560	[-3.667e-04,6.773e-04]
alpha[1]	1.3461e-06	1.855e-03	7.257e-04	0.999	[-3.634e-03,3.637e-03]
beta[1]	1.0000	4.037e-03	247.735	0.000	[0.992, 1.008]

Table 8 ADF Test for Tata Infrastructure Fund

	Coef	**std err**	**T**	**P>|t|**	**95.0%Conf. Int.**
Omega	0.0366	1.578e-02	2.322	2.024e-02	[5.711e-03,6.758e-02]
alpha[1]	0.0801	2.120e-02	3.780	1.569e-04	[3.858e-02, 0.122]
beta[1]	0.8886	2.666e-02	33.328	1.532e-243	[0.836, 0.941]

Fig. 4. Actual Volatility in NAV of Tata Infrastructure Fund (Test Data)

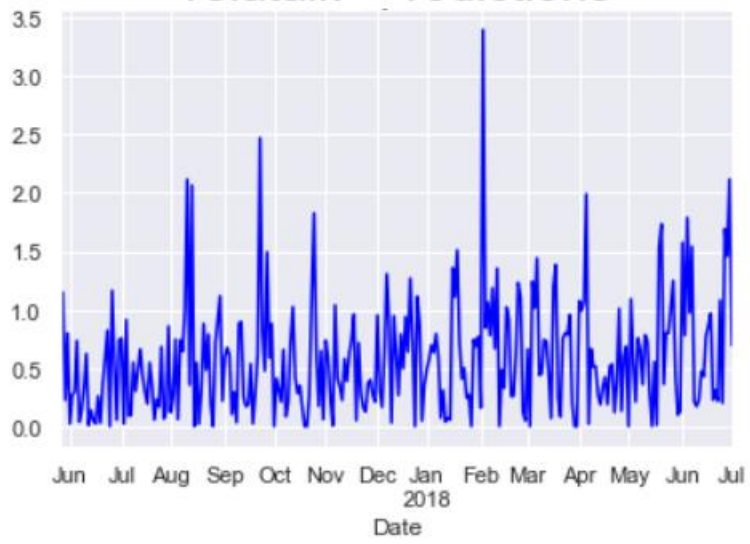
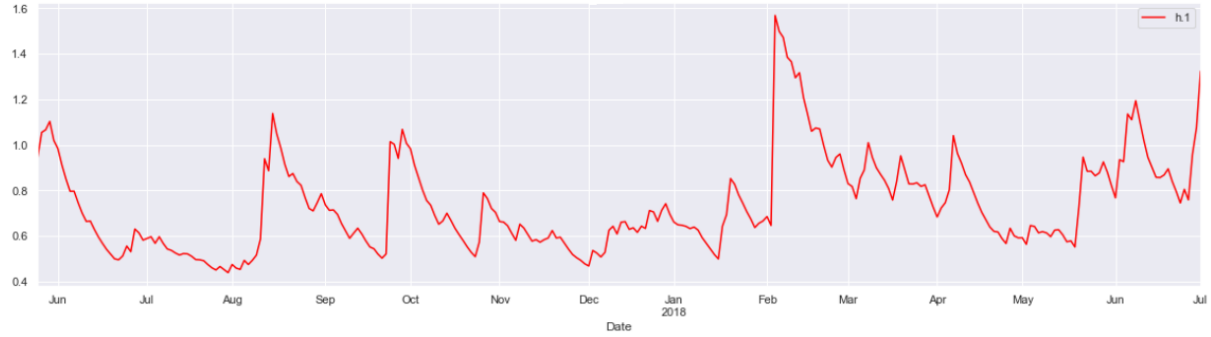


Fig. 5. Forecasted Volatility of Tata Infrastructure Fund (Test Data)



5. Conclusion

We aimed at developing a framework for forecasting the Net Asset Values and Volatility of Indian Mutual Funds. We used two different machine learning approaches namely Autoregression (AR) and Moving Average (MA) and a deep learning approach stacked LSTM for forecasting the NAVs. We used the Generalized Auto Regressive Conditional Heteroskedasticity (GARCH) model for forecasting the volatility of the mutual funds. Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) are used for evaluating the methods used for NAV forecasting results of which prove that whenever, the time series data is less complex i.e. the number of independent variables (impacting factors) are limited then, machine learning based approaches can provide better results in those cases.

The GARCH model when compiled suggests the optimal values of the coefficients for the equation:

$$var(Yt \mid Yt-1) = \omega + \alpha 1 * \varepsilon_{t-1}^2 + \beta 1 * \sigma_{t-1}^2$$

Looking at the results of the ADF Tests for different Mutual Funds of India presented from tables 4 through 8 it is clearly evident that all the coefficients are highly significant and we are getting a high likelihood as well therefore, this model becomes the front runner for measuring volatility.

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Performance Evaluation of Growth oriented funds: A study of selected Thematic Infrastructural Mutual Funds in India

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Abstract

Now a days Mutual Funds are gaining the interest of investors who have common financial goals. In this pool money is invested in different capital market instruments. Investors earn returns in the form of Net Assets Value appreciation. This makes Mutual funds a thrust area for investors as they are able to get the experience of professionally trained fund managers who handle diversified securities on an affordable cost. Mutual fund companies provide wide range of funds to invest in. Its easily accessible for common investors but they are not aware much that in which Mutual fund they should invest in, it become cumbersome job for them. The mutual fund industry was started in 1963 and unit scheme 1964 was the first scheme launched by UTI. At the end of 1988 it had Rs. 6700 crores of AUM and today this industry has Rs.33.67 trillon AUM As on 30th June 2021. In this paper an attempt is made to analyse the Growth oriented Thematic Infrastructure Mutual funds. On the basis of risk and return evaluation. The evaluation was done through various financial tests like Average return, Jensen Ratio, Sharpe Ratio, treynor Ratio, standard deviation and Beta.

Keywords: *Thematic Mutual Funds, Average return, Jensen's Alpha, Sharpe Ratio, Treynor Ratio, Standard Deviation.*

For any individual savings and investments are essential to fulfil their big future requirements. One has to make investment out his limited income thus he expects return on his sacrifices. That is why investment decision is called trade-off between risk and return. Mutual funds provide you many advantages like diversification, Professional management, low cost, and easy process. Investors are attracted towards equity because it comes with competitive returns. These thematic MFs comes with higher risk and higher returns.

Thematic MFs are bit different from sector funds. It identifies the theme and then invest in sectors and companies. Infrastructure funds became quite popular in 2006-07 when shares of companies in sector such as housing, cement and road building rose due to infrastructure boom. It is essential for any investor to understand the sector first before investing in thematic funds, as these are highly risky. But if you are aware about the sector, market and analysing the returns these will definitely give you exceptional returns, many times higher than the benchmark returns.

Literature Review

G Raghuram et al (2006) Infrastructure development and financing have been recognized as key areas which need attention for enhancing the competitive advantage of India. Provision of infrastructure facilities, traditionally in the government domain, is now being offered for private sector investment and management in most countries. India has joined this trend, which has been reinforced by the resource crunch faced by government.

Jensen Michael (1968) has developed a composite portfolio evaluation technique concerning risk adjusted returns. He has done evaluation of 115 fund managers. His analysis of Net Rreturns, indicate the 39 funds had above average returns while 76 funds yielded abnormally poor returns. He concluded that he has not considered the diversification has done risk return evaluation and those mutual funds were on average not able to predict security prices well enough to outperform a buy and hold policy.

M.Vijay Anand (2000) studied the schemes of Birlasunlife and competitor's study for 3 years and done SWOT analysis of BirlaSunlife and used Delphi technique. He found that BirlaSunlife outperformed in comparison with its competitors as well the benchmark.

Shivam Tripathi and Dr. Gurudutta P. Japee (2020) due to sharp fall in NIFTY during 2019 has impacted the performance of all the selected 15 equity funds. Therefore they suggested that investor should consider statistical parameters like Jenson's Alpha, , Beta, Standard Deviation , Sharpe Ratios while investing in mutual funds apart from NAV and total returns to ensure consistent performance.

Objective of The Study

1. To pick up the information about the performance of Thematic Infrastructure Mutual funds.
2. To analyse the CRISIL ranked top 5 TIMFs.
3. To compare the performance of selected TIMFs to the Benchmark i.e. NIFTY Infra Index.
4. To provide an insight to a common investor in Infrastructure sector.

Research Methodology

A. Scope of study: The period of the study if for 5 years (2015-2019). The study shortlisted the sample from CRISIL top 5 Infrastructure Mutual Funds.

B. Sources of Data: Secondary data has been used to study the current performance trends in Indian Mutual fund industry through data sheets, News Papers, magazines Journals, Periodicals and Time Series from NIFTY Infrastructure Index. Data was also collected from moneycontrol.com, AMFI, AMCs, etc. the returns have been collected of sample funds on monthly basis over a period of study. NIFT Infrastructure Index has been used as a benchmark for performance evaluation and provides fairly long period's time series.

C. Tools: to analyse the performance of TIMF whether it outperformed or underperformed following statistical methods and techniques have been used:

For Risk Analysis

Standard Deviation (Total Risk), Beta (Systematic Risk) and Correlation were calculated.

For Return Analysis

Average return over five years was calculated for analysing returns on mutual funds. And for doing the performance evaluation by Risk Adjusted measure Sharpe Ratio, Treynor Ratio and Jensen's Alpha were calculated.

Analysis of Dat

A. Average Returns

The performance evaluation of selected mutual funds is done by comparing the returns of individual scheme with returns of a benchmark index. In this paper returns have been called as Average returns. Average returns is obtained by taking the simple mean of monthly returns and those returns were accumulated in the yearly returns and took the mean. Whereas, monthly returns were calculated on the basis of NAVs.

B. Standard Deviation

The total risk of a mutual fund is estimated by

Standard Deviation (SD) In mutual funds SD discloses how much return on a fund is going astray from the normal profits based on the historical data. In simple words it assesses the volatility of a fund. It assures that sample is free from defects of sampling. The greater standard deviation will be magnitude of the deviation of the values from their mean. Small SD means high degree of uniformity and homogeneity of a series.

C. Beta

Beta is calculated to know whether investment in the company is risky or not. It basically indicates the level of volatility associated with the fund as compared to the benchmark. The success of a beta is heavily dependent on the correlation between fund and its benchmark. If the fund doesn't have relevant benchmark index then the beta would be inadequate to measure.

If beta is > 1 it means that fund is more volatile than the benchmark, while beta is < 1 , means fund is less volatile than benchmark. And if beta is very close to 1 means, fund's performance is very close to the index performance.

D. Correlation ®

Correlation measures the movement of a fund with that of a benchmark index. It shows the strength of a relationship between funds and benchmark. A perfect correlation means that if fund moves either up or down the benchmark moves in lockstep, in the same direction. A perfect negatively correlation means both funds and index move in opposite directions, while zero correlation implies no linear relationship at all. Its significance is these are used by investors and analysts to forecast future trends and to manage the risks within a portfolio.

E. The Sharpe Ratio

The performance extent progressed by Sharpe (1966) is established on capital asset pricing model (CAPM). It is a superfluous return received in excess of risk free return per unit of risk convoluted i.e. per unit of standard deviation. The Sharpe size regulates portfolio performance by overall risk moderately than beta risk. Sharpe's lucidity for familiarizing overall risk instead of beta lies with the hypothesis behind the beta risk. For this ratio calculation we must know three things, the portfolio return, risk free rate of return and the standard deviation of the portfolio. For the risk free return we may use the average rate of return (over the given period of time). The standard deviation measures the systematic risk of the portfolio. The Sharpe ratio measures the fund's excess return per unit of its risk total risk. A high Sharpe ratio indicates the superior risk adjusted performance, while low and negative ratio is an indication of unfavourable performance. Symbolically it can be written as:

$$S_p = \frac{R_p - R_f}{s_p}$$

Where,

S_p = Sharpe Ratio of Mutual Fund scheme

R_p = Average return on portfolio

R_f = Average risk free rate of return.

$_{p=}$Standard deviation of returns

The benchmark comparison with this measure of performance is

$$\frac{R_m - R_f}{s_m}$$

where,

R_m = Average return on the Market or benchmark portfolio

R_f = Average risk free rate of return.

$_{m=}$Total risk on market

F. The Treynor Ratio

Treynor (1965) is grounded on the perception of individualities ranks. He was the first researcher who computed measure of the portfolio performance. It is construed as testifying the incentive (return minus the risk-free amount) in relative to a logical risk, i.e. beta risk.In other words it measures the relationship between fund's additional return over risk free return and

market return is measured by beta. Using the beta , rather then stabdard deviation (in Sharpe ratio) we assumes that portfolio is well diversified portfolio. Higher the treynor Ratio the better the portfolio performed. This is useful for assessing the additional return , allowing incsters to evaluate how the structure of the portfolio to different levels of systematic risk will affect the return. Symbolically Treynor Ratio is $T_{p.}$

$$T_p = \frac{R_p - R_f}{b_p}$$

where

$T_{p=}$ Treynor Ratio of Mutual Fund

$R_{p=}$ Average return on portfolio

$R_{f=}$ Risk free rate of return.

$_p$ = Beta, sensitivity of fund return to market return.

The benchmark comparison with this measure of performance is measured by;

$$T_m = \frac{R_m - R_f}{b_m}$$

Where

$T_{m=}$ Treynor Ratio of the benchmark portfolio

$R_{m=}$ Average return on the market

$R_{f=}$ Average Risk free rate of return

$_{m=}$ Market Beta which is equal to 1

If Treynor Ratio is greater than the benchmark comparison ($R_m - R_f$)then the portfolio has out - performed the market and indicating superior risk adjusted performance.

G. The Jensen Ratio

The Jensen's Ratio is used to determine the excess return of a stock by the CAPM. This model is used to adjust the level of beta risk so that riskier securities are expected to have higher returns. It allows investors to testify the portfolio's super performance relative to the overall capital market. The important issue with the Jensen Ratio is the selection of Market Index, because portfolio's performance will be compared with the market portfolio.

$$\alpha_p = R_p - (R_f + (R_m - R_f)\,\beta_{p.m})$$

Where

$\alpha_{p=}$ Jensen Ratio measure of the performance of the portfolio

$R_{p=}$ Return on the portfolio

R_f = Risk free rate of return

$R_{m=}$ Return of the market portfolio

$\beta_{p.m\,=}$ Beta or systematic risk of the portfolio and market

Results and Findings

1. Performance in terms of Average Returns, Standard Deviation, Beta and R.

The performance of CRISIL Ranked top 5 Thematic Infrastructural Mutual Funds is evaluated using Average returns, Standard Deviation, Beta and R. It is not advisable to consider a mutual fund only on the basis of return, it should be measured in aligned with the risk taken by the fund manager, that's why every fund has different risk associated with them. Risk associated with the fund is being considered as the return's fluctuations or variability from the previous one. If there is is high variability of returns in a fund performance, it implied that fund has a high risk. Return is the primary motivating force behind any investment decision. It represents the reward for undertaking the investment and the risk inherent therein. Since the game of investing is about returns (after allowing for risk), measurement of historical returns becomes very essential to judge the performance of the investment manager.

Return =

(Value at the end of the period - Value at the beginning of the period) + Dividend x 100

Value at the beginning of the Period

Risk

It refers to the possibility that the actual outcome of an investment will differ from its expected outcome. Risk also refers to variability or dispersion. The wider, the range of possible returns, the greater will be the risk. The widely used measures of risk in portfolio evaluation are Standard Deviation and Beta.

Table 1.1
Risk and Return of Thematic Infrastructure Mutual Fund Schemes

S. No.	*Groups*	Average Returns (2014-19)	Total Risk (Std. Deviation)	Beta	Correlation R
1	Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	10.04	19.15	1.05	0.93
2	HDFC Infrastructure Fund -Direct Plan - Growth Option	5.86	18.42	0.98	0.9
3	Franklin Build India Fund	17.83	18.9	0.76	0.68
4	Canara Robeco Infrastructure-Direct Plan – Growth	11.04	17.46	0.83	0.8
5	Invesco India Infrastructure Fund - Direct Pan - Growth Option	12.91	17.72	0.82	0.78
6	IDFC Infrastructure Fund - Direct Plan – Growth	12.01	23.62	1.38	0.99
7	ICICI Prudential Infrastructure Fund – Growth	8.52	14.92	0.81	0.91
8	ICICI Prudential Infrastructure Fund - Direct Plan – Growth	9.3	15	0.81	0.91
9	Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	9.77	19.04	1.12	1
10	LIC MF Infrastructure Fund-Direct Plan-Growth	8.49	12.31	0.63	0.87
11	L&T Infrastructure Fund -Direct Plan-Growth	15.2	21	1.19	0.96
12	Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	18.24	25.42	0.98	0.65
13	Tata Infrastructure Fund -Direct Plan Growth	11.44	15.11	0.74	0.83
14	Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	8.98	14.57	0.84	0.98
15	SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	11.37	11.37	0.58	0.86

16	Quant Infrastructure Fund	8.48	11.54	0.61	0.89
17	Tata Infrastructure Fund -Direct Plan Growth	11.44	15.11	0.74	0.83
18	UTI Infrastructure Fund-Growth Option- Direct	9.51	15.44	0.82	0.9
19	DSP India T.I.G.E.R. Fund - Direct Plan – Growth	11.86	16.08	0.85	0.89
	NIFITY INFRASTRUCTURE INDEX	**4.41**	**16.89**	**1**	**1**

1.A. Interpretation

After doing the analysis of Table 1.1 its clear that in case of all Thematic Infrastructural Mutual Funds schemes all of them earned higher returns in comparison to Nifty Infrastructure Index (Benchmark). The top performers on the basis of average return Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option was ranked first, Franklin Build India Fund stood on second place, L&T Infrastructure Fund -Direct Plan-Growth placed on third position, Invesco India Infrastructure Fund - Direct Pan - Growth Option was on fourth place and IDFC Infrastructure Fund - Direct Plan – Growth was the fifth in top schemes. Quant Infrastructure Fund, LIC MF Infrastructure Fund-Direct Plan-Growth, ICICI Prudential Infrastructure Fund – Growth, Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth and ICICI Prudential Infrastructure Fund - Direct Plan – Growth were at the bottom in the list.

1.B. Performance in terms of Sharpe Ratio

The Sharpe Ratio measures the fund's excess return per unit of its risk associated (). It indicates the association ship between Excess return over Risk free (R_f) and total risk (), which is known as standard deviation. Following are the results of Sharpe Ratios on selected Thematic Infrastructure Mutual funds of all the Growth oriented option with the Nifty Infra Index.

Table 1.2
Sharpe Ratio of Thematic Infrastructure Mutual Fund Schemes

S.No.	*Groups*	Sharpe Ratio
1	Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	0.17
2	HDFC Infrastructure Fund -Direct Plan - Growth Option	-0.05
3	Franklin Build India Fund	0.59
4	Canara Robeco Infrastructure-Direct Plan – Growth	0.25
5	Invesco India Infrastructure Fund - Direct Pan - Growth Option	0.35
6	IDFC Infrastructure Fund - Direct Plan – Growth	0.22
7	ICICI Prudential Infrastructure Fund – Growth	0.12
8	ICICI Prudential Infrastructure Fund - Direct Plan – Growth	0.17
9	Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	0.16

10	LIC MF Infrastructure Fund-Direct Plan-Growth	0.14
11	L&T Infrastructure Fund -Direct Plan-Growth	0.4
12	Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	0.45
13	Tata Infrastructure Fund -Direct Plan Growth	0.31
14	Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	0.16
15	SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	0.41
16	Quant Infrastructure Fund	0.15
17	Tata Infrastructure Fund -Direct Plan Growth	0.31
18	UTI Infrastructure Fund-Growth Option- Direct	0.18
19	DSP India T.I.G.E.R. Fund - Direct Plan – Growth	0.32
	NIFITY INFRASTRUCTURE INDEX	-0.14

1.2. Interpretation

A high and positive Sharpe Ratio shows a superior risk adjusted performance of a fund while low and negative Sharpe Ratio is an indication of bad performance. Usually if Sharpe ratio is higher than the benchmark , it indicates that fund is performing exyreamly well over the market and vice-versa. The date presented in Table 1.2 shows that out of 19 schemes only one mutual fund HDFC Infrastructure Fund -Direct Plan - Growth Option has negative Sharpe ratio i.e. -0.05 which is lower than the Benchmark which shows the bad performance. Thus it can be concluded that performance in terms of Sharpe Ratio most of the mutual funds have been satisfactory performance and have outperformed the market index though market indicator is negative during the study period.

Table 1.3
Treynor Ratios of Thematic Infrastructure Growth Oriented Mutual Funds

S.No.	*Groups*	Treynor Ratio
1	Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	3.16
2	HDFC Infrastructure Fund -Direct Plan - Growth Option	-0.87
3	Franklin Build India Fund	14.64
4	Canara Robeco Infrastructure-Direct Plan – Growth	5.23
5	Invesco India Infrastructure Fund - Direct Pan - Growth Option	7.52
6	IDFC Infrastructure Fund - Direct Plan – Growth	3.84
7	ICICI Prudential Infrastructure Fund – Growth	2.24
8	ICICI Prudential Infrastructure Fund - Direct Plan – Growth	3.19
9	Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	2.71
10	LIC MF Infrastructure Fund-Direct Plan-Growth	2.81
11	L&T Infrastructure Fund -Direct Plan-Growth	7.13

12	Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	11.71
13	Tata Infrastructure Fund -Direct Plan Growth	6.35
14	Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	2.69
15	SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	8.06
16	Quant Infrastructure Fund	2.91
17	Tata Infrastructure Fund -Direct Plan Growth	6.35
18	UTI Infrastructure Fund-Growth Option- Direct	3.41
19	DSP India T.I.G.E.R. Fund - Direct Plan – Growth	6.07
	NIFITY INFRASTRUCTURE INDEX	-2.31

1.3. Interpretation

This ratio measures the relationship between fund's additional return over risk free return and market risk (β). The higher value of Treynor Ratio denotes the better performance of the fund. If fund's Treynor Ratio is higher than the benchmark comparison, it indicates that fund has outperformed the market. Table 1.3 represents the results of different mutual fund's Treynor Ratio in comparison with their benchmark index. In the above analysis except HDFC Infrastructure Fund -Direct Plan - Growth Option with -0.87 has under - performed during the study period else every fund has Out - performed over the benchmark index. Though the benchmark wasn't going well due to recession but inspite of this every fund out performed.

Table 1.4
Jensen's Alpha of Thematic Infrastructure Growth Oriented Mutual Funds

S.No.	*Groups*	Jensen's Alpha
1	Aditya Birla Sun Life Infrastructure Fund Growth Direct Plan	-1.86
2	HDFC Infrastructure Fund -Direct Plan - Growth Option	-5.97
3	Franklin Build India Fund	5.98
4	Canara Robeco Infrastructure-Direct Plan – Growth	-0.68
5	Invesco India Infrastructure Fund - Direct Pan - Growth Option	1.19
6	IDFC Infrastructure Fund - Direct Plan – Growth	-0.2
7	ICICI Prudential Infrastructure Fund – Growth	-2.81
8	ICICI Prudential Infrastructure Fund - Direct Plan – Growth	-2.04
9	Nippon India Power & Infra Fund - Direct Plan Growth Plan - Growth Option	-1.78
10	LIC MF Infrastructure Fund-Direct Plan-Growth	-2.46
11	L&T Infrastructure Fund -Direct Plan-Growth	3.19
12	Kotak Infrastructure & Economic Reform Fund- Direct Plan- Growth Option	5.63
13	Tata Infrastructure Fund -Direct Plan Growth	0

14	Sundaram Infrastructure Advantage Fund (Erstwhile Sundaram Capex Opportunities) Direct Plan Growth	-2.22
15	SBI INFRASTRUCTURE FUND - DIRECT PLAN – GROWTH	0.41
16	Quant Infrastructure Fund	-2.36
17	Tata Infrastructure Fund -Direct Plan Growth	0
18	UTI Infrastructure Fund-Growth Option- Direct	-1.91
19	DSP India T.I.G.E.R. Fund - Direct Plan – Growth	7.1

1.3. Interpretation

The Jensen's Ratio is used to determine the excess return of a stock by the CAPM. This model is used to adjust the level of beta risk so that riskier securities are expected to have higher returns. It allows investors to testify the portfolio's super performance relative to the overall capital market. The important issue with the Jensen Ratio is the selection of Market Index, because portfolio's performance will be compared with the market portfolio. Alpha is the contrast between the profits a financial specialist expect from the fund. A positive Alpha depicts that fund has out - performed the benchmark index. If Alpha is more positive its beneficial for investor's point of view. With -5.97 Jensen alpha ratio, HDFC Infrastructure Fund - Direct Plan - Growth Option was at first place among the selected schemes during year 2015 to year 2019. Then ICICI Prudential Infrastructure Fund - Growth (Jensen alpha ratio -2.81) was on second place followed by LIC MF Infrastructure Fund-Direct Plan-Growth with (Jensen alpha ratio -2.46) on third position of bad performance.

Conclusion

The study has done on Thematic Infrastructure Mutual Funds. This was the sector which was on boom during 2006-7 and reason to introduce these funds. It is a risky call to invest in this because you don't enjoy the more diversity, that makes its risky. But as per the analysis done, it is being observed that these mutual funds have performed well despite of slow down in economy in 2019. The common investor who is looking to take a more risk, having good knowledge of the Infrastructure sector and good return can try these Thematic Infrastructure Mutual Funds. The data employed in the study consisted of simple of annual returns and as well as the study period's NAVs of direct investment. The study conducted on Nifty Infrastructure Index, as it the dedicated index for the sector. The performance of Thematic Infrastructure mutual Funds was done on Average Returns, Standard deviation, Beta, Correlation, Sharpe Ratio, Treynor Ratio and Jensen's Alpha. After taking an analysis of Average returns it shows that 100% funds have performed better than the benchmark returns. And in analysis of Sharpe Ratio its being found that only one out of 19 funds was bad in performance, in the same way Treynor Ratio's only 5.26% funds were under – performed. Lastly Jensen's alpha shows 8 out of 19 funds i.e.42.91% funds have given good performance to their investors.

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