Chapter - IV

Case studies on Project Management Practices and analysis of data
It is a well-established practice in Management study to conduct case study to be familiar with the environment, identify critical factors for the business, and recognise the best practices, identify the lessons learnt from earlier failures or the limitations that the eco system imposes on the subject of study.

In this context we have developed case studies from select companies that are representative of a sector under study. The common elements at these companies are that they are large corporations, spread over geographies employing large number of people, have been in existence for a long time, have a long track record of consistent performance and most importantly have implemented project management practices in their business operations.

The case studies conducted are as follows

1. Infosys Technologies – representing IT and Private sector
2. VIOM Networks – representing Telecom, Infrastructure and Private sector
3. GMR Infrastructure Ltd – representing Infrastructure and Private sector
4. Railtel – representing Telecom and Public sector
5. ISRO – representing Technology and Government sector

4.1 INFOSYS LTD, Bangalore

Infosys has been well recognised as the representative of the 21st Century Indian software giant operating across geographies, working in a plethora of technologies, employing and managing large scale talent in many countries and delivering continued value to its customers who seem to be growing every day. Success at Infosys is largely credited to its high success rate in project delivery across the Globe. Hence it was an appropriate case for deeper study of project management practices in IT sector.
This study was intended to understand the Project Management practices at Infosys. A detailed meeting/interview with Project Director - EAS helped us to understand various project management attributes practiced by them, consolidated responses from PD - EAS is as follows:

4.1.1 Project Organisation

Project Organization in Infosys is as shown in the chart below. Infosys uses matrix structure of project Organization. Project organization structure is specifically designed to manage complex projects to ensure its successful conclusion and also to meet the requirements defined in the project brief. This structure enables channels of communication to decision-making forums and is backed up by job definitions which specify the responsibilities, goals and limits of authority, relationships, skills, knowledge and experience required for all roles in the project organization.

Project Board

The Project Board is the forum where senior management representatives of the Customer and Infosys come together to make decisions and commitments to the project. It consists of 2 roles namely Project Executive and Customer’s IT & Management team. It is therefore a very small manageable group of senior managers capable to make decisions on behalf of their organizations / interests without referring back to those organizations whilst working within the charter of the Project Plan. The Executive is ultimately responsible for the project and has to ensure that the project represents good value for money and balancing the needs of the business, user and supplier (all stake holders).

The Customer team represents the people who will use the final product – those who must specify the requirements of the end product. Customer team commonly represents a number of peers and it is therefore useful to have a User
Group to consider all the customers’ issues on behalf of the Project Board and from which the Senior User is shown below.

Chart 4.1: Project Organization at INFOSYS with linkages and communication flow.

4.1.2 Project Details:

Enterprise Application Service (EAS) division at Infosys executes implementation projects of ORACLE products, SAP products for their customers worth ranging from 3 to 5 crores consuming more than 1.5 years of time with 40 people in each EAS project including onshore team. The complexity of project in
functional interfaces definition and provides clearance for detailed design document.

- Critical Design Review: This stage of review is to provide final approval for designs, specifications, baseline production, Interface definitions and for finalising detailed test plans.

- Test Readiness Review: This review is to ensure compliance of activities to the design norms and programme plan before subjecting system for final testing.

- System Readiness Review: Review of the detailed & final investigation of project deliverable happens at this stage. It is actually delivered for assembling with principal project (programme objective), detailed interface performance checks, certifying system performance meeting requirements, Finalizing the system configuration and approval for system commissioning all these things happens at this stage of techno-managerial review mechanism.

4.5.5 Project Communication

ISRO clearly recognize the importance of timely flow of communication among programme participants is key for success in programme management. In order to achieve this ISRO has clearly defined and documented process flow for project communication, chart 4.11 below is quite self-explanatory in nature which depicts the flow of communication and responsible person at every stage of communication flow.
terms of milestones depends & varies with customer and type of projects. Every EAS project is developed simultaneously both at client place & Infosys campus. For clients abroad a small sized project team is assigned to work at client site.

EAS projects at Infosys is being implemented by following self-developed standards and guidelines like AIM(Application implementation methodology) Oracle E-business Suite, INTERACT, DART(Time Tracking tool),ALCON(Resource allocation),INFLUX(Business Process), PRISM Project Reviews by Infosys Senior Management (progress review), for feature development EAS team uses waterfall model, iterative model. These self-developed models cover activity planning, communication planning, progress tracking, risks identification & handling, Change Management etc.
4.1.3 Process Followed

Starting of new projects involves following process,

Chart 4.2: Project delivery Process Flow chart at INFOSYS

Programme Manager & Delivery Managers assisted by consultants takes care of technical & functional requirements of clients and they are responsible for project release & handover, business factors and project sign-off as well. Delivery manager
takes care and ensure the timely release of project with the assistance of account manager & project manager. PO structure is matrix because PgM, DM, AM, PjM are responsible for many projects at a time. DM & team at onshore have constant interaction with DM & team at offshore through consultants to ensure timely & effective configuration, development and implementation of project.

Project Managers both at offshore and onshore handles multiple (typically 3-4) project teams assisted by respective team leaders. Onshore project teams are comparatively small in size than offshore team, due to various commercial reasons. Development stage involves PjM, Project team & consultants where they work towards giving shape & form to elicited technical & functional requirements. Consultants work closely with development team to ensure the meeting of client requirements. This process is followed by various testing procedure like SIT (system integration testing), UAT (user acceptance testing) to make software bug free. Before signing off or handing over of project/software, it is subjected to various trail runs to check & rectify the probable error that occur during full fledge operation, once it is achieved the software is finally is checked for precision in GO-LIVE testing process in this process software is tested imagining that it is used by clients, various dummy actions & counter actions are made to see the possibility of faults, misuse, errors etc due to end user usage simultaneously effort is also put on calculating the lead time required to solve customer operational issues with the software.

Key Elements of Project Process identified by Infosys are:

Traceability: Traceability ensures all Requirements are implemented in design, code, testing, and helps to identify impacted programs/documents in case of any change. It keep maintain reference between Requirement Number, Description, HLD Reference,
DD Reference, Unit Test Plan Reference, Integration Test Plan Reference, System Test Plan Reference. Both forward and backward traceability exists. Forward traceability ensures all requirements are incorporated into product. Backward traceability ensures no unnecessary functionality is included unless specifically called for by a requirement.

**Defect Detection, Prevention, and Tracking:** Defect Detection includes Reviews and Testing, which are common technique in project management. For Defect Prevention, Infosys suggests Learning from past projects, doing defect prevention regularly, and measuring the improvement. In Defect Tracking, it is ensured that all defects are closed.

**Measures & Metrics:** Measures are rooted in scientific principles and give numeric meaning to physical attributes. And metrics are derived or proposed measures that cannot be directly observed, which provides insight into process or product quality characteristics. At Infosys, Measures are also called Basic Metrics, which include effort, defects, size, and schedule. Metrics are referred to as Derived Metrics, which include Process Metrics, Product Metrics, and Service Metrics. Metrics are used for setting quantifiable goals, measuring and tracking progress, taking decisions, and planning improvements. For metrics, accurate data is important.

**Estimation:** Estimation is based on history data. Using RFP and requirement SPEC can estimate Size. Basing size, using Productivity, Skill Requirements, Execution Complexity, Risks/Uncertainties can estimate Effort. Basing Effort, using Resource availability, Dependencies/Constraints can estimate Time and Schedule. With Time and Schedule, Unit Costs, Costs can be estimated.

**Quality Assurance & Quality Control:** Quality Assurance focuses on process. It ensures that Project Management Plan is followed. It also defines the project process
through the project plan. Besides, it does Technology and Business domain training, and does audits.

*Quality Control focuses on Product*: It measures a product against the existence of a required attribute. Major QC activity is identifying defects (Reviews, Testing) and correcting them (Rework).

*Project Risk Management*: At Infosys, a detailed plan for risk identification, monitoring and mitigation is a part of project planning. It covers risk identification, prioritization and mitigation options. Their business continuity plans are focused on Infrastructure, Security, Confidentiality and Privacy, People.

### 4.1.4 Process Infrastructure

Process Infrastructure includes the introduction of the implementation support of project management. These Process Infrastructures are PRIDE (Process Repository at Infosys for Driving Excellence), Quality System Documentation (QSD), Body of Knowledge (BOK), Process Assets, Process Database (PDB), Process Capability Baseline (PCB), and Tools Repository

### 4.1.5 Project Communication

Planned Communication is being opted to have frequent interaction with all project participants. Communication plan focuses on content, format, timings, sender & receiver. Communiqués also contains project progress as and when requires.

### 4.1.6 Change Management

Change Management is an integral part of EAS project plan for which Infosys has separate methodology to handle it usually involves technical & functional
consultants for respective change requirements. Account manager, Delivery Manager & Programme Manager all together takes care of business change requirements & other obligatory issues. EAS at Infosys encounters project scope change at higher frequency which is very common in IT industry with other factors like time, cost & quality freeze.

4.1.7 Reasons for deficient deliverables

Main reasons for deficient deliverables which are uncommon at Infosys as noted by project managers are,

- Estimation (Effort/technology errors),
- Resource and skills inadequacies,
- Proactive methods and foresight to identify risks to the project

4.1.8 Analysis

Infosys is one of the largest businesses in India with a turnover in excess of $4 billion in 2008. The company specializes in Information Technology (IT) and consulting. N.R. Narayana Murthy and six others started the company in 1981, and it is now the largest IT Company in India with its headquarters in Bangalore (although it was started in Pune). It employs more than 90,000 IT professionals and was famously rated Best Employer in India. It operates in a number of business sectors from banking to retail, and its services tend to encompass end-to-end IT solutions which includes a whole bundle of added-value solutions from infrastructure to software engineering.

Since the company is based in India its competitive advantage is enhanced. The Indian economy, despite weak economic indicators such as relatively high rates of inflation, has low labour costs. The workforce has relatively high skills levels in
Information Technology. Couple these two elements together and you have an operational basis that offers low-cost based, highly skilled competitive advantage. Trained Indian personnel often speak very good English and are sensitive to Western culture, underpinned by India's colonial past. Infosys is in a strong financial position. The business turned over more than $4 billion in 2008. This means that it has the capital to expand, and also the basis to leverage potential investors. The company has bases in 44 global development centres, most of which are located in India, although the company has offices in many developed and developing nations. This means not only that Infosys is becoming a global brand but also that it has the capability to support the global operations of multinational clients.

Project Management is at the centre of the business at Infosys as service delivery is the key to company's growth and performance. Hence the company has invested very heavily into people, process and technology. Hiring the right people, training and motivating them are key differentiators for the successful delivery model both on site and off site locations. Process perfections come from following religiously six sigma projects, regular review mechanisms, issue and risk management methodologies. Technology has always been an enabler as the company and its employees are in the forefront of technology and have no qualms in accepting the same. Infosys is proud of using their own self developed methods & tools in project management and are striving to use & implement this more religiously.

In spite of all the great achievements, still in a few occasions deadlines fail and customers do get annoyed as a result of over dependence on process, lack of creativity and pro activity among employees that essentially comes from reducing all the activities in the project into mundane activities leading to frustrations, employee turnover and other related HR issues.
4.1.9 Conclusion

This case study proved that the age old management concepts of mutual trust, belief in self, team work can produce results even in today's complex situations. Out of the box thinking, professional approach to the problem and proper planning brought the desired results. Focused approaches to problem resolution and persistent efforts have delivered the results. Project Managers believe they could have done better if they had applied more patience at times. It is worthwhile to note that without top managements understanding and support this would have not been possible. Generating agreements between all members of the team is necessary to keep the team motivated and moving. A leader's role is critical to the success of the project team. Leading from the front & living by examples communicates a lot to the team and instils confidence in the leader. Finally Infoscians always believe honesty and hard work pays.

4.1.10 About Infosys Ltd

Infosys Limited (formerly Infosys Technologies Limited) is an Indian multinational provider of business consulting, technology, engineering, and outsourcing services. It is headquartered in Bangalore, Karnataka. Infosys is the third-largest India-based IT services company by 2012 revenues. Of this revenue, the majority comes from international business. In 2009, Infosys collected 1.2% of its income from the domestic Indian market. Infosys defines, designs and delivers technology-enabled business solutions to its clients worldwide. It leverages its domain and business expertise as well as the strategic alliance with leading technology providers while developing its business solutions. One of the major initiatives of Infosys Technologies Ltd. is its Global Delivery Model (GDM). It came forth as a
disruptive force that leads to the rise of offshore outsourcing. Infosys has also made a mark in the software industry by its highly innovative.

History

Infosys Technologies Limited started its journey on July 2, 1981 when N R Narayana Murthy along with six others, Nandan Nilekani, Kris Gopalakrishnan, N S Raghavan, S D Shibulal, Ashok Arora and K Dinesh launched a software development company, called "Infosys Consultants Pvt. Ltd." with N S Raghavan being the first employee of the organization. The company started with a capital of INR 10,000 which Mr. Murthy borrowed from his wife Sudha Murthy. The operation started in the house of Raghavan in Model Colony in north-central Pune, which was the registered office of the organization. However, the office shifted to Bangalore next year, which became the headquarters of the organization soon.

Growth

It's the year 1993 when Infosys went public. The IPO of Infosys was undersubscribed, which was later bailed out by Morgan Stanley, when it took up 13% of its equity (at the offer price of ₹ 95 per share). In 6 years, the price of the share soared up to ₹ 8,100 to make it the costliest share in the market in 1999. It came into the list of 20 biggest companies on NASDAQ in terms of market capitalization, leaving behind the big names like Adobe Systems, Lycos and Novell.

The sales and earnings of Infosys Technologies Ltd, since the listing on BSE till 2000, compounded over 70% a year. In 2000, the then US President Bill Clinton praised India for its accomplishments in high-tech areas referring the example of Infosys. In recent years, Infosys has begun shifting operations to the United States and other countries outside of India. In 2012, Infosys announced a new office in Milwaukee, Wisconsin to service Harley-Davidson, being the 18th international office.
in the United States. Infosys hired 1,200 United States employees in 2011, and expanded the workforce by an additional 2,000 employees in 2012. Globally, Infosys has 67 offices between the US, India, China, Australia, Japan, Middle East, UK, Germany, France, Switzerland, Netherlands, Poland, Canada.

Awards and Accolades

As the company started growing at a higher pace, honors and accolades also started pouring in. In 2001, Business Today rated it as "Best Employer in India". Hewitt Associates also rated it the best employer to work for in the three consecutive years in 2000, 2001 and 2002. Infosys Technologies Ltd. was also the only Indian company to win the prestigious Global MAKE award for the three consecutive years in 2003, 2004 and 2005. It also found place in the Global Hall of Fame for that. Infosys was adjudged among world’s 5 best performing companies in software and services sector by Forbes in April 2009. In the same year, the organization was rated amongst the "50 Most Innovative Companies" by Business Week. Infosys offers a range of solutions to its global customers. It offers solutions to wide array of industries. It provides various services like IT services, Engineering services, BPO services and consulting services etc.

Infosys Technologies offers services to the following industries:

1. Aerospace and Defence
2. Airlines
3. Automotive
4. Banking and Capital Markets
5. Communication Services
6. Consumer Packaged Goods
7. Discrete Manufacturing
4.2 VIOM NETWORKS Bangalore

4.2.1 Introduction

Study of Project management practices at VIOM networks is expected to provide insights into project management practices in Telecom and Infrastructure sector. VIOM networks Ltd, a joint venture between Tata Teleservices and Quippo, a SREI Group enterprise, is the pioneer in the Shared Passive Telecom Infrastructure industry in India. In 2009, the parent company - Quippo Telecom Infrastructure Limited (QTIL) announced its partnership with Tata Teleservices Ltd. (TTSL) with the merger of their passive infrastructure businesses, resulting in the formation of a unified entity Viom Networks. The company further strengthened its leadership
position with the acquisition of the tower arm of Tata Teleservices (Maharashtra) Limited in early 2010. Viom is an independent entity with over 38,000 towers and with over 83,000 tenants. The company plans to roll-out nearly 20-25,000 additional towers in the next two years while targeting a tenancy ratio of 2.5. Viom is the strongest player in neutral host Shared In-Building Communication Solutions (IBS) with installations already completed at most of the major airports.

*Viom Networks business involves:*

- Offer innovative plug-and-play facility to their customers.
- Offer services from Site acquisition, site build-up, statutory permission, equipment’s to a complete range of accessories.
- Constant R & D to ensure customized, comprehensive yet cost efficient solutions.
- 24x7 operations and maintenance services.
- Uninterrupted service through professionally managed security services.

*Initiatives of Viom Networks,*

Green Initiatives:

- Solar energy initiatives are currently being tested with few sites already being operational.
- CNG generators are being explored in place of DG Sets that can reduce fuel opex to the extent of 14%.
- Energy storage platform are being explored, with pilot project implemented on 10 sites.
- Fuel Cell instead of conventional Diesel Generator Set in non-EB sites can potentially reduce fuel Opex by 25%.
- Installation of wide band Static Voltage Stabilizers has already been done at 250 sites.
- Free cooling units are being considered at existing sites which can save AC opex up to 25%.

**Business Process Management System (BPMS)**

Viom has adopted a business process management system (BPMS) that focuses on alignment all organizational aspects with client requirements while focusing on cost reduction, defect reduction, revenue enhancement and risk & loss avoidance at the same time. The approach aims at studying the state of the business, identifying challenges & issues, establishing efficiency through process documentation and automation, compliance with processes & policies and following best practices, providing an innovative, agile system where process updation are controlled but easy to build into the existing system and implement, ensuring performance visibility and optimization.

BPMS has developed world class documented SOPs (Standard Operating Procedures) for all key functions. These SOPs define in detail the execution process, roles & responsibilities, SLAs & TATs of various processes under different functions. Post releasing these SOPs across the country and ensuring access to key stakeholders, a thorough training was organized for the relevant target audience. Initiatives have been taken to ensure 100% process compliance to the documented SOPs. BPMS is streamlining process & procedures as per ISO requirements. The organization is poised for ISO 9001: 2008 Certification.

*Viom is engaged in achieving the following objectives:*

1. Effective implementation of Manufacturing Quality Processes:
2. Raw Material & In Process Inspection
3. Working with partners on creating right tools
4. Working with design teams & partners for new products
5. Facilitate performance improvement (on Quality) of the Manufacturing Partners
6. Ensure defect free product dispatch to site from plant
7. Ensure dispatched product is in correct quantity and is correctly marked for traceability.
8. Effective tracking of inspecting partner performance.

The project Management practices at VIOM will be discussed in this paper. Because of VIOM Networks success in telecom infrastructure business, its project management becomes a successful case of project management approach to telecom infrastructure services. VIOM’s Project Management Process shall be explained from two parts, the structure of VIOM’s Project Organization and VIOM’s Project Processes.

4.2.2 Methodology

A detailed interview with Project Head of Karnataka Region who was identified as respondent for this study was conducted. Interview was initially structured in a manner to cover all attributes of project management approach by VIOM networks. The questions were designed to understand the actual project management process at VIOM with respect to project planning, execution, risk, communication, process & change management. This study was intended to understand the Project Management practices at VIOM. The meeting cum interview with project head lasted around 3 hours. This helped in understanding various project management attributes practiced by them.
4.2.3 Project Organization

Project Organization in VIOM is as shown in below chart, VIOM uses weak matrix structure of project Organization. Weak matrix structure is specifically adopted to manage telecom infrastructure to ensure its successful conclusion and also to meet Project Brief and customer compliances. This structure enables channels of communication to decision-making forums and is backed up by job definitions which specify the responsibilities, goals, limit of authority, relationships, skills, knowledge and experience required for all roles in the project organization.

Weak matrix organizations are characterized by the fact that power and control lie less with a project manager, and more with resource managers. A project manager with only limited authority is assigned to oversee the cross-functional aspects of the project. The Resource managers maintain control over their resources and project areas.
VIOM networks Project organization (PO) is weak matrix structure with clear definition of accountability, responsibility, job description & with authority restricted to key people only, their PO structure does not provide for customer linkage and PO is certified to ISO 9001, EMS standards for their operations. Reason for non-inclusion of customer is business teams own the customer and they perform a buffering role with the project organization.
4.2.4 Project Details

Viom networks provide various products and services include In-building solutions, BTS Hotel, Tower Operating Centre, O&M Services and Towers for operators. Apart from these services and products Viom networks pioneered in Project management in execution of telecom tower sites. Project management is the key strength of Viom and has been the key driver for successful implementation of existing projects. Viom project management starts from the mutually agreed offer acceptance stage and continues through the planning, material sourcing, execution, and handover phases. Viom networks provide a comprehensive site to its customers with all accessories to provide smooth plug & play operation, including:

- Site Acquisition.
- Site Build-up.
- Statutory Permission.
- Equipment's sharing.

Along with tower, Viom provides complete accessories, suitable for shared telecom infrastructure. These accessories include, shelter, DG, ACPDB, DC Power System, Battery Backup, Electrical System, Alarm System, Air Conditioning etc. Telecom Tower projects at Viom networks is being envisaged and implemented by following industry standards and guidelines like PMP (PMBOK), KPMG Guidelines, Mckensy recommendations.

4.2.5 Process

For effective & uninterrupted implementation of the project, Viom has adopted 2 layer approaches.
a) The project management team consists of corporate team from the Head Office & execution team in each circle. The responsibilities of corporate team include, but not limited to project monitoring & control, equipment sourcing, coordination with vendors.

b) The execution teams at each circle are the primarily responsible for site rollout starting from site acquisition, site development, civil construction, equipment erection & commissioning, final acceptance test and handover.

In a pre-agreed time frame each team handovers specified number of sites to next team for their part of execution. The cycle continues till the entire project rollout is over.

Chart 4.4: Process chart for Project execution at VIOM
4.2.6 Execution Model:

With the rich experience gained from the successful implementation of the pilot projects in Punjab & Karnataka, Viom has already developed in-house capabilities to rollout any project in India.

In order to cater to the requirement of Indian Telecom Industry & to enhance customer satisfaction, Viom is continuously improving its competency through partnership & outsourcing especially in Technology, Project Management & Equipment Sourcing etc. As an Infrastructure service Provider (holder of IP1 License) Viom will be responsible for delivering complete telecom sites - plug & play - as per agreed contract terms & conditions. The responsibility includes site acquisition as per pre-approved site coordinates, site development including civil work, equipment sourcing, erection & testing, final acceptance test and handing over the sites. Every activity is well defined with robust processes good control mechanisms to ensure the best of the quality in the least turnaround time. 3rd party quality audits are in place for various activities like Tower erection, civil works, electrical installations etc.

4.2.7 Key Element of Project Process at VIOM networks are:

Online Project Management Tool – Site-Share:

To devise automated ERP solutions for its telecom infrastructure network and to speed up its business processes related to site rollout and sharing, Viom Networks has entered into a contract with UK-based software innovator Tarantula. Site-share service will provide a suite of ERP applications including Site Finder, Site Rollout and Sharing Project Management, Supply Chain Management, Operations & Maintenance Management, Asset Management, Billing Management and MIS to Viom. Tarantula specializes in providing Telecom ERP solution for end-to-end management of mobile telecom infrastructure and site rollout, sharing, operations and
maintenance processes through site-share.com. Site-share is a new and innovative concept in India which is proven and trusted by all the cellular operators in the UK. With this arrangement, Viom foresees significant time and cost savings. Just-In-Time order and delivery will help the company prevent leakage of operational assets, thereby improving the company's cash flows. Viom will be able to clearly view the progress by adopting a recognized and best-practice-approach to the management of rollout and sharing projects. Also, the uniformity of the process will enable Viom to prevent work duplication, thereby improving productivity and ensuring transparency. The systematic and automated process will help manage the quality of delivery and ensure customer satisfaction through improved service-level management and strict adherence to regulations.

*Defect Detection, Prevention, Tracking:*

Defect Detection includes Reviews and Testing, which are common technique in project management. For Defect Prevention, Viom Networks suggests Learning from past projects, doing defect prevention regularly, and measuring the improvement. In Defect Tracking, it is ensured that all defects are closed.

*Quality Assurance & Quality Control:*

Quality Assurance focuses on process. It ensures that Project Management Plan is followed. It also defines the project process through the project plan. Besides, it does Technology and Business domain training, and does audits.

**4.2.8 Process Infrastructure**

Especially in telecom tower business tower site owner management is the biggest challenge faced by all tower companies. Process Infrastructure includes the
introduction of the supporting system for the better implementation of project management.

These Process Infrastructures are:

a) Estate Management Group: Main responsibility of this group is to handle all sorts of issues, complaints and other queries of tower site owners. For rolled out sites this group also involves in proactive interaction with site owners to understand and resolves their queries.

b) Vendor Help Desk; This desk operates 24X7 dedicated to listen and resolve all its vendor’s queries.

4.2.9 Project Communication

Seriously looking to implement planned way of communication is to have frequent interaction with all project participants. However Current Communications focuses on content, format, timings, sender & receiver. Communiqués also contains project progress as and when requires.

4.2.10 Project Risk Management

At Viom networks, a detailed risk checklist is framed for risk identification, monitoring and mitigation as a part of project planning. It covers risk identification, prioritization and mitigation options. Brainstorming amongst the project team and lesson learned from previous projects are used for identification and prioritization of risks.
4.2.10 Change Management

Change Management is an integral part of project plan wherein all client requirements i.e. project scope, time and cost are frozen and signed-off with the clients at initial stage. Since individual projects are of small duration simultaneously happening in geographically dispersed locations at same time, changes are frequent which needs to be tracked diligently. However number of Projects/Orders received may fluctuate from time to time and this also needs to be tracked.

4.2.11 Reasons for deficiency in deliverables

Deficiency in deliverables is most common in telecom infrastructure service business, the main reasons are:

- Site Owner issues.
- Public Health issues.
- Governmental Regulations, Delays in approval from statutory authorities.
- Shortage of manpower and inadequate skills

4.2.12 Analysis

Viom Networks Limited, formally known Quippo WTTIL, India’s leading independent telecom infrastructure company, has strategic plans to ramp up its total numbers of towers across India. In view of the growing acceptance of shared infrastructure concept among the telecom operators, Viom Networks plans to add around 20,000-25,000 towers in the next few years with the aim to target tenancy ratio over 2.5 times. Viom Networks, the country’s second largest telecom tower company, is expecting to break-even in the next fiscal (2012-13). The company, which is already making cash profits, has been unable to report profit after tax (PAT) due to
high depreciation. Viom is a joint venture between Tata Teleservices (53 per cent) and an investor group led by Kolkata-headquartered SREI group. The SREI group through its 100 per cent subsidiary, Quippo, has a 14.5 per cent stake in Viom. Project Management is the key success factor at VIOM Networks. The Project organization follows a decentralized, enabled and empowered circle organization as project activities happen in the field and decisions need to be taken on an online basis. Central team works more as a facilitator and coordinator to ensure all the project variables such as manpower, finance, approvals are available in time. The success of the company lies in maintaining a fine balance between process compliance and use of local knowledge and initiative coupled with empowerment at the field level. Use of project monitoring software TARANTULA is one of the key elements for success.

With civil society raising the issue of telecom radiation, it could be difficult in future to set up towers atop buildings in major cities. Project delivery during these situations could be very challenging. Organization needs to adapt to this business requirement and evolve strategies to mitigate the same.

4.2.13 Conclusion

The ability to execute project at multiple locations simultaneously can be attributed to good project management techniques developed at VOIM. It involves local government clearances for tower erection, co-ordination with multiple departments within the organization, which also includes project management at field level.

VIOM has developed the following processes/initiatives to overcome the issues.

1. Dedicated ONLINE PROJECT MANAGEMENT TOOL (TARANTUAL.NET) for better project management which has enabled
VIOM to have real time tracking mechanism on project progress and other parameters like time and cost.

2. Dedicated Quality team to address the issues in quality management involving Defect Detection, Prevention and tracking, quality assurance & controlling.

3. Dedicated process infrastructure like Estate management group to address issues pertaining to site/estate owners.

4. Vendor Help desk to address all issues related to vendors/subcontractors, has enabled VIOM to overcome these challenges and execute the project in time resulting in customer satisfaction, vendor relationship and enhancing company growth.

Team efforts, proper planning and good project management has made VIOM. The approaches by VIOM are worth emulation by companies in Telecom and Infrastructure industry.

4.3 GMR INFRASTRUCTURE LTD Bangalore

4.3.1 Introduction

Study of Project management practices at GMR Group is expected to provide insights of project management practice at a successful Infrastructure company. GMR Group is a Bangalore headquartered global infrastructure major with interests in the Airports, Energy, Highways and Urban infrastructure (including SEZ). The Group is also actively engaged in the areas of Education, Health, Hygiene and Sanitation, reaffirming its grass root presence as change agents of society in the field of Corporate Social Responsibility. A dedicated division, the GMR Varalakshmi Foundation, manned by committed professionals, oversees and manages this project...
across India. With its foray into the Airports sector, the Group has established itself as a front runner and pioneer in the core infrastructure areas of the country.

Going forward, the Group is actively seeking opportunities in core areas of the country’s infrastructure development including Transportation and Property Development. All these would be driven by a single minded path of translating the vision of the Group by building entrepreneurial organizations that make a difference to society through creation of value.

GMR Group’s business covers:

- Energy/Power plant projects.
- Highways Projects.
- Airport Projects.
- Urban Infrastructure Projects.
- Power Trading.
- Special Economic Zones (SEZ).

4.3.2 Methodology

A questionnaire containing around 50 questions was used to conduct interview with General Manager of Karnataka Region who was identified as respondent for this study, questionnaire was structured in a manner to cover all attributes of project management approach by GMR Group. The questionnaire is so designed to understand the actual project management process at GMR with respect to planning, execution, risk, communication, process related & change management.

This study was intended to understand the Project Management practices at GMR group, a three hour long meeting/interview with Project Head helped understand various project management attributes practiced by them, consolidated responses from Project Head is as follows.
4.3.3 Project Organisation

GMR is basically a Project oriented Organization. GMR group has two different organization structures first its Corporate Organization structure to support all business of GMR group and secondly Project specific Organization structure to deliver projects successfully. Both Corporate organization structure and project organization structure is hierarchical in nature. This structure enables GMR management to have complete control over projects and maintain clear channels of communication to enable faster decision-making. This is backed up by comprehensively documented job definitions which specify the responsibilities, goals, limits of authority, relationships, skills, knowledge and experience required for all roles in the project organization.
GMR group is a complete Project organization. The project organization structure (PO) is usually a hierarchical structure with clear delegation of accountability, responsibility, job description & with authority restricted to key people only. Their PO structure doesn't recognize customer/stake holder and PO follows ISO...
90001, PMBOK standards and guidelines and also adhere to required international standards and guidelines for their international operations. Reason for non-inclusion of customer/stakeholders is due to PO follows the inputs of marketing department in all respects and doesn’t interact with customer/stake holder directly and 90% of the times customer will be government authorities so they are directly handled by corporate office. Project Organization structure is reviewed often as project progresses for validity and adequacy, this review is primarily to check the alignment of PO to project objectives since infrastructure projects are very huge in size they starts with resources and exponentially increases as project progresses so in order to keep the huge projects unaffected by resource constraints PO structure is frequently reviewed.

4.3.4 Project Details

GMR group does the wide range of infrastructure projects in Energy sectors, Airports, Highways and Urban Infrastructure which usually demands huge investments and high management & technical expertise to finally materialize the plan. GMR execute these projects by getting itself employed into Public-Private Partnership (BOOT, BOT models) with various state governments and sometimes with central government for projects coming under it. Project management and process orientation in business operation is the key strength of GMR and has been the key driver for successful implementation of existing projects. GMR’s project management starts from the mutually agreed offer acceptance stage and continues through the investment, planning, material sourcing, execution, and handover phases. PPP project is a project based on a contract or concession agreement b/w GMR and government or statutory entity with the following essential elements:

• Fixed Concession period.
• Pre-determined customer charges/tariff.
• Pre-determined scope of work for the concessionaire.
• Pre-determined bidding parameters.
• All conditions, specifications, and project agreements frozen prior to inviting final bids.

• Land required for the projects available with the implementing agency.

Implementing agency can be a concerned department of the state/Local body/Autonomous body which takes care of cost of following items.

• Feasibility Study and preparation of Detailed Project Report (DPR).
• Land for Right Of Way and en-route facilities
• Clearance of the Right of Way.
• Environmental Clearances.

4.3.5 Process

For effective and uninterrupted implementation of the project, GMR follows the implementation steps drafted by PPP framework which consists of PPP policy making Body and PPP cell/nodal agency. The execution of projects starts after the award of concession and financial closure by GMR. In nature PPP projects are generally huge size and cost which demand huge initial investments and expert management to manage these investments, in order to execute these mammoth projects GMR strongly believes in having dedicated project organization headed by Vice President.

The profit for GMR from these PPP projects lies in increased concession period. In order to increase the concession period, GMR strives and work hard to minimize the execution period of projects. GMR is well known in the industry for its fast track project completion. GMR has achieved this by have completely
decentralized controlling structure and by being completely process oriented and relying on software tools for its day-to-day business operations and project implementation. GMR ensures the projects are timely and profitably implemented by having a strong project progress review mechanism, review of each projects happens at business chairman level at high frequency and by having separate knowledge management wing to collect, analyze project progress information and to suggest corrective actions well in advance to project team.

GMR has completely defined and documented process for each of its business operations there by GMR is ensuring that its business is not affected by attrition. GMR is one of the early adopter of software tool (SAP) for infrastructure project business, construction business, realty development business. With businesses spread across diverse fields like airports, energy, highways, and urban infrastructure (including SEZ), GMR Groups business units were using several standalone systems running disparate processes; resulting in lack of real-time information availability, vulnerability to inaccuracies, and lack of reliable and meaningful information structure. The group started looking for a common scalable platform, in order to provide disruptive growth in existing business verticals. With entry into new businesses and locations, there was a need for seamless flow of information across the group, and mitigation of operational risks. GMR went in for SAP ERP, and went ahead with SAP as its implementation partner. GMR further got implemented with other new generation modules like BIW, SRM, CRM and SEM.

To handle specific project related activities like estimation, tendering, billing, quantity surveying etc GMR has depending on dedicated software tool called RIB software which is again linked to SAP ERP to capture the required information for report generation and other things. Defect Detection includes Reviews and Testing.
which are common technique in project management. For Defect Prevention, GMR group relies on Learning from past projects, doing defect prevention regularly, and measuring the improvement. In Defect Tracking, it is ensured that all defects are closed and required quality is achieved and maintained.

GMR has effectively implemented responsibility assignment matrix which is and has been a key process driver since introduction called RASCI methodology. This methodology has been introduced to encourage teamwork by clarifying roles and responsibilities, to eliminate duplication of effort, to reduce misunderstanding, to improve communication making sure people are not left out, to determines ownership, to help clarify activities and tasks in a process, to reduces bad decisions by ensuring the correct people are involved, to clarify hand-offs and boundaries and to improve cross-functional view for all employees. RASCI matrix describes the participation by various roles in completing tasks or deliverables for a project or business process. It is especially useful in clarifying roles and responsibilities in cross-functional/departmental projects and processes.

Brief description on RASCI, R: Responsible – The person who performs the task. A: Accountable – The person who is held accountable that the action/task is completed. S: Support – The person(s) who’s support has been sought for performing action/task. C: Consulted – The person (S) who is consulted before performing the action/task. I: Informed – The Person(s) who is informed after performing the action/task.

4.3.6 Project Communication

GMR understands that the essence of success in infrastructure projects under PPP model lies in communication flow. GMR has adopted the planned way of communication flow among each and every stakeholders of project which is achieved
by SAP-ERP. GMR has separate wing called knowledge management wing with inline portal which involves in project communication and captures relevant information and maintain in its repository for continual improvement from past lessons. Currently all Communiqués contains project progress as and when they happen and are electronically circulated among stakeholders.

4.3.7 Project Risk Management

GMR conducts Risk Analysis Study before bidding to any projects. This covers risk identification, prioritization and mitigation options under various subheadings like Social, Political and Financial/Economical. Brainstorming and lesson learned from previous projects are used while identification and prioritization of risks. Contingency planning is done after competing budget planning to take care of unexplained conditions during project execution.

4.3.8 Change Management

Change Management is an integral part of project plan wherein all Implementing agency’s requirements i.e project scope, time cost are frozen and signed-off with the Implementing agency at initial stage itself. Change management is not encouraged in projects of this kind i.e huge project with high investments, implemented phase wise over long periods of time. However common change requirements are scope of project and it is being completely handled by VP of that particular project.
GMR has specialised in PPP using BOT or a variation of the same. Here the ownership of the project goes beyond delivery, it encompasses operations as well. Many a times the project is executed in phases and the revenue in one phase would be invested in the project implementation of the next phase. The art of Project documentation has been perfected by GMR as this is more of a necessity in their strategy to avoid penalties and revenue leakages.

In spite of all the good practices, projects still gets impacted by the environment in which the projects are executed (local politics, interventions and changes during execution). Management of the environment is more of an art than a science involving maintaining relationships with local stakeholders.

4.3.11 Conclusion

GMR group has successfully employed the public-private partnership model to build a portfolio of high quality infrastructure assets for the nation. The record time completion of Turkey international airport brought GMR into league of international infrastructure players. This case study gave an interesting insight of project management practices, system centric operation methodology and belief on team effort, of GMR group which are the whole-and-sole reason for the success of GMR in infrastructure industry. GMR’s project management approach with dedicated project organization signifies corporate maturity to handle diverse business and their inherent challenges. By being system centric GMR has achieved seamless flow of information across all verticals, standardized policies and procedure and embedded controls with companywide risk management.
4.3.12 About GMR Industries:

GMR Industries was set up in 1978 and was the brainchild of its present Chairman Shri G.M. Rao. GMR Industries is one of the leading private sector companies and also among the fastest growing in the Indian economy. The main area of the interest for the company is the agro based and infrastructure based commercial activities. The company is managed by a highly professional set of work force and its activities are diverse. The company focuses on the infrastructure sector consisting of the airports, roads, and energy. The company also indulges in the manufacturing, and other businesses. Community-based programs, sanitation, hygiene, health, and education are some of the social services given by the GMR Industries. The division GMR Varalakshmi Foundation oversees all its projects in India.

GMR Group is one of the fastest growing infrastructure enterprises in the country with interests in Airports, Energy, Highways and Urban Infrastructure sectors. Employing the Public Private Partnership model, the Group has successfully implemented several iconic infrastructure projects in India. The Group also has a global presence with infrastructure operating assets and projects in several countries including Turkey, South Africa, Indonesia, Singapore and the Maldives. GMR Infrastructure Limited is the infrastructure holding company formed to fund the capital requirements of various infrastructure projects across the sectors. It undertakes the development of the infrastructure projects through its various subsidiaries. The Group’s commitment to inclusive growth is achieved through its Corporate Social Responsibility arm – the GMR Varalakshmi Foundation (GMRVF). GMRVF works with the under-privileged sections of the community in all the locations where the Group has business interests. GMR believes in providing high quality work to his
customers, and strives to obtain the position of a leader through practical work and theoretical knowledge obtained through investing in proper learning and research.

GMR group is amongst the nation's fastest growing organizations. It was founded in 1978, and its headquarter lies in Bangalore, India. The group holds superior position in diverse business areas such as Airports, Highways, Energy and Urban Infrastructure including SEZs. It believes in providing sustainable development through public-private partnerships. GMR Varalakshmi Foundation (GMRVF), is its social responsibility arm, that works with the under privileged sections of society, in areas where the group is present. The group has established three Greenfield power plants in Tamil Nadu, Karnataka and Andhra Pradesh. Thirteen power projects in Hydel and Thermal power have been developed, of which three are operational with a capacity of 808 MW and ten are under various stages of implementation. The Group has already completed six road projects, under the highway banner.

Realizing the importance of airports, GMR has also successfully invested in this field of business, and has built the following airports around the world, New Greenfield International Airport at Hyderabad, New Sabiha Gokcen International (SGA) airport terminal at Istanbul, Turkey, MALE International Airport (MIA), Maldives, It won the bid to modernize India's third busiest airport, the Delhi International Airport by constructing a world-class integrated terminal 3 (T3).

The founder envisions that-GMR Group will be an Institution in Perpetuity that will build Entrepreneurial Organizations making a difference to society through Creation of Value. GMR's single minded engagement to the core infrastructure sector has resulted in some failures for the group, It had to make an exit from some highly profitable businesses such as banking, insurance, breweries and jute, due to lack of focus and attention towards them. The GMR Group is among the quickest
infrastructure based organizations in terms of growth. Its major domains are airports, urban, energy, and highways infrastructure and thus can be counted as being among the leading infrastructure companies in India. The group has been able to successfully execute many well-known infrastructural projects by taking part in them through the Public Private Partnership model. GMR has also carved a global presence to complement its stature in India with several infrastructure projects in the following countries:

- Turkey
- Singapore
- South Africa
- Maldives
- Indonesia

4.4 RAILTEL CORPORATION, Bangalore.

4.4.1 Introduction

Study of Project management practices at RailTel Corporation of India Limited is expected to reveal the insights of project management practices at Public sector organizations. RailTel Corporation of India Limited (RCIL), formed in September 2000, is a Public Sector Unit (PSU) under the Ministry of Railways, Government of India. RailTel is a leading Telecom Service Provider all over India. RailTel enterprise Portfolio includes Transmission Network, Broadband Services, data and Internet Services.

RailTel has successfully created the State-of-the-Art Telecom Network using SDH/DWDM-based Transmission systems and MPLS-IP network. RailTel with strong nationwide presence brings cutting edge technology and offers innovative services to customers. As one of the primary objectives, RailTel also provides
Railways Communication requirement for administration, passenger information system, ticketing, train operations and control for efficient Railway operations.

RailTel Corporation of India Ltd is a telecom company and a managed service provider that offers IP based infrastructural solutions to its customers. RailTel is one of the largest MPLS VPN player and has been managing multi location wide area networks for various industry requirement. RailTel has substantial experience in managing large networks across most vertical segment including Banking, Financial, Services, Insurance, Telecom, Manufacturing, Logistics, Media, Retail, IT, Consulting, Education, Health Care and Government. RailTel has innovatively deployed a country wide network using wireless on the last mile and has successfully bridge the large digital divide that existed in rural connectivity in India. RailTel has further strengthened its leadership position by offering end-to-end fibre connectivity in all large metros of India.

RailTel business involves:

- Basic Infrastructure Services – Optical Fibre cabling to railway network.
- Multiprotocol Label Switching (IP – VPN).
- Access Networks – BWA networks by deploying WiMax/Wi-Fi Platform.
- Providing Towers Space – Enhancing Connectivity.

RailTel is engaged in achieving the following objectives:

1. To facilitate Railways in 'expeditious' modernizing of their operation and safety system and network providing y state of art communication infrastructure.
2. To plan, build, develop, operate and maintain a nationwide broadband telecom and multimedia network to supplement national telecom infrastructure to spur growth of telecom, broadband and IT enabled value added services in all parts of country specially rural, remote and backward areas.

3. To generate revenue through commercial exploitation of its telecom network.

4.4.2 Methodology

A detailed questionnaire containing around 50 questions was used to conduct interview with Executive Engineer of Karnataka Region who was identified as respondent for this study, questionnaire was structured in a manner to cover all attributes of project management approach by RailTel. The questionnaire is so designed to understand the actual project management process at RailTel with respect to planning, execution, risk, communication, process related & change management.

This study was intended to understand the Project Management practices at RailTel, a three hour long meeting/interview with Executive Engineer helped us to understand various project management attributes practiced by them, consolidated responses from Executive Engineer is as follows.

4.4.3 Project Organisation

Project Organization in RailTel is as shown in below chart at Chart 4.6. RailTel uses typical Indian government divisional organization structure for execution projects. Divisional structure divides function and responsibility based on specialty or geography such as market territory, this kind of structure is specifically adopted to address the division and assignment of tasks and functions across various departments.
within the organization and also to manage very large business happening at wide geographically dispersed locations.

Chart 4.6: Project Organization at RAILTEL.

Managing Director


Director (Business Development) → C.G.M (Business Development) → G.M (Business Development) → Ex.Engr (Business Development) → Engineer (Business Development)

Director (Finance) → C.G.M (Finance) → G.M (Finance) → Ex.Engr (Finance) → Engineer (Finance)

Director (Person Dept) → G.M (Person Dept) → Ex.Engr (Person Dept) → Engineer (Person Dept)

Managing Director

F.R - Functional Reporting ➔ O.R - Official Reporting
Executive Engineer of RailTel felt that this structure enables to develop managerial skills and executive skills, because people working in divisional structure are exposed to all other functions and is backed up by job definitions which specify the responsibilities, goals, limits of authority, relationships, skills, knowledge and experience required for all roles in the project organization.

RailTel organization is a Divisional structure with clear definition of accountability, responsibility, clear job description & with authority restricted to key people only. Their project organization (PO) structure doesn’t recognize customer/stake holder and PO follows ISO 9001, EMS standards for their operations. The reason for non-inclusion of customer/stakeholders is due to fact that Project Organization takes the inputs of marketing department in all respects and do not interact with customer/stake holder as a strategy.

**4.4.4 Project**

RailTel provide various kind of project implementation services for Indian railways which includes Basic infrastructure, MPLS (virtual private network), Access Networks (BWA through WiMax, WI-Fi), and providing tower space for enhancing connectivity. Majority of the project implementation activity by RailTel happens through Public-Private Partnership. Project Implementation by RailTel is executed through PPP model, they vary from short-term simple management contracts (with or without investment requirement) to long-term and very complex BOOT form of divestiture.

These models vary mainly by:

- Ownership of Capital Assets.
- Responsibility for Investment.
- Assumptions of Risk, and
• Duration of contracts.

Ministry of Railways approval for the proposed project on the public-private partnership model is sought where MoR has entrusted RailTel to execute the project. RailTel is uniquely positioned to provide certain economical infrastructural advantages to the prospective private partner enabling the later to minimize the operating costs, thus economically offer infrastructure service and obtain higher market share in the growing service market.

In this form of PPP, MoR defines and grants specific rights to an entity (usually a private company) to build and operate a facility for a fixed period of time. MoR may retain the ultimate ownership of the facility and/or right to supply the services. Concession is awarded to a private entity under BOOT contractual arrangement. In BOOT type the private entity Builds, Owns, Operates a facility and sells the service to beneficiary for the duration of concession period and finally transfers the facility to the principal entity which is RAILTEL.

4.4.5 Process

For effective & uninterrupted implementation of the projects, RailTel follows the procurement process guidelines of Ministry of Railways in selecting the private partner for the supply of materials and/or implementation of projects. Project Management / Implementation of projects at RailTel happens as shown in Chart 4.7

Chart 4.7: Process for Project Implementation at RAILTEL
For the smooth implementation of projects RailTel takes the responsibility of providing Right of Way (ROW) for private entity to get into project site. Also RailTel supports private partners by providing infrastructure, space for materials etc wherever possible on cost basis.

Projects happening at various locations come under the respective region heads, the overall responsibility of effective & efficient project implementation lies with region head. Constant monitoring and controlling of project activities are handled by the respective regional team by whom frequent reporting on project status to top management is done.

Project progress review meetings happen at all levels frequently, where the progress review and all stake holders’ issues are heard and resolved. These meetings are held in regional offices and corporate offices at every level on every project wise. Each and every project is subjected to constant quality audits with the intent to gain & record information on project during project implementation and at project completion as part of the continual improvement process.

4.4.6 Project Communication

RailTel has adopted a planned way of communication with all its stakeholder, these communications majorly happens on project progress reporting, stakeholder’s issues and on other project related information. These project communiqués are also constantly reviewed by regional authority for shortfalls, correction and updates to take care of change requirements by all stakeholders.
4.4.7 Project Risk Management

All kinds of risks related to project is being carefully taken care as the contract awarding process to private entity is initially being subjected to stringent procedure evaluations and selections. Still the officials believe in lesson learned from the previous projects for overall continual improvement process. Since project is of big in size and of long duration and also enough care has already been taken at initial stage itself, they have not adopted any rigorous mathematical analysis of the impacts on the identified risks.

4.4.8 Change Management

Change Management is not subject of discussion in PPP business as all parameters related to a particular project are frozen at invitation of bid stage itself. However execution issues due to unforeseen or due to force majeure are being considered and supported with a process to help manage the situation.

4.4.9 Reasons for non-achievements of deliverables.

Main reasons for non-achievement of deliverables which are usually common in PPP model business are:

- Delays in obtaining approvals from MOR authorities.
- Delays in permission issue from local authorities (ROW issues).
- Fund allocation/ distribution delays.

4.4.10 Analysis

Railtel is a large corporation having implemented various project successfully and ensuring smooth railway operations across the entire country. Since Railtel is
a public sector company under the Ministry of Railways GOI, the organization structure follows clearly defined line structure with clear reporting lines, responsibility and authorities well defined. The process, procedures, accountability follow established statues without any ambiguity whatsoever. This environment ensures predictability and dependable growth outcomes.

RailTel PPP model can be adopted by other companies in both Govt and public sectors particularly in technology and infrastructure creation. The organization structure together with the detailed devolution of decision making process, mechanisms for project review and change management are worth mentioning.

4.4.11 Conclusion

Within the Indian bureaucratic public sector setup in order to ensure competitiveness compared to private players in terms of productivity, technological capability, Cost effective operations, RailTel has taken initiative towards streamlining business process and practices with the focus on the following,

- Investing in the state of the art technology with the objective of improving the quality, enhancing the productivity through streamlining the process and achieving Cost reduction.
- Increased level of outsourcing particularly non-core activities/support functions, with a view to increase focus on enhancing productivity in core operations together with reduction in overhead costs of the enterprise.
- Increased focus on entering Public-Private partnership (PPP) primarily with the objective of attracting funds in sectors like infrastructure, requiring significant investments, along with the requisite technical expertise of private player.
RailTel has successfully created the State-of-the-Art Telecom Network using SDH/DWDM-based Transmission systems and MPLS-IP network. RailTel with strong nationwide presence brings cutting edge technology and offers innovative services to customers. As one of the primary objectives, RailTel also provides Railways Communication requirement for administration, passenger information system, ticketing, train operations and control for efficient Railway operations.

4.4.12 About Railtel

Railtel Corporation of India limited (Railtel) is a government of India undertaking under the ministry of railways, The Corporation was formed in September 2000 with the objectives to create nationwide broadband telecom & multimedia network in all parts of the country, to modernize train control operation and safety system and to significantly contribute to realization of goals and objectives of national telecom policy 1999. Indian railways have seamless right of way along 62,800 km of railway track passing through 7000 stations across the country, the stations in major cities are located in central business districts. Indian railways already had established a strong telecom Network to meet its communication requirements, with the formation of Corporation, Indian railways Right of way and OFC assets have been transferred to Railtel. Presently about 33000 km of OFC has already been laid and over 14,000 km has been commissioned, works on another 7000 km are in various stage of completion. As per the business plan of the railtel, railtel is presently venturing broadly into four business areas namely sale of bandwidth, ISP business, and international long distance/ national long distance business segments,

Railtel has built state of the art network using latest SDH technology for long haul communication. The complete network is managed by centralized network
management system located at New Delhi with back up at Mumbai and Secunderabad, Railtel has got the unique advantage to meet the quality bandwidth and service. Requirements from single network, the state of art network enables point and click provisioning of the bandwidth from anywhere to anywhere in the country. The Network has been designed in such a way that full redundancy is available for Bandwidth between any two points. The network supports SNCP and MS-spring protection schemes. It enables transfer of high bandwidth IP, ATM, frame relay, Gigabit Ethernet and other kind of data services, it enables provisioning of traffic of any granularity with the extensive reach from any part of the country to any other Part. With the avowed objective to transform the long distance communications experience in the country, railtel is focused on bringing world-class products and services to the market through its backbone, edge and access network creating about 4000 pops. Railtel brings the vast experience of Indian railways in constructing and maintaining Long haul networks. The company also brings financial backing of PSU’s of Indian Railways and consortium of banks led by SBI. Railtel is terminating 1 pair of fibre at every railway station enroute which are spaced at 8-10 Kms. At all the stations enroute access layer of stm-1 is deployed. The edge layer network of stm-4 spaced that 40-60 Kms is deployed in order to aggregate traffic from access layer and connect.

RailTel have been conferred with several awards by various agencies. RailTel got the highest honour for “MoU Excellence Award” conferred by SCOPE/DPE for its performance in 2008-09 in Telecom sector. RailTel holds the following licenses using which it is offering various services across India:

- National Long Distance
- Class "A" ISP (with Internet Telephony) IP-II IP-I
Backbone

RailTel has rolled out a transparent, robust, reliable, high speed OFC Backbone Network covering about 32000 km now and ultimately covering 45,000 km across the country by 2010. Over 3200 cities and towns have been connected on the network. The backbone networks have been configured in multiple 'self-healing' rings consisting of more than large no. of rings and linear sections, which provide for redundancy by automatically redirecting traffic away from failed/ de-graded route for fault-free service. The long haul network of RailTel is on STM-16 which has already been upgraded to 100 G DWDM which can be further augmented up to 400 Gpbs. The MPLS network has been built using Junos M-20 and M-10 high end routers of Juniper. The network supports services like layer 3 and layer 2 VPN services, broadband internet access, multicast services etc. The MPLS network has POPs at 40 cities across the country and is in the process of being extended to other important cities/towns also. The IP services at more than 3000 POPs in the country will be extended through Ethernet interface available in the SDH networks at these locations which will intern be connected to MPLS-IP backbone network at the 40 cities. The MPLS backbone supports multiple STM-1 capacity. The network is also being upgraded to Giga capacity overlaid on new DWDM network, so as to provide gigabit VPN ports for IP based voice, video and data applications. RailTel has also built a NGN network which is being used to transit Inter circle Voice call of various mobile and basic operators. The network has been rolled out in 18 cities and will be increased to more cities in the future. These cities are Bangalore, Chennai, Mysore, Coimbatore, Secunderabad, Madurai, Mumbai, Pune, Nagpur, Ahmedabad, Chandigarh, Jaipur, Jalandhar, Lucknow, New Delhi, Bhubaneswar, Kolkata and Patna On the strength of this network RailTel is offering not only Class 4 services but can further enhance its
service portfolio by offering various value added services (VAS) like enterprise VoIP, etc. RailTel is providing nationwide Internet services on its state of the art MPLS backbone. RailTel sources STM-1 level Internet bandwidth at three different locations, i.e., New Delhi, Mumbai & Chennai using three different service providers. The capacity will be augmented to multiple STM-1s/STM4s at each location. RailTel is set to unwire rural areas with High Speed Broadband connectivity using the future proof WiMax technology. On the strength of this network, RailTel plans to offer Broadband Internet, VoIP and other Value Added Services including E-Governance applications at your finger tip instantly. RailTel has been allotted spectrum in 2.7 GHz band by DoT in this regard. For this project RailTel has entered into a MoU with private organizations under PPP (Public Private Partnership) initiative. In addition RailTel has started making various Railway stations Wi-Fi/ WiMAX enabled thereby enabling passengers to connect to Internet using their laptops, handhelds and other Wi-Fi devices in railway stations.

With the formation of extensive and robust Pan India Fiber network RailTel is in a position to offer various bandwidth intensive application to its customers. One such initiative is Rail WIRE, a joint venture with MSOs to provide Voice, Video and Multimedia access on a single wire at home/office. Customers in urban and even rural areas can now experience the power of Triple play services. Digital cable channels can be broadcast to the end users on the strength of this network along with broadband Internet, VoIP and other services simultaneously.

RailTel plans to open Cyber Cafes on various railway stations across the country. In the first phase 83 cities have been identified for cafes. Out of which 24 cafes is already operational. The remaining cafes are already under implementation and are expected to be operational in a year time. The Cyber Cafes are fully air-conditioned.
The services offered at cafes: Internet browsing, Internet telephony, scanning of documents, Video conferencing, Audio video chatting, printing of documents and CD writing etc. Bandwidth services (From 64 Kbit/s to 10Gbit/s) RailTel has a vast OFC network capable of providing bandwidth services at a large number of towns and cities across the country. RailTel is uniquely positioned to provide these services with following features.

- Bandwidth at various granularities
- Secure and protected OFC path
- 24 Strand single mode fibre armoured OFC
- Network engineered for SDH, and DWDM
- Edge & access layer by STM1/4/16
- Network enabled for IP, ATM, frame relay, Gigabit Ethernet and seamless connectivity
- Extensive reach although STM-1/16 dropping at every small/remote location
- Centralized and regional NMSs
- Internet services

RailTel is also offering internet services as an ISP (Internet Service Provider). It has an ISP category-A licence to provide these services. This service is available all along the OFC network of RailTel. It is offering Internet Services all along its network. Corporate as well as individual or groups can avail of it. The network supports voice over internet protocol (VOIP) or internet telephony. An unrivalled network infrastructure with multiple Internet backbone providers to keep your data flowing and your access to the Internet protected, 24/7. Rock-solid, always reliable based on state-of-the-art systems. The Internet connectivity and speed provided by RailTel
supports all kinds of usage including VOIP and Video Chat. The Internet connectivity and speed provided by RailTel supports all kinds of usage including VOIP and Video Chat. RailTel plans to open about 250 Cyber Cafes on Railway Stations across the country. In First phase 83 cities have been identified for cafes. Out of which 7 cafes is already operational (New Delhi, Hyderabad, Bangalore, Gorakhpur, Asansol, Jhansi and Pune). The remaining cafes are already under implementation and are expected to be operational in a year time. The Cyber Cafes are fully Air-conditioned. The services offered at Cafes: - Internet browsing, Internet telephony, Scanning of documents, Video conferencing, Audio video chatting, printing of documents and CD writing etc.

Towers space is available for installing antennae at more than 1000 locations. There are various such locations which are being used by over a dozen satisfied customers including basic service operators, cell operators, Entertainment and Media organizations. Towers locations are spread throughout the country. Space available for installing electronic equipment, Electricity and Co-Location facilities available in secure railway premises in nationwide Railway infrastructure, RailTel is also tying up with tower Infrastructure companies to provide managed services and establishing new Towers.

RailTel is capable of providing virtual private networks for Corporate companies. The RailTel infrastructure for VPN is based on MPLS (Multi-protocol Label Switching) technology ensuring top class IP VPN services. MPLS system allows full control over parameters that are critical to offering secure and efficient VPN service. Thus the industrial houses can have very secure fiber connectivity and RailTel can meet all their voice and data VPN requirements. RailTel has launched NLD business by signing IUC (Interconnect) Agreement with major operators across
India. The NLD infrastructure has been built based on Next Generation Network (NGN) Technology. This will enable operators to offer cheaper STD (National Long Distance) services to subscribers using RailTel's NLD Network. Network has been rolled out in 18 cities and will be increased to more cities in the future. The proposed cities are Bangalore, Chennai, Mysore, Coimbatore, Secunderabad, Madurai, Mumbai, Pune, Nagpur, Ahmedabad, Chandigarh, Jaipur, Jalandhar, Lucknow, New Delhi, Bhubaneswar, Kolkata and Patna. On the strength of this network, RailTel will be able to offer not only Class 4 services but can further enhance its service portfolio by offering various value-added services (VAS) like enterprise VoIP, etc.

4.5 Indian Space Research Organization (ISRO) Bangalore.

4.5.1. Introduction

Study of Project management practices at ISRO is expected to reveal the insights of project management practices in Government sector. With the setting up of Indian National Committee for Space Research (INCOSPAR) in 1962, the space activities in the country were initiated. In the same year, the work on Thumba Equatorial Rocket Launching Station (TERLS) near Thiruvananthapuram was also started. Indian Space Research Organisation (ISRO) was established in August 1969. The Government of India constituted the Space Commission and established the Department of Space (DOS) in June 1972 and brought ISRO under DOS in September 1972.

The Space Commission formulates the policies and oversees the implementation of the Indian space programme to promote the development and application of space science and technology for the socio-economic benefit of the country. DOS implements these programmes through, mainly, Indian Space Research
Organisation (ISRO), Physical Research Laboratory (PRL), National Atmospheric Research Laboratory (NARL), North Eastern-Space Applications Centre (NE-SAC) and Semi-Conductor Laboratory (SCL). The Antrix Corporation, established in 1992 as a government owned company, markets the space products and services. The establishment of space systems and their applications are coordinated by the national level committees, namely, INSAT Coordination Committee (ICC), Planning Committee on National Natural Resources Management System (PC-NNRMS) and Advisory Committee of on Space Sciences (ADCOS). The Secretariat of DOS and ISRO Headquarters are located at Antariksh Bhavan in Bangalore. Programme offices at ISRO Headquarters coordinate the programmes like satellite communication, earth observation, launch vehicle, space science, disaster management support, sponsored research scheme, contracts management, international cooperation, safety, reliability, publications and public relations, budget & economic analysis, civil engineering and human resources development.

4.5.2 Methodology

A questionnaire containing around 50 questions was used to conduct interview with Senior scientists at ISRO, Bangalore, Karnataka Region who were identified as respondent for this study, interview was structured in a manner to cover all attributes of project management approach by ISRO Space Vehicle division. The interview was designed to understand the actual project management process at ISRO with respect to planning, execution, risk, communication, process & change management.

This study was intended to understand the Project Management practices at Space Vehicle Division of ISRO, a 3 hour long meeting/interview with senior
Scientists helped us to understand various project management attributes practiced by them, consolidated responses from Junior Scientist is as follows,

ISRO is fundamentally a programme focused organization. ISRO has been working on various space programmes of Indian government and have successfully completed various programmes and are already in utilization. ISRO develops the programme and achieves its objectives in coordination with various divisions like INCOSPAR, TERLS; DOS, NARL, NE-SAC, SCL etc deliverable/projects of these divisions is a crucial input to complete the programme. The major areas of focus of the Indian space program include:

- Satellite communications for telephony, television broadcast, radio broadcast, mobile communications, distance education, satellite-aided search & rescue, meteorology etc.,
- Remote sensing for resources survey & management, environmental monitoring and meteorological services, and
- Development and operation of indigenous satellites launch vehicles, and ground systems for providing these services.

ISRO has successfully launched, operated and utilized several generations of its two indigenously developed satellite systems:

- INSAT (Indian National Satellite) multipurpose satellite system for telecommunications, television and radio broadcasting, meteorology, and disaster warning; and
- IRS (Indian Remote Sensing) satellite system for earth observation applications, mainly Resource monitoring and management.

ISRO has demonstrated world-class capabilities in successfully and repeatedly launching multiple classes of Expendable Launch Vehicles (ELV). The PSLV and
GSLV are the latest ELV workhorses. The Polar Satellite Launch Vehicle (PSLV) is used for launching IRS satellites, and the Geosynchronous Satellite Launch Vehicle (GSLV), is used for launching the INSAT class of satellites.

This case study concentrates on the study of project management practices at space vehicle division. Development of Space Vehicle is itself a programme as it consists of integration of more number of sophisticated parts and components like rocket engine, propulsion system, Avionics systems etc.

4.5.3 Project Organisation

Space Vehicle division adopts matrix management structure, as shown in Chart 4.8.

Chart 4.8: Typical Project Organization at a ISRO Division
People inside the project organization structure simultaneously work and are responsible for multiple programmes. A core team for specific project headed by the Project Director is formed within the project organization structure on which overall responsibility lies. System projects refer to those projects which are required to arrive at the envisaged programme. These system project development works happen at distributed work environment. Implementation of project plan and procedures, Communication of project objectives, project monitoring and controlling, overall programme management and organizing the progress reviews at micro and macro levels are the responsibilities of core project team.

4.5.4 Project Process

Numerous projects like building launch complex, propulsion system development, testing project, Avionics System development, Motor cases development etc happens simultaneously at various locations to arrive at space vehicle programme. PROGRAMME CONTROL CYCLE Process is used in the programme development.

Programme development takes place in 4 stages namely.

- Establishing Targets: In this phase Overall programme plan, System development plans and schedule and milestone plans are generated. For any given programme this stage is a onetime activity. Except this stage other stages like Monitoring performance, Programme Analysis, management Reporting happens as an iterative process happen throughout the programme.

- Monitoring Performance: Project progress is continuously done at specific times and at all levels within the project organization.
• Programme Analysis: This phase is primarily meant to validate the actual quality of performance against the expected quality of performance as per plan.

• Management Reporting: Management reports primarily containing data on all activities and actions related to programme development are generated. Flow of information is usually from bottom to top in hierarchy. Reporting happens also on identified solution options, implemented decisions & follow up actions from previous meetings. Block diagram in Chart 4.9 below clearly depicts Project management approach by ISRO,

**Chart 4.8: Project Management approach adopted by ISRO**

[Diagram showing Project Management, Schedule Management, Quality Management, and Risk Management]

Project Management in space programme at ISRO is a tightly coupled approach of 4 key components of Project Management i.e. Schedule Management, Quality Management, Risk Management and Technology Development Management. These projects which form an integral part of ISRO programme have characteristics of very large projects.

Key Element of ISRO project process is their Techno-Managerial Review Mechanism. These review mechanism is a high intense & continuous activity
conducted at various level within the ISRO organization at high frequency rate. This review is basically a milestone v/s workload based review which is conducted on a predefined order along the project time line at regular intervals as shown in the Chart 4.9 below.

**Chart 4.9: Project Technical review process followed at ISRO**

**Technical Review Milestones followed**

- **System Concept Development**: In this initial kick-off review, Management reviews progress on required system configuration, subsystem specifications, manufacturing and test facility, project schedule and project resource projections.

- **Preliminary Design Review**: This review is basically to check technical adequacy of design approach and firm up for system and sub-system specifications. Technical management team defines the physical &
functional interfaces definition and provides clearance for detailed design document.

- **Critical Design Review**: This stage of review is to provide final approval for designs, specifications, baseline production, Interface definitions and for finalising detailed test plans.

- **Test Readiness Review**: This review is to ensure compliance of activities to the design norms and programme plan before subjecting system for final testing.

- **System Readiness Review**: Review of the detailed & final investigation of project deliverable happens at this stage. It is actually delivered for assembling with principal project (programme objective), detailed interface performance checks, certifying system performance meeting requirements, Finalizing the system configuration and approval for system commissioning all these things happens at this stage of techno-managerial review mechanism.

### 4.5.5 Project Communication

ISRO clearly recognize the importance of timely flow of communication among programme participants is key for success in programme management. In order to achieve this ISRO has clearly defined and documented process flow for project communication, chart 4.11 below is quite self-explanatory in nature which depicts the flow of communication and responsible person at every stage of communication flow.
4.5.6 Project Risk Management

ISRO once again has defined a very clear process to manage project Risk Management and meticulously drafted Project Risk management process for every project within the program. Risk in ISRO projects is only about technical risks of projects wherein management anticipates and proactively handle the technical risks by prioritizing these risks. Process for ISRO’s technical risk management is as follows.
4.5.7 Change Management

Change Management is an integral part of project plan, at ISRO the evolution and changes in the design are continuously monitored and the impact is also assessed. Traceability of changes, decisions and inputs are utilized to assess the impacts of a new change. Design changes and requirements are closely monitored during development and changes are meticulously catalogued. Dissemination of the information across the system teams is done expeditiously using management information tools.

4.5.8 Reasons for deficiency in deliverables.

Main reason for deficiencies in deliverables which are uncommon in space programme projects is technical failures only which is generally beyond the control of the team. Other dependencies like funds and skill sets are managed adequately and could never be a reason for non-achievement at ISRO programmes.

4.5.9 ISRO success and failures analysis

Success

On April-19, 1975, from a remote location in Russia (then USSR) a space rocket called Kosmos-3M lifted off successfully with an on board satellite. Thousands of miles away, in India, the rocket launching event was a moment of anxiety, relief and pride. The on board satellite in that rocket was “Aryabhatta”, India’s first indigenously developed satellite. That was the beginning, the beginning of a long, intense, occasionally bumpy but successful journey by the Indian Space Research Organization (ISRO). Today, ISRO stands as one of the world’s finest space research organization, completing its 100th mission with the successful launching of 2 foreign
satellites, using our own satellite launching vehicle systems. From a country who depended on other nation to launch our satellites, India and its space programmes has reached a point where we can launch our own satellites from our own launch points, to sending unmanned mission to moon and even planning for a Mars mission in near future. The ISRO was once a single room office at Thumba-Trivandrum, scientists sometimes working in cow sheds! Today ISRO has grown up so big and so quick, that it has its centres all across the country. ISRO today has research facilities at more than 20 places in the country with multiple research wings at many of these centres. ISRO has collaborations with almost all other global space organizations, including the NASA and ESA. After Aryabhatta, the ISRO has deployed more than 60 Indian satellites, the RISAT-1 being the latest one. These 60+ satellites were launched at different launch sites, many in India and from the US, Russia, Europe so on. Other than launching satellites for their own mission objectives, ISRO has launched 29 foreign satellites, the SPOT-6 of France and PROITERES of Japan being the last 2 satellites, sent during the 100th mission on-board the PSLV-C21.

Thus, India and ISRO has proved to the world that, they can build and keep up all kinds of satellites, let it be experimental, earth observatory and even Geo stationary satellites. Even Indian universities has made their own satellites and put them into orbit.

Failures

April 15, 2010: GSLV-D3 developmental flight carrying GSAT4 on-board failed and Plunged into sea

July 10, 2006: Second operational flight of GSLV (GSLV-F02) with INSAT-4C onboard. Satellite could not be placed in orbit. Rocket fell into sea
September 20, 1993: First developmental launch of PSLV with IRS-1E on board. Satellite could not be placed in orbit.

July 13, 1988: Second developmental launch of ASLV with SROSS-2 onboard. Satellite could not be placed in orbit

March 24, 1987: First developmental launch of ASLV with SROSS-1 satellite on board. Satellite could not be placed in orbit

August 10, 1979: First experimental launch of SLV-3 with Rohini Technology Payload onboard. Satellite could not be placed in the orbit

**Analysis**

From the success and failure story of ISRO it is clear that the organization emphasizes a missionary mode of working, national emotions are generated, recognition provided to scientists are of the highest order. This provides a high sense of motivation to all the scientists involved in the project. Multi stage review mechanisms are used to track the project from concept stage to completion stage. Failures are primarily technical in nature that which could be beyond the realm of the understanding of the scientists. This would anyway spur them into finding solutions to the problems that present themselves during the various stages of the project.

**4.5.10 Conclusion**

Success for ISRO in its space programme has been its programme control cycle approach and over management approach which have been very efficient. ISRO is now able to implement programmes with shoe string budget through effective schedule and cost controls and its focus is always has been on achievement of collective results, time tested review mechanism have helped ISRO to achieve
technical excellence. Some key factors for the effective management of ISRO programmes are;

- Engage teams into productive and constructive discussions, to address issues plaguing the program. Accept and committing to the decisions & plan of action arrived by the expert team. Each identified team member is accountable for delivery as per the plans.
- Creative leadership rewards and recognitions to the deserving team member that make significant contributions.

4.6 Conclusions on the Case studies.

The case study conducted at the five companies provided a wealth of knowledge emanating from the experience and learning’s over the past 3 decades. This information has been used to provide recommendations in the next chapters.

Summary of the best practices adopted by companies are as below.

1. Indian Space Research Organization – representing the Government sector
   Program control cycle approach and over management (multi-level and multiple checks) are the Key success factors to avoid risk of failure.

2. RAILTEL Corporation – representing Public sector
   Adoption of Public–Private Partnership (PPP) model with a twin benefit: to attract funds and technical expertise.

3. VIOM Networks – representing Telecom Sector
   Deployment of ONLINE PM Tool (TARANTULA), Blockage Buster team (Vendor help desk and Estate management) to overcome road blocks in project execution.
4. INFOSYS – representing IT sector

Adoption of acclaimed value systems like mutual trust, open communication, teamwork, leading by example, honesty and integrity to ensure superlative performance.

5. GMR Infrastructure representing Infrastructure sector

BOT model to build portfolio of high quality infra assets, dedicated project organization for achieving maturity in project practices and system centric IT network for information flow.