PROJECT MANAGEMENT

COST CONTROL

SCHEDULE MANAGEMENT

NITI Aayog

FIDIC

REPORT OF THE TASK FORCE ON
PROJECT & PROGRAM
MANAGEMENT

RISK MANAGEMENT

CONSTRUCTION MANAGEMENT

QUALITY

LEADERSHIP

STAKE HOLDER

KNOWLEDGE MANAGEMENT

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FOREWORD

As India marches ahead in its quest to become a global economic powerhouse, there is a felt need for a paradigm shift in our approach towards the existing industrial ecosystem. As per the Economic Survey 2017-18, India will require investments of around $4.5 trillion by 2040 to develop the infrastructure for sustaining its economic growth.

Infrastructure development has always been a challenge due to a multitude of issues which impact these projects. Each project is unique and needs a structured approach to manage its complexity. Therefore, it is high time to realise and appreciate the fact that the need of the hour is a coherent execution approach that forms a crucial link between the portfolios of projects and their component strategic disciplines.

The major problem is successfully dealing with the multiplicity of issues that obstruct the smooth execution of the project, namely- cost over-run, time over-run, environmental clearances, land acquisition, regulatory approvals and the like. This problem arises due to the fact that individual project managers are working independently on different verticals with lack of interdisciplinary coordination. This need for visibility and control over several projects simultaneously is where program management comes into focus.

At such a high level where economic transformation of an entire industrial ecosystem is involved, the executing authorities need individual projects to come together seamlessly and integrate with each other in order to provide the required economic transformation within the desired timescale.

Mega projects are complex and the technologies and management approaches involved are continuously evolving to adapt to the changing needs of the economy. In order to achieve the required economic progress, numerous inter-connected large-scale projects involving multifarious disciplines need to be developed and executed in parallel. The major issues involved include efficient resource allocation across these projects and ensuring that collectively these projects will provide the desired economic outcomes.

Program management integrates the individual elements of the projects in order to achieve a common objective. It is entirely cross-functional in its approach, managing across the various disciplines of constituent projects such as engineering, designing, planning, procurement, construction and finance as well as various components like power, water, highways, waste management, telecommunication, multi-use development etc.

Program management is strategic in nature, while project management is tactical in nature. Program management focuses on achievement of the intended strategic economic objectives through the coordination of multiple projects. Project management in contrast focuses on the tactics of planning and execution of the work output. Program management is entirely cross-functional, while project management focuses on a single function or limited cross-functional alignment at best. Program management integrates the individual elements of the projects in order to achieve a common objective. Project management, on the other hand is focussed more on accomplishment of deliverables, milestones and tasks from a single project.

Facilitating cross-learning is one of the major benefits of program management approach. Experiences in dealing with risks and lessons learnt are well communicated across the spectrum of projects in a program through networks, share points, staff etc. This approach allows reducing the costs and delays related to dealing with risks and issues since these will be repeatedly dealt with across all the projects within a program as well as adopting best practices.

The Government of India has been working towards de-bottlenecking infrastructure projects through numerous initiatives and NITI Aayog has also been advocating various guidelines for improving the performance of infrastructure projects. In line with these initiatives, NITI Aayog had constituted the Task Force on Project Management with an objective to lay down a plan of action advocating short-term and long-term strategies for improving project and Program management practices and aligning it with the global best practices.

Accordingly, the recommendations from the Task Force have clearly highlighted the need to develop a national policy framework for project and program management, with emphasis on strengthening the government's ability to effectively manage its portfolio of projects and programs.

The Task Force recommendations underline the need for more efficiency and transparency in procurement and enabling public-private investments through appropriate risk sharing, investing more efforts at pre-planning stage, augmenting organizational skillsets, improving stakeholder management, leveraging technology and establishing robust project governance. Furthermore, it is important that Project Management discipline is introduced in the curriculum of engineering, management and other technical courses in order to prepare young students to be "Industry Ready".

I sincerely hope that this report would be useful not only for Public Sector bodies, PSE officials and all key stakeholders in the infrastructure fraternity but also academics and industry interested in the subject. While this report sets a starting base for corrective actions, given the investments at stake, it is imperative to maintain continuity in reviewing the projects and set a governance framework for institutionalisation of Project and Program management discipline within the functioning of nodal agencies/ ministries for continuous improvement.

Dated- 14-06-2019
Place- New Delhi

(Amitabh Kant)

CONSTITUTION OF THE TASK-FORCE

A Task Force was created under the Chairmanship of CEO, NITI Aayog with the objective of a focused result-oriented approach and effective delivery of projects within time and budget for Central/ State Government and Public-Sector Enterprises (PSEs). It comprises of representatives of following Departments/Ministries/entities.

The composition of the Task Force

- **Shri Amitabh Kant**, CEO, NITI Aayog - Chairman

- **Secretary** or nominee (not below the rank of Joint Secretary or equivalent), **Ministry of Railways** - Member

- **Secretary** or nominee (not below the rank of Joint Secretary or equivalent), **Ministry of Road Transport and Highways** - Member

- **Secretary** or nominee (not below the rank of Joint Secretary or equivalent), **Ministry of Housing and Urban Affairs** - Member

- **Secretary** or nominee (not below the rank of Joint Secretary or equivalent), **Ministry of Power** - Member

- **Secretary** or nominee (not below the rank of Joint Secretary or equivalent), **Department of Economic Affairs, Ministry of Finance** - Member

- **Secretary** or nominee (not below the rank of Joint Secretary or equivalent), **Department of Expenditure, Ministry of Finance** - Member

- **Secretary** or nominee (not below the rank of Joint Secretary or equivalent), **Department of Financial Services, Ministry of Finance** - Member

- **DG** or nominee (not below the rank of Joint Secretary or equivalent), **Bureau of Indian Standards** - Member

- **Chairman** or nominee (not below the rank of Joint Secretary or equivalent), **National Highway Authority of India** - Member

- **Chairman** or nominee (not below the rank of Joint Secretary or equivalent), **NTPC** - Member

- **Chairman** or nominee (not below the rank of Joint Secretary or equivalent), **Oil and Natural Gas Corporation** - Member

- **CEO** or nominee (not below the rank of Joint Secretary or equivalent), **Delhi Mumbai Industrial Corridor Development Corporation Ltd.** - Member

- **CMD** or nominee (not below the rank of Joint Secretary or equivalent), **L&T** - Member

- **Country Director, Project Management Institute, India**- Member

- **Shri Adesh Jain, Chairman, International Institute of Projects and Program Management** - Member

The mandate of the Task – Force

a. To analyze the performance of Public sector/PPP Projects during the last decade and take stock of the present situation of Public-Sector/PPP projects.

b. To draw conclusions from the Performance Analysis with special focus on identifying the problems faced by the public sector/PPP projects and factors that impede their performance.

c. To lay down a plan of action suggesting short-term, medium-term and long-term strategies for improving project management practices in the public sector/PPP commensurate with the best international practices.

d. To ensure that appropriate systems, tools & techniques, processes and controls are in place at the departmental or government levels for managing projects; minimizing risk, limiting project duplication, encouraging stakeholder consultation, integrating decision-making across agencies and monitoring/evaluation of output-outcomes.

The Terms of Reference of the Task – Force

The Task - Force will deliberate, brainstorm and give recommendations on the following focus areas:

a) To suggest policy, procedural and institutional measures including examining the requirement of separate legislation and/or designating a separate agency/inter-agency forum/office to facilitate better project management of Public-Sector/ PPP projects.

b) To establish and oversee the adoption of standards/methodology, policies and guidelines including Project Management Policy Framework of knowledge areas for program and project management.

c) To examine and create the necessary wherewithal for developing skilled Project Management professionals, including institutionalizing project management in vocational education, training and recruitment, promotion etc., and establishing a dedicated Institute including laying down guidelines, course-curriculum, syllabus, qualifications etc. for developing a cadre of PM professionals.

d) To build competence of contracting firms and public-sector organizations through the adoption of contract clauses and processes for improving governance including transparency and accountability, efficiency and effective use of public resources with reference to the best practices.

e) To coordinate and act as liaisons between State and Central Governments/Entities to raise massive awareness amongst all the stakeholders about the importance of good project management practices and resolving project management issues, debottlenecking and accelerating project implementation of public sector/PPP projects.

EXECUTIVE SUMMARY

The Infrastructure sector is one of the key drivers of economic growth across the world, and India is no exception. The sector is responsible for propelling India's overall development and enjoys priority focus from Government for initiating policies that would ensure time-bound creation of world-class infrastructure in the country.

The Government of India has set ambitious growth plans and committed massive investment of close to INR 5.97 lakh crore[1] in the infrastructure sector in the current fiscal year. Further, it is estimated that approximately INR 304 lakh crore[2] of investment is required in the Indian infrastructure sector till 2040 in order to sustain the country's development.

Accordingly, the Government has launched various critical infrastructure mega programs like Power for All, Bharatmala (entailing an estimated cost of INR 5.35 lakh crore for Phase 1), Sagarmala (entailing a total outlay of INR 8 lakh crore), Smart Cities mission (entailing a total investment of INR 203,172 crore), Housing for All, Swachh Bharat Mission, AMRUT, etc. with an objective to build world-class infrastructure in the country. However, the track record of completing projects on time is abysmal. There are multiple challenges attributed to the same including regulatory clearances, land acquisition, Resettlement &

Rehabilitation amongst others. The Govt. has set up various bodies to tide over such obstacles and is continuing to improve them. However, one aspect which needs attention is the successful adoption of globally accepted Project and Program Management practices. The country is in the transformation phase and with such large-scale initiatives planned, there is a growing demand for structured project and program management practices in order to manage these programs and implement them successfully. Project and Program management practices, when implemented successfully, can bring in synergies, integration and a common language to all these complex program initiatives like Sagarmala, Bharatmala, Industrial Corridors, Smart Cities Mission, etc.

This can be well substantiated from the recent report of the Ministry of Statistics and Program Implementation (MOSPI) released in December 2018 which has reviewed 1424 central infrastructure sector projects worth INR 150 crore and above. It has been observed that more than 25% of these central sector projects are delayed beyond their scheduled date of completion, and there has been a significant cost overrun of around INR 3.17 lakh crore in these projects.

Clearly, Project and Program management best practices need to be maximized when resources are limited so

they can effectively respond to changing project requirements. Delayed projects also mean cost escalation and delay in the benefits of the projects to society.

India will need 70 lakh[3] skilled project managers in the next 10 years in order to avoid delays and escalation of budgets in projects in key industries like Roads, Railways, IT, and manufacturing. To overcome this issue, the Government has to play a more proactive role.

Initially, project management practices were more widely adopted by the private sector, however, now even the public sector is opening up to these practices. Many public-sector organizations are placing emphasis on training programs and strengthening their existing project management units and appointing professionals. "Lack of clarity of benefits" and "Lack of client-led demand in India" are the main barriers to the adoption of project management practices in the country.

 As India gears up and prepares for a stronger and resilient economy, Project Management will be the enabler. Project management capabilities must be improved for the country to get better returns from public investment in infrastructure and in the social sectors as well. Project management, with a view to deliver on time and within budget, is a learnable capability that can be institutionalized, as demonstrated by the development experiences of USA, UK, UAE, and China.

In addition, at the current pace of growth, the nation requires something more than just leadership, experience and conventional methods - there needs to be an emphasis on innovative thinking, instantaneous communication, adaptability of thoughts and diverse approach.

Given the fact that each of the projects are unique, complex, involve multiple stakeholders, and require significant funds and time to complete, traditional ways of managing projects have proven to be ineffective. Therefore, we must recognize the fact that Projects need refurbishment with modernized tools and techniques and acclimatize with agility, disruptive thinking, diversity of experiences, age, genders and geography, real-time communication, real-time data management, social media and internet of things and above all skilled workforce. Project management is an art and science of converting vision into reality and to achieve this, a 'Project Mindset' must be nurtured amongst all in organizations.

Accordingly, it is suggested to develop a National Project / Program Management Policy Framework (NPMPF). NPMPF can refer to the already available global best standards on Project / Program management, and suggest procedures and guidelines for effective project execution of public sector and PPP projects. These procedures and guidelines should be made part of all future contracts. NPMPF can also assist in

[3] Project Management Institute (PMI) report – "Project Management Job Growth and Talent Gap 2017-2027"

introducing project management course in the senior secondary level curriculum, which would help in strengthening the existing framework to build an Industry ready workforce. It can introduce a complete course on project management in the core curriculum of engineering, management and other technical institutes as well as diploma/degree programs at graduate and post graduate level in consultation with UGC and AICTE.

At the same time, it is also important to ensure that Project Management is one of the key skills for competency development and a part of Performance Management System for all professionals at managerial as well as specialist roles in Central and State Governments as well as in construction/contracting firms involved in executing public sector projects.

While developing NPMPF, the government can leverage the existing global standards and Certification program for professionals in project management which are widely accepted, and adopted. This, in turn, addresses the industry demand of such skilled professionals in the country.

While the constitution of nodal body through the legislative framework has been agreed to as a long term solution, in view of the time required for the various procedures/approvals involved as well as the pressing need for immediate implementation of remedial measures for on-going projects/schemes, in the interim the mandate is decided to be undertaken through Quality Council of India (QCI).

A. Approach to Projects Delivery in India

Project delivery method is defined as a process by which the components of design and construction, including the roles and responsibilities, a sequence of activities, cost of materials and equipment, and labor are combined to deliver a project. Conventionally, infrastructure projects have been split up into multiple separate work packages. A work package is a group of related tasks within a project, which can also be defined as sub-projects within a larger project.

Project delivery systems are defined by the official involvement of participants/contractors, level of integration, and contractual relationships between project parties. Some of the project delivery systems widely used in the conventional Indian approach are:

- **Construction Management at Risk: (Guaranteed Maximum Price / Open Book Contract)**
  - o A delivery method that entails a commitment by the construction manager to deliver the project within a guaranteed maximum price.

- **Design-Build:**
  - o The owner manages only one contract with a single point of responsibility.
  - o The designer and the contractor work together, from the beginning as a team to provide unified project recommendations to fit the owner's schedule and budget.

- **Design-Bid-Build:**
  - o The owner selects and enters into a contract with a design professional/architect.
  - o The architect fully creates the design and provides 'bid documents' that are made available to general contractors for competitive bids.
  - o The contractor so appointed then builds the project.

- **Engineer-Procure-Construct (EPC):**
  - o The Engineer and Construction contractor will carry out the detailed engineering design of the project, procure all the equipment and raw materials required and then, will deliver a functioning facility or asset to their client.

- **Engineer-Procure-Construction Management (EPCM):**
  - o The EPCM contractor provides engineering, procurement and construction management services, but the employer directly employs construction contractors to build the project. The EPCM contractor usually manages the construction contractors for the employer and is

more like a professional consultant than a contractor, providing design and construction advice (rather than building the project itself).

B. Key Issues of Conventional Approach in India

A number of issues have been encountered with the current methods of project delivery across different sectors. Some of **the key challenges faced during project delivery include uncertainties in the land acquisition process and regulatory approvals, lack of comprehensive upfront planning and risk management, and most importantly, low maturity of project management processes to adequately plan for such factors.** To counter this, significant front-end efforts should be invested in project pre-planning/initiation in order to reduce uncertainties/ risk factors during execution and enhance the reliability on project budget and schedule.

Other issues which hamper timely completion of projects include, but are not limited to, the non-availability of raw materials, unavailability of skilled workers (masons, carpenters, etc.), lack of water and power supply, an incomplete supply of drawings and frequent changes in design. Due to the local issues and lack of proper project planning and control, the effective project delivery schedule gets delayed creating an overall impact on the economy.

One of the major issues faced in implementation of urban infrastructure projects includes the challenge of lack of comprehensive planning and management by different Urban Local Bodies (ULBs), as well as lack of capacity in local bodies.

In brief, **poor project management costs the Government in a number of ways,** including:

• Additional expenditure burden due to increased costs, which crowds out funding for more deserving projects,

• Creating a culture of acceptance of delays and avoidable costs, which causes more cases to occur,

• Economic burden due to delayed return in investments,

• The increased cost of procurement due to monetization of higher risks perceived by contractors such as delay and scope creep associated with publicly funded projects.

It is a well-established fact that, structured project management practices would not only maximize the limited resources and effectively respond to changing project requirements but also bring in skills such as project scoping, planning, scheduling, risk assessment, team building and quality control for getting complex projects completed with desired quality, on time and within budget.

CHAPTER II
# CHALLENGES IN THE PROJECT IMPLEMENTATION MODEL IN INDIA

The latest MOSPI Flash Report December 2018, containing information on the status of 1424 Central Sector Infrastructure Projects costing Rs. 150 crore and above, brings to light the number of Project delays and cost overrun amount, and the same is alarming.

Cost overrun: Total original cost of implementation of the 1424 projects was Rs.18,17,469.76 crore and their anticipated completion cost is likely to be Rs. 21,33,649.81 crore, which reflects an overall cost overrun of Rs. 3,16,180.05 crores (i.e. 17.40% of the original cost). The expenditure incurred on these projects until December 2018 is Rs. 8,06,997.78 crore, which is 37.82 % of the anticipated cost of the projects.

Time overrun: During the reference month, out of 1424 projects, 384 projects are delayed with respect to their original schedules and 69 projects have reported additional delays vis-à-vis their date of completion reported in the previous month. Of these 69 projects, 16 are Mega Projects costing Rs. 1000 crore and above.

Trends in Projects over the Last Five Years:
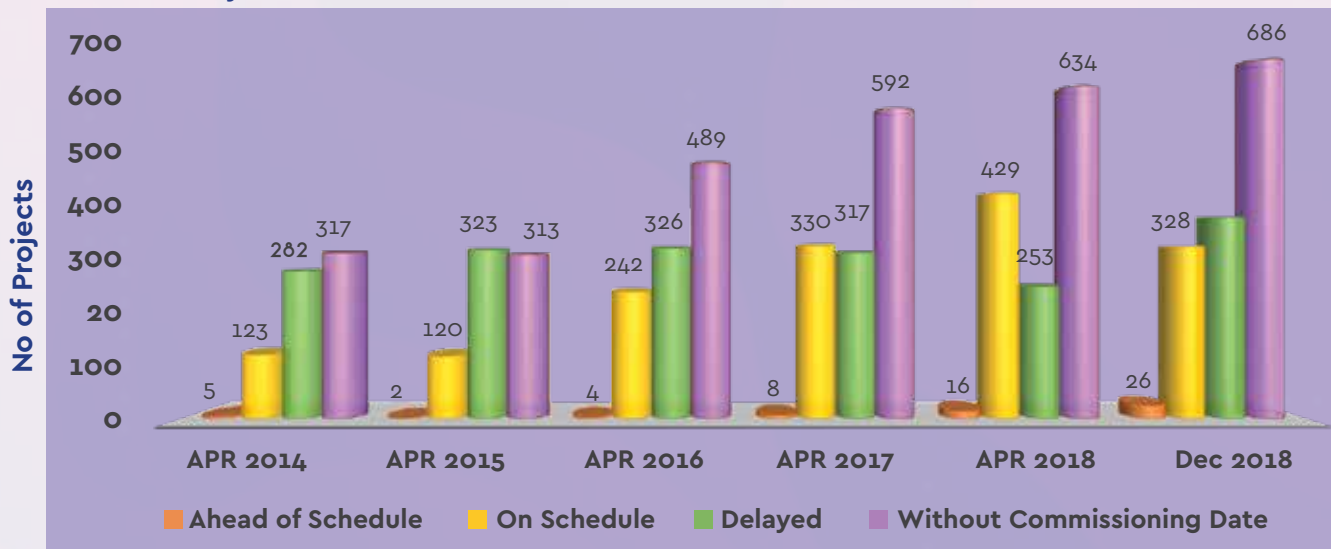
MOSPI – Project Implementation Overview –December 2018

S. No.	Sector	Projects on the monitor (No.)	Delayed Projects w.r.t original schedule (No.)	Additionally delayed during the month under report (No.)	Additionally delayed Mega Projects (No.)
1	Road Transport & Highways	605	112	19	2
2	Railways	367	94	8	3
3	Petroleum	137	33	16	4
4	Power	95	56	19	7
5	Coal	97	36	1	0
6	Urban Development	58	23	0	0
7	Steel	13	9	0	0
8	Health & Family Welfare	20	5	1	0
9	Telecommunications	6	4	3	0
10	Fertilizers	6	2	1	0
11	Shipping & Ports	6	3	0	0
12	Atomic Energy	4	4	0	0
13	Mines	5	0	1	0
14	Civil Aviation	1	1	0	0
15	Heavy Industry	2	1	0	0
16	Defense Production	2	1	0	0
	Total	**1424**	**384**	**69**	**16**

It has been observed that the current Project / Program models being followed in India are not effective in ensuring timely and within budget completion of projects. In the preceding section, the key issues arising due to the existing models followed have been highlighted. Insufficient attention, time and expertise are invested in project design and planning. The quality, experience and competence of the Project Design and Management Consultant selected to prepare the Detailed Project Report (DPR) needs to be properly ascertained. In addition, the time spent initially on site and market investigation, exploring technology, finance and implementation options, evaluating procurement options, etc., would eventually save on costs and time. Deep involvement of the project organization (Organization sponsoring the project) in the DPR preparation is a key factor in project success.

Land acquisition and securing all statutory clearances for the projects are critical conditions precedent for the start of any project. Any delay due to challenges results in a delayed start, and more often than not, delayed completion. As a principle, no project contracts may be awarded without possession of at least 90% contiguous land of the entire land and the statutory clearances/NOCs for project

construction and operation. Several organizations like NHAI (National Highway Authority of India) have laid down policies regarding the same. More importantly, stakeholder management needs to be strengthened for land acquisition and other regulatory approvals.

Scope and Design creep are the other causes widely stated for project delays. Changes in scope or design midway or even at the start cause time and cost variations. It is therefore essential to consider all options thoroughly and spend time on designs exhaustively at the time of DPR preparation. From experience with mega infrastructure projects, locking down the scope as one would really add to cost because every change reopens elements of the construction contract to renegotiation. A program management focus (Annexure E) recognizes that things will be learned as an individual construction project gets executed and that those learnings should be incorporated into the next phase of construction projects. So instead of one contract, there may be a master contract and then subcontracts for each phase of work. This would enable the government to maintain more control and better management of risks.

The quality of project and program management team overseeing the projects is also essential to regulate. The project/program managers must be approved by the project implementing agency, which in turn will also evaluate and assess their capability based on the requisite hard and soft skills to deliver the project.

Proper communication channels between the implementing agency and the contractor must be established, through weekly meetings between the two parties where key issues and delays are addressed. A healthy relationship between the agency and the contractor is beneficial, which can be achieved through training and orientation of the staff before the project begins.

ISO31000 standards on Enterprise Risk Management can be introduced. The use of established risk management methodologies at regular intervals enables identification of issues and risks associated with the projects enabling timely decision by the relevant authorities. It is important to ensure optimal sharing of risks between parties.

Timely completion of projects must be incentivized to encourage the establishment of a culture in which effective project delivery occurs. Moreover, weekly Project Management meetings of owner or customer with the consultants and contractors are the key factor in ensuring effective communications, timely detection of critical issues and their resolution. This will also help in preventing disputes.

Further, competencies and capability of contracting firms involved in the construction or development of projects need to be strengthened for the timely and on-budget completion of projects. There is a need to ensure that contracting firms adopt appropriate & global management standards.

An overview of the best of the Global Project Management Practices adopted by various countries is given in Annexure A.

Adoption of ISO 21500:2012 needs to be specified in the RFQ conditions while inviting tenders. Moreover, it's important that Contracting firms involved in project construction have qualified/ certified project management professionals at the time of commencement of works on awarded contracts. Certifications offered by globally recognized bodies (Annexure C) besides proven experience in delivering large scale programs, may be specified in the contract conditions for the key staff of the field project organization of the contractor.

Accordingly, it is important to set up a nodal body for continuous evaluation of projects for which investment approvals have been provided. The proposed body can track and monitor the performance or execution status of the projects and suggest key action or decision points by various authorities. This may also include periodic review of the further investment

decision based on the project performance till date. Project management maturity assessment level of organization need to be assessed specifically keeping in view the working of CPSUs.

This body can also critically appraise project integration issues which require multiple stakeholder involvement such as Central Ministries, State Governments, other quasi-government bodies etc. and facilitate early resolution by highest level escalation such as PMO/PMG.

The body should also focus on adoption of Project / Program Management practices since it is more critical to mega projects as the level and importance of stakeholder engagement is more complex and requires a much higher level of skill and capability. A case study of one such mega complex project involving multiple infrastructure projects within and various stakeholders - Shendra Industrial Area, a Greenfield Industrial Smart City Project - is discussed in Annexure B.

Box 1: What is Project Management?

A project is universally known as a temporary endeavor undertaken to create a unique product, service or result. A project is unique in the way that it is not a routine operation, but a specific set of activities designed to accomplish a singular goal. Project word is derived from the Latin word 'Projectum' implying 'to throw something forward'. Projects are undertaken therefore to build a future by undertaking the creation of soft and hard assets.

Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. It has always been practiced informally but began to emerge as a distinct profession in the mid-20th century. Project Management is recognized as a methodology that bridges the gap between the organization's strategic initiative and its implementation. Since time immemorial it has defined itself as a proven methodology/ approach that has invariably resulted in productive delivery of a project/program.

Strengthening Project Management oversight and Monitoring Framework

In a major move to support on-time and within budget delivery of all the large-scale infrastructure projects in the country, the Cabinet Secretariat vide letter dated 3rd February 2016 has directed all Departments to update information pertaining to central sector infrastructure projects costing Rs. 150 crores and above on the **Online Computerized Monitoring System (OCMS)** of MOSPI. In addition, the Project Monitoring Division and Program Implementation Wing in MOSPI provide management services by providing the latest information on the implementation of projects/ programs and performance of those infrastructure projects. It also brings out periodical reports, review notes highlighting deficiencies and action areas facilitating the administrative ministries and project authority concerned in timely implementation of projects and programs and provides a control mechanism to arrest delays in implementation.

On the other hand, the **eSuvidha-Project Management System (ePMS)** administered by Project Monitoring Group (PMG) requires the maintenance of a database of mega projects (costing Rs. 1000 crore and above) of the public and private sector. The portal focuses on resolution of bottlenecks/issues in the implementation of the projects.

The above two platforms focus on project monitoring mechanism and are complementary to each other.

Programme Implementation Wing (Prime Minister's Office, GOI): Pro-Active Governance and Timely Implementation - PRAGATI - an ambitious multi-purpose and multi-modal platform introduced by the GOI in 2015 that is suitable for simultaneously monitoring and reviewing important programs and projects of the Central Government as well as projects flagged by State Governments. A built-in feature of PRAGATI is that directions will remain in the system for further follow-up and review until the finality of the matter. The PRAGATI platform bundles three technologies: Digital data management, video-conferencing and geospatial technology. With this, the Prime Minister is able to discuss the issues with the concerned Central and State officials with full information and latest visuals of the ground level situation. It is an innovative e-governance implementation.

The key features of the PRAGATI application takes into consideration the issues ranging from Public Grievances, on-going programs to pending projects. It also takes into consideration various correspondences to PM's office from the common people or from high dignitaries of States and/or developers of public projects. Every project or issue taken up at PRAGATI meetings comes with a deadline, which government agencies have to adhere to.

Simultaneously, many states have set up infrastructure departments, paving the way for speedy project implementation. Project-specific structures as Empowered Committees (EC) or High-Powered Committees (HPC) have

helped accelerate the implementation of specific projects. The government of India may write to all States to set up a SCoS/HPC/EC for projects above Rs.500 crores to:

- Set overall targets (limits) for cost and time overruns.
- Debottleneck and accelerate project implementation
- Coordinate with GOI and implementing agencies to resolve PM issues
- Review cost and times overruns.
- Defining processes at State level for project related clearances & monitoring clearances
- Mentoring of State Government agencies for improving project

management processes and dealing with exceptions.

- Improve contract agreements and management, including effective dispute resolution.

MOSPI, PMO/PMG and PRAGATI platform have different activities of project management and monitoring. The tools adopted are more of MIS / escalation management. It is important that the Project Management Information System (PMIS) be used by the implementing agencies and in turn integrated with OCMS to provide near real-time information related to the project. More importantly, for effective tracking and monitoring of key public projects, there should be a single cell at the national level.

The Task Force suggests the following with respect to the mandate given:

A. *To suggest policy, procedural and institutional measures including examining the requirement of separate legislation and/or designating a separate agency/inter-agency forum/office to facilitate better project management of Public-Sector/ PPP projects.*

It is important to understand that large projects involve multiple stakeholders, and require significant funds and time to complete, consequently the traditional ways of managing projects would prove ineffective. Project management practices, implemented from day one, would help in getting complex projects completed and delivered with quality, on time and within budget. Accordingly, it is suggested to develop a **National Project/ Program Management Policy Framework (NPMPF)** considering the specific issues and requirements of the nation as a whole – such as contracts in public /private/ state sector, infrastructure, Health, Safety and Environmental issues, CSR requirements, etc.

Furthermore, it is proposed that a centralized committee may be formed which may be called the **"Committee on Project/ Program Management (CPM)",** comprising of the members of existing Task Force on Project

Management to develop NPMPF and its implementation, for review & monitoring in a few public-sector projects undertaken in the country across sectors. The said committee may be assisted by a team of experts in infrastructure, project finance, delivery and legal sectors with expertise in project and program management as well as members from MoSPI and PMG/ PRAGATI. The proposed committee will work with different Government Ministries/Departments and other stakeholders.

• It is proposed that during the initial phase (as per the directions of Cabinet Secretariat), the Committee on Project/ Program Management including the team of professionals under them may function under the aegis of NITI Aayog. However, in the eventuality that the system of centralized agency is established by such enabling legal/policy frameworks, the committee and team of professionals may be given a recognized status and function independently under the appropriate Ministry/Department of Govt. of India as notified.

• In the UK, Royal Chartered Status is given to the project management profession, similarly a separate institution as **National Institute of Chartered Project Professional**

(NICPP) may be created. Similar to the Institute of Chartered Accountants of India (ICAI), NICPP may become the nodal institution to create a resource pool of competent project professionals.

- It is proposed to have enough human & financial resources for Project Management support.

- The Program may be analyzed based on a number of projects & sub-projects and prioritized based on the national importance, amount of investment, impact on economy and society at large, etc.

- The Standards adopted by BIS could be the platform for the Project management related issues. Moreover, it could also function as the mechanism for implementation of large-scale projects (Central/State) in the country at an apex level through an authoritative body, which will also target the integration of existing monitoring mechanisms like PRAGATI/OCMS, etc.

B. *To establish and oversee the adoption of standards/methodology, policies and guidelines including Project Management Policy Framework of knowledge areas for program and project management.*

Project/ Program Management has grown to be accepted as a formal profession across the world. In the UK, project managers were given Royal Chartered status in 2016. In the USA, Program Management Improvement and Accountability Act (PMIAA) is being implemented throughout the U.S. Federal Government. The focus is on the development of a standards-based model for program management, ensuring responsibility and accountability for delivery of program results, increasing program performance and results by establishing practices of project/ program management, establishing a program management career field and consequently improving effectiveness and efficacy of the Government.

In India, presently, there is no formal approach to project management hence the focus should be on developing a robust methodology to develop competent project management professionals where they go through a structured way of acquiring knowledge followed by its practical application in the industry and government institutions/sectors. Diploma/ degree in Project Management which combines Learning to the application at the workplace followed by measuring the benefits and documenting the best practices should be encouraged enabling the creation of a large number of professionally competent project managers.

- It is necessary to first develop National Project Management Policy Framework in long run and a mandate on the implementation of the policy followed by creation of a nodal body "National Institute of Chartered Project Professional (NICPP)" under its aegis. The nodal body may assume the

leadership role in creating massive awareness of the imperatives of the project management profession and also act as a custodian of the best practices in various sectors of industry and governments both national and international.

- This nodal body will also be the nationally registered body working together with Ministry of Human Resource Development (MHRD) that will formalize the field of project management to mainstream graduate level and advanced level courses in universities (Management, Engineering etc.)

- The nodal body may also work as the think tank for the Project/ Program Management, as the central repository of knowledge for all major public sector/private Projects under various sectors for review and monitoring. It should partner with existing institutions in this domain to leverage the strength and be able to go to market quicker. It could encourage organizations to carry out maturity assessment levels specific to Indian environment and in particular CPSEs/PPP.

- As mentioned earlier, project management practices need refurbishment from time to time as the profession evolves; and therefore; any certification in this profession also has to be constantly evolving.

Its scope of work could be as follows:

(i)   Preparation of policy framework for Project/ Program Management.

(ii)   Project/ Program development & planning including - structuring & financing, monitoring and controls.

(iii)   Reporting of projects/ programs progress as per the requirement of the apex committee (Dashboard reporting for top authority and Detailed reports for respective functions).

(iv)   Project/ program management methodologies & best practices, which are also adopted by BIS.

(v)   Developing and managing project/ program policies, procedures, templates and other shared documentation in consultation with leading global associations.

(vi)   Create a Knowledge Management System on Project/ Program Management and managing shared resources across the project/ programs.

(vii)   Oversight on adoption of Project and Program Management Framework.

(viii)   Coordination communications across projects/ programs stakeholders.

(ix)   Monitor issues, facilitate for removal of bottlenecks and recommend practices on how to manage pitfalls.

(x)   Institutionalize the field of Project/ Program Management in the country.

(xi)   Conduct appropriate courses and award degree etc. on Project Management as an autonomous body.

- The nodal body constituted under NPMPF should refer to the global best standards on Project / Program management; suggest procedures, and guidelines for effective project execution of public sector and PPP projects. These procedures and guidelines should be made part of all future contracts. Simultaneously, a separate Project/ Program Management delivery team can be assigned to audit the delivery issues with mega projects and recommend "fixes" to the existing projects. This will ensure the knowledge transfer in the laggard public-Sector/ PPP projects. This will also enhance the project management capabilities of public sector/ PPP projects. Simulation models can also be used for establishing cause and effect relationship of various decisions in a simulated environment.

- The NPMPF should also publish annual best practices guideline based on national/ global practices and project learnings. The guidelines shall have a mandatory and optional category of recommendations such as the following:

  o Waterfall methodology to be adopted for executing any publicly funded project with preference to PPP(BOT), PPP(Annuity) followed by EPC/ Lump Sum/ Turnkey basis. The award of contract based on item rates to be discouraged and avoided.

  o A robust two-stage bidding process comprising of an RFQ for shortlisting of bidders with a proven track record and thereby obtaining the most competitive financial proposal from the shortlisted bidders to be adopted.

  o All the projects should go through gate stages.

  o At the bidding stage, the scope of work should be well defined and include sufficient information in the bid to limit the scope of change orders, risks etc. thus avoiding cost overruns and schedule delays.

  o Shareholder agreement, State support agreements be included in the contract to ensure timely availability of land/ infrastructure and other clearances etc. for project execution.

  o Bidder pre-qualification criteria should ensure that the Best Available Technology (BAT) is employed in any given project.

  o Project Management Consultant (PMC) with a proven record and certified project managers, to review the detail project design in parallel. The design /very critical components of design should also be reviewed and commented upon by an Institute of Eminence in parallel to design consultant. The review and comments should be provided within a defined timeline of (15) days and be limited to compliance with the specifications and standards provided in the bidding documents. The risk and responsibility of compliance of the design would continue to vest with the contractor irrespective of whether the Authority has reviewed the same or not.

- o Payments should be milestone/ outcome based starting with the completion of a stage of construction work with payment after supply and Installation of equipment. Early achievements of key targets should be incentivized.

C. *To examine and create the necessary wherewithal for developing skilled Project Management professionals, including institutionalizing project management in vocational education, training and recruitment, promotion etc., and establishing a dedicated Institute including laying down guidelines, course-curriculum, syllabus, qualifications etc. for developing a cadre of PM professionals.*

It is important to introduce project and program management in the core curriculum of engineering, management and other technical institutes. The government can help in expediting the process by pushing the project management courses in the Government institutes of national repute. Once these institutes make the change others across the country are expected to follow. At the same time, it is important to introduce project management course at the senior secondary level also. It will help youth to strengthen their preparation for work and be "Industry Ready". Take, for instance, more than 100 institutes in China offer courses specific to project management whereas this number is less than 10 in India, at present. We should also start looking at encouraging Universities in India to establish accredited degree programs as in the case of China.

- • Project Management should be recognized as a discipline of graduate and postgraduate courses. These courses are required to be tailor-made to the Indian context enriched with the experiences faced by the project implementation authorities on-ground.

- • The curriculum to address following knowledge areas for project management and should consider the project from concept to commissioning encompassing all life cycle phases i.e. Conceptualize, Plan, Organize, Implement, Control, Integrate, Deliver/closeout and Knowledge Leverage:
  - o Stakeholder Management
  - o Project Delivery system such as PPP, Design /Build, EPC etc.
  - o Project Finance
  - o Scope Management
  - o Time Management
  - o Cost Management
  - o Quality Management
  - o Human Resource Management
  - o Communication handling
  - o Risk Management
  - o Procurement & Contract Management
  - o Communication Management
  - o Performance Evaluation and Project Monitoring Systems
  - o Integration Management
  - o Safety Management

- o Health and Environment Management
- o Corporate Social Responsibility
- o Soft Dimensions covering Leadership, Motivation, Conflict Resolution, Problem Solving, Presentation skills etc.

- The nodal body constituted under NPMPF will have tie-ups with nodal agencies at State levels to strengthen project and program management discipline, competency and capability of officials engaged in critical projects.

- The nodal body will design various course modules which could suit engineering colleges as well as management schools across the country.

- The nodal body will publish Best Practices in consultation with leading global institutions (Annexure C) as well as will have enough resources of its own for the supervision of its implementation on the ground.

- Once the National Project Management Policy Framework is in place, it can lay down guidelines for human resources in the public sector for projects and programs, including recruitment and training. Recruitment policies to projects may outline assessment framework covering professional and personal competencies, knowledge, global certification and experience. For better project management in Indian industry, project management Certifications, Diploma and Degree programs should also address the specific requirement of India.

D. *To build competence of contracting firms and public-sector organizations through the adoption of contract clauses and processes for improving governance including transparency and accountability, efficiency and effective use of public resources with reference to the best practices.*

The nodal body constituted under NPMPF can also be authorized to review the intricacies of various public-sector/private/PPP contracts within definite time periods and evolve the best contracting practices through consultation of stakeholders as implementing agencies, contractors and consultants. As an example, the contractual framework under the DMIC Project is given in Annexure D. The expert pool under the nodal body could study the best practices in contract management followed across the world including World Bank and other international institutions. NITI Aayog may undertake to prepare a model Request for Proposal (RFP) document for engagement of Project/ Program Management Consultant (PMC).

It is necessary that the best practices evolved for India should be based on specific requirements from the local context through the integration of various governance parameters. At the same time, it is important to ensure that Training on Project Management is a part of the performance indicator for professionals at managerial as well as specialist roles in Central and State Governments as well as in construction/contracting firms involved in public sector projects.

Moreover, it is important to include "Project/ Program Management" as a core competence in RFQ documents while awarding projects as well as while hiring Project Management Consultant (PMC). For example, PMC should demonstrate experience of managing Projects/ Programs as per global best practices and should have certified project managers in the team before hiring them.

E. *To liaison and coordinate with State and Central Governments/Entities to raise massive awareness amongst all the stakeholders about the importance of good project management practices and resolving project management issues, debottlenecking and accelerating project implementation of public sector/PPP projects.*

Comprehensive Project/Program management principles can be applied across the projects/programs. In order to have massive awareness of good project management across all stakeholders, short term programs that range from 1 - 2 days duration to 3 - 5 days should be evolved in consultations with the various stakeholders thereby creating a project mindset across all levels in respective nodal authorities. This would help them understand how the project/program will unfold and get them to help with risk identification, communication planning etc. In fact, some fundamental concepts using simple language covering time, Cost and Quality may be introduced at the school and college levels. The practical approach to project/ program management teaching should be adopted so that the society at large understands the concepts and benefits from the same.

In conclusion, it is extremely important to understand that the right people with the right skillset are essentially required for making any project a success. Managing these high-value public sector projects requires a great deal of time, skill, efforts, which all the more highlights the need for adopting project management discipline within the day to day functioning.

Given the fact that Government / Public Sector is increasingly challenged to do more with less, it will need these project & program management skills to manage the complex projects and programs with quality, on time and within budget. It is important that a standardized approach is followed to augment these skills in officials with different levels of experience across Central/ State Governments.

Accordingly, it is recommended that:

- Project Management be included as one of the key skills for Competency development of all officials and it should be a part of their Performance Management System.

- *Skills of all officials working on projects be enhanced through in-house training activities and sustained thrust on Project/ Program Management.*

The Task Force after detailed deliberations suggested following course of action/ recommendations:

1. Recommendation for setting up of a nodal body for certification of chartered project management professionals under the legislative course has been made by the Task Force. While the constitution of nodal body through the legislative framework has been agreed to, in view of the time required for the various procedures and approvals involved as well as the pressing need for project/ program management professionals requirements of the upcoming projects, in the interim the mandate is decided to be undertaken on a fast track through **Quality Council of India (QCI).** QCI shall work in collaboration with associations like International Institute of Projects and Program Management (I2P2M), Project Management Institute (PMI) and others for initiating the work on draft policy framework, designing the courses and certification of project Management professional for Indian context. Inputs may be taken from the globally recognized qualifications available, for this purpose. Project Appraisal and Management Division of NITI Aayog as secretariat of the task force will be the nodal contact point for any further consultations.

2. India will need heavy investments in next decades in various sectors like Infrastructure, Social etc. to uplift the quality of life for its citizens. With most of the investments will be in the form of programs and projects, it is very important that these programs and projects deliver in time and budget up to the satisfaction of end user (i.e. Time- Cost- Quality). On one hand we have very good examples for adoption of best practices and directly replicable models and such practices needs quick adoption, on the other hand many projects are still grappling with issues of overruns and inability to deliver desired outcome. Opportunities exist for learning the lessons as well as best practices from one project and organization to another in different Ministries and across the sectors, which each CPSE/Dept./Ministry must exploit.

3. The plausible solution lies in project/ program-oriented mind set. Award of future contracts to be given to those organizations having certified project management professionals and include project management as core competence within RFQ documentation. Immediate thrust to be given to adopt best Project/ Program management practices, standards/ methodologies, tool & techniques. All necessary measures to be taken create massive awareness between all the stakeholders i.e. State/ Central Governments / Entities about the importance of good project management practices.

4. **Front End** processes are very crucial in all the public projects. Project tendering must not be a hush-hush activity carried out without heavy investment in pre-project planning to avoid scope and design creeps. Pushing a project into execution without due diligence at the beginning is a major reason for failure of projects. According to the principle of front-end process, quality time and resources invested in good scoping, structuring, definition and documentation before a project is awarded gives much more higher returns, better outcome and a satisfied delivery. All the projects must go through **stage gate-based project delivery framework.** After conceiving a project idea all the alternatives need to be evaluated well in feasibility study. Final alternative may be selected after internal benchmarking of data and implementation of a revalidation process of preliminary studies.

5. Post identification of a project, Detailed stakeholder consultations, Legal cum regulatory due diligence, Detailed Techno-Economic feasibility, land acquisition, Upfront clearances and approvals and interdepartmental coordination must be undertaken. **Earmarking of budget/** separate allocation may be considered at the Ministerial/departmental level for pre-feasibility studies and **Pre-Project Planning.** Detailed geological/ soil investigation reports to be carried out to avoid major surprises at a later stage. Encourage use of latest technologies like Mobile Mapping, Geospatial Analytics, use of drones, PMIS etc.

6. Germinate the guidelines for execution of individual Projects under a Project **Special Purpose Vehicle (SPV)** or cell starting from the stage of EFC/PIB approval. Land Acquisition in such case needs to be undertaken through the SPV which shall house all the land required for the Project as well as all related approvals and clearances. SPV shall then bid out the Project/undertake implementation as required.

7. Land acquisition is a major issue for delay in project execution, hence at least **~90% contiguous land** of the total land requirement to be completed at the **time of EFC approval** as well before the time of tendering of a contract. ~90% of acquired land necessarily needs to be **contiguous** except in case of **linear projects** (rail, roads etc.) where contiguous stretches of at least 40% of the total project length must be available to ensure seamless execution of the work with clearly laid down plans for the balance and adequate penalties on the Govt. authority for the non-compliance. This shall make project bankable and with easy financial closure.

8. In view of inconsistencies in **Rehabilitation and Resettlement (R&R)** policies within a state, it has been decided that Authorities shall undertake efforts for making them uniform at State level.

9. Share Holder Agreement (SHA) and State Support Agreement (SSA) should be included in the contract. On the matter of State Support Agreements, it must be ensured that the same may currently be undertaken under executive order of State Cabinet and the process for legislative agreements may be undertaken with the passage of time.

10. One of the best Program/ Project Management Consultant **(PMC)** should be engaged through a robust and transparent bidding process in early stages responsible for complete lifecycle of the project, who will bring in value through the life cycles of project like project scoping, structuring, execution and closure. NITI Aayog will prepare a **model document** for engagement of PMC for program/ project execution.

11. **Project Scope** and **Project Definition** needs to be mature with mature design basis, Basic Design, KPIs etc. to avoid design /scope creep as well change orders. Focus has to be on **quality** Detailed Project Report **(DPR)** or Front-End Engineering Design **(FEED).**

12. During procurement stage it is very essential to use right **bidding methodology** as well procurement mode. Draft Concession agreement should use model documents (if any) as base. The model documents should incorporate all the international best practices available in FIDIC conditions of Contract. A robust **two stage** bidding mechanism to be adopted with thoughtful qualification, technical and financial criteria, to bring the best of players on board for project execution. Selection criteria must be set that ensures the best bidders as well as **Best Available Technologies (BAT)** are employed in any given project.

13. **Waterfall Methodology** for undertaking the Projects in order of execution modes of BOT/BOOT, Annuity/Toll and Hybrid Annuity under Public-Private Partnership followed by Engineering procurement Construction (EPC) as last resort has been strongly recommended during Project development and procurement. Item rate contracts should be completely discouraged. The Waterfall methodology to be adopted for all the Projects as key recommendation and the same shall be used as **filter criteria** for deciding mode of execution and adequate due diligence needs to be conducted prior to arriving at a decision. Ministries/ organizations shall be required to test the Project on such filters so as to undertake the Project under the most preferential mode in the waterfall and the approvals will be sought accordingly.

14. **Payment Terms** to the contractor/ consultants shall be milestone based starting with the completion of a stage of construction work. Payment should be made for the equipment after supply and installation. Early achievement of key targets should be incentivized. Timely and late payments to contractors should be suitably incentivized/ dis incentivized.

15. QCI shall also be entrusted with the rating of suppliers, contractors etc. engaged in project execution and provide vendor score cards, shall assist in measuring vendor performance in different areas such as delivery, service, cost and quality and finally promotes a performance-based culture.

16. Institutionalization of knowledge leverage of the learning in successful projects needs to be ensured so that they can be used in other projects by various Ministries/ Departments/ Entities. Each Ministry may take sector specific initiatives to issue guidelines or publish best practices in project execution. NITI Aayog may consider publishing annual papers on the best practices in project execution across the sectors.

It is strongly suggested to initiate and conclude actions on the task force recommendations as mentioned above but not limited to these, at the earliest by all the Administrative Ministries.

ANNEXURE A
GLOBAL PROJECT MANAGEMENT PRACTICES

A. USA

The US Government has recently signed the Program Management Improvement and Accountability Act of 2015 (PMIAA) into law which impacts all areas of the government with the exception of the Department of Defense. The Department of Defense has to comply with its own specific project and program management capability requirements mandated by law. The Act ensures high-level sponsorship is in place to reduce waste, increase success ratios within all federal agencies and create essential value for taxpayers.

The focus is on the development of a standards-based model for program management, ensuring responsibility and accountability for delivery of program results, increasing program performance and results by establishing practices of program management, establishing a program management career field and consequently improving effectiveness and efficacy of the Government. It spells out the necessity for all federal agencies to have an assigned senior executive accountable for program management strategy and policies to ensure success. This legislation also helps to establish a program management interagency council to facilitate the sharing of successful practices and Project Management knowledge for continued improvements.

B. Kingdom of Saudi Arabia (KSA)

KSA also faced many issues in achieving the objectives set out in its National Development Strategy known as Saudi Vision 2030. Saudi Vision 2030 has a number of programs targeting the Financial Sector, Quality of Life, Privatization, Public Investment and Fiscal Balance. To achieve such an ambitious goal without a clear set of Project Management Guidelines for each program to follow was not feasible. Additionally, without a clear set of guidelines standardizing the quality and intended timeline of a project, contracts were awarded on the lowest price basis, which meant that at times the most effective contractor was not hired. The long-term impact of this means the quality of projects is compromised. To combat this, the KSA established a new National Project Management Office (NPMO) which envisaged outlining a standard approach to managing projects in an effective manner.

The new NPMO then created a standardized organizational model, which government entities in the Kingdom would implement and follow. Each entity would set up its own Entity Project Management Office (EPMO). Each EPMO will be established

and run by a Management Consultant, and each office will develop a strategic planning procedure to outline five-year infrastructure plans. These five-year strategic plans are then sent to the NPMO, which uses this information to consolidate a National Integrated Infrastructure Plan.

The NPMO will provide mandatory guidelines for all procedures in the project, which will be implemented by each EPMO. The effectiveness of this new strategy is then evaluated by the NPMO. The outcomes of establishing a set of guidelines mean that the risk of unnecessary investments and additional costs is significantly reduced. Additionally, the initial planning stage of a project will become notably more effective, where factors such as location, accessibility of services and other important considerations will occur before the engineering phase begins.

Another issue faced before the NPMO was set up was the lack of effective knowledge transfer in during the commissioning phase. To combat this issue, the NPMO will provide training to the entity the project is being handed over to, to encourage self-sufficiency and long-term sustainability. Furthermore, management consultants brought in to work in the EPMOs will be required to work with new graduates and existing Ministry Staff as part of their training. The company managing the program will then be held accountable for assigning individuals to roles that they are best suited for based on their

performance, along with providing them with an individual career development plan. These plans are submitted to the NPMO to ensure that effective knowledge transfer is occurring at every level.

The NPMO Program of activities intends to deliver the following objectives:

- The alignment of national standards and methodologies through a universal policy,

- The enablement of EPMOs to provide training and guidance to improve their capabilities,

- Support provided to the EPMOs through resources to execute their alignment requirements.

- The evaluation of the effectiveness of each EPMO in terms of how their execution compares to national standards and the monitoring of their critical project performance.

As of May 22nd, 2018, the IMF Staff that visited KSA to issue a preliminary report concluded:

- Growth is expected to increase this year as the reforms implemented take hold,

- Good progress is being made in implementing the reform program to increase non-oil-based revenue, in which one of the primary challenges remains in sustaining the undertaking of the reforms.

C. China

China realized the importance of Project Management very early since

the 1960s. Following that, many project management software based on CPM/PERT were developed by Chinese software and engineering engineers and applied to defense, aerospace and construction sectors in the 1980s. At the same, The World Bank also provided a stimulus for project management to grow at a very fast pace in China. The World Bank offered a number of training programs in Beijing, Dalian and Shanghai, aimed at improving the project management capability of China since it started lending to China in the early 1980s.

Similarly, the Ministry of Construction (MOC) also played a leading role in promoting project management in China. In June 1992, MOC issued a notice to all the state-owned construction enterprises stating that Project Management be made mandatory for textbooks, tests and certificates to meet the standards of MOC. Importantly, State Owned Enterprises in China attach preference to the contractors who hold proven project management credentials and have been acknowledged to execute and deliver a project efficiently in the past. MOC has evolved its own certification system suiting to their specific requirements. This completely removes the possibility of some of the challenges that occur during the execution stage of the project; lack of technical capability, insufficient manpower, poor coordination and communication within the executing team members, improper utilization of the resources etc., to name a few.

As in other parts of the world, project management is no longer limited to construction but has been adopted in most economic sectors in China. State Administration of Foreign Experts Affairs (SAFEA), Govt. of China is working on strengthening the project management competency and capability of both the private sector and Government officials. Furthermore, the focus is to transform the existing qualified research and management institutions into standardized project management professional bodies.

D. United Kingdom (UK)

In the United Kingdom, the Infrastructure & Projects Authority (IPA) is the government's centre of expertise for infrastructure and major projects. The IPA prioritizes the effective delivery of projects through the establishment of five core teams (Finance and International, Operations, Project Profession and Standards, Strategy and Policy & Infrastructure Delivery) that address each aspect of the implementation of a large project. IPA also provides oversight of projects and programs in its portfolio; intervenes when major issues surface; etc. IPA has a much greater hands-on engagement with the Senior Responsible Officer for each project/ program than this implies. In many ways, the IPA is a Strategic Program Management Office.

With an objective to strengthen project management capabilities within the Government of UK, is also

developing a Project Management framework, which would help in adoption and effective utilization of globally leading best practices. It has released a Standard on Project Delivery, focusing on the direction and management of portfolios, programs and projects ensuring value for money and the successful, timely and cost-effective delivery of government policy and business objectives.

The Standard lays out responsibilities of each of the nodal agencies, senior responsible owners thus ensuring the breadth of practices required for successful delivery of projects, programs and portfolio. It delineates the guidelines for officials directing and managing portfolios, programs and projects which include defining accountabilities and responsibilities which are mutually consistent and traceable across all levels of management, ensuring experience and lessons are captured, shared and used to promote future performance improvement.

E. European Union

European Union has established project management capacity as criteria for selecting beneficiaries of EU Cohesion and Structural Funds. Two key financial instruments of EU regional policy-making are available up to €366.8 billion to invest across the EU economy. As a result, project management will be at the forefront of levelling economic disparities between EU member states through 2020.

ANNEXURE B
SHENDRA INDUSTRIAL AREA - GREENFIELD INDUSTRIAL SMART CITY PROJECT: A CASE STUDY

Under the DMIC Project, "Greenfield Industrial Smart Cities" matching global standards have been conceived to be developed, and currently, four such cities are being implemented. These cities are the outcome of various infrastructure projects across different sectors like the creation of trunk infrastructure, expressways, airports, logistics hubs, etc. The nature of these mega projects is quite complex in terms of managing a variety of stakeholders, contractors, construction activities and day-to-day scheduling & planning, etc. The projects require a high level of resource efficiency, manpower, skills and greater coordination amongst all concerned. To ensure day-to-day monitoring and resource planning, etc. for effective project delivery so as to avoid the inordinate time and cost overruns, Program Management Consultants (PMCs) have been engaged.

The Program Managers work in an integrated manner entwining all the projects and sub-projects envisaged in the whole program. These PMCs are now acting as an extended arm of the SPVs created to manage these cities. Apart from provid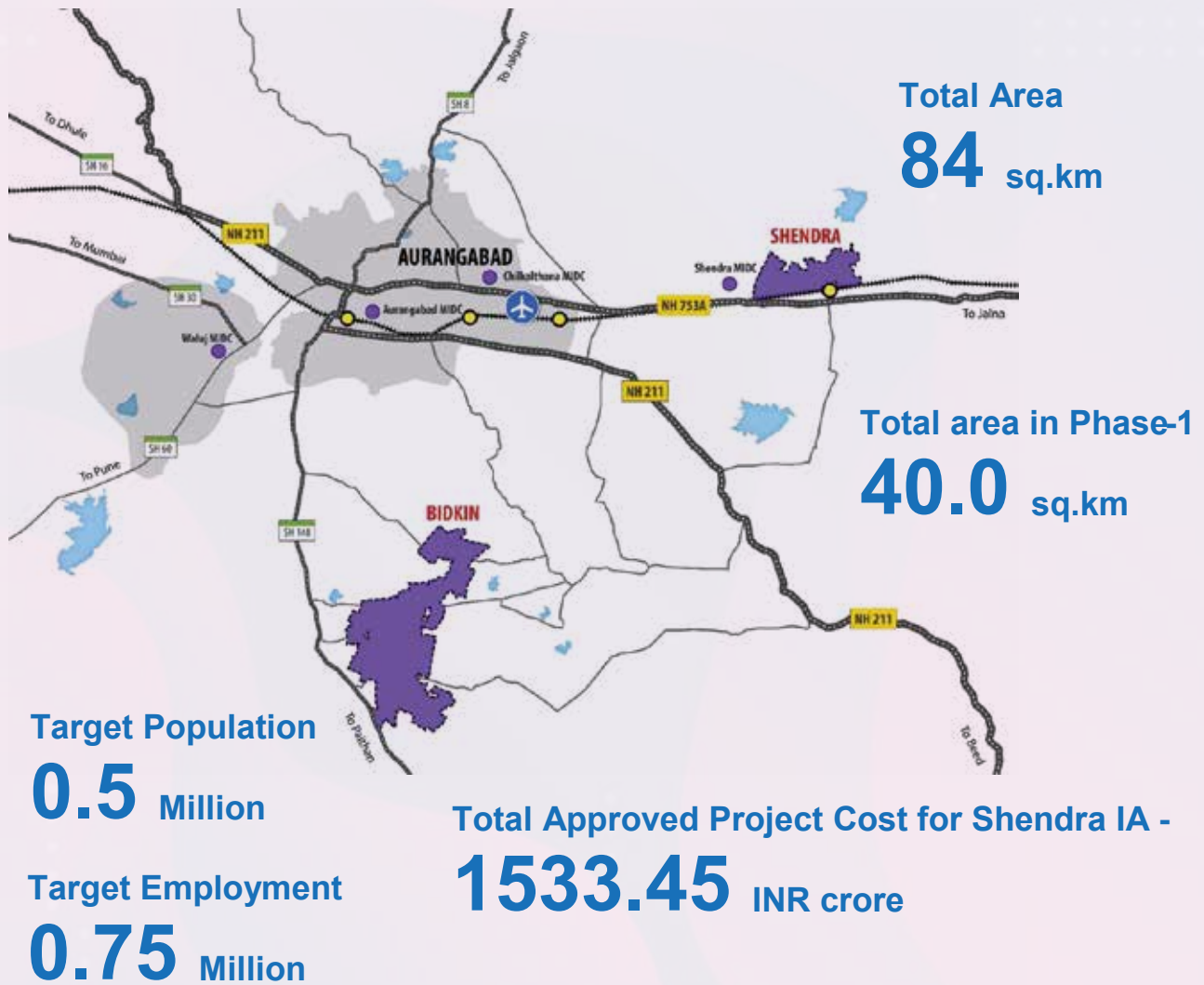ing technical capacity to manage and monitor the day-to-day complex activities in these mega projects, the PMCs bring in best of world-class technologies and standards in the development strategy of the industrial cities.

The PMCs act as an in-house core technical team in the SPVs to effectively plan and monitor all required activities in the delivery of the project right from conceiving the project to implementation and final allotment & monitoring. The PMCs constitute a team of technical experts ranging from engineers, schedulers, planners, architects, etc. headed by a Project Manager. The technical team also is equipped with Project Managers in different sectors for effective management of separate complex projects like for e.g. EPC contract for construction of roads, services & utilities, Water Treatment Plant (WTP), Sewerage Treatment Plant (STP), etc.

Owing to the highly complex nature of such projects, the "Hybrid Model" of Project Management is usually followed wherein the traditional approach is formalized through a technologically driven & more agile management practice.

SHENDRA INDUSTRIAL AREA - PROJECT AT A GLANCE:

Total Area
84 sq.km

Total area in Phase-1
40.0 sq.km

Target Population
0.5 Million

Target Employment
0.75 Million

Total Approved Project Cost for Shendra IA -
1533.45 INR crore

The Shendra Bidkin Industrial Area is located southeast of the city of Aurangabad with connectivity from SH-148 (Paithan Road), SH-178 (Jalna Road), and National Highway (NH) 211. The delineated land spreads over 25 villages in Aurangabad and Paithan tehsils.

Project Components:

- Roads and Utility Services;

- Rail Over Bridges (ROBs);

- Sewage Treatment Plant (STP), Common Effluent Treatment Plant (CETP) and Solid Waste Management (SWM);

- District Administrative Building (DAB) for SBIA; and

- Area Landscaping for Phase-I of SBIA.

In the Case of development &

implementation of Shendra Industrial Area (SIA), Aurangabad in Maharashtra under DMIC Project, the Program Managers have been able to achieve timely delivery of city infrastructure works under the contractual period without cost overruns. The PMC has set an exemplary case ensuring the best standards & practices which can be set as a benchmark for future projects. The allotment of land has already started in Shendra Industrial Area, where 45 plots have been allotted to different industries. Some of the salient Project Management Practices followed are as given below:

- The key stakeholders on the project were identified early and the vision and end goal that was mutually established followed by the vision implementation plan. This was made binding on all. A 100-day implementation plan was developed which set the way forward;

- Identified key staff from the PMC team and held workshops to explain the vision and goal. Then individual assignments were given to all the concerned;

- Majority of projects fail due to lack of project planning and not aligning the schedule and budget with vision. The team in Shendra-Bidkin Industrial Area spent 3 months in planning and developing an implementation schedule. The whole planning and preliminary design work took almost 11 months resulting in the

implementation to be completed within 24 months which normally would have taken 40 months to complete. The result was that the project was completed within the budget and with no additional change orders;

- The critical path was determined early during the planning stage, and measures were taken which gave the float for utilities and allowed the contractor to work on multiple fronts;

- Document control system i.e. MIS was implemented from day one for all the projects and tracking was done live;

- Chattering sessions (Workshops) were held with the contractors for design and implementation so that both teams know each other's expectations and how to work together as one team;

- Usage of advanced software's like GIS & BIM eliminated the need to rework on utility connections at the allotment stage.

- Safety factors: From the day the contractor came onboard safety was emphasized and the monitoring and implementation started. A lot of educational materials were provided to the workers on Safety and all the meetings started with a safety note. Incentives were given for the best safety performance to the workers/contractors. The Motto of "Beyond Zero" was made as a slogan for the project.

ANNEXURE C
GLOBAL PROJECT MANAGEMENT INSTITUTIONS

A. Axelos

B. International Institute of Projects and Program Management (i2P2M)

C. International Project Management Association (IPMA)

D. Project Management Institute (PMI)

A. Axelos's the Projects in Controlled Environments (PRINCE2) is a standard used extensively in the UK and other European markets and Australia under the for-profit Axelos Group. This was released in 1996 as a generic project management method. The PRINCE2 method is in the public domain and offers non-proprietorial best practice guidance on project management.

Key features of PRINCE2:

* Focus on business justification
* Defined organization structure for the project management team
* Product-based planning approach
* Emphasis on dividing the project into manageable and controllable stages
* The flexibility that can be applied at a level appropriate to the project.

PRINCE2 requires no preliminary project management experience to apply, unlike the PMP and IPMA (which both require at least 3 years of prior project management experience).

There are three examinations within this:

* Foundation Examination
* Practitioner Examination
* Practitioner Re-Registration Examination

  RINCE2 comprises of seven themes, processes and the framework to successfully execute the project.

B. International Institute of Projects and Program Management (I2P2M)

I2P2M was formed in 2008 as a non-profit, section 25 company to promote and enhance Project and Program management in India and globally.

Its Vision was to equip project leaders, managers, professionals from all sectors, engineering graduates, trainees and students to handle the complexity of tomorrow by building their Knowledge, Competency and Leadership through comprehensive training of cutting edge knowledge covering both hard and soft sides of project management and exposure to best practices through relevant case studies, real-time computer-based simulation of complex project and leadership scenarios and experience sharing with industry stalwarts. Its objective was to establish itself globally to be a leading project management certification body and to be foremost in imparting executive education leading to the International Executive Diploma in Project Management (IEDPM).

I2P2M is guided by a distinguished Academic Industry Council (AIC) which has eminent members from academia, industry, government, global experts and practicing professionals.

I2P2M proudly offers Nine 'Made in India' PM Certifications aligned to the 'Totality of Project Management' curriculum that covers all round global inputs with additional focus on Indian scenario. India through i2P2M is one of the few countries with project management certifications used globally. CIPM certification is based on 8 project life cycle phases with the addition of Organize, Integrate and Knowledge Leverage as additional three life cycle phases from the conventional 5 project life cycles phases. Some of its nine certifications are:

- Certificate in Project Management (CIPM)
  500+ organizations in India have CIPM holders and globally in 20 countries.

- Introductory Certificate in Project Management (IntroCIPM)

- Certificate in Project Risk Management (CrtPRM)
  - 1200 CrtPRM holders from 95+ companies

- Certificate in Earned Value Management (CrtEVM)

- Certificate in Advanced Project Management Concepts (CrtAPM)

- Certificate in Project Management Essentials (CrtPME)

- Certificate in Agile Project Management (CrtAgPM)

Worldwide, only i2P2M has negative marking in all its PM certification examinations.

I2P2M also offers the two top-rated part-time Executive Diplomas in Project Management in association with The George Washington University School of Business, Washington D.C., USA

- Executive Diploma in Project Management (EDPM)

- International Executive Diploma in Project Management (IEDPM)

  In the last 8 years, 860 senior level professionals covering 95+ companies from state and central governments and reputed public and private sector companies have acquired International Executive Diploma in Project Management (IEDPM).

C. **International Project Management Association (IPMA)** is a Federation of about 70 Member Associations (MAs) with a presence in 60 countries globally. It is the leading authority on competent project, program and portfolio management (PPPM), founded in 1965.

   The IPMA's four-level certification program is designed as an on-going competence development process. Every step up the four-level competence stair incorporates adequate development in self-knowledge and verified competence.

   The roles in the 4-L-C system, with

their distinctive capabilities, include:

- IPMA Level A: Certified Projects Director manages complex project portfolios and programs.
- IPMA Level B: Certified Senior Project Manager manages complex projects. Minimum five years of experience.
- IPMA Level C: Certified Project Manager manages projects of moderate complexity. Minimum three years of experience.
- IPMA Level D: Certified Project Management Associate applies project management knowledge when working on projects.

  IPMA's 4-L-C demonstrates a level of rigor that helps to assure knowledge, experience, competence and performance for each role.

D. **Project Management Institute (PMI)** is a not-for-profit memberships association for the project, program and portfolio management professions. PMI is a national standard development organization accredited by the American National Standards Institute (ANSI) and the U.S. member of the International Standardization Organization (ISO). PMI's 21 global standards are developed through a voluntary consensus process that brings together volunteers and subject matter experts with an interest in the standards' topics. The process relies on public feedback and is based on the concepts of consensus, openness, due process, and balance. These standards provide guidelines for achieving specific project, program and portfolio management results. The Project Management Body of Knowledge (PMBOK®) Guide is highly accepted for Project Managers across the world.

PMI has 301 Chapters worldwide with 8 Chapters in India. Its PMP (Project Management Professional) credential is one of the most important industry-recognized certifications for project managers. It is accredited by the ANSI against the International Organization for Standardization (ISO) 17024. In addition, the PMP is also registered against the ISO 9001:2000 standard for quality management systems.

There are 40,310 (9,14,401 global) Project Management Professionals (PMP)® in the country. PMI also has other certifications like Certified Associate in Project Management (CAPM), Program Management Professional (PgMP), Portfolio Management Professional (PfMP), Risk Management Professional (RMP), Scheduling Professional (SP), Professional in Business Analysis (PBA) and Agile Certified Practitioner (ACP).

The contractual structure for DMIC Project has been finalized after exhaustive deliberations amongst and due consideration of the concerns and suggestions put forth by the stakeholders. The transaction documents, the roles and responsibilities of the Parties hereto and the mitigation measures incorporated in the transaction documents to address potential issues have been provided as below:

The contractual structure for the DMIC Project envisages the fundamental involvement of the following three entities:

- The government of India represented by the DMIC Trust.
- State Government represented by the relevant Nodal Agency for the respective State.
- The SPV (already incorporated or to be incorporated at the time of execution) with equal shareholding by NICDIT (National Industrial Corridor Development & Implementation Trust) and the Nodal Agency.

Shareholders Agreement ("SHA")

The SHA includes the covenants governing the relationship between the State Government and NICDIT in their capacity as the shareholders in the SPV. Rights and liabilities of each of the parties have been provided in the SHA along with the equity structure and the mechanism of procuring such equity in the SPV. The procedure for decision making at the meeting of the Board of Directors and the general meeting has been substantially detailed.

State Support Agreement ("SSA")

The State Government has a crucial role in the DMIC Project. State Governments have been accorded expansive powers under various State legislation, which need to be assigned to the SPV in order to ensure functional autonomy of the SPV. The Parties endeavor to achieve the above-stated objective by means of an SSA, whereby the State Government undertakes, inter alia, to:

- Delegate the relevant powers and functions under various State legislation;
- Not act in a manner that may be detrimental to the implementation of the DMIC Project; and
- Accord its full support and assistance in obtaining the various approvals, permits, exemptions etc. as may be required by the SPV for the implementation of the project.

DMIC Project is a large-scale project and requires a contractual framework that ensures a balance of risks between the Union Government and the State Government. DMICDC being the nodal agency to spearhead the development of the DMIC Project & other Industrial

Corridor Projects and whose functions include but are not limited to acting as the project development partner and knowledge partner for the project. The process of activities being undertaken for the development of industrial corridor projects is given below:

Step 1: Preparation of the Perspective Plan for the overall Industrial Corridor Region

Step 2: Identification of suitable sites by the State Government which can be developed as the Investment Region/ Industrial Area under said Industrial Corridor

Step 3: Preparation of Concept Master Plan and Development Plan of the identified nodes

Step 4: Preparation of Feasibility Studies for Early Bird Projects identified in consultation with the State Government and preparation of pre-feasibility studies for the identified projects

Step 5: Preparation of Information and Communication Technology (ICT)/ Digital Master Planning for the Nodes

Step 6: Seeking Environment clearance for the Nodes

Step 7: Identification of Trunk infrastructure packages and preparation of detailed designs for Trunk infrastructure like internal roads, drinking water management, sewage, drainage, power, solid waste management, laying down of ICT layer

Step 8: Finalization of the Regulatory and Institutional Framework

Step 9: Execution of SHA and SSA

Step 10: Incorporation of Node/ city level SPV or Incorporation of project SPVs.

Step 11: Detailed engineering of Trunk Infrastructure

Step 12: Implementation of trunk infrastructure. Allotment of developed land

Step 13: Structuring of projects to be bid out under PPP

Step 14: Bidding of PPP projects

Step 15: Replication of implementation model for the development of future phases

Box 2: Key takeaways from the DMIC model

- The Waterfall methodology has been utilized for the execution of projects with preference to PPP (BOT), PPP (Annuity) followed by EPC/ Lump Sum/ Turnkey basis. All the contracts have been based on FIDIC guidelines and ensured that the robust two-stage bidding process was adopted, which comprised of an RFQ for shortlisting of bidders with a proven track record and thereafter obtained the most competitive financial proposal from the shortlisted bidders. The bidder pre-qualification criteria have been set to ensure that Best Available Technology (BAT) is employed in any project. During the execution, sufficient scope for incorporation of innovation during detailed engineering stages has been defined within the constraints of already set KPIs and Basic Design.

- The Project Management Consultant (PMC) reviews the detailed designs of the consultants and contractors engaged in parallel, meanwhile being vetted by an Institute of Eminence in parallel to design consultant. The review and comments were provided within a defined timeline of (15) days and were limited to compliance with the specifications and standards provided in the bidding documents. The risk and responsibility of compliance of the design was held with the contractor irrespective of whether the Authority has reviewed the same or not.

- Payments to the contractors/ consultants were milestone based starting with the completion of a stage of construction work with no payment for the supply of equipment. Early achievements of key targets were incentivized while delays or non-performance of KPIs were penalized as set forth contractually.

- The minimum defect liability period has been set to 2 years and O&M services of 3 years in all the infrastructure projects, with an option to sell out the project with O&M to competitive bidder after a period of 1 year.

ANNEXURE E
BENEFITS OF A PROGRAM MANAGEMENT APPROACH

The rigorous application of the proven processes and tools of Program Management have allowed Owners to exercise a greater level of control over complex and inter-related sets of projects and activities that span many years. This control allows the coordinated management of risks and change as the delivery details are implemented. It also results in a "no surprises" delivery as project objectives are effectively and efficiently achieved.

Box 3: What is Program Management?

A program is defined as related projects, subsidiary programs, and program activities managed in a coordinated manner to obtain benefits not available from managing them individually.

Program management is the application of knowledge, skills and principles to a program to achieve the program objectives and to obtain benefits and control not available by managing program components individually. It should be noted that this focus on benefits and recognition that a higher level of controls is needed to manage risk is one of the key distinctions between projects and programs. It is the disciplined, systematic orchestration of human resources, time, money and information to plan, design, construct, and deliver a collection of projects in a coordinated way, to obtain benefits for the owner not available if these projects were managed separately.

Program Management uses well defined and proven business and project delivery processes and tools to achieve the overall mission objectives within specified time and budget constraints.

Program Management is typically applied when the identified mission involves a significant expenditure of resources, involves the integration of disparate activities (for e.g., a total of 9 different disciplines have to be integrated during city building), requires achievement of extraordinary objectives and has demanding constraints on schedule, budget, quality or service.

Typical benefits of Program Management include the following:

(i) Reduced Costs

Coordinated management of the many diverse activities required to achieve program objectives has been demonstrated to reduce the "hard" costs of construction and also the "soft" costs of planning, engineering, and administration.

- Hard costs are reduced by a variety of methods. Coordinated planning and prioritization of all program elements result in the

selection of the most appropriate approaches to achieve program objectives. For example, in case of development of Dholera Special Investment Region (DSIR) under the Delhi Mumbai Industrial Corridor Project in India (DMIC), the Program Managers team were able to eliminate a complete treatment plant in the year 2030 by adopting a holistic approach to water management. The real savings is estimated at INR 767 Cr. Construction costs are also reduced through lower bid prices that result from coordinated contract phasing, selection of appropriate delivery approaches for each program element, and economies of scale resulting from design and with a unified, dedicated staff, applying proven material standardization. In DSIR, for the 10 contracts issued, the actual bids are on an average 7% less than estimates. Hard costs are also reduced through lower change order costs resulting from rigorously applying proven risk management and change management techniques across the full spectrum of program activities. With 50% of the INR 2800 Cr construction completed, the variation orders are less than 0.5% against an industry standard of 2 to 3%.

- Avoiding duplication of efforts that result from fragmented delivery approaches reduces soft costs. Implementing the program

mission processes and tools has been demonstrated to improve performance outcomes while reducing the soft costs of program delivery by 10% or more. For example, in the case of city-level projects, programmatic policies and standards including BIM and GIS have saved engineering costs by reducing the duplication each firm has to undertake if managed separately.

- Owners, who are not familiar with Program Management often ask, "How much is this going to cost me?" A more appropriate question would be to ask "how much is this going to save me?" Program Management is an "investment" which results in cost savings and lowers risks; it is therefore not a "cost".

(ii) Improved Schedule Performance

Improved schedule performance does not always mean getting it done quicker. If quickness is the objective due to legal requirements, immediate growth pressures or business opportunities, Program Management has been demonstrated to deliver quick results.

If the program is driven by a set of extended regulatory milestones, the control offered by Program Management can be applied to achieve milestones on schedule, but not earlier than needed, thus spreading out cash flow demands. If the program is in response to projected (but not immediate)

requirements for service expansion, Program Management controls can be used to balance cash flow, matching payments out to revenue received, thereby maximizing the effective return on the investment.

(iii) Improved Quality

Quality management is the prime focus of a Program Management delivery approach. Benchmark quality management systems, whether they be "TQM", "6-Sigma" or others, all rely on the rigorous application of standardized systems by well-trained staff. Quality management applies quality principles in the following way:

- "Quality" is defined based on overall program mission and objectives, and the quality definition for each program and project activity is further defined to ensure that each activity supports the quality goal of the mission.

- The quality program is developed and uniformly applied from the first steps of task identification through the final commissioning of the last program element. Since the approach is coordinated across all program activities, lessons learned are institutionalized, and the benefits accrue to all later activities.

- An overarching quality program allows the assignment of experienced quality management practitioners to implement a comprehensive quality system. In

addition, the resources of a program team often provide access to subject matter experts that might not be available in a fragmented approach to project execution.

The Program Management delivery approach is ideally suited to develop a quality-based organization, committed to excellence in all aspects of implementation.

(iv) Emphasis on Risk Management

Another benefit of the program management approach is the alignment of the program and its supported objectives to organizational strategy. This involves having a risk management strategy that ensures effective management of any risk that can cause the program to be out of alignment with the organizational strategy. Such a risk management strategy includes defining program risk thresholds, performing initial program risk assessment, and developing a high-level program risk response strategy, as well as determining how risks will be communicated to strategic levels of the organization.

(v) Focus on Benefits Management

Program Benefits Management includes processes for monitoring the program's ability to deliver against these benefits and outcomes. Its purpose is to focus program stakeholders (program sponsors, program managers, project managers, program team, program steering

committee, and others) on the outcomes and benefits to be provided by the various activities conducted during the program's duration.

(vi) Ensuring Stakeholder Management

Stakeholder Management identifies and analyses stakeholder needs and manages expectations and communications to foster stakeholder support. A stakeholder is an individual, group, or organization that may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project, program or portfolio.

Stakeholders may be internal or external to the program and may have a positive or negative impact on the outcome of the program. Program and project managers need to be aware of the stakeholders' impact and level of influence to understand and address the changing environments of programs and projects. Stakeholders should be identified, analyzed, categorized and monitored. Balancing stakeholder interests is important, considering their potential impact on program benefits realization or the inherent conflicting nature of their interests.

(vii) Change Management

Projects are intended to deliver specific results and attempt to constrain change to maintain cost, schedule and scope requirements. Programs, on the other hand, leverage change in a way that protects or enhances the realization of the desired benefits. So,

programs embrace and deliver change. Furthermore, while a project will lock down the design, the program will elaborate designs as the program is executed and more is learned along the way.

Role of a Program Manager

The program manager maintains responsibility for the leadership, conduct, and performance of a program and for building a program team that is capable of achieving program objectives and delivering anticipated program benefits.

A Program Manager (to preferably be a management/ consultancy firm, can also be an individual depending on the size of the project(s)) will be responsible for:

(i) Managing multiple projects/ programs at a macro level; (ii) To be assisted by several project managers (preferably a firm but can also be an individual depending on the size of the project); and (iii) Be responsible for managing individual projects at the micro level.

Program Manager and Project Managers are to be appointed by the concerned Authority and related expense also to be borne by the Authority.

Program Managers maintain continuous alignment of program scope with strategic business objectives and make recommendations to modify the program to enhance effectiveness toward the business result or strategic intent.

A primary role of a program manager is to monitor the outputs and

outcomes of a program's component activities and ensure that the program adapts appropriately to them in order to meet the organization's strategic objectives.

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Box 4: Program Manager Vs Project Manager.

A program manager manages a program, multiple projects and sometimes multiple programs while a project manager manages the teams responsible for fulfilling the project and achieving its deliverables.

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Program Management principles for success

(i) **Investment in Planning:** Investing heavily during the planning and design stage will reduce the time and cost incurred, as it reduces the number of unforeseen setbacks that may occur and lowers the probability of design errors.

(ii) **Prioritizing delivering a Project on time:** Adhering to the timeline defined for a project should be a priority by aligning the right people, resources, and schedules.

(iii) **Accountability**: The contractor should be held accountable for the quality of the services they provide irrespective of the quantum & magnitude.

(iv) **Rewarding Superior Performance:** Delivering a high-quality project should be incentivized.

(v) **Education in Project / Program Management:** Human resources at both levels including the contractor and client should be adequately skilled and globally certified.

(vi) **Efficiency:** Communication is essential to ensure that effective and timely decisions are made regarding a project. It is very important to ensure continuous communication with stakeholders to understand their needs and expectations.

(vii) **Effective Governance:** The successful implementation of a Project/ Program needs effective horizontal and vertical coordination between various institutions that are involved in the project.

(viii) **Capacity Building:** Right people with the right skillset are essentially required for making any program a success. Accordingly, it is essential to strengthen project and program management competency and capability at all levels.