

# Dissertation Report

# 2015

## Understanding PPP and its Implementations for Smart cities



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MBA (Power Management)

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## DISSERTATION ON

# “Understanding Public Private Partnership and Its Implementation for Smart cities”

Synopsis submitted to College of Management & Economic Studies for the  
Partial fulfillment of the degree of

MBA (Power Management)

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# DECLARATION

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I, Prakhar Chaudhary, Roll No. 500026010, student of MBA-Power Management (2013-15) at University of Petroleum & Energy Studies, Dehradun hereby declare that the Dissertation Report entitled “**Understanding Public Private Partnership and Its Implementation for Smart cities**” is an original work and the same has not been submitted to any other institute for the award of any other degree.

A seminar presentation of the Training Report was made on \_\_/\_\_/\_\_\_\_ and the suggestions approved by the faculty were duly incorporated.

**Presentation In-Charge  
(Internal Guide)**

**Signature of the Candidate**

**Countersigned**

**Director/Principal of the Institute**

# ACKNOWLEDGEMENT

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Regards,  
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# Executive Summary

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As we have entered into the 21<sup>st</sup> century with a strong trend of increasing concentration of population in large cities. Large cities can be highly productive, innovative and per capita very green. The rapid influx of new citizens presents overwhelming challenges to their governments. Along with the positive benefits, negative aspects such as cumulative development, waste management, traffic congestion, and access to resources and crime also come hand by hand. The demand for services would be immediate, but the tax revenues to fund them come later. On the same time, Globalization has connected cities on opposite side of the planet in forms of competition.

These challenges has leads to the experiments with innovative approaches related to planning, construction, design, finance, governance and operation of urban infrastructure and services that are broadly called **SMART CITIES**.

The smart city is most critical for sustainable urban development. It could deal with many critical problems accompanying the current overwhelming urbanization process for example traffic jams, environment pollution and natural resource limits. It features the utilization of information and communication technology infrastructure, social capital, human resources and environment resources for economic development and high quality of human life.

Developed countries take the major share of the world urban development, among which India taking a significant share of that. Smart city concept is a new thing to India. Still now projects being implemented either off infrastructure, sewage management; Modern railways (Metro) are either totally public owned or private owned projects. Indian governance majorly is public owned entity, we have lots of public sectors units and all the necessity products are being developed by them only. **Public Private Partnership Model** has emerged after the independence when privatization was promoted.

PPPs are mostly medium to long term arrangements between public and private sectors companies, whereby some of the services obligations of the public sector are provide by the private sector with clear and pre mentioned agreement on mutual objectives for delivery of public infrastructure or public services. They are also called as Turnkey construction contracts, categorized majorly as public procurement projects.

Union government has reviled ambition of building 100 smart cities in India, as a new concept; government does not have any prior experience of implementing it. In this report we have tried to analyze different PPPs projects being implemented in India in different sectors like water supply, sewage system, road construction and Metro's. Apart from this we have taken six basic smart cities of the world where these projects have been implemented and tried to analyze their problems and gaps, and how India should be prepared to implement this new concept.

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# List of Abbreviations

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- AAI Airports Authority of India
- AMTRL Ahmedabad Mehsana Toll Road Company Limited
- ASP Alandur Sewerage Project
- BHEL Bharat Heavy Electricals Limited
- BPCL Bharat Petroleum Corporation Limited
- CAGR Compounded Annual Growth Rate
- DERC Delhi Electricity Regulatory Commission
- DFA Distribution Franchisee Agreement
- GoI Government of India
- HUDA Haryana Urban Development Authority
- IDBI Industrial Development Bank of India
- IDFC Infrastructure Development Finance Company
- IIFCL India Infrastructure Finance Company Limited
- KMC Kolkata Municipal Corporation
- LIC Life Insurance Corporation of India
- MCD Municipal Corporation of Delhi
- MoA Memorandum of Agreement
- MoU Memorandum of Understanding
- NCB National Competitive Bidding
- OHSAS Occupational Health and Safety Management System
- PCB Pollution Control Board
- RDF Refuse Derived Fuel
- SBI State Bank of India
- SCADA Supervisory Control and Data Acquisition
- TAMP Tariff Authority of Major Ports
- UEM United Engineers Malaysia
- UTI Unit Trust of India
- WEBEL West Bengal Electronics Industry Development Corporation
- WTP Willingness To Pay

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# Background

## Indian Economy

In India every city has its own history, identity and culture. There is no doubt that we have to nurture, renew and preserve the urban fabric with changing times. A city is an urban agglomeration which provides many advantages and opportunities. However, there are some limits after that it becomes very difficult to sustain. Places which are once a small village grows and developed as a town, metropolis and then decay into a necropolis.



India's economy is increasing rapidly. It's being forecasted that by 2030 it would grow by 5 times mainly because of country's urban centers.

During the same period, the country's labor force is expected to grow by 270 million workers, with urban jobs accounting for 70% of that growth. Today, 30 per cent of Indian resides in urban and the life there is very chronically low. However, with 2/3rds of India's GDP already generates in cities and rural to urban migration patterns are increasing rapidly, the country faces a critical challenge: managing this rapid urbanization in a way that enhances the livability of India's urban spaces.

As India's population continues to grow, more citizens will move to cities. Experts predict that about 30-35 people will migrate every minute to major Indian cities from rural areas in search of better livelihood and better lifestyles.

It is estimated that by the year 2040, the number of people living in Indian cities will touch 850 million. To accommodate this massive urban population, India needs to find smarter ways to manage complexities, reduce expenses, increase efficiency and improve the quality of life.

## Smart Governance

Investments of about USD 1.1 trillion would be required over the next 20 years across areas like transportation, energy and public security to build smart cities in India

### Budget 2014-15:

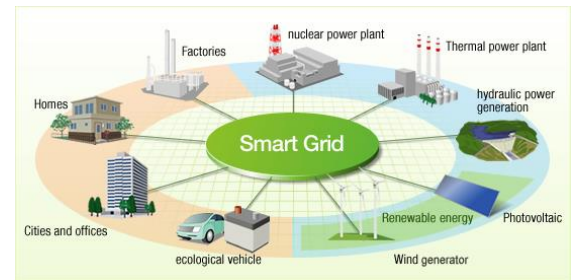
- USD 1.2 billion allocated for smart cities and FDI norms relaxed
- USD 85 million allocated for Digital India Initiative
- PPP Model to be used to enhance infrastructure in 500 urban areas
- Smart City projects to create 11-16% rise in employment
- Ministry of Urban Development had planned to develop 2 smart cities in each of India's 29 states
- Delhi Mumbai Industrial Corridor Development Corporation Ltd (DMICDC) plans seven smart cities along the 1,400 km industrial corridor across six states with a total investment of USD 100 billion



## Smart Energy

### Smart Grid

- Electrification of households with power available for at least 8 hours per day by 2017
- Low cost smart meter by 2014
- Establish smart grid by 2014 and smart grid knowledge center by 2015
- Implementation of 8 smart grid pilot projects in India with an investment of USD 10 million



### Energy Storage

- Addition of 88,000 MW of power generation capacity in the 12th Five Year Plan (2012-17)
- India needs at least 260-400 GW of new power generation capacity by 2030
- The Power Grid Corporation of India Ltd has planned to invest USD 26 billion in the next five years

### Smart Meters

- India to install 120 million smart meters by 2021

## Smart Environment

### Renewable Energy

- Ministry of New and Renewable Energy has plans to add capacity of 30,000 MW in the 12th Five Year Plan (2012-17)



### Water and Waste Water management

- The Indian Ministry of Water Resources plans to invest USD 50 billion in the water sector in the coming years
- The Yamuna Action Plan Phase III project for Delhi is approved at an estimated cost of USD 276 million

### Sanitation

- About 67 per cent of the rural population continues to defecate in the open, and India accounts for about 49 per cent of the world's open defecation

- The Government of India and the World Bank have signed a USD 500 million credit for the Rural Water Supply and Sanitation (RWSS) project in the Indian states of Bihar, Assam, Jharkhand and Uttar Pradesh

## + Smart Transport

### Green Transport

- The Government of India has approved a USD 4.15 billion plan to spur electric and hybrid vehicle production by setting an ambitious target of 6 million vehicles by 2020
- Electric vehicle charging stations in all urban areas and along all state and national highways by 2027



### Railways

- **Metro:** Ministry of Urban Development plans to invest more than USD 20 billion on the metro rail projects in coming years
- **High Speed Rail:** The proposed 534 km Mumbai-Ahmedabad high speed rail project will have an investment of around USD 10.2 billion
- **Monorail:** India's first monorail project at Mumbai will cost around USD 550 million, of which USD 180 million has been spent on phase I



## + Smart IT & Communications

### Information and Communication Technology

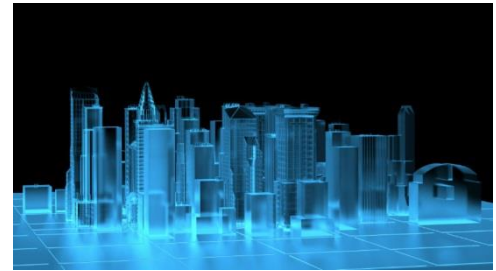
- Cloud computing will evolve into a USD 4.4 billion market in India by 2016
- Broadband connections to 170 million users by 2017

### Security and Surveillance

- Under the flagship Safe City project, the Union Ministry proposes USD 300 million to make seven big cities (Delhi, Kolkata, Ahmedabad, Mumbai, Bangalore, Chennai, and Hyderabad) to focus on technological advancement rather than manpower Disaster Management
- GOI and World Bank are supposed to signed USD 236 million agreement for reducing disaster risks in coastal villages of Tamil Nadu and Puducherry

### Smart buildings

- India is expected to emerge as the world's 3rd largest construction market by 2020, by adding 12 million homes every year
- The Intelligent Building Management Systems market is around USD 621 million and is expected to reach USD 1,900 million by 2016
- Smart Buildings will save up to 30 per cent of water usage, 50 per cent of energy usage and reduction of building maintenance costs by 10 to 30 per cent



## Understanding Public Private Partnership (PPP)

Since the formation of new union government and the hype to resurrect the growth trajectory of India, PPP has become the new buzzword for addressing the ills related to stagnation of growth and development in our country.

Let us now look on a brief journey of understanding PPP as a concept.

### What is meant by PPP?

PPP is a mode of implementing government program/schemes in partnership with the private sector. The term private in PPP means all non-government agencies such as the corporate sector, voluntary org, self-help group, partnership firms, individuals and community based org. PPP moreover subsumes all the objective of the service being provided earlier by the government, and is not intended to compromises on them. Essentially the shift in emphasis is from delivering services directly to service management and coordination.

### Salient features of a PPP

Not all projects with private sector participation are PPP projects. Actually, PPPs are those ventures in which the resources required by the project in totality along with the accompanying risks and reared/risk are shared on the basis of predetermined agreed formula, which is formalized through contract. A PPP project is basically based on a significant opportunity for the private sector to innovate in the design construction service delivery or use of an asset.

PPP are different from privatization. While PPP's involve private management of a public service through a long term contract between an operator and a public authority privatization involves outright sale of a public service or facility to the private sector.

### Fundamental Qualities of a PPP project



- High Priority, government planes project: the project must have emerged from a government led planning and prioritization process, the project must be such that regardless of the source of public or private capital the government would still want the project to be implemented quickly.
- Genuine risk allocation: shared risk allocation is a principle feature of a PPP project. The project sector must genuinely assume some risk.
- Mutually valuable: Value should be of both sides which means government should also genuinely accept some risk and not transfer the entire risk to the private sector and vice versa.

## Benefits of Public Private Partnership

The financial crisis of 2008-11 has brought both renewed interest in PPP in both developed and developing countries. Revealing constraints on public resources and fiscal space while recognizing the importance of investment in infra to help their economy grow, government are increasingly turning to the private sector as an alternative additional source of funding to meet funding gap. While recent attention has been focused on fiscal leverage of projects, government look to the private sector to help them deliver infra for no of others reasons:

- Exploring PPP as way of introducing private sector technology and innovation in providing better public services through improved operational efficiency.
- Promising the private sector to deliver assigned projects on time and within budgets.
- Imposing budgetary certainty by setting the present and future costs of infra projects over time.
- Utilizing PPP as a way of developing local private sector capabilities through joint ownership with large international firms as well as subcontracting opportunities for local firms in areas such as civil works, electrical works, facilities management securities services, cleaning services, maintenance services etc.
- Using PPP's as a way of gradually exposing state owned enterprises and government to increasing level of private sector participation and structuring PPP in a way so as to ensure transfer of skills leading to capacitated entities that can eventually export their competencies by bidding for projects/joint tenure.
- Developing diversification in the economy by making the country more competitive in terms of its facilitating infra base as well as giving a boost to its business and industries associated with infra development.
- Supplementing limited public sector capabilities to meet the growing demand for infrastructure development.
- Long term value for money through appropriate risks transfer to the private sector over the life of the project –from design/construction to operations/maintenance.



## Potential risk to public private partnership

There are number of potential risk associated with PPPs such as given hereunder:

- Development, bidding and ongoing costs in PPP projects are likely to be greater than for traditional government procurement processes-the government should therefore determine whether the greater costs involved are justified.
- There is a cost attached to debt- while private sector can make it easier to get finance .finance will only be available where the operating cash flows of the project company to provide a return on investment(i.e. the cost as to be borne either by the customer or the government through subsidy etc.)
- Some projects may be more politically or socially challenging to introduce and implement than others particularly if there is an existing public sector workforce that fears being transferred to the private sector if significant tariff increases are required to make the project viable if there are significant land or resettlement issues etc.
- There is no unlimited risk bearing private firms(and their lenders) will be caution about accepting major risk beyond their control such as exchange rate risks of existing assets. If they bear these risks then their price for the service will reflect this. Private sector will expect a significant level of control over operations, if it is to accept significant risks.
- Private sector will do what it is paid to do and no more than that-therefore incentives and that-therefore incentives and performance required need to be clearly set out in the contract. Focus should be on performance requirements that are output based and relatively easy to monitor.
- Government responsibility continues-citizens will continue to hold give accountable for quality for utility services.gov will also need to retain sufficient expertise whether the implementing agency and /or via a regulatory body to be able to understand the PPP arrangement to carry out its own obligation under the PPP agreement and to monitor performance of the private sector and enforce its obligation.

## **PPP bridging the gap to fund India's growth**

**Government of India's definition:** PPP projects means a project based on a contract or concession agreement between a government or statutory entity on the one side and private sector company on the other side for delivering an infra services on payment of user charges”

India has few notable PPP as early as the 19<sup>th</sup> century. The great Indian peninsular railways company operating between Bombay and Thana (1853), the Bombay tramway company running tramway services in Bombay (1874) and the power generation and distribution companies and Calcutta in the earlier 20<sup>th</sup> century are some of the earlier examples PPP in India.

PPP is emerging as the new success route in India's attempts to build world class infra and boosts sector development; over the last decade policymakers at both central and state levels have been increasingly focusing on infra investing so as to enable fast paced economic growth. PPP in fact has been identified as the key to policymaker attempts to create the requisites infra for enabling double digit GDP growth and enhancing people's welfare. In fact the planning commission accepts private investment to contribute 50 % to total infra investment (worth \$1million) in India during the 12<sup>th</sup> five year plan. It will be no surprise if a large chunk of these investments is directed through the PPP route.

## **PPP models supported by the Government in India**

- **User fee based BOT model-** Medium to large scale PPP have been awarded mainly in the energy and transport sub sectors(roads, ports and airports).Although there are variations in approaches over the years the PPP models has been veering towards competitively bid concessions where costs are recorded mainly through user charges.
- **Annuity based BOT-** In sectors/projects not amenable for sizeable cost recovery through user charges owing to social political affordability consideration such as in rural urban health and education sectors the government harness private sector efficiency through contracts based on availability based on availability/performance payments.
- **Performance based management/Maintenance contracts-** In an environment of constrained economic resources. PPP that has improves efficiency in more relevant. PPP models are performance based management maintenance contracts are encouraged. Sectors suitable for such models include water supply sanitation solid waste management, road maintenance etc.
- **Modifies design build(turnkey) contract:** In transitional design –build contract private contractors is engaged for a fixed fee payment on completion .the primary benefits of DB contracts include time and cost savings efficient risk sharing and improved quality. A new turnkey DB approach with the payment linked to achievement of tangible intermediate construction milestones and short period maintenance /repaid responsibilities is being considered.

**Following are the 15 case studies of PPP projects in India. The case studies have been prepared to highlight the experience and lessons learnt so far and thereby influence the design of future PPP processes and structures to improve the quality of PPP projects.**

**The choice of case studies are made in such a way that it cover different aspects across different sectors, covers different PPP project structures, includes projects at different stages of the PPP life-cycle and has projects with different levels of complexity.**

**These case studies include the following:-**

- A description of the project with project features;
- The project structure are adopted with details of the roles and responsibilities of the private and public partners;
- The financing details of the projects are given along with the current status
- A description of the PPP process adopted including project feasibility, project identification, structuring of the contract/concession and awarding projects to private partners. This includes details such as timing of major events like tendering and details like the level of response to the bid process;
- A detailed matrix of initial allocation of key risks across the public and private sector partners, along with details of subsequent changes, and an assessment of the implications of the risk allocation;
- A concise assessment of the achievement of objectives originally set out for the project, viz., improvements in service delivery - e.g., capacity, quality, coverage affordability – with indicative parameters, to the extent possible;
- A Value For Money (VFM) assessment of the project to illustrate the benefits of following a PPP approach vis-a-vis the alternative of public procurement; and
- A summary of observations and key learning from the project.



# Snapshot of Case Studies

Sn o.	Sector	PPP project structure	State and Year PPP project signed	Government/public sector entity	Private sector promoter/sponsor/c consortium member	Project cost	Concession period
<b>1</b>	<b>Alandur Underground sewerage project</b>						
	Sewerage	Construction Contract (Underground Sewerage System) O&M Contract (Underground Sewerage System) Build-Operate-Transfer (BOT) Annuity (Sewage Treatment Plant)	Tamil Nadu 2000	Alandur Municipality and the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL)	IVRCL Infrastructures and Projects Ltd and Va Tech Wabag Technologies Ltd.	34.6 crore (Sewerage Network) 6.68 crore (Sewage Treatment Plant)	O&M Contract – 5 years BOT Annuity – 14 years
<b>2</b>	<b>Karnataka Urban water supply improvement</b>						
	Urban water supply	Operations & management contract	Karnataka 2005	Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)	Veolia Water (formerly known as Companies General des Beaux, France)	32 crore	42 months (Later extended to 59 months)
<b>3</b>	<b>Latur Water supply project</b>						
	Water supply	Operations & Management Contract	Maharashtra 2006	Maharashtra Jeevan Pradhikaran	Subhash Projects & Marketing Limited, UPL Environmental Engineers Limited and Hydro Comp Enterprises India Private Limited.	182 crore (including payment to MJP for right to use assets)	10Years
<b>4</b>	<b>Salt Lake Water supply and sewage Disposal system</b>						
	Water & Sewage	BOT (includes Design and Finance)	West Bengal 2007	Kolkata Metropolitan Development Authority and Naba Diganta Industrial Township Authority	Jamshedpur Utilities and Services Company Limited and Voltas Limited	70.09 crore	30years
<b>5</b>	<b>Timarpur okhla Integrated municipal solid waste management project</b>						
	Urban Infrastructure - Municipal Solid Waste	BOOT (includes Design and Finance)	Delhi 2008	New Delhi Municipal Corporation (NDMC) and Municipal Corporation of Delhi (MCD)	Jindal Urban Infrastructure Limited	200	25

<b>6</b>	<b>Vadodara Halol toll road</b>						
	Roads	BOOT (includes Design and Finance	Gujrat 1998	Government of Gujrat	Government of Gujrat and IL&FS	161	30
<b>7</b>	<b>Tuni Anakapali Annunity road project</b>						
	Roads	BOOT (includes Design and Finance	Andra Pradesh 2001	National Highways Authority of India	GMR Group, United Engineers Malaysia (UEM) Berhad Group	315	
<b>8</b>	<b>Delhi Gurgaon Expressway</b>						
	Roads	BOOT (includes Design and Finance	Delhi and Haryana 2002	National Highways Authority of India	DS Constructions and Jaiprakash Industries	1175	20
<b>9</b>	<b>Nhava sheva international container terminal</b>						
	Ports	BOOT (includes Design and Finance	Maharashtra 1997	Jawahar nehru port trust	P&O Australia Ports Pty Limited, Consortium Perkapalan Berhad and Trans Impex Private Limited (P&O Ports subsequently taken over by Dubai Ports World Limited (DP World))	733	30
<b>10</b>	<b>Kakinada deep water port</b>						
	Ports	BOOT (includes Design and Finance	Andra Pradesh 1999	Government of A.P	Larsen & Toubro Ltd, India, Stevedoring Services of America, USA, Precious Shipping Company, Thailand, Consortium Perkaplan Berhard, Malaysia	330 crore (4th Berth including offshore jetty)	20 years (extendable by 12 periods of 5 years each) Later extended to 30 years (extendable by 2 periods of 10 years each)
<b>11</b>	<b>Gangavaram port</b>						
	Ports	BOOT (includes Design and Finance	A.P 2004	Government of A.P	Mr. D.V.S. Raju & associates, Warburg Pincus and the Andhra Pradesh Infrastructure Investment Company (APIIC)	1696	30
<b>12</b>	<b>Mumbai Metro</b>						

	Urban Infrastructure – Mass Rapid Transport	BOOT (includes Design and Finance)	Maharashtra 2007	Mumbai Metropolitan Region Development Authority (MMRDA)	Reliance Energy Limited, Veolia Transport (France) and MMRDA	2356	35
<b>13</b>	<b>Hyderabad metro</b>						
	Urban Infrastructure – Mass Rapid Transport	BOOT (includes Design and Finance)	Andhra Pradesh 2008 (Subsequently cancelled in 2009)	Government of A.P	Maytas Infrastructure, Government of Andhra Pradesh, Nav Bharat Ventures, IL&FS and Ital-Thai (Subsequently cancelled in 2009)	11814	35
<b>14</b>	<b>Bhiwandi Electricity Distribution Franchisee</b>						
	Electricity department	Operations & Management Contract (Franchisee)	Maharashtra 2004	MSEDCL	Torrent power AEC ltd	61(MSEDCL)250(TP AL)	10
<b>15</b>	<b>Amritsar Intercity bus terminal</b>						
	Urban transport	BOOT (includes Design and Finance)	Punjab 2004	Department of Transportation (DoT), Government of Punjab	Rohan Builders (India) Pvt Ltd., Rajdeep Buildcon Pvt Ltd and Rajdeep Road Developers Pvt. Ltd.	21.34	11.5

**Table 1: Snapshot of Case studies**

# Study 1: Alandur Sewerage Project



## Project Description

The Alandur Sewerage Project (ASP) was initiated in the year 1996 by the Chairman of the Alandur Municipality (AM). AM, located adjacent to Chennai city, forms a part of the Chennai Metropolitan Area. With a population of around 167000, the municipality is a residential suburb of Chennai with predominantly residential and commercial activities. Around one-fifth of its population lives in slums.

Prior to 1996, the town did not have an underground sewerage system and all sewage was managed with individual septic tanks. The Hugely unregulated disposal of sewage in storm water drains was an environmental and health concern for the local residents and was frequently raised as a political issue. Around 98% of 19,800 households used either septic tanks or holding tanks collected periodically by tankers and disposed in the low-lying areas outside the municipal limits. In 1997, AM announced an plan to construct an underground sewerage system and waste water treatment facility with the participation of the private and public sector, and payment to be provided by the city. The proposal was 'transformational' as it involved a service never before made available by the municipality, financial and management responsibilities being shared by the municipality, the private sector, the residents, and state government bodies.

The Alandur sewerage project was designed with objectives stated below:

- To improve the standard of living of the residents of Alandur (on par with that of Chennai);
- To provide the most basic and essential facility to all the residents of the town;
- To eradicate the mosquito menace;
- To avoid the expenditure on septic tank cleaning; and
- To avoid ground water contamination.

The proposed sewerage system was to be designed for the estimated population of about 310,000 in 2025 and was planned to be completed within a five-year period from its inception date. The project components included:

- A sewerage network consisting of the main sewer line, and manholes;
- Construction of a sewage pumping station;
- A sewage treatment plant; and
- Low cost sanitation

In the initial phase the plant was to treat 12 million liters per day (MLD) of sewage supplied to it by the municipality. The ultimate capacity was to be 22 MLD. To plan this complex and politically challenging project, the AM worked in partnership with the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL), the state asset management company and with USAID's Financial Institution Reform and Expansion (FIRE) Project.

## PPP Structural Engineering

In the ASP route is through public-private partnerships in India to take in the first project of municipal water sector. Underground sewage system Alandur towns, involving the laying of pipelines, pumping stations and other construction, do a BOQ (BOQ), based on which the sewage treatment plant (STP) basis in BOT (build, operate and transfer) of. In addition to the construction of responsibility, the contractor has to bear the operation and maintenance of wastewater treatment system for a period of five years from the date of completion of construction, on a fixed fee basis. In the O & M of the price, and to provide new connections to collect directly borne by the municipal government.

Therefore, PPP structure of this complex project awarded to a restricted the engineering, procurement, and select construction (EPC) contract of three contracting mechanism through a competitive bidding process:

- A construction project contracting sewage pipe network, the World Bank Contract National Competitive Bidding (NCB-W2) as a template;
- Operations and management contracts, while using NCB-W2. Selected Contractor will operate and maintain the underground drainage system for a period Five-year fixed-fee basis.
- Lease contract (BOT agreement in nature) for STP, use guide Federation of Consulting Engineers (FIDIC). Through this agreement, Contractors will fund proposed STP in the construction and operation period Contractors bid. The Contractor will be required to recover the investment.

On the basis of a flat rate payment from the city for treatment on, STP Water delivery. Each municipal government has agreed to provide a minimum contribution level Regardless of the annual volume of water actually delivered. It is designed to cover the the company's minimum fixed operating costs and capital investment. Therefore, in the PPP Structure is technically BOT- annuity nature. Following the bidding process, the project was awarded IVRCL Infrastructure and Projects of the Company and VA Tech Wabag Ltd. is a special project vehicle (SPV), known as the "first sewage treatment plant Private Limited" (the first STP) technical cooperation was established, is to sign the BOT concessionaire their agreement with. Once realized the financial settlement of the project, the first STP Pvt. Ltd. signed the VA Tech Wabag IVRCL and contract. IVRCL is engaged in civil engineering projects. VATECH Wabag, through mechanical and electrical contracts, is in the process of design, supply, installation and commissioning of the equipment. This is also the launch of the contract to operate and maintain facilities for 14 years. The plant was set up land leased by the city for the first time STP.

## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Land Acquisition</b>	High	-	Government	AM took the responsibility for directly acquiring the land for the construction of the STP.
<b>Delay in obtaining permits</b>	High	0-3 months	A.M private developers	The AM took responsibility under the Contract for key approvals, including road cutting, shifting of services and environmental clearances. The Developer was responsible only of the 'works' related approvals.
<b>Design Risk</b>	high		Private developers	Design for the Sewerage System as well as the STP was developed by the AM as part of the feasibility study. The same was provided to the developer as part of the RFP document. The Bidder had the option to comment on the design Provided and suggest changes, if any. However, after the submission of bids, the Contractor was required to adhere to the design provided by the AM.
<b>Construction Risk</b>	High	0-2 years	Private Develops	The Construction Contract for the underground Sewerage System specified strict construction milestones linked to the payment along with a One year defect liability period to address any construction related risk. Liquidated damages were prescribed in the contract for every day of delay limited to 10% of contact price. In respect of the STP, the construction risk was borne by the Developer as the investment was made by him. The STP was constructed in two phases under tight deadlines. The defect liability period for the STP extend one year beyond the lease period of 14 years, during which the developer operated and managed the facility.
<b>Construction Cost over runs</b>	High	0-2 years	Private develops	The construction of the Sewerage System was based on detailed bill of quantities with rigorous clauses related to cost over-runs. In respect of the STP, though the developer bore the construction cost, the design and cost was based on detailed costing

				predetermined at the bid stage. Since the construction cost was also the basis of the annuity payment determined in the Bid, it was carefully controlled. Since the construction did not experience any time over-runs, cost over-runs were also controlled. The Project was implemented as per the original cost estimation.
<b>Change in scope Risk</b>				As the design and costing had been drawn up at the bidding stage itself, this risk was largely controlled. And did not arise on the ground.
<b>Payments Risk (Capital cost for Sewerage System)</b>		3 years	Government	The key risk in respect of payment of capital cost for the sewerage system was the component of the cost that had to be met through public contribution. While the AM assumed significant risk in this regard, the risk was addressed effectively through extensive public consultation and interactions. In fact that the collection exceeded initial plans and the AM did not have to draw upon the debt as planned from TNUIFSL.
<b>Payments Risk(STP Annuity Payments)</b>		Through the Lease Period for the STP	Government	The question of periodic payment arose only in respect of the Annuity Payment for the STP for which the AM was contractually bound over the period of lease. Here the AM assumed significant Risk. However, based on the ‘willingness To pay’ survey, the Government had agreed to extend subsidy support to meet operational cost to the extent of `30 per person per month. On the ground, the AM has been able to collect the monthly sewer fees effectively and has not faced any issues in this regard.
<b>Payment Risk(Dept. Repayment)</b>			Lenders	Lender’s risk was addressed through an escrow arrangement opened in favor of the term lenders where all the revenue receipts of the AM (including property tax, stamp duty, and the grant from GoTN) as well as sewer fee was be deposited. The AM had also accepted limits on future indebtedness. In addition, a State Government guarantee also backed the borrowing of the AM.

<b>Technology Risk</b>			Government	There are no clear references to this in the agreement. However, the design was prepared at the bidding stage and thereafter accepted by the Bidder during submission of proposal. Also Since the project was implemented without significant delays, the question of technology up-gradation due to passage of time did not arise.
<b>Operations Risk</b>	High		Private Developer	The performance parameter mainly referred to the treatment of sewage as fed into the STP during the lease period. The Agreement prescribed a fine if the treated effluents failed to meet the required standards at the rate of 10,000 per day of default.
<b>Financial risk</b>	High	0-4 years	Government and Private Developer	The AM bore the financial risk in respect of the Sewerage System while the Private developer bore the risk for the STP. While the AM's capital investment plan was carefully planned even before the bidding process, the key risk arose from the portion of the capital cost that was to come from public contribution towards connection charges. In respect of the STP, the Private Developer was able to raise the capital Funds effectively as re-payment was protected by the annuity payments as assured by the AM, including acceptance of 'take or pay' charges for the minimum assured sewage to be fed into the STP.
<b>Force Majeure</b>			Government and Private Developer	Both the Construction Contract and the Lease Contract had suitable provisions for Force Majeure protecting the ensuing risks for both the AM and the private developer.

## Learning and Observations

**Way beneficiary participation:** Project peoples, including the cost of the project is nearly 29 percent of contributions from the public include the fact that participation is the most outstanding aspects and learn from ASP. The project has established infrastructure projects are likely to mobilize people's participation through collective efforts and transparent process.

A high degree of success from the outset of the project depends on the effective collection of connection fees and monthly fees are also acceptable to the public sewer hire private BOT participants. Community awareness, support and continuous cooperation, therefore, essential. By the municipal government and



GoTN and stakeholders has been actively involved in public outreach activities are essential to ensure that lenders and city officials will meet repayment requirements.

Coordination of stakeholder participation and inter sectoral: stakeholders continue to participate in the project, to ensure timely completion of projects and problem solving, even if they appear. In order to maintain support for the project, the citizens committee was established and met regularly to review project status, monitoring BOT contract performance, and to provide a forum for citizens to express their concerns. In the ASP established a close involvement of all stakeholders / departments in key decision-making phase of the project, because there is censorship and surveillance, is key to ensuring the project stays on track.

Political will and strong decision-making, especially at the grassroots level: ASP proof "of political will and rapid decision-making to make the project happen." Political leadership provided by the municipal government and the President of the Council and vigorously promotes the project proved to be a critical success factor. Exist sewage system support, political will is essential to convince customers and citizens to pay a significant share of the cost, and accepted into the private sector. Decision-making phase of the project, members of the municipality to maintain the full support of the project.

Acceptance of fiscal discipline: the long-term loans, TNUIFSL and TUFIDCO, tighter lending conditions in the municipal government, requiring municipalities to accept and implement strong fiscal discipline measures. TNUIFSL asked the municipality to establish an independent city sewer account the general budget, forcing officials discipline and transparency in the management of the different systems. Municipalities also need to limit a certain percentage of their income on new debt (typically 30%). GoTN, loan guarantees, prescribed by the government to default of payment of these entities account will be transferred to the state government to recover payments from the city each year.

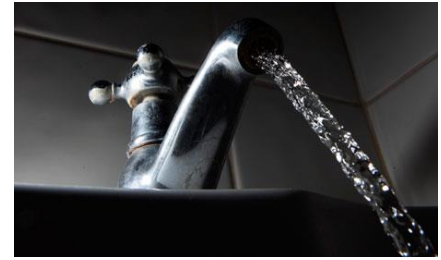
Similarly, contractual obligations between the municipality and the BOT operator, forcing the city government to ensure timely payment of management and wastewater treatment services. Therefore, loans and contractual obligations to ensure strong fiscal discipline, the municipal body, by making it bear difficult decisions on capital priorities, closely oversee the sewer system management, and ensure budgeting of sufficient funds to meet payment schedules.

**Implement an effective system of charges:** Although WTP survey shows that the public will far below the tariff requirements to meet operating costs and capital projects, the City Council, through its rigorous public awareness measures, try applying a reasonable level of public sewage connection fees and charges. TNUIFSL loan time government has also managed to collect quite a good connection charges preemptive needed.

In this respect there is a large part of the success of the municipality from the fact that they provide address public concerns sympathy measures sprung. For example, connecting twice sediments collected in accordance with the consumer's convenience; the local branch of the Punjab National Bank also lent by creating a plan to connect the deposit amount will be provided to the financial support they Alandur citizens.

## Case Study 2: Karnataka Urban Water Supply Improvement Project

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### Project description

In 2005, the Government of Karnataka (GOK), together with the assistance from the World Bank, launched a program to improve the water supply and private sector participation in service delivery at the local level. This initiative by providing high-quality, sustainable services developed by Gok, local agencies in various cities of the country (ULB), in order to improve the performance of the urban water sector part of a larger project. Design (KUWASIP) project and the World Bank through the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC), its central body called the Karnataka Urban Water Sector Improvement Project in Karnataka external financial aid programs to achieve. According KUWASIP initiatives to improve the water supply project in the national and local body level. These projects include Karnataka to strengthen water and sanitation sector, and specific projects to increase water supply and service in the reform ULB levels based programs for.

In the local institutional level, various projects have been identified Belgaum, Gulbarga and Hubli for - Choose Dharwad three underwater locator beacons. These projects, in order to provide bulk water supply and improved distribution system expansion. The goal is to provide public-private partnership on the basis of the water supply system by 24 \* 7 aims to determine the area of a project carried out. Select three to five Municipal Corporation building pilot demonstration area occupied in Karnataka. Urban local bodies involved in the three demonstration areas choose five existing distribution network renovation / rehabilitation projects, followed by water supply system in the operation and management of a PPP basis in these areas. The project structure allows private developers are determined to carry out the necessary repair work and commitment to the sales network of operations and maintenance (O & M) of the contract period. Capital investment required for the repair project will be used by the World Bank through KUIDFC compensation for private developers to provide operation and maintenance activities of an expense. The project is planned in three years and six months inclusive both restoration project for the operation and maintenance of the distribution network and the total time of the distribution system.

## PPP structure of the project

In the PPP contract is basically related to the project management contract following organizations: three underwater locator beacon that. Belgaum, Gulbarga and Hubli - Dharwad in Karnataka by Gok Urban Infrastructure Development and Finance Corporation (KUIDFC) and Karnataka Urban Water Supply and Sewerage Board (KUWSDB), as well as private developers. According to PPP structure, private developers are specified in three cities across KUWSDB and KUIDFC regional distribution network rehabilitation / construction activities. Rehabilitation / construction activities include replacement of distribution pipelines, installation of water meters and meter a lot of consumers, and the establishment of a computerized billing system. Rehabilitation activities undertaken by private developers, funds from KUIDFC are funded as grants. `Maximum subsidy amount of Rs 4.2 billion has been set aside for capital works, and require private developers to carry out rehabilitation work in the money.

Detailed design works is to be capital by private developers, and are subject to approval from the KUWSDB and KUIDFC offer; the work is carried out by private developers. Are made by private developers for the project performance indicators are also listed KUIDFC.

Private developers are responsible for identifying and tendering for construction activities. After the construction of the project, private developers are required to demonstrate the demonstration area to achieve performance targets. By the system efficiency demonstration zones in audit, private developers will take over the distribution system operation and maintenance phase of the project. Raw water supply, water distribution point and the activity after the treatment supplied to the processing of large volumes is fully accepted KUWSDB management. To impose the same tariff structure must be set in consultation with KUWSDB and KUIDFC by underwater locator beacon. In the O & M phase of the project, was asked to private developers to ensure that 100% of individual housing service connection in the demonstration area, the supply of treated water to customers, ensuring the reduction of distribution losses by setting performance goals, according to the tariff bill produced by the ULBs bill to set up and distribute to consumers. Oppose the bill collection is their responsibility ULBs.

For activities undertaken by private developers, the cost is paid by the underwater locator beacon and KUIDFC in the contract period. Fee includes a fixed base 60% and 40% of the variable component of the composition, the latter meeting performance targets. In addition, further encourage the developer to be supplied to a private group to achieve a level other than these objectives. This incentive is paid by the operators of the above costs. (Performance indicators and incentives have been included in this case notes later section) During the contract period, and repair of existing assets, ownership of assets inclusive of pipes, valves, meters, fully maintained with the respective underwater positioning beacons. Post-rehabilitation stage, only the right to private developers to provide operation and maintenance of facilities. At the end of the term of the contract, the sales network must be returned to their underwater positioning beacon operation and maintenance.

## Risk Allocation Framework

Risk Type	Sensitivit	Risk Period	Primary	Comments
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	y		Risk Bearer	
<b>Delay in obtaining permits</b>	high	0-3 months	Private developers	The private developer was responsible for obtaining permits for rehabilitation works. There were difficulties in the same owing to the need to obtain permits from several departments which were not forthcoming. Lack of coordination among various departments resulted in a delay in permits being obtained. However, since the three ULBs were stakeholders in the project, the process of obtaining permits was eventually managed.
<b>Design risk</b>	High		Private Developer	The three ULBs did not have an asset inventory list and there were no detailed drawings of the physical assets. The design for the system was to be fully developed by the private developer based on their own assessment of the distribution system. Post implementation of the project there have been no design related issues which have arisen.
<b>Construction Risk</b>	High	0-2 years	Private Developers	The private developer was allowed to subcontract the construction activity, and fully manage the process. The construction period exceeded the timeline envisaged. However, no penalty was imposed on the private developer since, the delays were largely attributed to lack of on ground information sharing and assistance by the respective ULBs
<b>Construction Cost over runs</b>	High	0-2 years	Private developers	The construction cost ceiling was pre-determined and the upper ceiling set. In the event of the costs exceeding the limits set, KUIDFC had the authority to terminate the contract. The project was however implemented well within the limits set.
<b>Performance risk during the transition phase between construction and commence</b>	Low	0-2 Years	Private Developers	The private developer was required to maintain the service standards as were available at the time of handover of the system for rehabilitation work. The private developer was able to manage the same without any disruption of supply.

ment of O&M management				
Change in scope Risk	-	-	-	No specific provision for change in law was made in the contract. On ground, however, there was no change in scope of the developer once the project commenced.
Market Risk		2 years	Government	The private developer was to be paid a fixed remuneration of ` 22 crores as operator fees. This fee increased to `28 crores on account of delays from the Government side. Additionally, financial incentives had to be paid for achievement of performance targets by the private developer. Further, although the private Developer undertook the generation of bills as per the tariff set, its levy and collection was the responsibility of the respective ULBs.
Financial Risk	High	0-4 years	Private Developers	The private developer was to prepare a capital investment plan for the rehabilitation works and undertake the construction within the ceiling of ` 42 crores specified. Any incremental expenditure above the same would have, as per the agreement, resulted in the private developer having to bear the same, or in case of noncompliance, would have resulted in termination of the contract.
Force Majeure	-	-	Government n Private	In the event of the private developer being unable to perform the duties on account of Force Majeure event, the Government would provide suitable extension, and would continue reimbursements to the private developer.

### Key Learning and Observations

**The key pre-project assessment:** Before bidding the project, which is very important, first-class service to assess the Government's commitment in the project area? This assessment should be able to explain the status of the underlying physical infrastructure and service delivery gaps and assessment, to determine the nature and the required investments needed to repair works. This assessment will be given to conditions on the ground, the real government of the situation and publish winning bid, a private developer. Thus, in the part of the ULB carried out the following basic research to assess the situation on the performance parameters of the development and private developers to bring before these important studies include:

- Water Auditing Research
- Energy Auditing Research
- Consumer Survey
- Pre-feasibility study

**The effective implementation of the project to promote the government:** there project campaign, which is sponsored by the KUIDFC, consumers is familiar with the proposed project. In addition, some non-governmental organizations and some PIU gathered to promote the effective implementation of the project. This facility has been the work of the effective implementation of the project.

**Governments need to provide full cooperation at all stages, by private developers: private developers must implement the project, the greatest degree of cooperation.** There have been observed in the demonstration phase of the project delays due to bulk water supply by KUWSDB non-availability. In addition, the underwater locator beacon did not provide sufficient information in a timely manner, there is no release of the sums due and timely development. Importantly, such payments on time to a private developer. But also in the allowable delay.

**Project ownership and participation by the implementing agencies underwater locator beacon is very important:** the success of the water supply project is very important, there is the ownership of the project marked the two letters by underwater positioning actuators and participation. Collected to determine what potential users want and what resources it requires proper preparation period and related information, and they are willing to apply for grants and manage the installed system. Counseling, consumers and other stakeholders involved in the successful implementation of the key.

**Proper preparation acquisition ULBs and KUIDFC:** private developers have provided training existing staff of three underwater locator beacons by private developers after the surrender of management systems. Importantly, these techniques are well absorbed by the officials and management systems for the effective implementation of, and understanding, and the system by continuous ULB smooth operation.

## Case study 3: Vadodara Halol Toll Road

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### Project Description

Vadodara Halol Toll Road (VHTR) is one of the first national highway widened in India on the basis of public-private partnerships to develop the project, which is then laid a lot of projects in the way of Gujarat and a similar format will be taken to rest India. VHTR is an active commissioned as part of the 2010 vision - by Gujarat Government (GOG) Infrastructure Master Plan development. The basic principle is that vision through infrastructure projects to attract private sector participation in the development of Gujarat. The project involves the expansion and strengthening of the existing two-lane national highway (SH 87) is connected to the industrial town 32 km Vadodara Halol of (km) into a four-lane freeway sounded.

Commissioned by Infrastructure Leasing and Financial Services (IL & FS) in GOG, joint development of the two state highway projects, namely Baroda - Halol and Ahmedabad - Mahesana. Roads and Buildings (R & B), Gog and IL & FS signed a memorandum of agreement (MOA), and this effect on 31 October 1995, a special purpose vehicle (SPV), to this end named Barrow Daha lol Turnpike Ltd. is composed (VHTRL) 4. VHTRL also appointed a contractor through international competitive bidding, the project's construction, operation and maintenance. VHTR building 15 September 2000 on the 24th Operations began in October 2000 VHTRL charge management, operation and maintenance of the road for 30 years, from 2000 to 1999, and completed the March 1 start.

### PPP structure Of the Project

The VHTR projects under construction, own, operate and transfer (BOOT) basis of development. For the purpose of the effective implementation of the project is to SPV - VHTRL has been created. VHTRL promoted

By Gog and IL & FS. It signed a concession agreement with the high-grid design, financing, construction, Operation, maintenance, and restoration after predetermined return transmission facilities. Conversely VHTRL. Appointment of Punj Lloyd Ltd and IRCON International Limited, a consortium as a contractor Construction, operation and maintenance of the project. Contractors also have VHTRL stake. For VHTRL scope of work includes the following activities:

## **Construction**

This includes the design and completion of roads, including roads, cross drainage systems, bridges, toll station facilities, median, separators, roads and horticulture.

## **Management, operation and maintenance**

This includes fees, operating the toll plaza, traffic control and maintenance of the facility. It also includes special maintenance activities, such as eliminating the potholes, the replacement of drainage structures, road markings and signs, cleaning lanes, shoulders, - with the right of way, structure, maintain business facilities and drainage facilities. Rehabilitation works will include preparatory work, pulp sealing, surface treatment, resurfacing and emergency work.

Considered to fulfill its obligations, VHTRL user fees charged directly to the VHTR rights, and allow the project from advertising hoardings and other commercial activities earned scene.

Concession period is for a period of 30 years. If VHTRL not recover the total cost of the project from the date of operation, including 20% return rate, in 30 years, the concession period shall VHTRL requirements GOG not qualify for an extended period of two years, until the total cost of the project and earnings have recovered VHTRL. Any request needs to be extended, from an "independent auditor to confirm with a certificate to support.

In addition, GOG also be given certain development rights VHTRL. Management and Development of the right terms and conditions of use shall be entered into a separate agreement between the parties specified. All development should generate revenue VHTRL to the total cost of the project and the benefits of recycling applications. The project site is leased to VHTRL through a lease agreement between the parties by the GOG.

At the end of the concession period, the concessionaire to transfer and assign all of the franchise rights to the GOG, leases, and interest in the facility at a nominal cost of a also delivered to the GOG Operating Manual, planning, design drawings and other information, so that it can continue to operate the fund.



## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	high		Government	Land Acquisition and provision of vacant possession to the concessionaire was a condition precedent under the agreement. Failure to do so implied an extension of the period for fulfilment of Conditions Precedent. In case of persisted nonperformance, the concessionaire had a right to terminate the agreement.
<b>Delays in Obtaining Permits</b>	high		Private developers	While the Government had to facilitate approvals and permits, it was the private developer's responsibility to obtain the same.
<b>Design risk</b>	High		Private developers (transferred to contractors)	The Contractor needs to adhere to the performance standards and technical specifications. The contractor would need to bear any additional costs due to rectification of construction due to noncompliance with the technical specifications.
<b>Inflation Risk</b>	Medium		Private Developer (transferred to contractor)	Borne by the Concessionaire but this is transferred to the contractor due to the fixed price nature of the contract.
<b>Financial Risk</b>	High		Private Developers	Any increase in the projected capital cost was to be borne by the private developer. However, the developer was protected, in situations where the increase was beyond its control, with the provision for extending the concession period till a 20% return was achieved.
<b>Construction Risk</b>	high	0-1 years	Private developers	The complete construction was to be accomplished within 18 months. The increase in project cost due to any delay had to be absorbed by the Concessionaire. This was transferred to the contractor due to the fixed cost nature of the contract.
<b>Political Risk</b>	low		Government	Comprehensive insurance package and GoG to at least pay compensation to meet all project costs including takeout of lenders and other investors.

## Key Learning and Observations

**Pre-evaluation is crucial to the development of the market:** The VHTR case makes it fully clear, pre-development agents need to be more robust, because these agents can affect the long-term goals of the project. For example, the flow estimate for the project is based on the assumption that the region continued long-term industrial award will be available. Eventually, with the bonus time is revoked and lower than anticipated traffic flow by nearly 50%. And other risk factors unaccounted for may jeopardize the project and lead to significant losses.

**Competitive bidding to ensure a "better deal":** a long-term concession bidding major infrastructure projects is extremely important. This not only brings the best of the ability of the private sector, but also allows the Government to ensure competition and a level playing field, to get the best financial terms. This is also, to a certain extent, the requirements of government agencies within the ability of the project to build the way in which the ability to tap the private sector, in the best possible way. VHTR is to develop and did not create enough competitive tension by the Ministry of Agriculture between GOG and IL & FS, because there is no precedent can be used to develop such a structure. However, the contractor is appointed by the competitive bidding process.

**Conflicts of interest should be early detection and avoidance:** the need for the early identification of conflict of interest in the development process to ensure the transparency and integrity of the transaction will not be harmed. In the case of VHTR, IL & FS and in itself is the developer / promoter, consultants, financiers lead to serious conflicts of interest projects. Conflict of interest exists in the government, since it is granted to people who hold favorable 11% stake in the project.

**Innovative financing mechanisms:** VHTR is one of the first projects using a variety of innovative financing methods. Instruments used therein are deep discount bonds, money taken out of an option. The project is a further advantage of some other instruments, such as cumulative convertible preference shares and long-term loans to IL & FS. The project is to produce a final follow the country's infrastructure a few examples.

**Respond to environmental and social development framework:** This VHTRL introduction of environmental and social safeguards obligations of the developer's first project part of the contract. This has created a benchmark and a huge demonstration value, because it emphasizes the infrastructure can be developed in environmentally and socially responsible manner.

# Case study4: Mumbai Metro



## Project Description

In order to address current and future needs of public transport, the Government of Maharashtra (GOM) planned 146 km long by Mumbai Metropolitan Region Development Authority (MMRDA) railway infrastructure MRT system (MRT) in Mumbai. The project is the first proposal MRTS corridor. The Verso Aetna Ghatkopar line should be overhead line route length and 11 km, with 12 stations and a depot located DN Nagar. The line will have 100 meters and 5.5 meters minimum curvature minimum ground clearance. This will be on the line between the coach and the width of 22 m length, 3.2 m, respectively. Other technical features of the project include 25 kV AC overhead equipment, cab signaling and automatic train protection average speed, maximum speed of 80 KMPH and 33 KMPH. Mumbai Metro One is to run on a dedicated elevated corridor, and should have a high level of comfort for passengers that. Fully air-conditioned, world-class coach, provision of lifts and escalators automatic fare collection system and a high level at the station, a modern passenger safety systems.

Existing commuter trains connect the city north and south. The project will provide something of railway infrastructure connecting central and western suburbs. The total time taken from Versova Ghatkopar journey is about 21 minutes, for 90 minutes as in other transport modes by typical time taken.

## PPP Structure of the Project

BOOT basis in the concession agreement for a period of 35 years, including a five-year construction period, has gained MMRDA. According to the concession agreement, the operator has the ability to design, financing, construction, operation, owned and maintained first corridor, and transfer of ownership and assets at the end of the concession period.

A special purpose vehicle (SPV) named Mumbai Metro Sdn Bhd (MMOPL) has been formed with the Reliance Energy Limited, Veolia Transport and MMRDA holds 69%, 5% and 26%, respectively, of the shares. This project is a PPP basis in the mass transport system in one of the first projects being implemented in the state of Maharashtra. The Government therefore considers it necessary to closely monitor the project and take a 26 percent stake in the SPV project implementation. This government has three members on the board of the SPV, and ensure that it can effectively monitor and financing, design and construction of the project to influence decisions. The MMRDA will contribute equity of 13.4 billion rupees' tunes in the 26% stake in SPV, during the construction phase of the contract.

The assets of the project include the viaduct, stations, bridges, depot, rolling stock, signaling systems, traction and supervisory control and data acquisition (SCADA) systems, communication systems, track work, fare collection system, all of which are owned by the SPV. Construction or purchase of assets should be by contractors and equipment suppliers. For example, the signaling system installed by Siemens in the communication system by Thales and rolling stock should be purchased from CSR Nanjing. The depot has taken a long-term lease of land from the owners of this land of renewable energy. The SPV has the exclusive right to develop land use projects MRTS.

### Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	high	0-5 years	Government	The land will be handed over to the concessionaire as per the schedule submitted in the contract. If the MMRDA is not able to provide access to any part or parts of the site for reasons other than a Force Majeure then the MMRDA is liable to extend the Project Completion Date, Financial Closure Date as Well as the Concession Period as determined by an Independent Engineer.
<b>Financing Risk</b>	Medium	0-5 years	Private developers	The Private Operator has to achieve financial closure 180 days after the signing of the contract. MMRDA can extend the date for financial closure for a further 180 days in case the private operator cannot achieve financial closure.
<b>Planning</b>	Medium	0-5 years	Private developers	The risk for the planning and execution of the project would vest with the private operator and would need to be executed in conformance with the Specification and Standards specified in the Schedules of the Agreement. (i.e. Performance Requirements, Performance Standards and Technologies, Proposal submitted by private operator)
<b>Design Risk</b>	Medium	0-5 years	Private Developer	The private operator would submit all the drawings and the schedule of the project to MMRDA. These would be reviewed by MMRDA and scrutinized by the Independent Engineer. MMRDA would not be responsible for any delays caused due to the drawings of the project.
<b>Construction Risk</b>	Medium	0-5 years	Private developers	The private operator, for the due and faithful performance of its obligations, shall provide a

				Performance Security of ` 14 crore (USD 2.8 million) for the due and faithful performance of its obligations. This security would be renewed from time to time and would need to be replenished within 30 days. The private operator would also be liable to pay damages at the rate of ` 2 crores /day if it fails to achieve any milestone. Furthermore the private operator has to submit Monthly progress reports and allow the Independent Engineer to inspect the progress of construction. The Independent Engineer also would subject the MRTS to test and provide a provisional completion certificate for the project.
<b>Change in Law risk</b>	Low	Througho ut	Private sector	No compensation from the government, although enabling provision to mutually discuss in good faith to suitably amend the terms of the concession agreement, including extension of concession if the financial effect of the change in law is greater than ` 1 crore. MMRDA is required to pay the amount of cost increase in case no settlement is reached.

### Key Learning and Observation

- **Speed up the bidding process is to ensure that the proposal a good response key:** The entire bidding process to select the winning bidder spent more than two years. This results in less number of bidders to bid for the project. Similar obstacles in the bidding process for the Metro Line 2 are an experienced franchise agreement is based on the model of the concession agreement. However, this protocol must be used exclusively for the implementation of the subway system. These delays result in only one bidder submitted the final bid.
- **Delayed approval VGF:** VGF government has approved a substantial delay. Although this is due to the parts of the model concession agreement is not in the PPP Appraisal Committee does not constitute only a tentative approval to the VGF guidelines are available when this issue is a deterrent factor, developers, but also the interest that may affect, in The first two stages of the bid level.
- **Delayed approval could undermine the project:** there by obtaining approval from the railway sector railway line delay in the bridge. This potential project schedule had to be postponed. This is due to the intrusion of another project studies the feasibility of metro line rail route. However, this issue resolved quickly to ensure that this work can continue. We recommend that the authorities should recognize that to affect the operation of projects, while the tender for projects to address before the appointment with the development potential of all other infrastructure projects coming. Land acquisition process may cause problems for the project: the land promised by the Government essentially assigned to the depot site project will purchase land procurement plan in accordance with the provisions of the agreement. However, this piece of land is in private ownership and controversy. This exposed the government land is not available at the depot so that the possibility of derailment risk of the project. This problem has finally been agreed that private land owners to resolve 75% of the allocation of land for the development of the government's conditions for the project was given to him to the floor space index (FSI), land rights in the entire plot of land

of 25%. This land has provided a nominal lease rent to the concessionaire of the concession period. Recommended that future problems, such as the procurement phase of these projects, be resolved to ensure the smooth operation of the project.

- **Public support for the project:** For a project of this size, it is the government agency in order to secure sufficient public support to ensure the smooth implementation is very important. MMRDA through dialogue with affected individuals, land acquisition and road construction activities to ensure adequate public support. Despite these efforts, the project is likely to delay and also experiencing similar difficulties in the second phase of this project.

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# Case study 5: Bhiwandi Electricity Distribution Franchisee

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## Project Description

Worsening power scheme deficit to take immediate action is necessary in Maharashtra, Maharashtra State Electricity Distribution in part Ltd (MSEDCL) of. During pregnancy due to increased generation capacity is a long, MSEDCL decided to focus on the load side of energy management and use of their savings to cut the growing budget deficit to some extent. MSEDCL also decided to expertise in the private sector, through the distribution of franchising arrangements, improve efficiency in the distribution system in some circles selection (network). Electricity Act 2003 allows the distribution of permits allocated activities outsourced or all licensees. Suitable arrangements for the distribution ring in the town of Bhiwandi distribution franchise in Mumbai at about 48 km to the east is a pioneering project and a "put" into franchisee distribution projects in accordance with the concept of the power law. In the "input" mode, the agency responsible for the franchise area in input supply and the franchisee responsible for the distribution license, that all obligations

- Supply
- Consumer Services
- Operation and maintenance of sales network
- Billing and Collections
- Compliance with regulatory standards

Bhiwandi was selected as the project because of its reputation it has been long overdue electricity bills, have a poor distribution network aggregation technology and commercial (AT & C) losses a very high level. It has, at the time, 160,000 customers (about one million total populations) over 721 square kilometers of the geographical area. In Bhiwandi circle of power demand, a significant number of textile / apparel manufacturing units (mainly power loom), at the time, about 800 MVA, translated into about 2,500 gigawatt hours (one hundred million kWh), the annual energy input.

Torrent Power AEC Limited (TPAL) is a private entity specified by MSEDCL this project.

## PPP structure of the Project

For Bhiwandi circumferentially distributed Affiliate Agreement (DFA) is valid for an initial period of 10 years. Distribution franchise model structure is as follows:

- MSEDCL is still licensed and authorized distributor's franchisees (Bhiwandi circle) on behalf of its electricity distribution in specific areas.
- Franchisee the right to use the asset distribution MSEDCL exercises of his responsibilities and obligations within the franchise area of rights.
- The deadline to join the trader responsible for the following functions MSEDCL

In DFA:

- Distribution and supply to consumers in the franchise area MSEDCL,
- Operation and maintenance franchise area,
- Metering, billing, collection and all these consumer-related services,
- Meets all standards, including electricity supply code and performance and other regulatory requirements.
- MSEDCL is committed to providing a minimum quantum of power in determining the distribution of input point's franchisee. Chartered makes payment MSEDCL power input rate being called for a pre-determined tariff. Enter the bid rate is the key parameter in the evaluation of the bids to determine the time. When franchisees allowed purchasing additional power supply shortages from other sources than the MSEDCL.
- MSDECL must pay the sales network have certain minimum capital expenditure in accordance with the minimum five-year investment plan.
- Franchisee given full autonomy, planning and execution of capital expenditures and meet agreed minimum to reduce losses and improve the collection efficiency of the target (MSEDCL than originally planned and committed capital expenditures except). Add any value of assets must be certified as acceptable by MSEDCL.
- Consumers charge the same tariff applicable to other consumers MSEDCL, and decided by an independent regulatory body - Maharashtra Electricity Regulatory Commission (MERC).
- MSEDCL will or default at maturity, MSEDCL / franchisee distribution of assets in the creation of the depreciated value of the capital expenditure incurred by the franchisee to terminate the case of payments made to the franchisee.

## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Pre-operative Phase Risk</b>				The distribution franchise was an operating business at the time of handover. Therefore, this risk category is not applicable
<b>Construction Phase Risk</b>				The distribution franchise was an operating business at the time of handover. Therefore, this risk category is not applicable.
<b>Procurement Risk</b>	High	10years	shared	MSEDCL is obligated to supply the agreed quantum of power in absolute terms and at



				the agreed input rate payable by distribution franchisee. The distribution franchisee may procure power from other sources for any shortfall.
<b>Tariff Risk</b>	High	10years	shared	The tariff charged to the consumer is regulated. At the same time, the input rate i.e. the cost of power purchase is indexed to the changes in the consumer tariff. Thus in case of an increase /decrease in tariff, the input cost for the franchisee will also increase / decrease in line with the formula prescribed in the DFA. However, on a net basis, there will be some impact on the cash flows of the franchisee.
<b>Financial Risk</b>	High	10 years	Distribution franchisee	The onus of collection efficiency during the applicability of the DFA is on the distribution franchisee. For arrears from current consumers, up to 3 months prior to the effective date, the distribution franchisee is responsible for ensuring 65% collection efficiency. For past arrears, pending more than 3 months prior to the effective date, the franchisee is provided an incentive @ 10 % of collections. The same is @20% of collections for disconnected consumers.

## Key Learning and Observations

- The PPP model structure selection of extensive discussion, and in its inception in

Which is a key reason for the success of Bhiwandi model is the interests of all stakeholders (i.e. MSEDCL, franchisees, customers and employees MSEDCL) is considered to be in the process of changing the business model of the structure. The model is designed keeping in mind the specific problems in different sectors, such as electricity deficit, regulating nature tariffs, subsidies, distribution of assets, etc.

- open the key parameters of the level of joint audits

Because the distribution business related to assets (i.e. network) are spread out across the vast region of a large number of customers of the sale of electricity distribution in a large geographical area, normally distributed. As a result, the motion estimation of distribution losses, collection efficiency, and total assets, the average billing rate is very complex and error-prone. Thus, in a distribution franchise model requires that joint audits can be used to determine the value of these parameters, because they are very critical and can affect yields and returns the selected bidder.

- Transparent bidding process

The bidding process is appropriate to negotiate a transparent way with potential investors were. This helps to build trust and confidence of investors.

- Alternative modes of distribution reform appear privatization India Environment

In franchise mode input distribution, involve risks and electricity purchase costs substantially mitigated regulation of private partners. In addition, franchisees must realize operational efficiencies in the distribution system of incentives (i.e., reduce distribution losses and improving collection efficiency), as this will lead to higher profit margins to the franchisee for the same power purchase costs. This ability PPP model to take advantage of these profit motive excitation efficiency is crucial to the success of Bhiwandi projects, particularly in the electricity tariff deficit and regulatory regime of the Indian background.

# Case Study 6: Latur Water Supply Project



## Project Description

Located Maratwada region, Latur city is a regional headquarters occupies an area of 32.56 square kilometers and 3.5 million rupees (2001 census) of the population. The city is expected to witness a significant population of about 52 percent a decade of growth. From Latur City Council (LMC) is responsible for water supply Latur city. Prior to May 2005, the main source of water supply of the city were on two weir Manjra rivers of water per day (MLPD) to provide 35 million liters. Two sewage treatment plants and distribution network covering 350 km LMC operation. In addition, the city also draws about 3 MLPD groundwater through bore wells and open wells.

Historically, Latur city is facing serious water shortages. LMC is water, connected by a single city, and public water points. 26000 normalized water connections, mostly along a significant number of unmetered illegal connections. In addition to limited water supply, demand coverage is also low, only 70% of the population receiving water once a week. In summer the situation further.

For Maharashtra, Maharashtra Jeevan Pradhikaran (MJP) is responsible for the development, water supply and sanitation monitoring core body. In order to overcome the limitations of the source of Latur city, in May 2005, MJP source enhancement project commissioned by the fifth water supply scheme for the city - the bulk of the water supply and distribution plans. This includes a lot of water transmission over 65 km, approximately 130` crore in the cost of capital. With the commissioning of the program, MJP by an additional increase to a total length of 126 km Latur city water distribution system.

LMC took over the program from MJP in 2005, but it does not operate and optimize maintenance. Despite adequate water supply, LMC cannot manage its distribution network and the city Latur, receive water once a week. Thus the non-revenue water (NRW), which is treated water quantity and the amount of water in the distribution system, i.e., actually accounting for the difference between a consumers, to a very high proportion of LMC. In addition to these operational problems, LMC is also troubled by the revised water low collection efficiency and revenue growth constraints. Given the LMC existing debt and inability to improve the 1.717 billion rupees for additional resources to complete the existing water supply systems, LMC initial decision to move to the fifth water programs MJP.

Subsequently, LMC resolved to transfer existing water supply scheme for the entire Latur city MJP. Passed a resolution based on the LMC, MJP give Latur operation of water supply scheme, the rights for a period of 30 years. It is responsible for the operation and maintenance of existing water supply schemes, as well as improve financial done by private operators for water programs. MJP is also given the right to charge the price of water and water users need to collect revenue.

MJP final in March 2006, which is the integrated management of mining contracts, through a special purpose vehicle (SPV), the first source float management contract tender being executed. For the duration of the contract, the private entity is responsible for:

- Take over the operation of existing mining assets and providing such resources from the source, maintenance and repair
- Operation and maintenance personnel, including key staff, from the delegation MJP and LMC deployment. It will also provide enough staff to meet the needs of network expansion
- Provide a minimum average residents enough water pressure and ensure 24 \* 7 pressurized water supply in the contract period of 2 years
- With the new connection, increase the coverage of water and to ensure 100% metering of existing connections
- Water supply on the basis of cost recovery tariffs fixed in the management contract
- Implement billing and collection system
- Create and implement consumer awareness consumer redressed mechanism

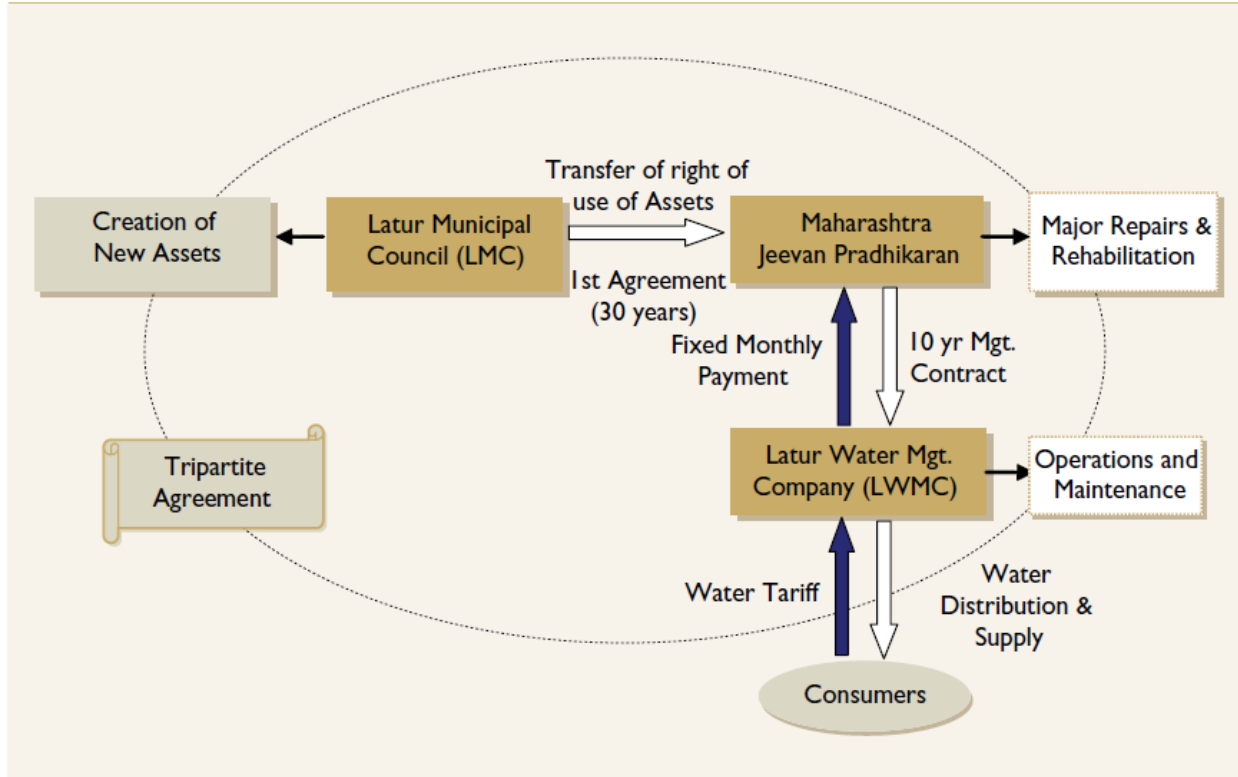
The project area by three sources, six pumping stations, six electrical installation, three sewage treatment plants, two main reservoirs balanced, 95 km of transmission lines, 10 elevated reservoirs, a ground reservoirs and 476 km of distribution lines.

### **PPP Structure of the Project**

The PPP structure for the project is a performance based management contract for integrated source to tap water supply management for the Latur city. The project contracting structure deployed is at Figure 1:

## Project Structure

Figure 1

**In the key components PPP structure comprising:**

- LMC and MJP's first agreement: MJP entered in February 2006 was granted the use of LMC under MJP water transmission and distribution assets, rights and LMC agreement. MJP Latur city is responsible for water supply, as well as operation and maintenance of the related assets. Under the agreement MJP entitled to receive water and collect revenue from customers. This agreement is entering a period of 30 years.
- MJP and LWMC management contract between: Based on the competitive bidding process, the operation MJP granted, maintenance and repair, including the three companies, Subhash Projects and Marketing Limited, UPL, environmental engineers Limited and hydropower compare corporate consortium management contracts. In accordance with the terms of employment, SPV "Latur Water Resources Management Limited" (LWMC) having a stake equal to 33.3 percent of each partner to create a consortium of private operators. MJP-year-old company with LWMC a management contract to run in June 2008, the maintenance and repair of all the assets and resources of the water supply scheme under Latur. It includes metering, billing and collection, and investment in the water supply scheme for all fixed and variable. The basic premise of contract terms is to provide two years to reduce the water 24 \* 7 NRW, and Latur city. The main highlight of the terms of the contract is listed below:

Assigned the role of contract between the parties were so LWMC

- Will be responsible for operation and maintenance of assets, and MJP will take care overhaul and reconstruction activities.
- Promote the implementation of the project through the establishment of the Steering Committee. The Steering Committee will include residential collection, segmentation engineers and project managers Superintendent, City Council, City Council President, Chairman of the Water Commission, LMC chief officer in charge of engineer, the engineer in charge, MJP, the chairman of the contractor and his two field person. The Steering Committee will meet at least once a month to oversee the issue may be raised by LWMC.
- Performance standards, the lowest compliance levels of project implementation specifications in detail the terms of the contract.
- LWMC will do it deems necessary provision for additional capital expenditures to upgrade efficiency and infrastructure.
- Collect from the consumer as a management contract pricing.
- Pay a fixed monthly fee for the period from LWMC to MJP contract.
- Provide 70 qualified employees by MJP to LWMC who also work at the direction and control of the contract period LWMC the project. MJP will transfer 15 highly qualified staff, and LMC 55 employees will be transferred to LWMC.
- Provides contract terms to provide stable electricity, in order to ensure investment in the cost of electricity is still a specified price range. This is the term of the contract with the incremental electricity price increase. Under the tariff increase beyond the price range, the contract terms to ensure that such an increase will compensate MJP private operators. If you reduce the tariff differential amount will be transferred to the MJP / LMC by LWMC.
- Through, which provides billing discount on slum areas, and introduces the concept of poverty reduction strategy group connection? In order to ensure a smooth transition, concessions are available to slum dwellers for the first nine months of the flat tariff provisions. Groups of up to four connections introduced and appraisal team leader will be responsible for the collection and payment of all dues.

Latur water entering into the management contract is not a typical water supply management contract, but with the lease / concession, where private operators are taking more of a hybrid version of the Technical Standards built into it elements of management contracts and commercial risk management contracts. Into the decision to private parties such contracts, mainly because of resource constraints LMC to finance and operate the water supply network.

Related to taxation and retained by private operators, rather than a fixed payment services, such as construction management contract management may also take into account the fact that the cash-strapped entity LMC or MJP would not have been in a position to guarantee any fixed payments to private operators. Therefore, it decided to allow private operators to retain earnings, but to ensure efficient service delivery to define the level of service standards and parameters, and punish the case of privately run, he could not reach the predetermined criteria.

Tripartite agreement • MJP, LMC and LWMC between: In addition to the above agreement, the tripartite agreement entered into MJP, between LMC and LWMC, to ensure effective implementation of the project. Under the terms of the tripartite agreement

- LMC retained ownership of the assets related to the project. LMC will maintain the existing water supply and distribution assets, as well as the sole owner of additional assets that will be created by the investment plans MJP and LWMC specified in the agreement. MJP will act as custodian of assets.
- The necessary provisions to ensure an adequate supply of raw water to LWMC allocation. If the water in the dam scarce, MJP / LMC will provide all the necessary support, including receipt of any government agency to MJP, any diversion of funds from MJP and LMC decision. In addition, if there is no any change in the price of raw water provided by the irrigation department, MJP / LMC will absorb the same.
- MJP / LMC will also be provided with respect to the duration of the prerequisites in assets and 100% metering of water regularization LWMC necessary support to implement the repair.
- MJP and LMC must be paid in order to LWMC / and with this management contract execution related to any profit / loss shared equally.

The agreement is a combination of all three to look at, such as the case of any inconsistency, the terms of the tripartite agreement will prevail.

## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Design Risk</b>	High	0-6 months	Private operator	The private operator has to take over operation and maintenance of assets from MJP. Efficient O&M of project could have potentially been impacted on account of the lack of accurate information on network drawings. A detailed investigation of asset conditions and asset life cycle was undertaken by the private operator.
<b>Political Risk</b>	High	0-6 months	MJP and Private operator	Being the first integrated source to tap management contract to be handled by a private operator in India, the political risk associated with such a project is high. Water supply being an essential service, the number of stakeholders involved with divergent and strong views is also high. The project execution has been delayed and has not commenced as on date on account of political Resistance to the takeover of water supply and distribution assets by the private operator.

<b>Performance Risk</b>	High	Throughout contract term	Private Operator	The terms of engagement clearly lay down the minimum performance standards to be maintained by the operator in terms of service availability and quality. Non adherence and/or divergence will impose penal charges on the private operator, having a direct impact on cash flows of the project.
<b>Revenue Risk</b>	Medium	0-6 months	MJP and Private operator	The revenue from water connections is the primary source of cash flows for the project. Part of this risk is mitigated by MJP in the contract through setting of the condition precedent of 100% metering of 25,000 connections which will ensure a basic minimum revenue stream to the private operator. Additionally, commercial data validation through detailed consumer surveys was undertaken by the private operator to identify and estimate definitive number of water connections.

## Key Learning and Observations

**1. Develop an effective communication strategy:** initially identified key stakeholders through communication needs survey greatly develop communication strategies, the implementation of an enabling environment to help for the project. Necessary to create consumer awareness, in exchange for payment of uninterrupted water availability is a critical variable, the success of such transport mechanisms. Due to the transfer of the right to use public assets to private operators is a politically sensitive issue, the necessary infrastructure to facilitate this transition needs to be carried out by private parties involved in government institutions. Existing water related programs / projects, and improve service delivery by the positive impact of private operators to participate in the open and frank discussions will ensure faster buying arrangements from stakeholders such as management contracts. If the water supply project from Latur, stiff resistance to the project because of concerns about rising prices. Thus creating the necessary consumer awareness and inclusive stakeholder interaction, participation and management is the key to success.

**2. Determine a central agency to facilitate the smooth implementation and execution of the project:** a mechanism to provide the necessary technical expertise to support the government and deal with the relationship between consumers in specific sectors in promoting the implementation of the project will greatly help the experience of participation. If Latur water supply projects, MJP intermediary between project conception and during the implementation phase of the time including public private operators and stakeholders to play a key role. MJP also to protect his project to continue, despite the serious public



opposition to private operators to provide the necessary support and protection. Which has the support of government institutions such as the node can play an important role in the promotion of PPP infrastructure construction.

**3. Conduct comprehensive and detailed project preparation activities:** key project parameters availability of data is the key to success of the project bid. In the case where a significant amount of business risks private operators need to Latur water supply project in the case of critical and fundamental variables, such as the availability of a contract distribution network and consumers accurate information is important a. In this case, project, network drawings incomplete, the data is not accurate. Private operators to carry out a detailed investigation and asset condition assessment. Further data via a detailed survey of consumers also need to verify the commercial and private operators to bear.

**4. The commitment of the necessary capital expenditure to ensure effective operational assets before bidding.** Thorough assessment of asset condition and expected asset life cycle, before the bidding process should be carried out. In addition, adequate capital expenditure required to affect the transfer occurs before the operator of private contractors. This is relevant, in order to ensure the water supply scheme which will not hinder the provision of private management contract to fulfill its obligations to any major business problems plagued capabilities. Most government agencies such assessments may not be in a position, because the main driving force of such a privatization initiative is bound by these financial institutions in the case of the LMC Latur not in a position to raise funds for future investment.

However, funding for such research, bear the same may improve the ability of these projects, funded by the private sector.

**5. Develop an efficient and effective risk management mechanism is the key to the success of complex contract management:** risk identification and mitigation of the key elements in the success of any construction contract. If the MJP from Latur, detailed risk identification process. Identify and discuss a variety of circumstances to carry out the relevant officials and industry experts in the country. The risk of a framework to reduce the risk of closure as determined to develop and these are included in the comprehensive management of the contract. For example, the contract structure in such a way that financial security is to ensure that revenue is always more to private operators than by spending the contract period is estimated tariff collections. Capping this risk such a detailed risk analysis and identification of measures to develop management contracts, will help improve confidence in the private sector and in turn may translate into better when projects, the private sector participation, or they will be considered as high risk .

**6. Create tariffs and by establishing clear before the bidding process metering policies to create a favorable policy environment.** Contract period tariff before completion of the tender process, allowing bidders to undertake quantifiable tangible benefits from the project. Tariff structure is seen to rise based on staggered terms of the contract. This reduces the degree of revenue risk.

**7. Entrepreneurship flexible project structures:** from Latur Water Project is the foundation of an amazing balance between pro-poor strategy and development to enhance the operating efficiency of the private operators for example financially viable project.

- Pro bad strategy: The project structure and contract terms to keep in mind the specific circumstances of Latur city. As mentioned earlier, the monthly water rate concessions are available to the former slum dwellers nine month contract period. In addition, public water points to be banned and affected parties are encouraged to take an individual or group to connect up to four families.
- Private operator's financially viable project: in the case of Latur, trying to develop operational efficiency based on the minimum performance standard has been set in the contract and the increased revenue could be raised from private operators by taking an economically viable model operational efficiency. Basis by private operators together generated revenue metering connection, the successful bidder for loss reduction on the existing system. Financial model is based on improving the operational efficiency of the entire contract period and reduce transmission losses. As mentioned earlier, tariff rationalization is carried out prior to bidding MJP. This coupled with the input cost of electricity and water risk minimization to further strengthen the financial viability of the project.
- Changes that may occur in order to reduce opposition: the opposition to this project is necessary to "privatization", and the concept of water services billing. Prior to this arrangement, the residents cannot receive from Latur's regular water supply, and water supplies are not accustomed to being billed. To minimize opposition to such a system, a longer contract period can be considered which would allow staggered tariff increases, will give private operators have sufficient time to recover their costs.

# Case study 7: Salt Lake Water Supply and Sewerage Network



## Project Description

West Bengal Government (GoWB) have been identified sectors V, IT and ITeS Salt Lake Kolkata (IT / IT enabled services) hub in West Bengal, V is designed to be upgraded to international standards

department. This site located in the area of 300 acres on the eastern edge of Kolkata. Sector V consumption structure, including IT business office space, government agencies and other private companies owned office space. However, V is the lack of an organized department of water supply and sewage systems. Due to the lack of proper water supply and sewage disposal systems, departments V units must rely on groundwater for industrial water supply and sanitation development site in their own costs. This approach has led to excessive groundwater extraction.

In the absence of civil infrastructure development support, upward gradient V department's IT department is considered to be difficult. 2005, Development GoWB city of Calcutta Municipal Development Authority appointed (KMDA) develop basic infrastructure services, comprehensive plan Nabadiganta industrial development in the township. Therefore, KMDA as Nabadiganta industrial township Authority (NDITA) plan to jointly supply cum sewage treatment projects. The project in the built - operates - transfer (BOT) PPP arrangements for the implementation. The project is to provide financial assistance under development Nehru national urban redevelopment corporation (JNNURM) scheme of the central government.

The project involves the design, construction, and all the water and wastewater treatment facilities debug PPP basis. Specifically, water infrastructure, the project required an elevated storage reservoir (ESR) increased primary, an underground reservoir (UGR) structure, and along which will be connected to a dedicated individual main road laying pipes. For the wastewater industry, construction and development projects needed health network pumping stations and sewage treatment systems.

KMDA and NDITA select private developers on the basis of competition. Private developers formed a SPV - in Nabadiganta Water Management Limited (NBWML). The SPV has been asked to assume part of the financing; the specified component design of water and wastewater treatment systems; plan; undertake construction; and the operation and management, including the purchase of water, generation of bills and collection system of the concession period. The infrastructure projects planned in 18 months, within a total time of development. After the completion of construction projects, the SPV is the water supply system operation and maintenance of 30-year concession period.

## PPP Structure of the Project

Project in PPP contracts a franchise agreement to develop the project on BOT basis. Contract involves the following parties, namely, KMDA, NDITA and a consortium of private developers. According to the concession agreement, private developers need to bear in the development, design, engineering, finance, procurement, construction, completion, testing, implementation, management, administration, water supply network, sewage network and sewage treatment plant operation and maintenance ( STP) in the field, namely, the five departments of the investment made, private developers cum allows consumers to collect sewage water tariffs. Franchise agreements require private developers to operate and manage water and wastewater treatment systems, for the time period of 30 years.

Because part of the pre-implementation activities, private developers are asked to prepare a detailed project report to implement the project. Detailed design work is to be capital by private developers, and is subject to approval from the KMDA and NDITA offer; the work is carried out by private developers. Appropriation JNNURM program is subject to the Ministry of Urban Development (MoUD) approved by the DPR. Tariff collection and the same structure is determined by private developers and KMDA, NDITA and relevant stakeholder consultation, including the IT sector institutions located five representatives

After the completion of the construction phase, private developers will need to purchase treated water from NDITA and provide water to all connected devices and sewerage; water must then be discarded following treatment. In addition, generating bills and its collection, is managed by a private developer. Private developers will retain fees collected from the consumer user. To undertake the project, and set up STP, private developers will provide the required land area for free. In addition, private developers do not need to do any type of license fees paid or payable to KMDA or NDITA annuity contract period.

At the end of the term of the contract, the water supply and sewage disposal network must be returned NDITA for future operation and maintenance.

## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
Design Risk	High	0-6 months	Private operator	The initial designs for the water supply and sewerage system had been prepared by KMDA and NDITA. Post selection of the bidder, the detailed designs for the project had to be completely developed by the

				JUSCO-Voltas consortium for the ultimate Population for 2039. The designs were detailed out in the DPR and were subject to approval by the KMDA and NDITA Before implementation. The designs were Approved by KMDA and NDITA after a few requirements for design optimization. The design risk was therefore shared by both the parties.
<b>Construction Risk</b>	High	0-2 years	Private developers	The JUSCO-Voltas consortium was to undertake and manage the construction of The components as per the DPR. The risk of construction rests with the private developer.
<b>Market Risk</b>		Throughout	Private Developers	The recovery of the capital investments made by the private developers would be through the tariff that would be levied on the IT and other units in Sector V. The consumer base was projected for the design period of 2039. The revenues for the developer are extremely sensitive to changes in the population in the project area and the subsequent variation in the demand for the water supply services. This risk is however to be borne completely by the JUSCO-Voltas consortium.
<b>Force Majeure</b>			Government and Private Developers	In the event of the private developer being unable to perform its duties on account of a Force Majeure event, the Government would provide a suitable extension, and would continue to make reimbursements to the private developer.
<b>Operations Risk</b>	High	Throughout	Government and Private developers	The treated water to be supplied to the Consumer base is to be supplied in adequate quantum at the agreed frequency by NDITA. Any inability on the part of NDITA to provide water would disrupt the operations of the private developers. The overall working of the supply of treated water to all the consumers, collection and treatment of the sewage rests with the private developer. Operations risk is thus shared between both the parties.

## Key Learning and Observation

- Pre-project assessment and feasibility studies critical
- Effective facilitation of project implementation by the government
- Government needs to provide full cooperation to the private developer at various phases:

# Case study 8: Timarpur Okhla Integrated Municipal Solid Waste Management



## Project Description

Delhi produces 7000 tons of municipal solid waste (MT) (MSW) per day in 2021 is expected to increase to 18,000 tons, is being used for waste disposal landfill currently nearing full capacity, even with the envisaged capacity addition, this situation is not too likely to improve. Municipal Corporation of Delhi (MCD) has thus embarked on a project to be set to reduce the amount of waste in landfills and the use of waste for productive purposes, such as generating power waste. MCD has identified two locations, namely Timarpur and Okhla, for the implementation of this project.

Part of the following facilities will be developed as an integrated municipal waste treatment project:

1. The plant converts MSW refuse derived fuel (RDF), capable of handling 1300 TPD in Okhla and 650 TPD in Timarpur.
2. The device is capable of processing bio-methanation Okhla 100 TPD of green waste.

Be able to handle up to 6 MLD sewage treatment site in Okhla recovered process water and cooling water 3. Water recycling plant.

- The power plant generating capacity of 16 megawatts Okhla.
- The RDF 5. Transportation from Timarpur to Okhla for combustion in boiler plants above.

The project is registered with the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC) for more than 10 years to earn 2.6 million certified emission reductions (CER).

## PPP structure of the Project

The project has been carried out to build, own, operate and transfer (BOOT) basis. IL & FS Infrastructure Development Company Limited - task (IL & FS IDC) is to build a project to assess the various technologies, to carry out project development activities and through competitive bidding to select the appropriate developers. IL & FS IDC and Andhra Pradesh Technology Development and Promotion Board were

established before being called Timarpur-Okhla Waste Management Company Private Limited (TOWMCL) SPV bid it.

Acquired 100% stake in the successful m / s Jindal Urban Infrastructure Limited (JUIL) in the SPV - TOWMCL. Following the implementation of the project agreement by the SPV, respectively

1. SPV signed a development and NDMC integrated municipal waste treatment plants, construction, operation and maintenance of the master franchise agreement.
2. SPV signed Delhi Power Limited (DPCL) Timarpur land lease agreement. DPCL of Timarpur site owner, is a holding company, in the Indraprastha Power Generation Company Limited (power plants), Delhi limited supply companies (electricity procurement, transport and bulk supply company), and shares in the three distribution companies ( Middle East Delhi Electricity Distribution Company Limited, south, west and north Delhi Distribution Limited and northwest Delhi Distribution Limited)
3. SPV signed a land New Delhi Municipal Council (NDMC) in Okhla a 25-year lease agreement. NDMC Delhi Development Authority has taken this piece of land on lease.
4. SPV concludes with MCD and NDMC for urban waste supply agreement.
- 5, the agreement the company and the Delhi Jal Board (DJB) to receive and dispose of treated sewage effluent.
6. SPV company and BSES Rajdhani Power Limited power purchase agreement.

## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	High	First Year	Government	In case NDMC failed to handover the land after signing the concession agreement, NDMC was liable to reimburse the Development Costs incurred by the developer.
<b>Delays In Linkages</b>	High	Throughout	Government	As per the agreement signed with NDMC, NDMC shall ensure the provision of a sanitary landfill site for the disposal of refuse and inert material. However, as on date, MCD does not have an engineered landfill site. The site at Narela is under development and the other dumping grounds of MCD have already reached their full capacity. Therefore, the scientific disposal of refuse and inert material is a risk the NDMC shall have to manage.
<b>Construction Risk</b>		0-2 years	TOWMCL	In the event the construction of the plant is not completed within 24 months from the



				date of financial closure, TOWMCL shall be liable to pay NDMC Rupees 100 per ton of MSW that is being disposed by NDMC at the MCD landfill site, for each day of delay in the construction of the Plant.
<b>Market Risk</b>	Low	Throughout	TOWMCL	There are two saleable end products from the plant – Electricity and Organic fertilizer. In terms of revenue potential, the sale of power contributes a major share of the expected revenue. A Power Purchase agreement has been signed with DERC for purchase of electricity generated from Integrated Waste Management Plant.
<b>Financing the project</b>	High	0-5 years	Government	NDMC agreed to enter into agreement with the lenders to enable the financing of the project. Usually, the developer must ensure the financing of the project.
<b>Change in Law</b>	high	Throughout	TOWMCL	If TOWMCL has to bear any additional expenditure over and above their agreed project expenditure on account of change in law, NDMC shall reimburse 100% of the amount, or make changes in the agreement provided such additional cost is not more than 5% of the project cost.
<b>Transfer and hand back of project Facilities</b>	Medium	On the completion or termination of contract	TOWMCL	If at the end of the term of the agreement or in the event of the termination of the agreement, NDMC decides not to take over the operations of the plant then in that case the developer shall be required to provide the site free of all encumbrances at its own cost.

## Key Learning and Observations

Was awarded in 2008 when this particular item, which is one of its trades. General household waste is not considered to attract private sector participation. Development of the project has been summarized as follows Learning:

### • Project Preparation

Opinion

The degree of preparation before the launch of the bidding process is quite large. This phase entailed detailed technical study and review, financial evaluation, the contract clearly, risk assessment and obtain regulatory and statutory approvals. In fact, before the implementation of the project SPV also be combined to launch bid.

#### Learning

Good project preparation is crucial to ensure that the financial attractiveness and faster settlement of the project. Uncertainty of clear contractual and regulatory framework to reduce the extent of private investors face.

#### • **Government support:**

##### Opinion

IL & FS and APTDPB have support and support GoNCTD Chief Minister and principles Secretary (GoNCTD electricity and urban development). Despite the support of the government, which lasted three years, winning the project? One reason is that the time required for a no-objection certificate to convince stakeholders and procurement clearance and various government departments.

##### Learning

This is very important, the government set up a single window clearance or authorization to solve such problems. This process will help reduce the time lag between the expected and the actual time to complete the project. Also, you must have the full support of the government, which helps to get a buy-in of the general public.

#### • **Technology:**

##### Opinion

The alliance chose RDF waste due to the nature of India and other mature technology. The technology is able to efficiently convert waste into pellets used in the majority of power plants. Delhi technology being implemented before the test is in two different positions.

##### Learning

When the art or methods to implement a selection of the output, and the loss of the benefits by using the specific method or technique should be thoroughly performed a comparative study to assess the way.

#### • **Consumer education:**

##### Watch

The project is located near residential areas, killing about protests from waste incineration development and pollution. To solve these problems, five public hearings were organized; three Timarpur, one in Okhla, an Electricity Regulatory Commission in Delhi. Public hearings will help resolve substantial doubts about the project.

##### Learning

Implementation of new technologies requires the consumer or end-user education, so as to realize the benefits. Including buying multiple items stakeholders should public hearings or stakeholder interaction to get.

- **Convenience:**

- Opinion

- Multi-stakeholder participation adds to the complexity of the project. In this case, SPV project had to take a gap from a number of government departments to assess the progress of the different departments, and to achieve financial settlement at the same time.

- Learning

- It is important to have a single window clearance, which will facilitate the smooth flow of information and transaction. Even if this is not possible, government entities and other formalities can be appointed to take care of. With this private entity can focus more on core development issues, rather than dwell on the administrative procedures.

# Case Study 9: Tuni Anakapalli Annuity Road Project

## Project Description

The Tuni Anakapalli project is one of several projects in the golden quadrilateral scheme, by the National Highway Authority of India (NHAI) for road expansion project. The scope of the project is to strengthen the existing two lanes, and expand to a total 59 km Road (NH) 5 (Chennai Calcutta) between Vomiting and Anakapalli PPP basis in Andhra Pradesh on the four-lane dual carriageway. Keep in mind the lack of road sounding appealing, NHAI decided to take up on building their own transfer (BOT) mode annuity projects.



In the GMR Group, in consortium with the American engineer Malaysia (UEM) Ltd Group was awarded the project contract. Formed a name GMR Vomiting Anakapalli Expressway Sdn Bhd (GTAEPL) the SPV to execute the project. Road construction (expansion) began after May 2002 and December 2004, a month's time to end the overflow, due to the delay in the transfer of land NHAI. The total project cost for 295 crore. The NHAI royalties paid Rs 2.948 billion from the semi-annual fixed annuity May 9, 2005 to November 9, 2019.

## PPP structure of the Project

The project has received the NHAI basis of BOT (annuity) of. NHAI annuity model involves a fixed sum of semi-annual payments to the concessionaire during the concession period to cover operating and maintenance costs as well as a certain percentage of his income and the cost of capital projects on it. If concessionaire failure, traffic in the actual availability of any annuity payment period below the guaranteed availability of that pension is reduced proportionately. NHAI

Fixed annuity payments from a bank in India, plans to provide credit during the entire operation of the credit cycle. In the GMR Group (including GMR Power Company Private Limited, GMR Infrastructure Limited and GMR Technology Holdings Limited), in consortium with Malaysia UEM Group, won the contract for the project, development, operation and maintenance of roads, including 17.5-year concession period of 2.5 years construction period. An SPV - GTAEP L GMR group, which was established to perform 74% stake in the project and the UEM 26% stake.

GTAEP L also entered into March 18, 2003, the State Council and the NHAI Andhra Pradesh, according to which the Government has agreed to extend continued support and give certain rights, authorities to facilitate the implementation and operation of state support agreement for the project, including all infrastructure, application permissions, police officers, highway patrol team of professionals, and generally support the implementation of the project. GTAEP L do not have fees or advertising of other development options on the right to charge or allow any form of road. Annuities are the only developer of project income.

However, NHAI has the collection and use of tolls or fees or allow any ads collected. GTAEPL been with UEM Limited (O & M contractor) operation and maintenance agreements, operation and maintenance, and to take care of project facilities for risky:

(A) monthly `O & M costs of 012.5 million rupees; and

(B) `periodic fee of Rs 750 million.

Operation and maintenance costs and the cost of the upgrade from the regular day 1.5% per year, a year of starting the business from. When the concession period ending in November 2019, franchisees should be transferred

NHAI's no-cost project assets.

### Risk Allocation framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	Low	First Year	NHAI	The obligation for land acquisition was with NHAI. The land already had all environmental and other clearances. However, there was a slight delay in the land acquisition because of which the construction was delayed by a month.
<b>Financing Risk</b>	Low	0-2 years	Concessionaire	While the concessionaire had to bear this risk, it was relatively easier to get financing because of fixed annuity payments from NHAI. In addition, NHAI also gave an irrevocable revolving letter of credit for ` 29.48 crores throughout the concession period. This provided comfort to the bankers.
<b>Design Risk</b>	Low	0-2 years	Concessionaire	The design had to be accepted by NHAI and vetted by an independent engineer. In addition the road designs were standardized as per the Indian Roads Congress (IRC) and Ministry of Surface Transport (MoST) standards.
<b>Construction Risk</b>	Low	0-2 years	Concessionaire	The concession agreement had clear standards and specifications for construction with an independent engineer having to ensure adherence. The concessionaire had to provide a Performance Security for ` 6.58 crores.

				Also, the clause of retention of minimum equity (26%) in the SPV by the original concessionaire throughout the concession period provided a sense of the security to NHAI.
<b>Market Risk</b>	None			The annuity payment is not related to the traffic or other market related forces. Therefore this risk is nonexistent.
<b>Payment Risk</b>	Low	Throughout		NHAI is compensating the concessionaire by way of a fixed annuity backed by an irrevocable revolving letter of credit for 29.48 crores throughout the concession period. This facility reduces the risk of defaults in annuity payments.
<b>Change In law</b>	Medium	Throughout	NHAI	The Concessionaire is exposed to risks in case of any increase in the capital expenditure and/or operating costs or taxes due to a change in law. This obligation of the Concessionaire is limited to 6 crores, beyond which NHAI has to bear the expense. In case of operating expenditure the exposure of the Concessionaire is restricted to 1 crore.

## Key Learning and Observations

### Innovative Funding through Securitization

During the operations stage, GTAEPL raised debt at very low interest rates by securitizing the annuity payments receivable from NHAI. This mode of funding enabled the concessionaire to repay the term loan and provided access to relatively lower cost funding.

### Transfer of Risk

The GMR consortium stabilized its risks by entering into a long term O&M contract with its own consortium partner, thereby transferring substantial risk of the project.

### Incentive to Developer to complete construction on schedule

The Developer had an incentive for early completion that attracted a bonus payment while a delay led to a penalty. Moreover since the concession period included the construction period, the developer was incentivized for an earlier completion to begin earning annuities.

# Case Study 10: Delhi Gurgaon Expressway

## Project Description

US National Highway Authority of India (NHAI), Road Transport and Highways in (Mott & H), the implementation of the responsibility entrusted gold quadrilateral project (road project connecting New Delhi, Mumbai, Chennai and Kolkata four metro cities). As part of this project, it is recommended to connect NH-8 Gurgaon Delhi a very busy part of the conversion for a 6/8 lane divided carriageway access control.

Then existing four-lane, 27.7 km section between Delhi and Gurgaon NH-8 up to 20 intersections, experienced high density of vehicles (145,000 passenger car units (PCU's) / day in 2000) and Traffic Non-



isolated incidents resulting in increased waste pollution, acute congestion, fuel and excess.

The project was awarded the Jaypee Industries and Construction Co., Ltd. of the Commonwealth DS design, financing, construction, operation and maintenance of the facility's 20-year concession period. As a typical BOT road project, the concessionaire was allowed during operation, the project facilities to collect user fees to recover his investment and the required highway was transferred back to the government at the end of the concession period. This is a negative grant was awarded in India first BOT project, expressing willingness to pay upfront costs of NHAI concessions in return for government capital grants as a franchise. Considering the strong flow projections in selected bidder offered to pay 6.106 billion rupees to NHAI.

After the highway was in January 2008, dragged on for so long, mainly because of land acquisition problems and changes in the scope of work. It carries more than 180,000 per day for the PCU date.

### PPP structure of the Project

The project was awarded Jaiprakash Industries Limited and DS Construction Co., the built - operate - transfer (BOT) basis, a 20-year consortium. Selection of the concessionaire is willing to pay the early `6.106 billion rupees for NHAI negative granted. The concessionaire was asked to design, build, operate and maintain the highway in accordance with the specifications approved by NHAI. Concession period including construction period, in order to encourage the early completion of the construction of the concessionaire.

Create a special purpose vehicle to implement the project known as the new super connectivity Ltd. (formerly of Jaypee DSC Ventures Ltd). And when in the tender, Jaiprakash industry 51% controlling stake and holds 49% DS construction, the project implementation process, Jaiprakash industry to reduce its stake in the SPV, to about 1.2%. The SPV conclude a fixed time, fixed price engineering, procurement and construction (EPC) contract, DS Construction Limited for this item.

### Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
Delays in land acquisition	High	0-5 years	NHAI	NHAI was liable to pay damages of if it failed to provide Row within the specified time. Delays in land acquisition resulted in an increase in the acquisition cost for the government. They also resulted in loss of potential revenue accruing to the Concessionaire due to delays in commencement of operations.
<b>Financing Risk</b>	Medium	0-5 years	Private sector	The Concessionaire was required to achieve financial closure within 180 days from the date of the agreement beyond which an additional period of 90 days was allowed subject to an advance weekly payment of ` 1, 00,000 per week as damages by the concessionaire for delay in achieving financial closure.
<b>Design Risk</b>	High	0-5 years	Private sector	There were substantial changes in the design that led to escalation in cost as well as time over-run. This meant revenue loss to the Concessionaire as



				the concession period was not altered.
<b>Construction Risk</b>	High	0-5 years	Private sector	If Concessionaire failed to complete the project construction by the scheduled completion date, the agreement prescribed weekly damages at the rate of 0.01% of the total project cost. The construction of the expressway got delayed due to inordinate delays in land acquisition and changes in the scope of work. The risk was primarily borne by the Concessionaire and more specifically by DS Constructions Ltd. As it was also the EPC contractor for the project. For change in scope, NHAI was also asked to contribute the increased investment requirement.
<b>Payment Risk</b>	Low	Throughout		NHAI is compensating the concessionaire by way of a fixed annuity backed by an irrevocable revolving letter of credit for 29.48 crores throughout the concession period. This facility reduces the risk of defaults in annuity payments.
<b>Change In law</b>	Low	Throughout	NHAI	In case a change in law results in a financial burden greater than 1 crore in any accounting year for the concessionaire, the concessionaire may notify NHAI and propose amendments to the concession agreement so that the concessionaire is in the same financial position. Similarly, if a change in law results in a financial benefit greater than 1 crore for the concessionaire, NHAI may notify and propose changes in the concession agreement.
<b>Force Majeure</b>	Low	Throughout	NHAI	In case of a Force Majeure event before financial closure, the date for achieving financial closure shall be extended by the period for which the force majeure event shall subsist. In case of a Force Majeure event after financial closure, before commencement of operations, the dates in the project completion schedule and the concession period shall be extended. In case of a Force Majeure event after commencement of operations, the concessionaire shall

				make efforts to collect toll, failing which the concession period shall be extended.
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## Key Learning and Observations

1. The land acquisition process: the government has promised to provide the sponsor prior to the actual acquisition of land, lots of land area. Due to the densely populated areas surrounding the highway, there are some pockets of land is difficult to grasp. This exposure to the risk of the government does not provide the

Land within a reasonable period of time affect the overall progress of the project. It would have been better if the problem cannot control, such as the procurement phase before these projects get it resolved to ensure the smooth operation of the project.

From project stakeholders 2. Support: For a project of this size, for government agencies to gain sufficient public support to ensure the smooth implementation are very important. Public support for land acquisition and road construction activities should be ensured through continuous dialogue with the affected individuals. Such efforts should create a sense of ownership through public participation; reduce resistance, leading to delays and other complications. And with the project throughout the two states, the demand made by the various government agencies, resulting in scope, project cost and the consequent delay in project implementation change dramatically change the project location and design. Ideally, this problem should be resolved in consultation project preparation stage.

3. Approval from multiple entities: more than 15 government agencies / non-governmental organizations have been affected in some way or other by the development of this road is that approval must be given a variety of projects. This became during the construction of a complex and time-consuming process. Government can provide a single window clearance project of this size.

4. The risk of lower traffic situation brownfield projects: Although traffic risk is a toll road feasibility of a typical project of the biggest risks, the situation greatly reduces the project involves improvements to existing roads and charges, because of traffic flow were more or less established. New section of NH-8 has been one of the busiest roads, to that extent a profitable business, so it may gain the advantage.

5. outdated traffic forecast: NHAI Transportation Research at the 1998 procurement projects rely on. Therefore, the actual traffic severely outnumbered, from the beginning of commercial operation of the forecast. In fact, as long as the highway was opened to traffic, the unexpected large number of vehicles, causing heavy queues at the toll booths, and delays in crossing the stretch. This seems to have defeated the fundamental purpose of the highway to reduce travel time and fuel costs and congestion in the community makes the project unfeasible. However, timely action and necessary measures to improve conditions and licensing authorities.

6. The need for effective cost-sharing contract management: Contract provisions for sharing costs by charging the daily traffic exceeds the threshold level to achieve. However, such an approach on greater responsibility in the supervision and management of government contracts to track project performance, ensure that the audit results reflect the true performance of the highway.

# Case Study 11: Nhava Sheva International Container Terminal

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## Project Description

Newport International Container Terminal in Mumbai (NSICT) is India's first private container terminals in India and one of the most modern container terminals. It is promoted by the port P & O, Australia. Opposite Terminal Island, located in the Nehru Port in Mumbai. Royal was awarded the 1997 base port for 30 years the highest net present value of the licenses available on the (NPV), to: 600 meters long three Approach pile wharf, reclaimed 20 hectares of container yard construction and installation construction of office facilities and ancillary buildings and construction of electrical sub-stations and associated electrical work which is to be developed in India, needed all of its first fully automated container terminal operating container handling equipment, to receive Plover Cove planning to invoicing, is the computer. The total design capacity of 2 berth container terminal is 7.2 million tons per year in the first stage (i.e. 0.65 million twenty feet equivalent units (TEU)) and cumulative 15.6 million tons per year (that is, 1.3 million TEU (60 + 070 = 130) in the second stage. The port is fully operational, both Phase I & II capability from July 2000 which is currently running at capacity more than 100%.

## PPP structure of the Project

Nhava Sheva International Container Terminal Sdn Bhd (NSICTPL) was founded in 1997, special vehicles, based on M / s of P & O Ports Australia Holdings Limited, M / s between Consortium Perkapalan Company Limited and M / s DBC Group's joint venture agreement ( by cross-Impex Pvt Ltd on behalf of). March 2006, P & O Ports was taken over by Dubai Ports World Limited (Dubai World), is one of the largest container terminal operators in the world, and then became part of the Dubai World NSICTPL terminal network.

**Obligations of the Parties:** the concession agreement for the construction of container terminal development, operation, maintenance and management, operate and transfer (BOT) basis for a period of 30 years, expires in 2027 JNPT responsible for scheduling access and ships, pilotage and tugboats, dredging, navigation safety, power supply, water supply docks and boats, and to monitor air and water pollution

berthing. JNPT is the licensee has developed six hectares of additional container yard area, so two hectares of inland container depot licensees operating railway station provides a fully developed. Licensee, in this case NSICTPL, responsible for the development, management, operation and maintenance of common user infrastructure. NSICTPL be required to pay a fee in the case does not meet the specified minimum flow in order to ensure the flow of JNPT. Land ownership in licensed premises, recycling sea, water retention and JNPT.

**Pricing:** For pricing, the licensee fee prescribed rates and charges approved by the Government of India shall not exceed the published price of the lowest interest rates JNPT Port Tariff Schedule and sizes. Port is expected to grow 20-25% of electricity every three years. Licensee to charge the user container terminal services, including costs associated with port charges, container handling and cargo. According to the tender documents will ensure the successful treatment of at least 90% of the estimated annual throughput level.

The expiration of the period specified in the license, all the civil engineering structures, equipment, machinery, auxiliary equipment will be handed over to JNPT Free: termination. If JNPT were 30 years ago to terminate the agreement, the license will be subject to depreciation costs of permanent buildings and other assets taken over. The document sets out the estimated life of the asset depreciation.

## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	Low	1-2 years	Public sector-port trust	The Port Trust already owned the land required for the project. However, there was lack of clarity in the concession agreement for additional land for expansion and allied activities.
<b>Financing Risk</b>	Medium	Throughout	Private sector	There has been uncertainty with respect to the tariff, which is set by an independent authority. Other financial risks, as a result of adverse movements in interest rates, exchange rates, etc., are expected to be managed by the private sector through appropriate financial management techniques.
<b>Design Risk</b>	High	1-3 years	Private sector	
<b>Construction Risk</b>	High	1-3 years	Private sector	
<b>Change In law</b>	Low	Throughout	Private Sector	No compensation from the government is due, although there is an enabling provision to mutually discuss in good

				faith and suitably amend the terms of the concession agreement, including an extension of concession period. No compensation for changes in any tax laws. Extreme government actions, including change in law that frustrates operations of the project have been included under political force majeure events and suitable termination and compensation procedures have been prescribed.
<b>Force Majeure</b>	Low	Throughout	Private Sector	While, force majeure risks are partially transferred to the extent of insurance, they are largely borne by the private operator. In the event of termination, there is compensation payable to the concessionaire to the extent of debt outstanding and varying levels of equity contribution, depending upon the nature of the event.

## Key Learning and Observation

1. The evaluation criteria must be simple and powerful. Evaluation criteria - the highest NPV Royalty payments - is simple, but not enough. License lack a way to pay the assessment fee and unforeseen problems from interaction with the tariff levels generated by the royal family, at a later stage of operation created some problems.
2. Quality assessment market. Traffic forecast (market assessment) is keyboard input tariff setting, and is directly related to its costs and benefits are set off against income. For the same level of investment, container handling unit costs and different levels of flow and change, mainly because of the distribution of fixed costs and return traffic base. Therefore flow forecast (market assessment) a quality port is crucial. Roles and the licensor and the licensee's responsibility 3. defined. Clear, not only in the bidding stage and at the end, and role in the operational phase, and these two licensor and the licensee's responsibility is crucial. For example, the provision of adequate transport links, a direct impact on the effective functioning of the port.
4. Project Performance definitive agreement to solve the problem with the contract. The issue related to the specific performance specifications or delivery standards need to be designated to safeguard the interests of users. In NSICT agreement, mentioned only performance criteria related to the crane productivity (i.e. move per hour), it is of limited interest to the user. In addition, there is no mention of the case, inadequate performance penalties.
- On the tariff structure and efficient project management 5. positive attitude. TAMP actions should be strictly checked to ensure the efficient and effective management of the port of ISP costs port facilities - both public and private. And with the ability of the tariff structure, a capable project management team, the decision shall be entitled to performance standards listening port operation and maintenance of the defined criteria.

6. A commitment to provide more land: It may take a variety of purposes, including additional land at the time of signing for road / rail links, warehouses, yards, etc., it cannot be reasonably determined to what would require additional land during the concession period, if there is additional land, such as the degree of trust or port is available in a position to provide more land. Therefore, in the drafting of the agreement, the expansion may be considered appropriate provisions to avoid adversely affecting the growth of the terminal / port.

7. terminate the commitment to cover maturing debt: This is a standard practice in order to protect the interests of the lender, and the relevant provisions of the concession agreement are very common. However, it put more pressure on the government to monitor the borrowing and repayment SPV. This is even more critical in an independent regulatory body to monitor the service and financial performance has not been established. For example, in the main port, the main port tariffs Bureau (TAMP) to examine the ports of capital expenditures, and to allow or not allow to be included in the "allowable expenses" heading for certain expenses set tariff purposes. In short, despite the promise to pay the debt maturity "is essential, the government sponsors also need to establish an effective regulatory capacity of the contract, to ensure the protection of the interests of the lender.

8. promoting other port industry PPPs: the bid process NSICT project, PPP and other projects in the port sector, the infrastructure is now paving the way for the industries most sought after. Late, increasing the number of port projects is being provided through the PPP approach reflects the benefits from private entities to be exported by the government to participate.

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# Case Study 12: Kakinada Deep Water Port

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## Project Description

In Kakinada Deep Water Port (KDWP) is located partly in the east coast of India at Kakinada in Andhra Pradesh in southern ports. In Kakinada Port after Visakhapatnam, the state's second largest port. It includes, KDWP, Kakinada fishing port and ship-breaking unit.

Although Kakinada port of Anchorage by the Andhra Pradesh government (GoAP) operation, KDWP was in November 1997 by the PPP mode GoAP the PPP route before being privatized in 1999, the project uses a OMST / BOMST (operation and maintenance, and share transfer / sharing and transmission construction, operation and maintenance) Kakinada Seaport Ltd (KSPL) private entity operating the project.

## PPP structure of the Project

In order to attract private investment, and improve operational efficiency, KDWP privatized OMST / BOMST basis. Concession agreement was signed in March 19, 1999 with M / S International Seaport Private Limited (ISPL), a joint venture company incorporated in Singapore, by Larsen & Toubro Ltd., India, the United States (SSA), the United States and precious handling services to enhance the shipping company, Thailand. ISPL then guide Consortium Perkaplan Berhard (KPB), the name of Malaysia and Canada Port Limited (CPCL), the management of port operations floated a special purpose company. CPCL renamed Kakinada Seaport Ltd (KSPL)

KSPL start port operations from April 1, 1999 for 20 years beginning with each of the two five-year extension options (ended March 31, 2019). Under the original concession agreement, KSPL are:

- Operation and management OMST based on the existing three berths at the existing Deepwater port (a)
- build, run and manage a fourth berth in the future, 70% after consecutive berth occupancy reached BOMST basis (Phase 2) on the three existing berths.

Users are allowed to appropriate fee KSPL levy, collect and retain the port. KDWP is due to a small mouth, it is determined tariff flexibility, not governed by the Bureau of the main port tariff rules.

It pays GoAP a 20-22% share of income subject to the provisions of the previous year on the basis of sensible minimum guaranteed amount (MGA) annually. Port lease GoAP land use also pays KSPL. In



addition, all personal property was sold to the port KSPL by GoAP. Back in 2009, the way the concession agreement Revised Supplementary Agreement. These amendments include:

- Line 20 to 30-year term of the original concession period, in blocks of two further options for each 10 years of age, to extend for 20 years,
- Eliminate provisions on revenue sharing and GoAP MGA KSPL allowed to harbor additional / new developments (such as building a fifth berth, on the same terms and conditions of existing agreements)

At the end of the concession period, KSPL should all real estate project assets GoAP free. Moveable assets will be transferred to GoAP payable at the time of the carrying amount of assets

### Risk Allocation and framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	Low	0-5 years	Government	The port already existed and was given out for private sector operation and maintenance. Therefore, there was only limited land acquisition that was required for some supplementary purposes such as rail connectivity. This obligation rested with the government.
<b>Financing Risk</b>	Low	0-5 years	Government	The financing risks for the expansion of existing facilities were relatively lower since the traffic movement at the existing port already provided some base comfort. However the private entity faced difficulties in achieving financial closure due to the unfavorable terms in the concession agreement.
<b>Social risk</b>	High	0-4 years	Private Sector	This risk was high since KDWP was potentially competing with the Kakinada Anchorage Port and there were cases of social unrest and strikes by employees of the anchorage port.
<b>Design risk</b>	High	0-5 years	Private sector	The design of the fourth berth had to be developed by the private operator and was subject to approval from GoAP.
<b>Latent Defect risk</b>	High	0- 5years	Private sector	Cavities detected in the diaphragm wall translated into higher costs from repair expenses with respect to existing infrastructure. These costs were not taken into consideration when the

				contract was signed.
<b>Construction risk</b>	High	0-5 years	Private sector	The private operator had to provide a performance guarantee in the form of two bank guarantees equal to 0.5% of the estimated capital cost for Phase 1.
<b>Approvals</b>	Moderate	0- 5years	Private sector	In this case, the port was already constructed with GoAP itself having taken all approvals during construction. However, the risks of getting approvals for additional berths remained fully with private developer with the agreement only stating that the Government “may assist in obtaining clearances”. The clause did not even include the term “best efforts”.
<b>Market Risk</b>	High	Throughout	Private sector	There were over-optimistic traffic projections which impacted the estimated revenues adversely and resulted in a high risk to the developer owing to the MGA clause, thus effecting unfavorable the project viability.
<b>Change in law</b>	High	Thorough out	Private sector	The private operator is not entitled for compensation from the government, although there is an enabling provision to mutually discuss and amend the terms of the concession agreement, including extension of the concession period. No compensation for changes in any tax laws.
<b>Force Majeure</b>	High	Through out	Private sector	Any costs arising out of force majeure because of non-political events have to be borne by the Concessionaire. The same are restricted to the extent of insurance.

### Key Learning and Observation

Fair competitive environment: in the bidding process / tender stage, the Government has said that private developers will get the complete development of the port of rights. However, the award of the project, there is anchorage in the port, parallel limit operational aspects. Which is a key reason for the dispute between the KSPL and GoAP KDWP can handle restrictions on goods. In order to protect the existing anchorage port cargo, GoAP not provide a fair competitive environment, thus affecting the extent to KSPL traffic. Although

this problem was later solved, preferably it should be processed in the initial stage, in order to prevent a negative impact on the project.

MGA government: government by insisting on a minimum guaranteed amount of revenue maximization approach proposed substantial pressure may derail the project. Government had finally agreed to cancel this provision.

Technical Due Diligence: There are some issues with respect to the assets of the port, such as underground continuous wall cavities, additional dredging demands to remove the stones. Since this is a brownfield assets were privatized, the government should undertake a project site for detailed technical due diligence to accurately estimate the investment demand.

Stakeholder consultation: This project has experienced social unrest and strike against the deep-water port anchorage port operations staff. Where the interests of private operators of all parties have been taken into confidence before the appointment of stakeholder's consultation would prevent such damage.

Solutions to problems through mutual discussion: worthy of attention from the project in the absence of knowledge is to abandon the project made by the revised terms of the concession agreement for mutual discussion. Despite these problems, such as the nature and duration of MGA concession agreement, the two sides GoAP and KSPL parties agree to amend the agreement, and to ensure the continuity of the project.

Competition facilities and better package: newer ports, such as intense competition Gangavaram port and harbor Krishnapatnam given to KDWP. These two ports are green port, a huge land for future expansion, no longer concession period and better preferential terms, because in terms of the evolution of the availability of domestic franchise agreements and risk-sharing mechanisms have a competitive advantage. Thus, although obviously at a disadvantage KDWP began its preferential terms were modified to close the gap.

# Case Study 13: Gangavaram Port

## Project Description



Located in the Indian state of Andhra Pradesh on the east coast (Visakhapatnam latitude of about  $17^{\circ} 37'$  and longitude  $83^{\circ} 14'E$  district, south of Visakhapatnam port about 15 kilometers), Gangavaram port has been developed for each types of weather, multi-purpose, up to 21 meters of depth deep-water port, capable of handling up to 200,000 dwt Capsize vessels super. Master Plan has 29 berths that can accommodate up to 200 MTPA developed in three phases 15-20 years provision. In the first phase, five berths have been built 35 MTPA capacity estimation process used. A dedicated iron ore berth and the second are to deal with the coal berth and three multi-purpose berths, handling containers and other cargo. Development of the total land area of 2,800 acres of port port facilities.

Port also has a good connection of the national railway system has its own independent special railway line, while connecting National Highway 5 from the port four-lane highway, Calcutta, Chennai Golden quadrilateral arm.

## PPP structure of the Project

After the launch of global tendering process, the consortium, led by Mr. DVS Raju was selected to develop the port on BOOT basis in 2002, according to the concession agreement, the Government of Andhra Pradesh, through its transport, roads and buildings department (TR & B), provided the rights of the private sector, the waterfront and build franchise owned - operate - transfer of the port project.

The private sector is responsible for developing a comprehensive long-term overall planning of port facilities designed to arrange the necessary funds to build the tools to build their own assets, assets and operations, until the end of the concession period. The initial concession period of 30 years (may be extended an additional 10 per year held two).

The government also provides project land. By the Andhra Pradesh Industrial Infrastructure Ltd, AP Business Government expropriated part of the land, and instead of 11% of the SPV shares available to the project. The remaining land purchased by the SPV direct payments.

Formed Raju and his colleagues has a 51% stake in the US private equity firm named Mr. Gangavaram Port Limited (GPL) of the SPV - Warburg Pincus holds 28%, while the Andhra Pradesh Infrastructure Investment Corporation (APIIC ) holds 11% of the consortium.

## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	Low	0-5 years	Government	Delays in land acquisition resulted in increase in acquisition cost for the government. They also resulted in loss of potential revenue accruing to the government due to delays in commencement of operations.
<b>Financing Risk</b>	Medium	0-5 years	Private Sector	
<b>Design risk</b>	High	0-5 years	Private sector	With the private sector and strict performance penalties.
<b>Construction risk</b>	Medium	0-5 years	Private sector	With the private sector and strict performance penalties
<b>Approvals</b>	Low	0- 5years	Private sector	In minor ports all the responsibilities of obtaining approvals lie with the private sector, with government providing 'best effort' support.
<b>Market Risk</b>	High	Throughout	Private sector	Market risks are high due to competition but firm minimum cargo or long term cargo commitments with the users reduces this risk. In this agreement however, the government allows a contractual waiver of the concession fee (which is a gross revenue share) in the years in which the concessionaire does not earn any gross profit. On the other hand, the concessionaire also provides a concession fee payment guarantee to ensure that payments are promptly made in profitable years.

<b>Change in law</b>	Low	Thorough out	Private sector	No compensation from the government, although there are enabling provisions to mutually discuss in good faith to suitably amend the terms of the concession agreement, including extension of concession period. No compensation for changes in any tax laws. Extreme government actions, including change in law that frustrates operations of the project have been included under political force majeure events and suitable termination and compensation procedures have been prescribed.
<b>Force Majeure</b>	Low	Through out	Private sector	Such risks are transferred to the extent of insurance, however are largely borne by the private sector. In the event of termination, there is compensation payable to the concessionaire to the extent of debt outstanding and there are varying levels of equity compensation depending upon the nature of events.

## Key Learning and Observations

1. Prior to the tender by the powerful government-sponsored project preparation is essential. As the experience of the first round of bidding, the reality is not ready to predict the traffic resulting from the government and optimism bidder unfounded.
2. The evaluation criteria must be simple, but powerful. The first round of bidding, there are several parameters were evaluated for the purpose of cross work and encourage speculative bidding.
3. solve basic engineering and related contractual issues, before the bidding, it is very important. The second round of bidding has gone through a lengthy contract finalized. This is mainly due to the fact that some of the basic issues, such as contractual issues, land acquisition and rehabilitation of the problem have not been solved before the full bid. As can be seen, once these issues are resolved, the project is economically attractive and profitable. Today, the project is a success story.
4. The Government sponsors must fully recognize the commitment they make, they may impose obligations. Although this problem does not arise in this project, in fact, additional land for the project commitments made by the Government in when necessary, but no such requirement to determine the extent or whether the Government would be in a position to provide more land , one reason for concern. This exposure to the risk of land designated government may not provide such derail the entire project, or secondly, the cost of land

may not be fully transferred to the project (such as government in finalizing the contract reasonable land prices per acre cost of land is considered government The equity contribution to the project). Details of the actual land costs were not disclosed, and cannot even determine whether or not the cost of the entire land through. We can say that this is the government's responsibility, not to provide more land could lead to a breach of the government. The demand for land is more reasonable growth in demand for the project, the government needs to be submitted at the same time for the same care. In this case, a more appropriate choice may be the intention to introduce "best effort on" concept, rather than a commitment.

5. It is recommended, where the company made a commitment that they should be clear by the parties or may no government sponsors may find them in serious trouble within the management decision-making framework.

6. land back to normal termination of the project is a regional concern. The contract stipulates that the government should get ownership of the land, said port SPV, and in the transfer of normal termination of the project, due to the additional time row, along with important assets, the land would revert to the government of the formula - based on valuation. It needs to be noted that a fully functional port seaside port, not only need to use (this is a sovereign assets are leased to the SPV), but also in the backup area of land, warehousing and other infrastructure being created. The rights under the contract, the government took the land back to normal termination, in the case of instability, which may appear on the SPV claims can continue with its stake in the ownership of land or other aspects of development. Therefore, the land, a fully functional port return, the government has in accordance with the concession agreement, to take bear significant risks.

Franchise fees in years 7 to give up non-profit are a positive policy stance. An interesting feature of this contract, the government only in the years of the profit share of total income paid by SPV. This position has a historical perspective. Earlier port concessions were fierce minimum guaranteed amount provision requiring payment of royalties to the government so that even in the years of the loss of income share. Several projects, including a number of countries, suffered this count. Secondly, the Government recognizes, MGA's policy is not a suitable place huge investments need to build infrastructure, to a considerable cumulative flow of new projects. MGA impose stiff conditions, new projects have not become profitable. Therefore, the Government decided this more flexible approach. However, such an approach will also be more oversight and management responsibilities in government contracts, particularly in operations for many years, in order to track the financial performance of the project and to ensure that the audit results reflect the true performance of the port, rather than underreporting profits. And effective contract management is critical in the past it was an understatement by the government sponsors and this place more pressure on the government to actively undertake contract management and oversight.

# Case Study 14: Hyderabad Metro



## Project Description

Hyderabad is a developing city, covering an area of 625 km<sup>2</sup> and 6852 km<sup>2</sup> Mission City metropolitan area (metropolitan area, including 16 mandalas in Hyderabad district, 22 mandalas in Range Reddy district, 10 mandalas in Medak County, 5 mandalas in Nalgonda district and 3 mandalas in Mehboobnagar district). It is the IT / IT enabled services (IT / ITES) hub, biotechnology and pharmaceutical industries, as well as a tourist attraction.

Booming population has put Hyderabad transportation system under immense pressure. The city needs a strong, reliable, comfortable, economical and sustainable transport system. To meet this demand, the Government of Andhra Pradesh (GoAP) has planned rapid transit system (MRT), including Hyderabad, three high-density traffic corridors. The project will be developed in the PPP on the basis of build-operate-transfer through (BOT) mode.

The project will include three special elevated corridors, corridors, namely 1: Miyapur - LB Nagar (29.87 km), there are 27 units, Corridor 2: Jubilee Bus Station - Falaknuma (14.78 km) with 16 stations and corridors 3: Nagole - Shilparammam (26.51 km) has 23 stations. There will be three stations, one for each corridor, located Miyapur, Falaknuma and Nagole. Corridor 1, 2 and 3 will be designed to peak hour peak distribution of 50,000, 35,000 and 50,000 respectively, transportation (PHPDT).

The speed of the system will change from 34 KMPH to 80 KMPH and the train will have 3-5 minutes frequency.

## PPP structure of the Project

Hyderabad Metro Rail Corporation, a wholly-owned public sector commitment GoAP Hyderabad Metro Rail project is currently being implemented. The project under the BOT concession agreement for a period of 35 years, including a five-year construction period, to be developed. According to the concession agreement, the operator has the ability to design, financing, construction, operation and maintenance of three corridors, and transfer of assets at the end of the concession period.

The assets of the project include the viaduct, stations, bridges, warehouses, vehicles, signaling systems, traction systems, communication systems, track work, fare collection systems and other assets, or by the construction contractors and equipment suppliers procurement. In addition, operators will also have access to land-use commercial development of the depot (212 acres), and 10% identified in the concession agreement



in the site area rug. This gathering in case the warehouse, the cumulative case and stand up to 12.5 million square feet under, cumulative maximum 6 million square feet. The SPV will also be allowed to engage in real estate development in the parking lot and circulation at the station. All created in real estate development projects related to assets will be considered which will be handed over to the government, when the 35-year concession period ends, SPV's assets.

## Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	High	0-5 years	Government	The land has to be handed over to the concessionaire on or prior to the Appointed Date (i.e. date on which financial closure is achieved). Further, up to 90% of the land has to be handed over to the concessionaire within 120 days of signing of the agreement (contingent on paying of Payment Security). This is a Condition Precedent for the Agreement. The government is liable to pay damages to the tune of 0.1 percent of the Performance Security (240 crore) for each day of delay. If the GoAP is not able to provide access to the remainder 10% of the land for reasons other than a Force Majeure, it shall pay the Concessionaire damages to the tune of 1000 per day for every 500 square meters, commencing from the 91st day of the Appointed Date.
<b>Financing Risk</b>	Medium	0-5 years	Private Sector	The Concessionaire has to achieve financial closure 180 days after the signing of the contract. GoAP can extend the date for financial closure for a further 120 days in case the private operator cannot achieve financial closure. The Concessionaire would be liable to pay damages to the tune of 0.1 percent of Performance Security for every day of delay in achieving financial closure. The GoAP has the right to cancel the contract after a period of 6 months from the signing of the contract.

<b>Design risk</b>	Medium	0-5 years	Private sector	The private operator has to submit all the drawings and the schedule of the project to the GoAP. These have to be reviewed by GoAP and scrutinized by the Independent Engineer. The GoAP is not liable for any delays caused due to late submissions of drawings of the project.
<b>Construction risk</b>	Medium	0-5 years	Private sector	The Concessionaire has to provide a Performance Security of ` 240 crore for the performance of its obligations. This security has to be renewed from time to time and replenished within 30 days. The Concessionaire is also liable to pay damages at the rate of 0.1 percent of the Performance Security/day if it fails to achieve any milestone. Further, the private operator has to submit monthly progress reports and allow the Independent Engineer to inspect the progress of construction. The Independent Engineer has to subject the metro system to test and provide a provisional completion certificate.
<b>Market Risk</b>	High	0-30 years	Private sector	The private operator will levy and collect the fares from the users of the Metro and is entitled to revise these fares up to 60% of the Wholesale Price Inflation in the previous year. The private operator shares the traffic risk with the government. The government would provide a revenue shortfall loan to the tune of the revenue shortfall at an interest rate 2% above the standard bank rate specified by the RBI. In the event of the actual traffic falling short of the target traffic by more than 2.5 percent, on a pre-determined target date (1 October 2011), the concession period shall be increased by 1.5 percent of the concession period thereof for every 1% shortfall compared to actual traffic. In the event the actual traffic is more than target traffic then the concession period will be reduced by 1% for every 1% reduction in traffic.
<b>Change in</b>	Low	Thorough	Private sector	No compensation from the government,

law		out		although there are enabling provisions to mutually discuss in good faith to suitably amend the terms of the concession agreement, including extension of concession period. No compensation for changes in any tax laws. Extreme government actions, including change in law that frustrates operations of the project have been included under political force majeure events and suitable termination and compensation procedures have been prescribed.
<b>Force Majeure</b>	Low	Through out	Private sector	Such risks are transferred to the extent of insurance, however are largely borne by the private sector. In the event of termination, there is compensation payable to the concessionaire to the extent of debt outstanding and there are varying levels of equity compensation depending upon the nature of events.

## Key Learning and Observations

1. Real estate development: the government basically almost 296 acres of land, including the allocation of land to the warehouse and franchise stations provide the right commercial land development. In the case of the warehouse, allowing real estate development is the next highest total of 12.5 million square feet and stations, the cumulative maximum is six million square feet. A summary of the total value of real estate development to a large proportion of project costs. Coupled with the use of a commercial basis on the subway project on land the opportunity to lead very different from bidders bid. The bidder consortium withdrew money into real estate development foundation on. Siemens consortium bid of `25 billion rupees negative viability gap, Maytas consortium bid 3.0311 trillion rupees` high negative viability gap. On the other hand, the other two bidders - Reliance sought from the government to seek `281.1 billion rupees a VGF funding grants and Essar` 310 billion rupees.

The real estate market is very volatile and cyclical in nature. Unfavorable prospects of the industry there is a risk to endanger the development and construction of the project. Therefore, the ideal real estate development should be the project that will allow private operators to complete the project, although a small part of the real estate industry downturn. DMRC, it carried out a feasibility study project, in fact, suggested that quantum ideally in real estate development should not exceed 7-8% of the total project cost.

In addition, real estate development and investment typically provide capital investment than in the metro rail system faster return. Large-scale real estate development component will expose the quality of the actual

construction of the project risks and subway is compromised private operators will have a greater incentive to complete real estate development, rather than the construction of the subway.

Provided to the government by its own choice is borne of real estate development and / or private operators, the development of this land, through a separate procurement process. This development may have been used to cross-subsidize the income of the project construction / operation stage.

Another approach would have been to break up the project into smaller components (such as 3-channel may have different bidders bid to minimize the risk of operator default.)

2. Traffic Risk: The franchise agreement is transferred to the government of the traffic risk, largely. Under the agreement, if the target traffic of more than 2.75 million rupees smaller passenger kilometers, and then increase during the concession period. Similarly, if the traffic is the traffic exceeds the target, the concession period will be reduced. Ideally, this should not be a part of the traffic estimates franchise agreement; the market risk should be fully vested with the private operators. This will encourage operators to provide a better level of service, thereby enhancing the passengers take the Metro line number.

3. The right way: the way for the creation of Hyderabad metro viaduct on the right side also brings significant challenges because the proposed route through the city's population density areas. This obstacle is overcome using something like giving a persuasive way of development of additional floor space index (FSI) of. The local municipal corporation that is the great Hyderabad Municipal Corporation (GHMC) is also closely involved in the negotiation process. The project is also trying to use government land for warehouses, railway stations, etc., as the development in order to mitigate the risk of the project and because of vested interests and / or affected private parties stalled.

4. Start the backup: Maytas Metro winning consortium is due to the adverse effects of troubled Maytas Infrastructure Limited sponsor problems. South China Sea code violations such as red, green, Ramalinga Raju owns shares of Maytas infrastructure being promoted his son Teja Raju company. While Maytas Metro project is implemented as a separate dedicated car appeared investor confidence in the project sponsor's loss. Therefore, the project failed to achieve financial settlement. Therefore, the startup configuration file support is vital sustenance and success of the project.

# Case Study 15: Amritsar Intercity Bus Terminal Project



## Project Description

Located in Grand Trunk (GT) Road, Amritsar city is not only a spiritual center of the Sikh community, but the hub has traditionally been in the area of trade-related activities. Taking into account the religious heritage of the city, attracting a large number of tourists Amritsar (up to \$ 50,000 a day) who visited the Golden Temple. Amritsar Wagah (India-Pakistan) near the border also provides an opportunity to develop it into the center of the cross-border trade in commercial activities. In addition, a significant portion of the local residents to use public transport, such as buses statewide movement. These factors have had a growing impact on the existing urban infrastructure, especially transport infrastructure. Spread in 8.5 acres, was established in 1965 the city of Amritsar existing bus terminal, which serves as an intercity terminus at GT Road. The passenger terminal complex, including all administrative areas, passenger waiting areas and facilities. According to the proposed Transportation Department Punjab (DOT), government (GOP) bus schedules, as well as many day 1800~2000 bus arrivals in Amritsar Bus Terminal. With pressure growing demand for transportation in the terminal goes far beyond the existing facilities and existing passenger terminal state of disrepair, the point, the Republican Party in the Punjab Infrastructure Development Committee (PIDB) decided to promote the modernization and development of existing Some Amritsar bus terminal by building - operate - transfer (BOT) route. This project is in India to build and operate through the BOT route one of the first passenger terminal projects by the private sector.

Long-distance bus terminal in the city of Amritsar, the same location, the existing passenger terminal development. Involving the demolition of the modern state of the art passenger terminal building and the existing complex development projects to meet the growing needs of the city. The project is being run by private operators, for a period of 11 years, 5 months, including the construction period. At the end of the concession period, the project will be transferred back to the concession of power without any encumbrances.

## PPP structure of the Project

Through a two-stage bidding process, the point, the Republican Party to get contracts infrastructure (Rohan Builders (India) Ltd, between Private Limited Rajdeep Buildcon Private Limited and Rajdeep road development partners) in order to carry out the development and operation of BOT in Amritsar is a modern passenger terminal.

Following the signing of the concession agreement, the private operators to establish a special purpose vehicle (SPV) called Infrastructure (India) Ltd to execute the project. According to the concession agreement, the private operator is responsible for finance, construction, operation and maintenance of Amritsar bus terminal complex, 11 years and 5 months, and the concession period. Private operators are required to pay 350,000 rupees project development costs of the project site rental and lease rentals ranging from 50,000 Yuan `use of the concession period of the project site.

In the franchise agreement, the two potential sources of revenue for the private operators were identified. The first source of income is through the bus terminal operations. Private bus operators what company was named "ADDA fee", which is the right to pay the bus terminal devices using charge collection. The second source of income is located intercity bus terminal complex commercial shops rent. Other sources of revenue include the sale of advertising rights, and parking fees.

### Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>Delays in land acquisition</b>	Low	0-90 days from signing of concession agreement	Government	Project development was undertaken on the existing bus terminal site and involved transfer of land from the Municipal Corporation of Amritsar to GoP who in turn leased the land to the private operator. Hence delay in land acquisition was not a major risk for this project.
<b>Financing Risk</b>	High	0-90 days from signing of concession agreement	Private Sector	The private operator was required to ensure financial closure of the project within 90 days of project acceptance unless a time extension was provided by the concessioning authority. Inability to ensure financial closure within the stipulated time would have resulted in a default on the part of the private operator and he would have lost the performance security.
<b>Design risk</b>	High	0-18 days from signing of concession agreement	Private sector	The private operator was required to submit detailed construction design for review. The private operator was also to provide design warranties for the project.
<b>Construction risk</b>	Medium	0-18 days from	Private sector	For the duration of the concession period, the private operator was

		signing of concession agreement		required to furnish a performance security. During the construction period, the private operator was required to facilitate periodic inspection and was to submit monthly progress reports.
<b>Policy risk Risk</b>	Low	Throughout contract term	Private sector	In case of any changes/modification in laws, interpretations of the same or impositions of new statutory or regulatory approvals or taxes or duties imposed subsequent to the proposal acceptance date, the concessioning authority would take necessary action to ensure that there is no change to the private operator's legal, commercial and financial position as a result of such change.
<b>Change in law</b>	Low	Thorough out	Private sector	No compensation from the government, although there are enabling provisions to mutually discuss in good faith to suitably amend the terms of the concession agreement, including extension of concession period. No compensation for changes in any tax laws. Extreme government actions, including change in law that frustrates operations of the project have been included under political force majeure events and suitable termination and compensation procedures have been prescribed.
<b>Force Majeure</b>	Low	Through out	Private sector	Such risks are transferred to the extent of insurance, however are largely borne by the private sector. In the event of termination, there is compensation payable to the concessionaire to the extent of debt outstanding and there are varying levels of equity compensation depending upon the nature of events.

## Key Learning and Observations

1. Provides a convenient by government to ensure effective implementation. If Amritsar intercity bus terminal development, it is necessary facilitation during the construction phase, by ensuring effective land leased to private operators, require approval of the project to develop and provide support for private operators to provide the government, and in the O & M phase of the project. This is the timely execution of

the project and a key factor in private operators to be able to advance the cost of construction is substantially completed within budget.

2. favorable policy environment to ensure a source of income. Because part of the terms of the concession agreement, the government issued to all intercity buses drop passengers will be asked to pick a new intercity bus terminal in effect notification. Concession terms also provide "ADDA fee" and user fees or specific passenger facilities and ease upgrades during the concession period. In addition, the policy environment related to the uncertainty of the concession agreement also resolved, in which the feasibility of the project and policy level have a direct impact of any changes that will occur in the concession of power to compensate for the signing of the concession agreement later.

3. The flexible structure of the project funding to promote the project. If Amritsar Intercity Bus Terminal, the government's concession agreement, by borrowing the funds necessary to facilitate the project requirements. Due to impose "ADDA fee" similar road toll collection project, sources of income by obtaining loans for the project to provide adequate security, and by the case of private operators, the default alternative rights.

4. The need to establish a monitoring and enforcement mechanisms. According to preliminary estimates, Amritsar intercity bus terminal is expected to handle 2000~3000 buses, according to the Ministry of Transport Punjab Government predefined schedule every day. However, the current inter-city bus terminal handles only about 1700 cars a day. The recent slowdown in the economic impact of the bus arrived, the lower part of the bus number is attributed to the private operators do not have the ability to ensure passenger facilities all buses used on schedule. Some buses pick and drop passengers distance bus terminal outside the complex, and thus avoid paying "ADDA fee." In addition to publishing a notice should also establish a monitoring mechanism to ensure that all the buses meet the notification. Government should identify and implement the necessary mechanisms to implement the various departments to ensure that non-compliance with the effective implementation of such a plan predetermined schedule, and impose penalties. This will help to improve the financial viability of these projects and reduce the risks associated with such events.

5. A detailed and clear design and scope of the definition of the project. Scope of the project and to provide comprehensive design and construction phase, and performance parameters specification O M & some detailed definition is crucial in the first such project being carried out in the private sector. This is to ensure that the project development and concessions expectations and standards required by the authority of private operators for project development and delivery are maintained.

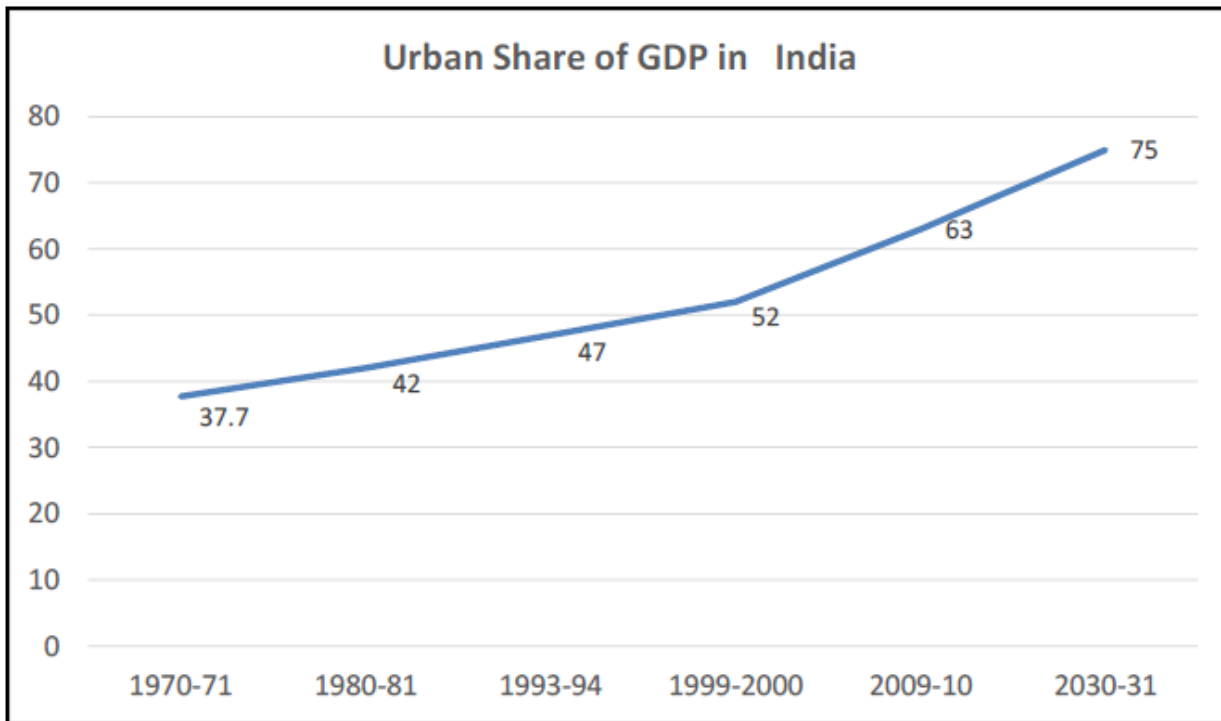
### **Conclusion:**

If implemented in right earnest PPP have the potential to create synergies between public authorities and private sector companies provide value for money for the taxpayer through optimal risk transfer and risk management; enable speedy efficient and cost efficient delivery of projects and accountability for the provision and delivery of quality public services. PPP can also help in the provision of public services along with effective utilization of the assets for the benefits of all users of public services. In short PPP has the right ingredients to chart & growth and development of our country.





share of GDP has been growing, seen in Figure 2.



**Figure 2: Urban Share of GDP in India**

The urban population is currently about 31% of the total population, it contributes 60% of India's GDP. It is predicted that Indian cities will contribute nearly 75 percent of the national GDP in the next 15 years. It is for this reason that the city was known as the "engine of growth" and make sure they are as efficient engines, is the key to China's economic development. Urbanization trend is the emergence in India will continue for some time in the past few decades. Global experience is that a country's urbanization, the 30% level is relatively slow, but the pace of urbanization, until it reaches about 60-65%. With 31% of the urban population, India is at a point of transition, which will accelerate the pace of urbanization. It is for this reason that we need a good plan our urban areas, cannot wait much longer to do so. Relatively low base allows us to take advantage of the latest technological developments through especially in the ICT (Information and Communication Technology) to plan our direction is correct urbanization strategy. In addition, it also provides us with an opportunity to create a favorable environment to create a lot of times more jobs and economic activity, while improving the quality of life significantly. It also allows an opportunity to get a good practice and learning from mistakes, and other places outside the territory of the country.

It is in this context, the government decided to develop the country 100 "smart city." Thus, in his budget speech in July 2014, the finance minister has said the following:

"As more and more the fruits of development to reach large numbers of people, is increasing migration from rural to urban pace of a new middle class is emerging desire better living standards. Unless development, new cities to meet peoples The new number, the existing cities will soon become uninhabitable. Prime

Minister in the development of 'smart city one hundred, "as the satellite towns and cities existing mid-sized city with modern vision."

Countries have taken different paths of development, from VS consumption figure income Figure 3. While some, such as petroleum resource-rich countries to see, have adopted a high-energy approach, others have adopted a more energy-efficient growth of the road. In India, because we still have one of the economic developments, mostly not built, we have the opportunity to choose the path we want to take. Obviously, we should take the low energy channels, especially in view of the fact that the requirements of environmental sustainability and to become globally competitive, we need an efficient energy use, we have to import an important part of our energy, and in the price already very vulnerable to international political situation.

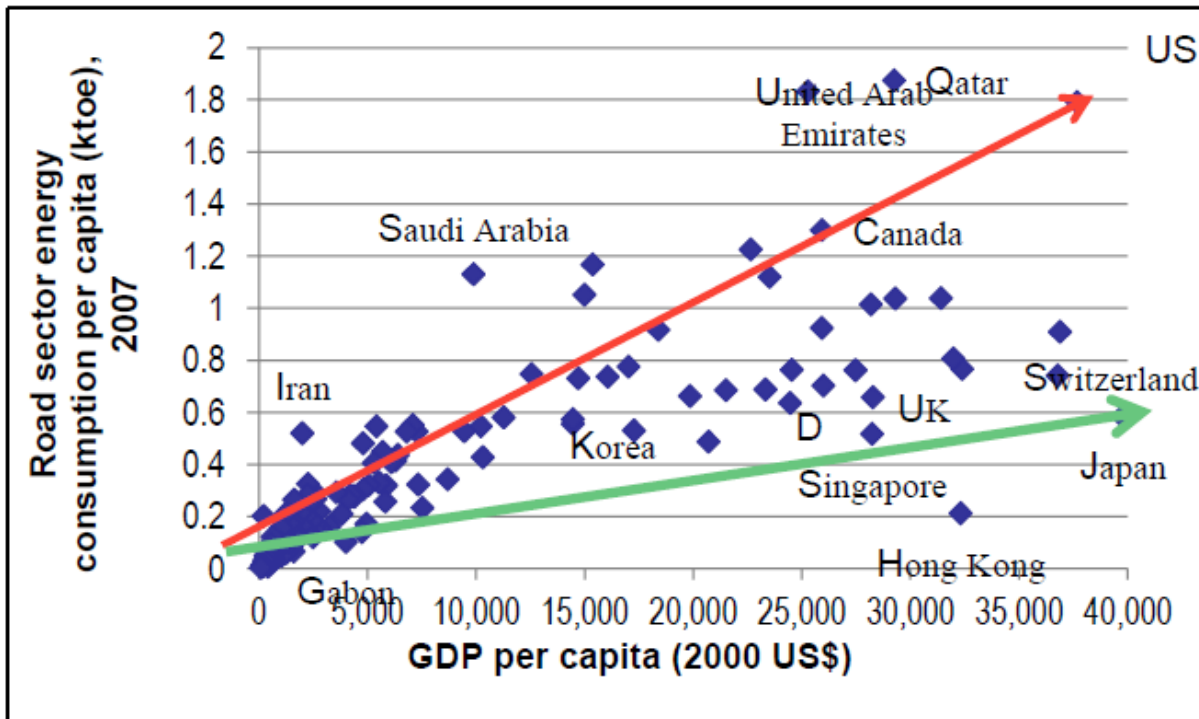


Figure 3: GDP V

s Energy Consumption

# What is Smart City..??



Smart city means different things to

different people. This may be a smart design, smart utilities, smart homes, smart mobility, smart technology, etc. Therefore, it is quite difficult to give the definition of smart city. However, people migrate to cities in search of employment is mainly a better quality of life and economic activity around.

Therefore, the sustainability of the intelligent city needs to provide economic activity and employment opportunities, wide strips residents, regardless of education, skills and income levels. In this process, an intelligent city needs to find its relatively positive or unique strengths and core competencies in specific areas of economic activity, to promote such activities; institutional, physical, social and economic infrastructure through the development of the required and to attract investors and professionals took such activities. It also needs the support of the skills required to develop such activities in a big way. This will help create a smart urban development necessary environment for economic activity and employment opportunities.

In addition to employment, it is also very important to provide a decent living smart city selection, every resident. This means that it must provide a quality of life (and any comparable developed European cities) is very high, that is good quality, but affordable housing, cost-effective physical, social and institutional infrastructure such as adequate water supply and quality, health, 24 × 7 power supply, clean air, quality education, cost-effective health care, reliable security, entertainment, sports, robust and high-speed Internet, fast and efficient urban transport.

In this context, smart cities are those investments, experts and professionals to be able to attract. Good quality infrastructure, which can easily practice their profession or to establish a business, efficient bureaucracy to run it without any trouble is a citizen-centric, and the essential characteristics of investors in favor of simple and transparent smart city online operations and processes of public services. Sufficient availability of skills needed in the labor force is a necessary requirement for sustainable development of a smart city. Entrepreneur himself, looking for a decent living, so they expect a high level of intelligent housing, health care, recreation, education and quality education. Security is a fundamental need for them any other residents. Is considered unsafe city is not attractive. Another entrepreneur or professional needs of people in there who can help a city prosperous and adds value to it, rather than from someone who had to place.

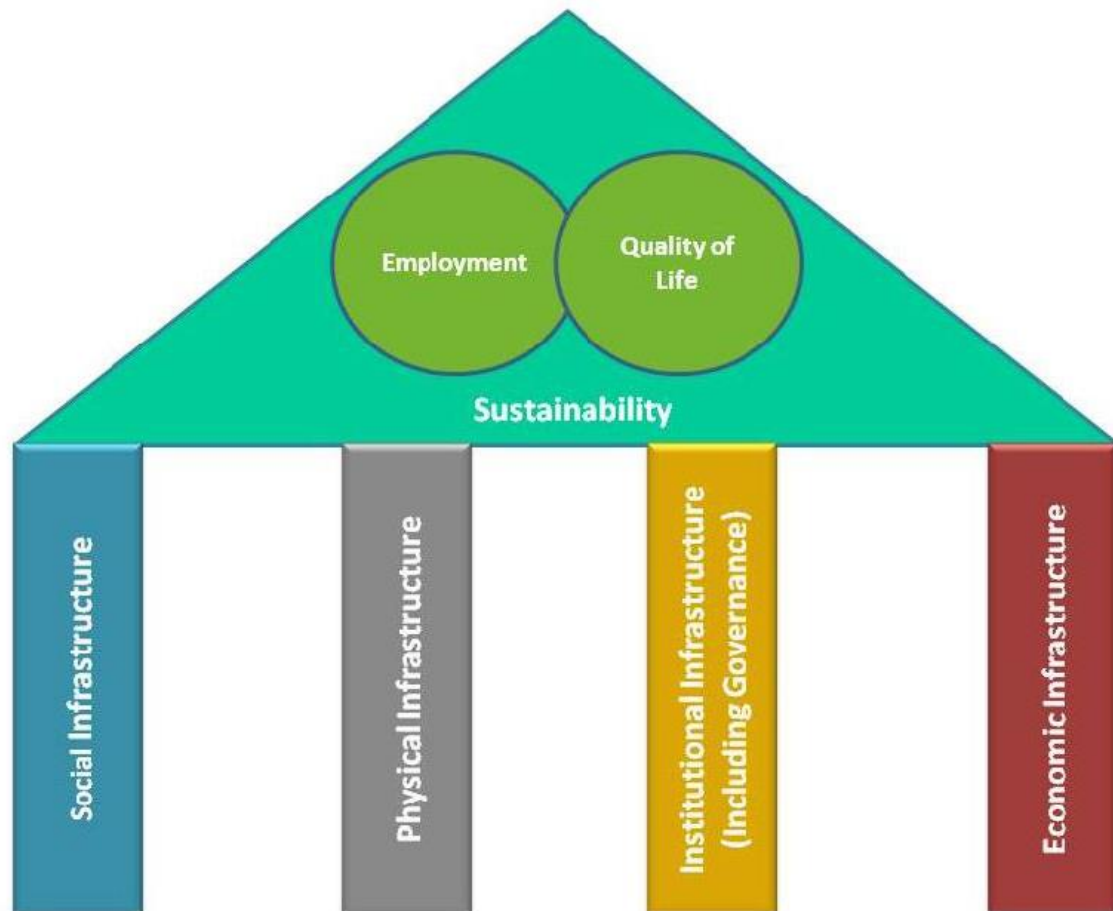
Different agencies use different definitions, smart cities. Although there are many definitions, a key feature of smart cities, as it appears from the various definitions and from the above discussion. Smart City is the natural, social, institutional and economic infrastructure with intelligent (smart), while ensuring that the

environment of the city civic center of sustainable development. Such a smart city is expected to select all residents will have to pursue their livelihoods and interests meaningful and happy. In this case:

- competitiveness refers to the creation of employment opportunities for the city, attracting investment, experts, professionals and the ability of the people. Capable of doing business and quality of life also provides a convenient determines its competitiveness.
- Including social sustainability sustainable development, environmental sustainability and financial sustainability.
- Quality of life, including security, inclusive, entertainment, easy to find and access to public services, cost-effective health care, quality education, transparency, accountability and opportunities to participate in governance.

### Pillars of Smart city

Institutional infrastructure (including management), on the four pillars of the physical infrastructure, social infrastructure and economic infrastructure constitutes a city residence. A central concern of each of these pillars is citizens. In other words Smart City project to ensure the best in the whole person, regardless of their social status, age, income level, gender, etc.



- Institutional infrastructure refers to activities related to a city governance, planning and management. New technology (ICT) provides a new level; this system allows a citizen-centric, efficient, accountable and transparent. It includes the opportunity to participate in the system of governance, e-government, inclusive governance, security and a sense of security and creativity.
- Physical infrastructure refers to a cost-effective and intelligent physical infrastructure, its stock, such as urban transportation system, within the housing stock, energy systems, water supply systems, sewage systems, sanitation, solid waste management systems, drainage systems, etc. This is all integrated through the use of technology.
- Social infrastructure related to those working on the development of human capital and social capital, such as education, health care, entertainment, etc., but also including performance and creative arts, sports, open space, children's parks and gardens.

These together determine the quality of life of residents in the city. It is also necessary to promote the city and the city has a structure inclusive of the negative part of the initiative, namely caste, STS, social and economic backwardness, the mainstream development of ethnic minorities, the disabled and women.

- Economic infrastructure

For proper economic foundation of a city to attract investment and create jobs, it must first determine its core competencies, comparative advantage, and analyze its potential to generate economic activity. Once this is done, you need to determine the gap between the economic infrastructures. This will usually include the following:

- Incubation Center
- Skills Development Center
- industrial parks and export processing zones
- IT / BT park
- Trade Center
- Service Center
- financial center and services
- logistics centers, warehousing and freight terminals
- Guidance and counseling services

## Why are smart cities needed..??

A smart city, in order to maximize the city managers and the public interest, while minimizing negative impacts on the environment and economy. Smart City momentum is increasing in both developed and developing countries, more and more people are realizing the benefits and lifestyle, a smart city can offer. Smart cities to support urban lifestyles and enjoyable, but also provides disaster recovery and environment-friendly, sustainable economic growth and effective support.

### 1. The need to address global environmental issues and urbanization

In many countries, the need for intelligent urban environments does not want to deal with changes in order to avoid or mitigate the adverse effects of uncontrolled urbanization. This section describes some of the changes and negative effects: -

- Global warming and climate change

Governments, researchers and companies are beginning to focus considerable attention to the causes and effects of global warming and related climate change. Climate change significantly affects ecosystems; however, they also lead to major risks for all of society. These risks include secondary damage, severe weather events such as natural disasters and the impact on economic activity. For example, when Hurricane Sandy hit the United States in 2012, resulting in economic losses are so large that they are actually on the United States' own financial situation identifiable impact.

Global warming is expected to increase to produce, which in turn, is expected to increase the frequency and severity of hurricanes in ocean surface temperature. Greenhouse gas global warming and climate change are closely related, such as carbon dioxide and methane, which are often produced by emissions from industrial activities. In order to minimize and mitigate global warming, many governments and private organizations are taking steps to reduce greenhouse Gas emissions. These measures include the establishment of a new global framework for emissions reduction steps.

- Population growth and resource depletion

A sharp increase in population has led to economic development and the price of scarce resources faster consumption of resources, in turn, leads to a combination of resource depletion and growth. The problem with the population growth. According to the UN Population Fund, the world's population grew by 2.8 times, from 1950 (2.5 billion people) to 2011 (7 billion people). Population is expected to reach 93 billion in 2050.

- Adverse impact of increasing urbanization

Urbanization increases very rapidly. The United Nations estimates that by 2020 the urban population in emerging economies will exceed the rural population, while in 2050 about 70 percent of the world's population will live in cities.

With increasing urbanization, the negative impact of increases. Swelling population will only exacerbate many problems in urban areas. Issues, including slums, air pollution, water shortages, lack of energy shortages, traffic jams, for treating wastewater and sewage, and lack of capacity of the capacity of urban and industrial waste disposal. In addition, the developed economies are encountering new problems: If necessary, make the city a low birth rate and aging population leads to fewer people, the need to provide mobility options for elderly residents more compact.

## 2. To adapt to the changing lifestyle needs

Smart City deal still needs the ongoing transformation of the values of life of residents. This section describes some of the related aspects.

- Valued using the equity

An interesting trend is to share and leasing arrangements to enable people to realize the benefits of ownership without the development of harm. A typical example is the addition of a shared or rented vehicle, which allows users to use wherever and whenever a vehicle is required. Three specific factors, from the ownership of this trend will be shared or rented. The first is being offered to the residents of the nature, extending from product to service. The second is to achieve shared or rented arrangements

Preferably in many cases, the cost of inspection in accordance with the purchase and maintenance of the product, and continues to ownership environmental impact. Third, the ownership of material



goods brings the need for maintenance and repair, and the freedom of people to share or rent arrangements from these obligations, and also when the user wants to ensure that the benefits of the product can be used

Them. In the near future, smart cities should take these factors into account, and to help provide new systems and services to match this trend.

- Focus on non-monetary values

The way people think about the payment services are constantly changing, and in some cases, the exchange of non-monetary benefits and services (including satisfaction from helping others) is preferred. For example, more and more people use the Internet to find the skills required of a person or place, but if the recipient does not have to pay for services provided by the market rate! Givers do not exchange their expertise or ability of other skills for the money, but in order to meet the individual's values, as they want to help others. Volunteer work is common, and it is expected that this trend will grow. The Internet provides the use of their knowledge or expertise, to help other people more opportunities.

Of course, the system, so that the value of non-monetary satisfaction with the work needed for economic and monetary system. How to value exchange that greater diversity is likely to lead to a multitude of activities and did not exist in the past economy. Features of these activities will be a high degree of freedom and flexibility. In the future, the smart city must continue to provide trading markets, which can be used in the exchange value of money, but also to provide a mechanism and infrastructure to allow other forms of complex and diverse value exchange smoothly.

- Have the opportunity to work and study more widely

Technology makes it possible to expand the work and learning opportunities, as demand for such opportunities are increasing. For example, the Internet is expanding online learning and the opportunity to deliver off-line learning materials. This enables it to suit everyone, from children to the elderly, the time and place of learning, and what they want. Expanded opportunities is particularly important in Japan, it will be one of the challenges facing the world's first national population aging. By 2025, it is estimated that one in three people in Japan will be 65 years old or older. Japan faces the challenge is to provide a more elderly can make use of their skills and knowledge in the employment environment. This will help alleviate the problem of shrinking labor force and reduce the burden on the young and middle-aged. Smart City will need more and more to expand the number and diversity of work and learning opportunities.

- Overcome the limitations of time and place

New technologies provide new services, regardless of time or place. For example, broadband access and smart phones to give people access to a variety of services from anywhere at any time. Similarly, in video streaming services and advances the recording function allows viewers to watch videos or television programs when they want, and do not need the audience present at a particular time. This

technology is a boon for busy people with full schedules struggle. At the same time, the ability to work in a place outside the office of the creation of new ways of working is not limited to a specific time and place. This can improve productivity and work-life balance. These technologies and related trends, so that people get what they want, at any location or time of need. Smart City will need to ensure access to these technologies and services they provide.

- Both a consumer and producer

Previously, consumer products are rarely the product manufacturer. However, recently, a new bi-directional directivity has occurred, whereby the same individual or group can be both consumers and producers. For example, many sites on the Internet allowing participants to see others upload information, and also to upload the information to be viewed others. As another example, in the field of energy, solar power installations to install their own people who can act as both users and suppliers. In this bi-directional and require the parties to each other, the communication between consciousness. Future urban operations will no longer be able to take a one-way relationship with consumers. Smart City will need to ensure that this two-way communication is provided in various forms, automatic and otherwise.

# International Case Studies on Smart Cities

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In the past decade, development and information technology, remote sensing, big data and information-based products and services have been transferred rapidly absorbed, so that the way people live in the city. Smartphones makes access to information, services and communications anytime many citizens, who have adapted to life almost seamlessly baseline expectations of this new approach. Meanwhile technology vendors support the increased sensing, information management and control of the "smart city technology 'can significantly improve the efficiency, quality and cost of providing urban services. At the same time, although the city government to make the transition to the online terms of service, they must ensure that those who did not get the technology did not leave.

In response to the innovative "smart city" and the private sector opportunities in the public sector may face special challenges. They struggle to quantify novel, disruptive technologies; it can be challenging to make the investment impact. Organizational structure and culture of the city council on ICT can prevent long-term cross-sectorial strategic thinking, as well as the necessary organizational change may be difficult to achieve.

While all cities are unique, they also have common goals and common challenges. Our study of six cities focused on how to deal with these cities are the challenges they face, and how they adapt their organizations to their citizens to provide new digital services.



# Case study 1: Chicago

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## To sum up

Chicago has been active in the Mayor Emanuel's election in 2011 the wisdom of urban space, although within such a relatively short period of time, strong political leadership and governance structure has been completely consistent allow the city to take in achieving their goals significantly steps. Open-end investment superfast broadband infrastructure, community participation and inclusion of the project, as well as specifically for the promotion of technological innovation projects, are all part of the city's desire to create a "city as a platform", which can be built on the products and services have in the city resources.

With 2.7 million people, Chicago is the third most populous city in the United States. Its challenges include economic development, education, crime and transportation. In the past decade, the economy has been underperforming. From 2000 to 2010, the Chicago area lost 7.1% of jobs, any top ten metropolitan areas in the United States a worst performance. In addition, the budget deficit remained at approximately \$ 60,000 2.

Chicago is a national transportation hub, with many transportation-related challenges. It hosts two major airports, the cargo hub of the railway network, but also has a good network of bicycle use. "Chicago is the first in the country area traffic congestion; bottleneck damage and delaying freight and passenger rail service; roadway crashes cost time, money and lives."

The school has its own \$ 720 million deficit and the high dropout rate of about 50%. The city has offered up to 2,000 air marshal's location in a city with a high homicide rate.

## Introduction

Smart catalytic urban agenda in Chicago in May 2011, when Mayor Emanuel was elected mayor Daley, who had worked in the office for 22 years to take over. Obama's staff had previously been chief Mayor Emanuel and created in 2009 two federal skilled jobs - Federal CTO and CIO Federation. He has helped to create data.gov which instigated open data movement in the United States. On arrival in Chicago, Mayor Emanuel and data transformation technology has a role in a very clear understanding of the city and set up the digital agenda is very clear from the outset.

Chicago CTO explains:

"At this point (Mayor Emanuel's campaign), we were a bit behind us. There is a pent-up demand for the city. The previous government did not open data policy; so that when Mayor Emanuel goes over the gate open. I believe there to pay for it than if it had gradually established over time, such as Boston, New York and more attention. "

Focus on the core driver in Chicago smart city projects include:

- 1) **Transparency** - President Obama's first term to develop a clear agenda for government transparency around. For the opening of the federal agenda has benefited to the openness of the city, especially in Chicago. For example, the Chicago site, the largest part of the number one visit per year, has been a "plow tracker" This shows where the snow plow. Mr. Tolva explains, "If you think about it you will find it pragmatically- useful- it did not like the bus or train tracker track, but it just did not extinguish the desire to say to spy on how the government works."
- 2) **Responsibility** - the city is public money and drive smarter investment and operating expenditure responsibilities of a better way.
- 3) **Analysis** - data provide new insights into how to run a city; it can be a great value on both operational and strategic. Mr. Tolva provides us with an example: "We have seen, in the part of the city, alley lights go out in the trash stolen - this is a correlation, which was previously unknown, and we can take action."
- 4) **Economic Development** - based on access to new, reliable data sets, new business and services.

## Organization and Leadership

Chicago created an organizational structure that combines a strong leadership and strong civil society partnerships.

### Political leadership / citizenship

Mayor Emanuel has brought investment wisdom of the city with his strong mission. His experience in the White House also gave him the organizational structure can affect the success of the smart city planning to understand.

Task data policy in Chicago as part of the executive order, so the government is a long-term commitment. Mr. Tolva explains:

"In many cases, these actions seem very bottom, but in our case, it was a government official has been paired with third-party developers a bottom-up perspective of sport - which seems to have worked."

## Structure

ICT strategic role in the mayor's office

His arrival, Mayor Emanuel appointed two new positions in particular focus on the role of technology and information and communication technology in the city. The first is the technical director, strategic policy level position to inform the mayor of technical issues, which is currently held by John Tolva. Mr. Tolva, who had worked for IBM, has lagged behind the city is how to optimize lead to more effective management of the city's understanding of the concept.

The second position is the appointment of a new Chief Data Officer (CDO), by Brett Goldstein, who had established a predictive analysis group was held in the Chicago Police Department. Because CDO, he was responsible for the city's consolidation of spatial data to help inform decisions. He also created a strategic role in the city's open data policy and the primary liaison with the community. Chicago, the role of the social contact is particularly important because a significant proportion of the work lies in the intelligent city boundary interests of the Government, society and private sector stakeholders in Chicago between.

Situation in the mayor's office to promote these positions different city departments working process. This is because they sit directly in the mayor's task, rather than in any city warehouse.

### Smart Chicago Collaborative

Smart collaboration Chicago city partnership MacArthur Foundation (one of the largest philanthropic foundations) and Chicago Community Trust between. This is a non-governmental organization focused on the use of technology to improve the quality of urban life. Synergy "early to mid-2000s birth digital divide talk about closure. As the Internet has become an indispensable tool for citizens, as well as the central gathering place for people, it became clear that the uneven access to the Internet is a problem to be solved." 4 Torr Mr. Silva explained,

"Smart Chicago collaboration has been crucial; it really helps us a lot more flexibility than we could have them to represent our grants, they are really behind what is a very broad interest in the developer community. engines. They hold meet-ups, I know it sounds soft, but in fact the work of the community into the wisdom of the policy of the city is very important. There is a power beyond maintaining the government. You cannot have Mayor's Office continue to try to drum up interest; it has a momentum of its own intelligence from Chicago to promote one of these methods.

It would be very difficult to do the work we do not have such capabilities. This is specifically for digital literacy organizations and government efficiency; it really is a testament to the outside and inside of this method to Smart City project in Chicago. "

### Smart City project in Chicago

In the three main application areas of smart city of Chicago and open data projects are:



- Infrastructure Investment
- Economic Development
- Community Involvement

## **Infrastructure Investment**

Broadband project - the city is investing in new open-loop fiber optic gigabit speeds obtained through an open network. By investing in the infrastructure of the open city hopes to promote a more dynamic and competitive market. City hope to high-speed broadband plus a very competitive price will be an incentive digital technology company positioned or repositioned in Chicago.<sup>5</sup>

The pilot and the spectrum of the US Federal Communications Commission - Chicago City has run out of unlicensed radio spectrum. It is currently working with the dynamic spectrum sharing the Federal Communications Commission has been assigned to the public safety spectrum, so that when it is not in use, can be used in small batteries or phones.

Sustainable Broadband Adoption program prepares -The Chicago intelligent sustainable broadband adoption of "promoting economic development in disadvantaged communities in Chicago 5" 6 broadband awareness and adoption program provides computers and training opportunities to more than 11,000 residents and 500 small businesses and not change -profits.

## **Economic Development**

Chicago saw the open data, due to the fact that businesses and applications built on the development of the concept to get their economies open data platform. Mr. Tolva introduced this new information technology market:

"Where the innovation is happening is indeed with third parties - other than developers, and government parties designers work to make things better a lot of things we've done is put around the equation, and think the city itself as a platform. We can provide raw materials, but the application is built on top. "

Facilitate stakeholders, and adjust the industry, communities and the public sector market demand is a key priority in Chicago. To this end, the mayor called the policy recommendations of the Expert Committee to develop a diversified technology, supporting technology industry workforce diversity in Chicago. Some of the recommendations may need to collaborate with other departments. For example, one solution might involve learning through the promotion of engineering, and educational channels of cooperation with the investment focus of the private sector.

### **Other investments in promoting this market include:**

Chicago Health Atlas - a website shows the total health-related information on a map.

Windy Network - Real-time open data infrastructure investment programs and platforms. User participation, help to understand the needs of the city, marketing and information delivery and service.

Illinois open technical challenges - challenges in collaboration with the Illinois technology brings governments, developers and communities to use public data and create digital tools, will become the demand of today's citizens, and promote economic development.

Web hosting space - support person / hope that through cyberspace, as they created a government open data services.

### **Community Involvement**

Working away in Chicago, community participation is collaboration by intelligent Chicago. The measures include:

Network of the city - what do smart Chicago collaboration around digital inclusion key position reporting.

Digital Skills Initiative - coordination across federal department's hub has received funding and training in science and technology commission agency.

Chicago connection - more than 250 places in the Internet and computer access, digital skills training, online learning resources available free7 loose network of cities.

Smart Health Centre - already trained health information specialist clinic for low-income patients to connect to their own medical records and find reliable information about their conditions of the place.

### **Smart City project realization Pilot / demonstration**

- **Role**

ICT investment in Chicago, the pilot study and is considered an effective way to test how to launch a project size. Some projects carrying too many unknowns to immediately roll out a large-scale. The Windy Grid project is now being enlarged pilot. Pilots exist, partly because resources are unavailable roll out of the project in terms of size, but also can test this concept, as well as the business case for investment.

In Chicago, there is a drive to encourage the creation of new ideas in urban ICT pilots. Each week, the city held open.gov hacker night. Each event has a specific theme (such as transportation or public health) and various stakeholders were invited to work together to develop potential solutions.

- **Procurement**

The city is eager to work with their smart city project, not just the big players in the various companies. They think this is important because open data not previously possible in this city to create a wealth of expertise. For example, the ethics database data released by lobbyists (i.e., who is lobbying whom nothing is). Some companies have set up around this data and approached the city about the tender in its official "behind the firewall" moral database. In this case, in favor of the city's greetings to provide better service, as well as for the local economy and create jobs. Mr. Tolva explains, "We are creating a new specialty; we just do not yet have a perfect mechanism for contact"



The city has taken some initial steps in this regard, and in accordance with the example of the White House has made two important changes:

- 1) under the instigation of 10 million dollars in official procurement process threshold, which means a smaller scale procurement projects can be a little more flexible.
- 2) create a translation of legal boilerplates. Cities tend to have that they do not speak the same language as the small companies, the problem they are trying to work together. This model of translation tools to support these businesses by reducing the overhead associated with the purchase.

## **Funds**

ICT projects in the city funding are obtained from various sources.

- Grant funds

City of Chicago Department of innovative technology funded under ARRA Sustainable Broadband Technology Opportunities Program using a public computer centers and support. Smart Chicago Collaborative help manage all projects in this city funding.<sup>8</sup>

- Partnerships

Chicago has a partnership with IBM's do some basic research. Chicago intelligent collaboration that supports the MacArthur Foundation, which helps to subsidize some of the city's projects.

- Existing municipal funds

Many cities are more long-term role in funding through the city budget. Similarly, the ICT sector has been re-skill the more creative and strategic, existing positions evolve to adapt to the new strategy. This means that the funding of these posts is from existing departmental budgets.

Mr. Tolva explained that if the funds for this work will be long-term, you need to have a strong cultural change in the city, so that all departments can intelligent grasp opportunities. He said;

"Open Data Strategy is now part of the individual departmental budgets. They have a budget, what people need now. So, this is not to say I am very worried external financial sustainability, the question becomes 'have this institutionalized way, standard operating procedures for each department?'"

## **Measure impact**

Measuring the impact of investment in smart city of Chicago has taken a mixed method approach.

A key indicator for the city is based on cost savings. For example, the city saves 400,000 transferred to the cloud-based productivity tools. Similarly, the purpose Windy Grid application is to save money by enabling insight into the city to work in order to achieve a more efficient urban operations and to inform long-term policy decisions.

But to quantify, it is a central challenge of Chicago. Tolva explained:

"Now, we must take a common-sense approach to this, because the system is not fully established it. There is more work to be done, but once it is, I think we will

Quantify it - we will have to put figures to it. I'm not worried, because if there is one thing that we now have more data than ever before, this is a good thing. For example, we know what to do with baseline spending in all classes. "

The city also plans to work with colleges and universities to help understand the impact of their work. In "The city is a network company report provides an overview of the city's plans to cooperate with universities, to" undertake effective statistical baseline surveys and tracking progress. "9

### **The main obstacle**

- Financial capital

The city is how it must find funds to undertake the project, which is a key initial challenge idea.

- Human Capital

A key challenge is to re-process the IT department in the city able to these new challenges. Previously, IT departments contracted development work, but now the city has a development and design resources, and data analysis director.

### **Future Plans**

#### Gigabit Broadband

Broadband is seen as the work of the city in a transformative project. Speed and their goal is to hit the price point is intended to be destructive. They believe that this will be the key to promoting the city's challenges, innovative and creative responses.

### **The city as a platform**

Chicago has many network devices (such as trash, bike-sharing program). These have a chance to get a better connection similar open data portal. Tolva explained:

"I think this is an opportunity to create another platform for the development - to be able to ask these things in public objects to create applications, internal efficiency."

### **Dispersed Digital Literacy**

Digital literacy, 2013. Digital Access more dispersed than ever, we are moved away from the PC era. Although Chicago Public Computer Center, the future challenge will be to put these resources to the street.

### **Ensure sustainable development**

Truly sustainable development of this work in Chicago from it's by the communities. Mr. Tolva explains:

"When we released crime statistics for 10 years, more than any other city in North America, from the reporters I say thank you very much, we've been asked this many years of call. We are now seeing is some use of the data portal headlines The story, so this is a way of understanding the news in the 21st century, it has an element of data reading and writing. This is part of sustainable development, you have a bunch are using it to do good things and its people. "

# Case study

## 2: Rio De Janeiro

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### To sum up

The upcoming Olympic Games and the World Cup are to make the world's attention in Rio de Janeiro, is a powerful catalyst for urban investment. Rio Tinto is the use of public-private partnership (PPP), to help



fund infrastructure projects, and to stimulate growth in the private sector. An example of successful smart cities PPP is action center, which was originally to support the city in response to natural disasters, but now significantly promote interdisciplinary work. Center City is studying how operations will likely continue to support investment in the wisdom of the city.

The challenges of natural disasters on urban significant. 25 people were killed in a landslide in the city in 2010, the state 800, 15,000 people homeless. Rio de Janeiro's population of about 6.3 million, about 20% of residents living in slums across the city 1000. Rio Tinto is the most violent city in Brazil, with 37 murders per 100,000 people per year. Lack of public transportation. Currently, the bus system is in Rio de Janeiro's main public transport services. Demand for health care is changing; including the incidence of chronic diseases is increasing.

The upcoming Olympic Games and the World Cup has focused global attention on Rio Tinto, and reconstruction and ongoing investment in urban services.

### Introduction

When the current city hall into the government in 2009, Rio Tinto is facing significant challenges. The city is one of the most violent in Brazil; there are significant political and economic challenges. Rio Tinto is also the lowest in the country's health and primary care capacity. Rodrigo Rosa, Special Adviser to the Mayor of Rio de Janeiro, explained that with the new government,

"The city itself began to find their way, and the public sector to play a role in this regard. We stop blaming others for our problems and begin to take ownership of them. We have designed a plan to address in a sustainable manner to address these challenges It began in 2009 with the municipal. "

The new government in the first two years the government has made a very strong financial readjustment. The budget has not been previously seen as a sustainable city is unable to meet their business needs. The first action is to finance 20 percent cut in the city of all expenditures, and renegotiated contracts for all cities. Mr. Luo Sha claimed that this refocusing is a new, more effective ways is a key enabler of development and management of the city, combined with the new smart city technologies.

The upcoming Olympic Games and the World Cup has brought the world's attention to focus to Rio de Janeiro. This has injected new vitality to become updated urban systems, and the city can take advantage of new support and investment has some kick start their rebuilding projects, including smart cities around the technology. Mr. Luo Sha described as a "significant material and cultural change."

The wisdom of investing in the city of Rio de Janeiro is also affected by natural disasters, accelerated, especially landslides, floods, killing tens of thousands of people each year. Mayor Pace believes that a more coordinated response is required by the city, a control room will help promote it. Therefore, the city in cooperation with IBM and Oracle, to create a 'state of the art room situation. "This has been a major investment in intelligent technology in the city, and is being used as the basis for its continued investment.

## **Organization and Leadership**

### **1 Vision / Strategy**

When the data for the new government came to power have a strong vision in 2009 to play an important part in addressing the challenges facing the city. Mayor Paes' approach is to balance its own empirical data and statistics.

Rio de Janeiro look at the social challenges of the city, the most important thing is that they have one. Their view is that a strategy to 2020 urbanizes all the slums, and is on the public finances, focusing on the key risk areas (such as natural disasters). Developments mainly in their poor communities, all investments are concentrated in the bottom of the social scale.

### **2 Organizations**

New Action Center (see 3.3.1) of the house of representatives from more than 30 different departments at any one time. This is taken from the previously isolated and isolated city department's huge organizational change. The technology has helped this coordination, but Mr. Luo Sha explained,

"It's not just in the Situation Room of the screen; typically this is a significant organizational change and it is actually a high degree of professionalism of our whole mindset change in one aspect, how you plan and how to deal with public administration."

Action Center is a huge cultural change for the city as an organization, which is used to isolate individual efforts to achieve the goal, rather than toward the strategic, coordinated vision embodied. In this sense, the action centers on the support of both organizational change strategy, because it is about optimizing the city's disaster response capacity.

## Smart City project in Rio

### 1 Operations Center

Action Center is set up to respond to natural disasters. In 2010, the second year of the current administration, a large landslide killed 50 people. Operations center planned at the Olympics in 2016, but the mayor decided to immediately request. It was built from scratch in eight months a partnership with IBM and Oracle, and the general use of decision-makers in the city's urban management services, especially to coordinate emergency response.



Over time, the government has begun to develop daily operational use Action Center. For example, garbage trucks, through the coordination of GPS, so that in an emergency the truck can be re-used for other tasks. This will help the city manage resources, improve the reaction efficiency.

### 2 Open Data

Center of one of the core principles of the operation is that it is transparent. Mr. Luo Sha explains, "If you want to manage a city, you want to do this is one of the best way flow of information - in order to facilitate the flow of information." For example, all of the media companies, television stations and radio stations have seating internal operations center. There is a press hall, the information they receive. This helps ensure that the information is spread traditional mechanisms by social media, and also through the Internet.

Rio Tinto has made a significant amount of data available to the public free of charge. In large part, these data sets are divided into two categories:

- 1) the data portal - which provides in-depth information on the city, such as crime rates, mortality.
- 2) operational data center - which holds the daily management of information - such as: congestion, weather and so on.

## Smart City project realization

### 1 Promote market

As an emerging economy, focusing on Rio Tinto is to attract new businesses and promote economic development. Therefore, they have created an organization called the Rio business, which was established to focus on providing the private sector with the support of the city and those who wish to (investment by companies doing business in London, and now "inspired by London and Partners'11 ) of the city. It explains the bureaucratic procedures, and other nuances of the public sector, which communicate with institutional investors, the information generated by the enterprise, to promote investment.

## **2 Funds**

Rio Tinto is trying to import innovative ideas and management by the private sector to solve their cash-strapped, and keep on top of innovation out of the private sector. Performance - related pay is one such example.

35% of municipal management by investment from the private investors. Public-private partnership (PPP) is being developed to manage these new investments in Rio de Janeiro. In the past, public-private partnerships have been difficult to implement, due to bureaucratic obstacles, but the regulation has been changed to promote public-private relationships.

Rio Tinto is currently the largest of the three public-private partnerships in Brazil, including the transformation of the port area, \$ 4 billion PPP. Prior to the legislation have prevented private investment in the region, and therefore the policy mechanisms and city regulations were introduced, in order to ensure that private investment can support local development. Rio Tinto believes public-private partnership, to achieve healthy plan that manufacturers pay an additional building rights, and promote the regeneration of the area.

The Olympic Park will be built using private funds. Olympic construction contractor will build, own and sell them to the market. Therefore, the city has been able to concentrate public funds public space, infrastructure and facilities, such as transportation.

Action Center is a PPP financing with IBM who voted for a significant proportion of concept demonstration. The city now has the support of the system service contract with them.

## **3 Measure impact**

In the first year of government, the new government has created a strategic plan, and public management office (PMO), to ensure that they make practical steps to achieve their goals. This set of monitoring activities has two main purposes:

- 1) Monitoring the progress of the project (time and cost). Mayor he spent a few hours every Monday to ensure that the core operation of the project plan.
- 2) To ensure that these projects, they want to realize the impact and value of citizens. PMO office investigates the impact of investment on real people's lives, rather than simply the physical output.

One of the challenges in creating investment targets smart cities are facing is that it takes time to create a system that is easy to use, transparent and understandable. Rio Tinto employees 15,000 staff in the public

sector, as well as the core of the challenge is to make all stakeholders in the same direction. This requires clear leadership, cultural change and time.

City workers, pay for performance, which means that if the various departments to achieve their goals (for example, in mortality, etc.), they get a bonus. The incentive program across frontline staff, such as teachers and doctors to run the entire public sector in, to the role of the back-end, the city administration.

### **Future Plans**

The main focus in the coming years is the legacy of the Olympics and the World Cup. They wanted to create a virtuous cycle of development, will focus on the city produces. Mr. Luo Sha explained

"This led to the social and economic sustainable virtuosity beyond the scope of the public sector. It brings innovative city."

Rio Tinto is becoming a hub for digital start-ups in the country; the level of investment in construction than any other city in Brazil. The main focus here is to develop their own city creative economy, which is an important strategic objective. In the next few years, Mr. Luo Sha saw "an opportunity for us to create a more integrated, more equitable city."



# Case study 3: Stockholm



## To sum up

Stockholm ways to invest in smart city civic center and the creation of e-government services have emerged from their work. The city has been funded Stokab, the company owns a large city fiber optic broadband network, and positioning itself as a test bed for new technologies. Kista Science City in Stockholm as a focal point for smart city technology, technological innovation and economic development throughout.

€ 70 million as a capital investment in smart city technology projects all city departments to support the various departments to carry out the new and untested technology projects.

Stockholm is the Nordic financial center. With the population of 870,000 has the highest GDP growth in the region of production, GRP, in Scandinavia. 12 Stockholm is the focus of research and innovation to support the world's largest information and communications technology cluster one.

In Stockholm, the total amount of greenhouse gas emissions from transport and energy consumption of 43.6 tons of carbon dioxide equivalent per year and residents. This is significantly more than the same metropolitan area below the world - nearly half the average for the rest country.<sup>13</sup>

## Introduction

The telecommunications industry has a strong presence in Stockholm in the past hundred years, Ericsson particular drive, communication technology is part of the urban heritage. At the beginning of Stockholm "smart" tour began in the 1990s when Stokab created. Stokab is a company 100% owned by the city, which lay in a huge city fiber optic network (total length of about 25 laps around the world). The aim is to provide access to the great communication competitive prices of local businesses. Currently, there is the use of such fibers, which is accessible to about 80% of households about 50 ISP.

Stockholm sees itself as a good test market for new technologies and the introduction of 4G, mobile telecommunications new standard first city in the world. In 2006/7, the city began to invest in e-government. They set aside 70 million € to set up e-government services to make them appropriate, customizable, available to all citizens.

## Organization and Leadership

Since 2007, the ICT industry has the opportunity to develop drivers for the city's services.

### 1 Vision / Strategy

City of Stockholm in 2007 to take a vision and detailed core priorities, in order to achieve by 2030 there are a cornerstone of this strategy is to become a more citizen-centered city, they have developed an electronic service programs to respond to such a long - term goals.

Costa Ingvarsson, vice president of Stockholm, explain a vision of the importance of smart cities:

"Driving around intelligent vision is to provide the infrastructure, at least, because if we are very clear that we want to create this (we have since 2007 and long-term vision can clearly), as important is a great help, because other interests stakeholders will adapt. If the political statement is clear and firm, then it will work. "

## **2 Leading political / citizen**

In this regard a strong, consistent leadership has been essential to the success of the project. Mr. Ingvarsson led e-government for five years, during this period to ensure that they deliver to the appropriate standard. He explained;

"I spent a lot of time around the city, talking about this and trying to get people to understand our own organization, we should be how this trip. You have to do a part of it. Leadership on these issues is to explain to people why the process of digitization is very good. You can see that there might be a bad thing, because jobs may be lost. But at the same time, this is a good citizen has the focus, it is behind a strong political vision is very good. "

## **3 Structures**

Structure and mode of how investment is a strategic decision by the city, and they designed and funded by the Chief Executive's Office plans to introduce e-government projects. After this, the management level of the organization is working on it. Strategic task for the behavior of the flexibility and freedom of other departments in the city, without having to put all decisions to the political level. They do in their vision and goals in the annual budget, the progress of the integrated management system in the report.

A key prerequisite for getting money from the program budget, it will be for citizens, this is a strong political vision of a greater value in the background. Mr. Ingvarsson explains:

"This is a way that we in the executive office to occur throughout the organization, did not do everything ourselves. We have established a framework that we put money into to do it."

## **Smart City project in Stockholm**

### **1 E-government**

In Stockholm, a large part of the intelligent agenda already invests in high-quality, access to e-government services. € 70 million investment since 2007, they have created more than 50 digital services, which have cut management costs. Mr. Ingvarsson also claimed

"We can see that the opportunity to recognize and love Stockholm choice, and do business in the city, 24 hours a day."

## **2 Stokab fiber network**

Stokab was founded in 1994 to establish a publicly owned company "competitive neutrality (fiber) infrastructure to meet the needs of future communications, stimulate competition, promote diversity, and provide freedom of choice and to minimize the need to dig." 14 The company is now also responsible for managing the infrastructure used, and leased to the network. Their aim is not only to provide a fiber optic telecommunications, but to create a favorable environment for IT development and expansion of positive development for the Stockholm area.

## **3 Kista Science Cities**

Another aspect of investing in smart city is Stockholm Kista Science City, that is:

"A creative melting pot of local companies in Stockholm, researchers and students to collaborate, develop and grow in Kista is the most important sector of information and communication technology ... Ericsson, Microsoft and IBM are in Kista Science City just some of the major ICT companies has established presence. There are also various sizes over a thousand other ICT companies. 6800 students currently studying at Stockholm University and the Royal Institute of Technology, Kista Science City ICT curriculum." 15

## **4 Royal Harbors**

Royal Harbor is a huge new development area in Stockholm. "Upon completion of the Stockholm Royal Seaport will accommodate 12,000 new housing 35,000 new office space - from the port and its associated trade, finance and media company ambition is one of Europe's most modern and attractive living environment." 16 The goal is to become carbon neutral in 2030 to a mechanism to implement those that use information and communication technologies and smart grids to enable it to provide power for different houses in different times of day, and is very energy efficient.

## **5 Transports and Energy Efficiency**

The city is working with various private entities investigating the connected equipment, and with the use of the data layer between big data solutions to optimize the program (such as traffic monitoring) cooperation.

The city also operates to support data collection through processing of the congestion charge zone of the vehicle. The system is currently helping the city to monitor traffic; they are investigating how this can be good exploited<sup>17</sup>.

## **6 Green ICT**

"Green IT - a strategic city of Stockholm" 18 applies to the city government and Stockholm AB Stadshus (parent company of the City of Stockholm selected as a limited liability company's activities). The strategy

has passed the City Council, is managed by the Executive Office. Stockholm City Green IT strategy explained:

"Green IT is a general term measures aimed at reducing the environmental impact of our assistance and IT. It involves the use of information technology to reduce the impact on the environment and reduce energy consumption and IT sector as a whole, the impact on the environment.

Green IT is a strategic and management issues, which is why it is important to consider environmental issues from a business perspective. This clarification, in which the city can reduce its environmental impact line manner. "19

## **7 Open Data**

Stockholm think open data as a basic principle the future, they are keen to be more widespread access to data and simple. It is seen as a huge opportunity for the city, especially for the creation of new and innovative products and services, and provides economic development of the city.

However, Mr. Ingvarsson explains that there are many more stories.

"We're dealing with data subject to legal restrictions, which are personal data of citizens, so you have to draw a line somewhere. It will be a development in which the line will be drawn, and we do not have all of our ourselves. This is a dialogue at European level on who owns the data is going on. But I see the future of information and public data concerning these issues. "

Thus, in Stockholm, there are two key drivers around big data. The first drive is to get the data to the public and enable them to make better, more educated choices. The second is to create back-end systems on public funds, real change and promote efficiency within the city organization.

Game - in order to promote and facilitate the use of urban open data, they launched a competition, "Open Stockholm Award'20 this contest to encourage innovative companies and individuals to use the data to create new products or services as part of this, the city announced. data environment, demographics, etc. - this is feasible on the legal and practical data sets this competition received about 200 different ideas of new electronic services, and the creation of about 60 developed solutions it is people. participation and yield hailed a huge success.

## **Smart City project realization**

### **1 Promote market**

Stockholm City work through dialogue with citizens and the private company structure. Citizens ask them what kind of service, such as the city offers, while private companies are given space to interact with the parliament.

For the smart city market, the city found private stakeholders is particularly important, a good two-way communication. Mr. Ingvarsson chaired the meeting in the city all the information and communications technology, transportation to the show who they are, their products and services. This is also the opportunity for the city to present their priorities and strategic direction for. Mr. Ingvarsson explains,

"Our goal is to create some common ground, to tell people this is where we are, this is where we're going, and get from private companies, many of whom have their own R & D department all the good knowledge have dialogue all the time is very important. "

Another important role in promoting the city's market is to act as a mediator in between university and industry. The city is able to create a space or a platform where they can meet and test new ideas.

## **2 Demonstrations**

Demonstrators are seen as an important way to invest in smart city of Stockholm. Demonstrators investors understand what the impact might be, and how best to manage it, to do any different. In particular, the protesters provide the opportunity to test the concept in terms of size. For example, the Royal Seaport will have up to 20,000 residents and 50,000 people work there. In this way, it will not be a "test area" in the traditional sense. Mr. Ingvarsson believes that this is "very important, because it means that you have to do very, very well."

The city owns the majority of the land, having in the city, which means it can be created using a surrounding carbon emissions technology, provides services, in addition to creating great places requirements and objectives, legislative control people's living space, this way to promote the new technology, and has the potential of new ideas and companies to enter the market.

A key challenge is that real estate developers tend to be conservative approach, often to implement effective solutions. City Council has learned, including universities and SMEs in the process creating new solutions may be really powerful, but they may not work, because they have not been fully tested. To address this challenge, the council has established a variety of test beds where very new unproven technology, you can try.

An example of such a comprehensive test-bed is "Kista Science City" where many ICT companies are trying to find a way to cooperate with real estate owners, allowing the use of new technologies, develop new innovations.

## **3 Procurement**

When it comes to the development of e-services, the city needs by Swedish and European law to regulate procurement procedures. However, they believe that through good social dialogue with suppliers, they really understand what kind of projects and programs, they can bid and get a good response.

The city has launched Sweden's first pre-commercial procurement and the Swedish Transport Authority about the new intelligent transportation solutions. Instead of sourcing solutions, they have released the

questions to get different companies and organizations to develop solutions for the purpose. This is an open competition, encourage innovation and creative ways to solve problems.

#### **4 Funds**

"The key to this success is that we did not use the regular budget, we got money on the side, so that we can really drive innovation."

€ 70 million investment as the city needs an early investor in the technology. The large investment of money from the budget surplus (in 2006) in the previous year. In 2012, they had about 208 million € of further overcapacity. In this regard a significant proportion will be used to invest in infrastructure, but the part will be assigned to future IT investments.

The city established the optimization and the use of guidelines and rules of data and appropriate project will fund all sectors. This means that any department have a suggestion, a cost-benefit analysis will be conducted to determine the value of citizens of Stockholm, funded by the central pot. This put pressure off individual departments on a tight budget. By reducing the cost of the investment and, since the digital compensation of the method. This may be a longer period of time, depending on the efficiency of investment and the estimated project creation.

#### **5 Measure impact**

Residents are asked to relate the annual Stockholm quality of public services, efficiency, selection 10 issues. These monitoring annual income over time, and submitted to the next Council as part of an integrated management system.

Monitoring and evaluation are included in the Council's management system. They have used the funds from the requirements of electronic services department to report on how they plan to cut annual costs. Mr. Ingvarsson said, "It gives them credibility and continue to do what they are doing."

### **The main obstacle**

#### **1 Fund**

Smart money is extremely important to work in the city of Stockholm. This is a key mechanism for the time and resources in this area are important to develop and progress. Funds for the wisdom of the city to work will continue to be a challenge because Ingvarssen interpretation;

"Looking ahead, I see there is a continuing need for money can accommodate before financing - to look at this as an investment that we need to find financing ICT investment over time, not taking the money from the daily expenses of the different departments, and adventure. We are a way of taking the debate from the teachers' salaries. "

#### **2 promote change**

Driving change large public sector organizations is a key challenge. Mr. Ingvarsson introduced this challenge;

"When you're trying to make a change and do something different, you'll run into the social and organizational internal resistance. You really put the focus on the communication around it. Of course, my employer for election every four years, so it More importantly, they proved that this is a good thing for what it might take ..... but it will make us a better organization, it will make the city a better place to people. We've been mayor Stockholm is very clear the importance of wise. "

### Future Plans

Potential areas for future investigation include working with traffic management and smart grid and Sweden as a whole. The city saw and connected devices, "things" as a fun way forward for the cities economic and physical development aspects.

People who do not have access to the Internet and work are a priority for the future. Currently 90 percent of the city's communication is via e-mail or the Internet. There are also people who are not included, and are uncomfortable technology, which is a social and economic dimension. In the City keen to understand this challenge and has the potential to make all citizens are part of the digital society.

## Case Study 4: Boston

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### To sum up

The new mechanics in the city of Boston, an important mechanism established by the mayor's office of Mayor Menino of Boston's innovative Smart City investment. MONUM by providing expertise and funding to encourage and support cooperation with innovative companies and SMEs, pilot projects, and support other city departments. It uses a top-down and bottom-up model innovation, with particular emphasis on good communication internally and with other cities.



Boston's population is 625,087 (2011) and growth, and the young people moved to Boston and the "return to the old Boston" 21. It played in fueling the biggest growth in the US population between 2000-2010 22 1 4.8%.

Mobility is a significant challenge in Boston: There are more than 300,000 daily commuters to the city, congestion and parking is a problem. "Because of the rush and lack of distinctive grid road system, Boston is listed as the fifth-largest traffic delay-prone city in the country, according to a recent study." 23

Waste Management of the city is also a challenge. The city spends more than 40 million US dollars in the garbage and recycling, no problems of citizens more requests or complaints. In the main priority of investment education and crime in his "city-state address," stated Mayor Menino

## Introduction

Boston Mayor's Office of New Urban Mechanics (MONUM) "pilot experiments provide fundamentally improve the quality of urban services potential" 24. It was set up by the Mayor Menino is able to respond to innovation within the public sector challenges.

New Urban Mechanics office in Boston is totally focused on the job, in order to create value for citizens, and its focus on the interface between the government and the public. Nigel Jacob, co-chair of the new city mayor mechanics office explains:

"We have developed a method, is positive about the experiment we call" citizen participation space ", and how people can participate in civic life in general and their government."

The three main areas of research include:

1. Click and Brick
2. Century Learning
3. Participation in Urban Planning

## Organization and Leadership

### 1 Structure

There are two broad types of items, MONUM engaged:

1. innovation projects in its most general sense; this is usually hatch and R & D projects.
2. To promote the relationship between municipal departments.

Authorities in order to be able to work effectively in the entire city, MONUM put a lot of time to build relationships and trust them. Mr. Jacob explained;

"In order for us to work with the organization of the operator to work effectively, they need to understand that we are here to help them, support them, we will not expose or make them look bad. We build trust. This can be From writing grant proposal to do more technical analysis, what; we have with the local university, so we can bring a very complicated person to lend a hand with some of the departments are working to resolve technical issues more relationships. "



## 2 Leading political / citizen

Mayor Menino's focus is on serving the community. His focus is to provide people of Boston resident's quality of service, safety awareness in their communities, or the sense of trust of people in their school system, rather than focusing on business objectives. This is a very clear message that lists the mayor, and to promote a decision made in MONUM

Structure and organizational culture specified by the mayor and MONUM inside and outside government to encourage and promote entrepreneurial action. They do this by focusing on what they call "folk innovators who are trying to solve problems in their communities, Mr. Jacobs explains:" Increasingly, we found that some people who are interested in finding their own solutions and business groups for social entrepreneurs and social entrepreneurs have a thriving Boston. More people, it is realized that the government needs to become part of the solution. "As a result, city leaders in Boston focused on the promotion of a group of entrepreneurs and outside government to work together to achieve their goals.

## Smart City project in Boston

Three core programs at MONUM Smart City project: "The participatory urban" and "clicks and bricks" and "21st Century Learning."

### 1 Participation in Urban Planning

MONUM believes that smart technologies to cultivate new wave of citizen participation. In the "participatory urbanization" driven project, aimed at supporting the creation of new, citizen-centric products and services.

Citizen's connection - the application of smart phones can help constituents make their communities better to give them a simple tool to report service problems. They drive called "citizen connected txt 'SMS version.

Community Plant - a platform to explore how online platform for people to add to community meetings, as well as reach the audience may not attend community meetings.

Innovation Zone: Welcome home Challenge - a competition focused on attracting and growing businesses in Boston's Innovation District.

Participation in Chinatown - Chinatown's participation is to engage in a wider range of information and consideration of the planning and development of the dialogue component of a video game-like platform.

### 2 clicks and bricks



The project "clicks and bricks" plans to investigate how to take advantage of new technologies to link the city is built on how it is managed and experienced. In particular, they focus on how to link 'interests and the designer's talent and technology outside the town hall and the leadership and staff from the city's public works and transportation sectors. "25

Redesigned trash system - city cooperation with IDEO to look at this challenge through people-centered design of the lens.

Street bump - bump Street is a mobile application that helps people improve their streets. Because they drive a mobile application collects data about the aircraft's smoothness; these data it can provide real-time information to solve a problem, and the city's long-term investment plans.

City workers - in order to help the city staff to better manage their infrastructure and composition respond to requests, the city has developed to be used for smartphone apps city workers. This allows workers to easily manage their daily work list, and access and conditions relating to urban infrastructure, such as street lights, trees, road record information.

Using -A- hydrant - a pilot project to encourage residents to Boston winter shoveling snow fell in the fire hydrant. Through the application, after residents claimed they were going to storm, shovel out fire hydrants.

Complete Streets - Boston transport sector led project, complete streets are trying to make the city's transportation infrastructure greener, more intelligent, more multi-modal, in order to improve the flow of people and goods through Boston.

### 3 21st century learning

21st Century Learning Program is designed to provide convenient, integrated and lifelong learning to the citizens of Boston. Its purpose is to promote the relationship between teachers, students and parents, the school and the educational experience both sides to improve schools.

**Boston Card** - As part of the efforts of the city, has its schools, community centers and libraries for educational opportunities for young people seamless system, the city is piloting a card, it provides all of these resources, visit the Boston public school students.

**Find BPS** - The Web application can help parents navigate their children to the public schools of choice.

Where my school bus - this program is for parents to sign up to the real-time location on your computer or smartphone children on the school bus to see.

Autism application / assistive technology - the city is with two local companies and international companies to develop new robotic applications in order to help children with autism learn.

Class talk - send SMS alerts are designed to help teachers, student's homework and quizzes.

### 4 Open Data

Open data is seen as a core element of smart cities to work in Boston, and as a mechanism to promote innovation city. Mr. Jacob that "open data is one of the legs of the stool; we do open innovation, more efficient use of data and generate a part of it, however, we need to focus on behavior change data are not yet available; we need a stronger focus on more sensitive data sets. "

One of the more sensitive the data sets, including data open school work and education. The data they are interested in, such as students, exams, grades, discipline records, course data through open school behavior, MONUM think these data, there is a new wave of innovation and create value - the enormous potential value-added services for children.

There are some data sets, which will allow the school to improve school performance and track-school program is very useful. There are many organizations that want to know whether they can improve performance in school, and at that moment, they've done a very limited way.

However, there are a range of legislative restrictions on how the data can be used. MONUM are engaged in a research project with Harvard to see what is possible and safe to use around the data.

## **5 Other investments**

Improve traffic management

The program will help the Boston Transportation Department can find traffic problems faster, allowing them to spend more time solving problems and less time looking for them.

Healthier environment

The program will help cities understand their bicycles, parking and traffic management policies are affecting the use of vehicles in the city; this intelligence, the city will be able to see how it can achieve its aggressive action on climate change targets in 2020.

Transparency

Because part of its commitment to transparency, the city has performance indicators, service request data, informed the meeting that the city council and by broadcasting video conferencing.

## **Smart City project realization**

### **1 Promote market**

Mr. Jacob explained, "to do a new city on the mechanical nature of innovation is a citizen incubators and R & D labs." It is focused on the realization of the connection the government, citizens and social entrepreneurs around the urban service delivery innovation, outside make the partnership between the people inside the government to respond to the challenges of urban incubator.

MONUM plays various roles in driving the market. First, they support private companies to establish new contacts, applications for funding, and looking for new business opportunities.

They also often have a more practical approach to support those who want to play in their own communities to solve the problem of organization. This may include providing seed funding, or help them develop the technical elements of their proposal. Mr. Jacob explained, "When they find us, they are usually in the hearts of the basic pitch, they need support and resources to get the project off the ground. We can help them do that."

## **2 Pilots**

Most believe MONUM undertake the project without leaving their long-term. They run the experiment, then, if it is successful, their work positively and unscrupulous, it makes sense to expand. They designed a scale model of the project on an individual basis. For example, a company may need more customers or clients so that the city, the city is sometimes linked to more traditional venture capital, or other charitable foundations interested in exploring this area.

Expand may also mean extended to another city. There is a branch in another MONUM work is related to the connection with other cities. This involves building bridges; so that where there is a city of innovation they can create a network innovation to other cities, so they do not need to reinvent the wheel. Our idea is that both the size of the city of Boston and the Boston stuff out to other cities.

In some cases, the project has been enlarged to a particular city department, because they are needed to solve specific cities. The city has become paying customer's suppliers, and is willing to pay for solutions, and signed a service contract at a time.

## **3 Test Bench**

Positioning the city as a test bed for new technologies is the pattern of Boston has repeatedly used. In this case, the city's value-added services to innovators deep access to the city to work, access to back-end systems, they can also get high quality feedback on how the system works.

### **Citizen's connection**

In 2008/09, it is necessary to improve the citizens to report government channels of communication, at the time there is no ready-made solution, the city can buy. MONUM approached local start (connection-bit), and presents the opportunity to provide a lightweight tool for the government to cooperate with the citizens better. If they are willing to do the technical development of below-market costs, the city provides a test bed for technology.

They are able to develop the first version of the application of \$ 25,000. Depending on the deployment of success in Boston, company size up, go out at least two dozen US cities who are subscribers to connect bits.

## **4 Funds**

Smart City project in Boston funds from a variety of sources. Project-level funding often comes from grants and private donations. On top of this, the city-funded salaries. In some locations the team may also be given funding.

### Innovation Capital

MONUM trying to instill a culture of innovation within the city, and to promote private innovators in government. Mr. Jacob explained that urban culture is risk averse, and that MONUM to take out liability risk projects in specific sectors, so that they "allowed failing."

MONUM which effectively acts as what has Mr. Jacobs described as "risk capital pool" that can subsidize those who are considered too risky for the private sector to spend public money project has attracted a lot of subsidies.

## 5 Measure impact

### Project Statistics

When you start any project, a lot of time is spent establishing success criteria to ensure that the project will provide valuable citizens. At the same time, the city wants to allow for result is new, or perhaps accidental, which means that there must be flexibility and an open approach to some extent.

Because, as the role of the government's social interface, measure MONUM projects generally focused on the degree of citizen participation. This number may include, for example, downloaded, and reports requesting the program or programs to engage in service, or digital human.

### Higher level ending

When evaluating the project MONUM also trying to understand the broader implications. A key challenge here is to understand the longer-term impact, because it is still a fairly young field. In addition, the city invested interconnectedness and complexity means that causality is difficult to identify.

The city has been working with a local university (Emerson College), called the study is designed to operate government (DARG). The aim is to begin to understand the iterative model innovation, how cities can learn from these experiments, and how rigorously they understand the broader implications and their work.

## The main obstacle

### 1 Funds

For the first six months, MONUM operate without subsidies, which is the first challenge. At that time they spent a lot of time trying to figure out how to use in-kind resources, which is to reduce over time and private grant funds.

### 2 Procurement Legislation

Have purchased products and services, legal tight. This legislation is not able to cope with the 21st century, the use of cloud services procurement practices is an ongoing challenge for the city of Boston to work smart.

### **3 Human Capital**

Have the right people who can drive this type of work is essential. Mr. Jacob believes

"The kind of work that we do require people who can run this business model. In many ways it is a mindset to make your staff and resources become their way. A lot of our work is to strive to promote innovation of these cultures We need people willing to innovation, to take some risks with our support. "

### **Future Plans**

The city hopes the concept will become the city MONUM movement nationally and internationally. Last year, the Philadelphia office to become the first city outside the official establishment MONUM of Boston. Both MONMUM office almost every day, communicate, share resources and experiences. There are some other cities, such as New Mexico; this is the beginning of an interest in this method.

In Boston, the city plans to continue the development of its smart cities, drawing additional resources to build a team (currently 8), to be able to solve more problems. They intend to solve more difficult problems. They believe that these types of innovation centers to cope with the most difficult issues facing cities; Mr. Jacob explains, "it's ratcheting up, start small and build confidence, and then move to these tough waters."

## Case study 5: Barcelona



### To sum up

Barcelona have scattered in various departments of many smart city projects in the city. They are currently finishing these projects, and the development of a global

vision, unite them under a single strategy. <sup>22</sup> @ Barcelona area is a focal point for economic development and innovation, and is being used by SMEs as a test bed to test new technologies.

Barcelona understands the importance and role of the vertical and horizontal work, and has been reflected in both their structure and projects undertaken by the organization. Cooperation with other cities in the development of ideas and networks, their agreement through their city projects to promote a significant priority.

Barcelona's population of 160 million US dollars and 17.2% unemployment rate in 2011. "Economically, Barcelona is still far ahead of other Spanish cities and some of the major economic centers around the world. This performance ranked fourth in the world in its GDP statistics city, and 35 in the EU." <sup>26</sup> Venture Barcelona level is the highest in Spain.

Barcelona is a very compact city; it offers an advantage of sustainability. However, it can cause noise, traffic congestion and challenges pollution.<sup>27</sup> tourism is one of the core industries in Barcelona, along knowledge and information services, media and fashion. Education is one of the main pillars of the Mayor of Barcelona, Xavier Trias vision.

### Introduction

Smart City movement in Barcelona is growing rapidly, and already from the previous exercise, such as a decade ago, "Digital City" evolved. Julia Lopez Slavin, director of strategy TIC iSmart City of Barcelona City Council, explained that smart city movement is useful to them a new step:

"From our perspective, this is a great opportunity to say thanks for what we are doing by creating a global ICT strategy, rather than isolated in different departments strategy. In the past we, like many other cities to improve the welfare of the use of information and communication technologies and the promotion of economic progress- This is not something new, but the smart city movement has not only the city is one of the particularity toward this goal, but also business and academia. For us, It is important, because there are a lot of things happen at the same time, perhaps because the technology is mature enough to help the city, and now, it's not over. "

Another important change is that the smart city movement is the use of information and communication technology as a mechanism to achieve their goals facilitator city from the strategy. For Barcelona, Smart City is a means, not an end in itself. Ms. Lopez explained that the text "This is a major change from the previous trend, that technology is a push mover of the project." This idea is clearly reflected in their strategy, technology is seen as an enabler:

- Efficient and sustainable urban transport
- Environmental Sustainability
- Enterprise-friendliness, attract capital
- Integration and Social Cohesion
- Communication and proximity with people
- Knowledge, creativity and innovation
- Transparency and democratic culture
- Universal culture, education and health.

In Barcelona, the smart city movement began in the energy, but now spread all departments. The city believes that this investment will create a sustainable city, but also to promote citizen participation, job mobility and other areas. The city is described as a "horizontal approach."

City leaders in Barcelona to know the city as a dynamic, ever-changing; network of networks, as shown, in the wisdom of the city of Barcelona, which is broken down into three conceptual model: People / Information / urban structure.

## **Organization and Leadership**

### **1 Vision / Strategy**

Barcelona city is currently developing a formal process of smart city strategy. Smart City movement developed so rapidly, there is no formal strategy for Barcelona is to create early; the project first. The vision outlined in the strategy is as follows:

"A self-sufficient city, made fruitful community in the human speed, super-metropolis internal connections, high-speed and zero emissions"

This is a long-term vision for the city, and the use of the cultural identity of the Mediterranean Barcelona compact city.

### **2 Leading political / citizen**

When the new mayor was elected in 2011, one of the first commitment is by investing in smart urban investment digital innovation and entrepreneurship, outlined Mayor Xavier Trias:

"We should not waste the opportunity, we have to apply these new technologies to improve the quality of people's lives, by generating a new" smart cities around the city's innovation economy. "This is another promise of our future." 28



The first of organizational change is to create a new group called the project as an urban habitat umbrella to facilitate the use of various departments to work together in isolation. Habitat structure below the city sits water, energy, human services and the environment. Housing and urban planning are combined.

### 3 Structure

The city has set up a smart city PMO (Personal Management Office), which belong to the project, the city is responsible for coordinating all of the items are classified under the label of a smart city. This means that, from isolated work transition "horizontal" work. The city has produced a strategy paper early, try to build on the wisdom of the city's urban strategy. Lopez said the lady with:

"I think this change so that working towards the same strategy is fairly new in all sectors."

International promotion, international cooperation and local projects: the development of action in three axes lie Barcelona Smart City Strategy.

### Smart City project in Barcelona

There are more than a hundred projects were considered part of the smart city is working in Barcelona, and the number is growing. However, there are currently 13 projects are an important part of the city is currently considered as a smart city project office.

- Lateral Project:

The new telecommunications network - different fiber network integration, promote Wi-Fi networks, reduce operating and maintenance costs, new business models.

Urban Platform - Barcelona sensor platform, the city operating systems, applications and services.

Smart Data - open data, urban indicators of measurement, and the central decision-making and control of the situation room.

- Vertical Project:

Lighting Bureau Program - Lighting strategic plan in Barcelona.

Self-sufficiency of the island - to create energy self-sufficiency of the island, in order to improve the relevance of energy consumption and production practices.

EV - electric mobility development in the coming years, short-term (two years) and medium-term (five years) in Barcelona.

Telecommunication Management irrigation - for automatic irrigation facilities in the region in order to control the duration and frequency of irrigation system of centralized control of remote management.

Orthogonal bus network or mobile office plan - public transport network in Barcelona, orthogonal design, improve urban transportation.

Urban transformation - the main street in Barcelona framework alterations will develop a series of intelligent cities and telecommunications projects.

Citizens compromise sustainability 2012-2022-- a roadmap to achieve a more equitable, prosperous and self-sufficiency of Barcelona.

O-government - government affairs, the implementation strategy and roadmap, development tools and transparency, open data and citizen participation in specific areas of the site.

Intelligent Parking - Parking availability of sensors and display network throughout the city.

Barcelona in your pocket - Barcelona contacts and mobile applications.

## City Agreement

In the development of smart city projects and share their experiences with the rest of the world, academia and industry and other cities, it is important to Barcelona. They believe that the spread of the dialogue centered learning and maximize the benefits and value of their work. City agreement is a discussion space to talk about cross-sectorial city.

They have started to discuss the city's classification. The idea behind this is that the city may be different, they may have their own cultures and backgrounds, but they have one thing in common. Ms. Lopez explained that pull,

"We (the city) must have mobile solutions, nature, energy, water; we have something in common the idea of the city of the agreement is a common problem research."

Vicente Guallart, Barcelona City Council and a director of the city's chief architect of the new department of human settlements increase this, he said:

"In the 21st century, we have in common is that people will be in the cities in which we live and work, where the real economy. Therefore, the city will be a global agreement, open platform, comprehensive and progressive, which cities will share knowledge, projects and policies identify indicators and common evaluation system, promote the transformation of ecological principles and the basis of our collective progress on the city. "29

### 1 Open Data

Barcelona has an open data portal, Open Data BCN30, the city opened up the data to the public and has three clear objectives:

1. Increase the transparency of the City Council
2. To universalize access to data

3. To promote innovation and economic structure

## Smart City project realization

### 1 Partnerships

In collaboration with various partners is central to the practice of smart cities Barcelona. Partners fall into three categories: the private sector, research centers and other cities.

Cooperation with the private sector

Telefonica, ABERTIS - Telefonica and ABERTIS signed the agreement the City Council, a common definition of the pilot, whose main objective is to integrate the city network process, but also a sensing platform (BSP) development cooperation. In addition, Telefonica is working with the head TAP & GO

Indra - Indra is working with the City Council to establish a collaborative agreement to develop a project of the European ARTEMIS "innovative pilot" 2012 Arrowhead framework in the field of energy and mobility, pilot projects currently uncertain.

IBM - City signed a memorandum of understanding, research and development of the city and its operating system for future applications in other cities in the world with IBM.

Endesa company - proposed European Smart cities and smart grid a FP7 project cooperation in Turin, Italy. This is an energy efficiency project is divided into three axes:

- Extended intelligent power distribution grid.
- Network expansion of the heating and cooling of the city.
- rehabilitation of buildings to improve their energy efficiency.

Ross Roca - UNITED used in intelligent automation of municipal waste collected by a European project.

Catalan research centers,

RDI projects to promote cooperation with the European Research Centre of Catalonia, and the "Generalist" of Catalonia, creating smart cities clustered into the company in Barcelona / Catalonia together. These include:

- Bdigital (CITCLOPS, Watt ERP)

IREC (micro-grids and electric vehicles, lighting, buildings (NZEB) and industry)

- Barcelona Design Innovation Cluster / Barcelona center DISSENY (Initiative DIPOLIS)
- I2cat - (SENSORDROID / Abiotic transmission)

In collaboration with the City Council and other agencies

Cooperation with other cities includes:

- Dublin City Council
- Seoul Metropolitan Government
- Ajunctament Germany SantCugat

## 2 Demonstrations

Barcelona is fast becoming the world's leading manufacturers; companies can try out new ideas and technologies in the field of the environment in the city. Mayor Xavier Trias explained:

"Barcelona is becoming a real city laboratory, there is likely to develop, test and apply the most advanced solutions for electric vehicles, smart urban development and energy self-sufficiency, such as inventing a new way to plan for the future of the city, it can be applied to many other cities around the world, to "brand Barcelona" stamp. "31

As part of this, the city has invested 22 @ Barcelona's urban transformation projects, providing strategic spatial concentration of knowledge-intensive activities of modernization. "This project is a new model of urban development, the challenge of providing a knowledge-based society brought about by the response" 32.

Some technologies and projects are being implemented in the 22 @ Barcelona include:

- Underground gallery service system: Repair or without street excavation improve interconnect blocks, enabling service network.
- The new fiber-optic communications network, with a dark fiber network: allow businesses to directly contact any of the different parts of the service provider, and create a partition between contracts.
- Selective pneumatic garbage collection networks: the difference between organic and inorganic waste and between the sheets.
- New electricity network: guarantee electricity supply, more efficient quality gas and water supply services.
- 22 @ Urban Lab: Laboratory city's goal is to use the city as a laboratory to test new solutions and services, and promote market access and improve competitiveness.
- Pilot project on behalf of the project 22 @ Urban Lab: improving resource management and efficiency, the nearby city of taste.

Barcelona also created a smart city Campus33, located 22 @ innovation district. In order to further strengthen the city and the city's innovation strategy, Barcelona city hopes to provide a test rig and "storefront" for enterprise development and test pilots.

Smart City Campus will develop "smart city" of company clusters, and the Council hopes that this will facilitate the connection between the different sectors like ICT, energy and mobility, to create an eco-system that integrates not only companies (MNCs and small enterprise), but also institutions, research centers, technology transfer centers, and universities.

## **Future Plans**

Barcelona's recently announced their smart city strategy, combined with the existing recognized and successful projects, and set an agenda for the future. This will help build Barco in their existing investment and success, while adjusting the common goal of the entire city action.

In the next few years, the city believes, with the private sector, research institutes and other cities for effective dialogue will be the core of their success. Therefore, they see the city agreement, participation in international activities and openly share their learning as the focus of the next step. They believe that this will help them to improve their personal information as a global smart city, safe investment, and support for other cities to achieve their goals.

## Case study 6: Hong Kong



### To sum up

Hong Kong ICT has significant organizational and strategic investments, and there is a clear strategy, ICT investment, as set forth in his "Digital 21" strategy. They have a specific function, information and communication technology strategy, placed in the office the Government Chief Information Office, employs 700 employees. They have a special focus on economic development through the promotion of the digital economy, and are committed to building a world-class e-government services, and the priority of digital inclusion.

With seven million people, Hong Kong is one of the world's most densely populated areas. This particular strain of the stock of housing and transportation systems. Traffic congestion is a particular challenge. Significant environmental challenges in Hong Kong, particularly those involving air, solid waste and water pollution<sup>34</sup>.

In the "two systems", Hong Kong has its own economic and political system, distinct from other parts of China. Hong Kong is one of the world's leading financial centers, and four key industries including financial services, trade and logistics, tourism and professional services.

### Introduction

In 1998, Hong Kong investment in ICT must be determined to have a positive economic impact potential. However, they also know that to find the changes in this regard will bring new challenges. In response to this, they developed the Digital 21 IT Strategy modeled, ICT development in Hong Kong. <sup>35</sup> Since then, it has been. "Upgraded on a regular basis taking into account changes in technology and social economy," <sup>36</sup> current strategy consists of five key areas for action:

- To promote the digital economy
- promotion of advanced technology and innovation
- develop as a hub for technological cooperation and trade in Hong Kong
- To promote a new generation of public service
- Building an inclusive knowledge-based society.

Government Chief Information Office (Chief Information Officer) Director established in 2004 aims to streamline the government structure and functions of information and communication technology within the leadership of the government, so the government has taken a proactive, leading advocacy role of ICT. 37

There OGCIO with three main roles Digital 21 IT Strategy in row. The biggest role, which requires the most resources is to provide government information and communication technology projects and supervised across the entire government, responsible among ICT professionals within the government and set technical standards. Godfrey, Chief Information Officer, CIO, explains:

"A decade ago the government's information and communication technology are scattered, and each has its own ICT department store, now it is more sensible to have a sharing system and share data. So, what OGCIO understanding is meaningful focus do, what is done in a distributed fashion meaningful role to the central system is then provided by our "

The second role is to promote the digital economy in Hong Kong. There is a particular emphasis on promoting the ICT industry; the growth of the industry, given government support, and to enable them to play a role in global and regional. Mr. Godfrey presented the opportunity to:

"We see that because of the size and growth of the ICT market in mainland China and Hong Kong ICT industry plays a role, as the possibility of re-exports of Chinese digital very significant (market) opportunities ... This is a Hong Kong enterprises to play a leading role in ICT innovation and trade, while taking advantage of the relationship with China - which is to make our special relationship."

The third role is digital inclusion, to ensure that all citizens can benefit from smart technology investments. Godfrey explained:

"The use of information and communications technology demand is widespread. We cannot have excluded groups. We believe that the information and communication technology as a mechanism to reduce social exclusion in a way digital inclusion is the social inclusion of ICT. "

## **Organization and Leadership**

### **1 Vision / Strategy**

The first Digital 21 IT Strategy together to buy Pan government ICT strategy. Related to this core objective is "to maintain Hong Kong as Asia's leading digital city." Because Godfrey explains,

"Digital 21 IT Strategy, its core, Hong Kong should maintain its desire leading digital city status. Over time, what does that mean to change our attitudes and our understanding of what the government needs to do in order to promote this concept has been changed. "

Therefore, the policy is regularly reviewed, updated and consultation.

### **2 Structure**

Government Chief Information Officer (Government Chief Information Officer) led by Chief Information Officer provides a single focus and Digital 21 Strategy ICT policy under the responsibility of strategies, plans and initiatives. Policies and customer service and consulting and operations: In addition to government IT Government Chief Information provided (IT) services and support by the two Deputy Government Chief Information Officer (DGCIOs) who is responsible for two major areas of responsibility deputized.

Both DGCIOs by five Assistant Government Chief Information Officer and two overall system manager who led seven divisions, namely the digital economy Promotion Division, E- Government Services Division, Digital Inclusion Division, IT Division strategy, business transformation career Ministry, IT Division operations support and professional development department IT.

OGCIO Approximately 700 career civil servants and the government are responsible for approximately 1,300 IT professionals in various bureau and departments work. The government IT professionals responsible for ensuring the quality of the Government's IT activities, particularly in developing countries, and with the business and policy objectives align IT strategy, design and delivery of IT business transformation project to make timely provision of policy objectives. In addition, about 2,500 contract IT staff engaged to supplement government IT workforce.

### **3 ICT for public participation**

New communication technologies are changing fundamentally how citizens interact with government expectations. They want to be a two-way communication, efficient and society. Godfrey believes this is both a key challenge and opportunity for better policies:

"The challenge of communication is growing quite rapidly. If you and effective public participation, you will get better policy, you will get a better buying policy. So it's fundamentally social media makes the government ..... exhibit We listen to the public and more humane face, and can help the government's image, as well as come up with, will have a better impact, gain wider support, better policy. "

Chief Information Officer has determined that ICT is a catalyst for change, not only how to communicate with people in the government, but to stimulate debate about the city's basic role. Mr. Godfrey said:

"We now see, especially with social media, the government is becoming a voice in the debate, there is a debate in society, how the government can learn from within."

## **Smart City project in Hong Kong**

### **1 Electronic Information Management**

Electronic Information Management (EIM), is central to the 2008 Digital 21 Strategy, and covers three central themes:

- 1) Content Management
- 2) File Management



3) knowledge management.

"The purpose of EIM strategic approach taken to achieve effective information management, through wider use of information technology (IT) and related cultural change, so that information can be created, storage, use, dissemination, retrieval and archiving management improvement way, and ready-made day-to-day operation of the use of appropriate records, knowledge sharing and decision support. "38.

## **2 E-government**

Chief Information Officer is responsible for running the city's major sites. Their goal is to reach 80% of the needs of citizens and government transactions on the site, through e-government services. Godfrey explained:

"The vision is that our customers should look for government services as convenient, efficient and enjoyable, because they get the best service from the private sector to use."

"As of December 2012, there are 49 government and 38 mobile applications mobile government websites. OGCIO move conducive to the implementation of e-government services, by providing support to the government sector and the development of mobile applications often use their public service. "39

## **3 Government through Wi-Fi**

Government Wi-Fi wireless Internet access program (through the Government Wi-Fi\_\_\_33) transition of Hong Kong aims to become a wireless city, free wireless Internet service to all citizens. The program places a Wi-Fi wireless Internet access in designated government premises, designed to ensure that:

- "Citizens can freely surf the Internet for business, study, recreation or access government services when they visit the designated government premises.
- Organizations can extend their services to the wireless platform to achieve with their customers.
- ICT industry can take advantage of the development of new wireless platforms, and provide more Wi-Fi applications, products and support services to their customers, and to open up more new business opportunities. "

## **4 Open Data**

The Government thought it might be a significant value to the public of a significant amount of data. These data sets include, for example, demographic, economic, geographic and meteorological data, historical

documents and archives. However, this information is not always the format, to facilitate re-use by a third party value-added.

To solve this problem, the government launched a named data (Data.One.gov.hk) data portal. This 18-month trial made a geo-referenced public facilities data and provides free, real-time traffic data. They believe that this data, which is the competition they received 41 best applications. The winner is the one application that is located nearest doctor, and keeps track of appointments. According to the success of this trial, as well as from the support of the public and the industry, the government plans to continue with the portal, and gradually add more data sets. Chief Information Officer, said:

"Vision is the type of PSI and is offering more; there will be more creative and value-added applications reuse PSI (public sector information). This will not only increase the convenience of the public's daily life, but also creates new business opportunities, encourage entrepreneurship and promote innovation, knowledge-based society. "41

## **Future Plans**

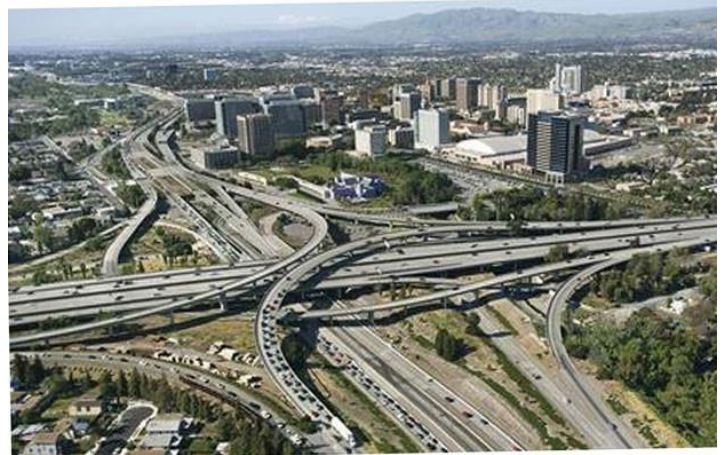
Hong Kong will continue to move in the Digital 21 Strategy articulated vision work, and as new challenges and opportunities are identified to update it. Godfrey explained that the purpose of the city center on ICT is a continuous improvement process, rather than the ultimate goal:

"While we have clarified our vision, I do not think we will ever be able to say that we have done, because even when you get there, ICT changes so fast, you will have to keep running in order to realize the vision."

He also identified a shift of cloud-based ICT business cities will be the upcoming challenges a core:

"We see that in the next few years, the biggest change is how we make use of cloud computing in the government, which would affect the applications and infrastructure."

# Smart Cities in India



- Union government has launched an ambitious plan to build 100 smart cities in India.
- Smart cities use technology to effectively deliver citizen services. Technology enables government departments, the planning process, from various sources and other information, and the establishment of the integration of intelligent and interconnected network of infrastructure services.
- Government promises to reflect the seriousness of Rs 70 billion set aside in the federal budget for 2014-15 in the development of smart cities. The Government will work to make existing urban smarter, develop new satellite towns.
- The program prompted a significant global interest in the past few months. Proposal submitted by an international technology company in the local
- Government bidding projects, and works with real estate developers to build green digital cities. Singapore has proposed Knowledge copy its Tianjin city mode, the new partnership, in India.
- The British Government has extended the £ 1 billion line of credit Help. British companies take advantage of this opportunity. India is also seeking to invest in the construction of the 100 smart cities in Japan.
- State government is not far behind. Orissa has submitted a proposal to the central government under the coverage of 10 cities
- Gujarat government has been preparing a new policy framework and roadmap for the development of the existing urban into a smart city.
- Number of initiatives has been taken to the Indian city of smart management. National e-government program to help government
- In Bangalore, Bangalore and Mysore smart grid pilot underway, 13 of them have been approved. Advanced Communication systems, next-generation technology and fiber optic networks are being deployed. Some cities are also being explored
- Intelligent traffic systems to manage traffic congestion integrated fare system. There are more and more focused on intelligence Building, to ensure energy efficiency, safety and security.
- Addition, many pilot smart city projects, such as Gujarat International Finance TEC- City, Kochi Smart City, Lavasa, Electronic City, and Palava being involved in the development by the private sector. At the same time, planning in Delhi - Mumbai seven new smart city Industrial corridor has been under consideration for the past few years.
- Rapid urbanization in India. By some estimates, more than half of India's population will live in its cities by 2030 this figure will exceed 70% by 2050 Smart City Development is the key to managing this growth.

- Construction of new cities and upgrade the existing general plan is full of challenges related to integration, political orientation, Financing and stakeholder management. Between an enabling policy framework and government agencies and all the good internal arrangement levels are required.
- Task of this meeting is to highlight the opportunities for smart cities, to discuss the challenges facing the implementation of strategies and inspection display technology. The conference will also showcase the world's noteworthy initiatives and projects.

List of 100 Smart Cities of India Proposed by Arun Jaitley in Budget 2014-15

In the 2014-15 Budget Session, the Finance Minister of India Mr. Arun Jaitley is allotted the 7,060 Crores of Rupees for the 100 Smart Cities. The Indian Prime Minister Mr. Narendra Modi is going to develop the 100 Smart Cities as Satellite Cities of Larger Cities by modernizing the present Cities.

List of 100 Smart cities are in Appendix 1.

# Research Methodology

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## Research Gap

- ❖ The need to accommodate changing Lifestyles

Smart cities are also needed to handle the ongoing shifts in the lifestyle values of residents. This section describes some related aspects.

- Valuing Usage above ownership
- Focusing on Non-Monetary values
- Having wider opportunities for work and study
- Overcoming restrictions of time and place
- Being both a consumer and a producer
- The need for a long term approach to developing sustainable cities
- Improving economic performance over the entire lifecycle
- Enhancing city competitiveness

## Research Problem

Many cities around the world want to become smart cities, but face a complex network of challenges. For example, all cities need to invest in social infrastructure, such as roads and other public facilities. But all cities have limited budgets and the investments must take into account various financial planning and economic performance considerations. The cities must also examine the efficiency of such investments under actual operating conditions.

Other challenges include those related to working with other groups. For examples, cities must follow the policies and rules set by national and local governments, and must often set up and use specific mechanisms to ensure fairness and appropriate cost allocations. There are also many difficulties in handling issues that transcend local government boundaries, such as issues requiring decisions by the national government, or decisions on sharing arrangements. Even international standardization can be an issue when managing and operating systems and examining system efficiency.

City administrators on their own cannot resolve this complex mix of different elements, and neither can developers, system vendors, or other suppliers working by themselves. What is needed is the formation of collaborative consortiums with other stakeholders to identify the issues and then to proceed with the urban development. This requires partners who can engage in dialog from the earliest planning stages.

### ➤ Research Objective

The major Objective of the report is to judge what the smart cities are and if they are being implemented through Public Private Partnership in India then what would be the major key attributes to be considered by the government.

- The report attempts to evaluate different Smart cities models/examples being implemented throughout the world.
- What were the problem areas for the implementation of Smart cities?
- India's future perspective for Smart cities implementation.
- What is Public Private Partnership and areas it's being implemented in India.
- Scope of PPP model for the Smart Cities in India.

### ➤ Research Methodology

Researchers argue that quantitative research is seldom able to capture their subject's perspectives because they have to rely on more remote, inferential empirical methods and materials whereas qualitative research requires a broad and less restrictive concept of design than quantitative research (Maxwell, 1998). Qualitative research relies on the integration of data from variant sources of information that allow a better assessment of the validity and generality of the explanations made about the investigated phenomenon (Maxwell, 1998).

- **Research Design**-The present study uses qualitative data to a larger extent; however quantitative data have also been gathered parallel to have an in depth view.
- **Types of sources**- Primary information about the Smart cities has been collected through internet and deliberations with the senior officials of the Board.
- **Data collection**-The data required for the study are obtained from several News Paper reports, bulletins, publications of Annual Reports and Management Information Reports issued by different Government bodies. For in depth and broader view, the study is not confined to a particular number of years hence the facts and figures concerning SEB's performance since its inception have been analyzed.
- **Sampling**- Non probabilistic type of sampling

# Key Learnings and Recommendations

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The study found the common theme of urban intelligent approach to city management.



- Leadership model. Through intelligent cities have a clear vision of the role of action in support of a strong political mandate to support cross-sectorial strategic positioning and technology investments? This should be an inclusive grassroots activities (e.g. individual department's pilots, or local SME innovation) to ensure durability and sustainability of the program.
- Mechanisms for managing risk, and the introduction of innovation. Cities can manage risk by organizational structure and financing model innovation brought about by both sides. Organization, they can create a function, its role is to act as entrepreneurship, collaboration and pilot new ideas. This feature can be drawn not from taxpayers through the capital support (via funding from foundations and other private EG), allows the use of more flexible and innovative projects, the results are less certain funds.
- To support inter-departmental working smart cities, many cities have chosen to smart city vision has crossed the level of urban siloes at work (such as the mayor's office) sectors. In addition, they are adding a new organizational structure that can be used as an umbrella group for a number of existing activities. The aim is to ensure that all departments are working together towards a coherent vision.
- For the SME procurement policies often makes local governments, which may act in the city's desire wisdom challenging work. This can be a threshold size to fight on Projects need to go through the formal procurement, or to support small businesses through the procurement process.
- Smart City is no longer the city government as a development driver in the city's top-down, but they are as a player in an ecosystem. In response to this, the strategic wisdom of the city should represent the city's various stakeholder needs and abilities. In particular, the core of the development of relations with community groups, the private sector and universities, comprehensive and sustainable initiatives.
- Data analysis can be used to plan and provide better local services.
- Provide a significant advantage in intelligence services and methods of urban mobile e-government, citizens, paying special attention to ensure that opportunities are all equally convenient. Provide vulnerable citizens with access to the Internet around the use of digital services, transparency and government data equipment and training, and ensuring access is to ensure that certain groups of citizens are not being transferred to the marginalization of the smart city approach is essential.

## Summary of Learnings with referenced case examples

The following table provides a summary of the learnings identifies and the case examples referred to.



No.	Learning	Key Risks Addressed	PPP examples to be emulated	PPP examples where problems were encountered
<b>Project Preparation</b>				
1	Robust Traffic / Market Assessments	Operations Risk, Time & Cost Overruns Risk		1. Delhi Gurgaon Expressway 2. Gangavaram Port
2	Comprehensive Due Diligence Studies	Design Risk, Approvals Risk, Time and Cost Overrun Risks, Policy Risk, Revenue Risk	1. Timarpur Integrated Solid Waste Management Project	1. Vadodara Halol Toll Road
3	Clarity in Determination of Tariffs	Revenue Risk, Termination Risk	1. Latur Water Supply Project	1. Nhava Sheva Integrated Container Terminal
<b>Procurement</b>				
1	Robust & Simple Bid Criteria	Default Risk, Termination Risk		1. Gangavaram Port 2. Nhava Sheva Integrated Container Terminal
2	Dealing with speculative Bids	Defaults risk, termination risk	1. Gangavaram port	1. Hyderabad Metro
3	Importance of Lead Consortium Member / Promoter of Concessionaire	Financing risk, Time and cost overruns risks		1. Hyderabad Metro
<b>Development</b>				
1	Handling of Land acquisition	Land acquisition risk, Time and Cost Overruns Risks, Social Risk	1. Hyderabad Metro	1. Delhi Gurgaon Expressway 2. Mumbai Metro 3. Gangavaram Port
2	Streamlining of Approvals & Clearances	Approvals risk, Time and cost Overruns risks	1. Alandur Sewerage Project	1. Delhi Gurgaon Expressway 2. Karnataka Urban Water Supply Improvement



				Project
3	Well Defined Project Scope	Scope Change risk, Time and cost Overruns risks		1. Delhi Gurgaon Expressway
4	Environmentally and Socially responsive Development framework	Social Risk, Environment Risk, Land acquisition risk, Social Risk, Time and cost Overruns risks	1. Vadodara Halol Toll Road 2. Timarpur Solid waste management project	
5	Financing Innovations	Financing Risk, Default Risk, Performance Risk	1. Tuni Anakapalli Road 2. Vadodara Halol Toll Road 3. Alandur Sewerage Project	1. Hyderabad Metro
<b>Operations</b>				
1	Favorable operating Environment	Policy Risk, Revenue Risk	1. Amritsar Inter-city bus terminal 2. Latur Water Supply project	1. Kakinada Deep Water Port
2	Need for Public support	Time and Cost Overrun Risks, Social Risk, Revenue Risk , Political Risk	1. Alandur Sewerage Project	1. Latur Water Supply Project 2. Kakinada Deep Water Port
3	Strong political will	Political Risk, Time and Cost Overruns Risk , Revenue Risk, Social Risk	1. Alandur Sewerage Project 2. Bhiwandi Electricity Distribution Franchise 3. Salt Lake Water Supply project	1. Latur Water Supply Project
4	Resolution of Issues through Mutual Discussions	Termination Risk	1. Kakinada deep water port	

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# Appendix 1

List of 100 Smart Cities as mentioned by Budget 2013-14

1. Pune – Maharashtra	22. Burhanpur - Madhya Pradesh	43. Thrissur – Kerala	64. Kota – Rajasthan
2. Mumbai – Maharashtra	23. Jabalpur - Madhya Pradesh	44. Hyderabad - Telangana	65. Udupur – Rajasthan
3. Nagpur – Maharashtra	24. Chennai - Tamil Nadu	45. Warangal - Telangana	66. Ludhiana - Punjab
4. Nashik – Maharashtra	25. Coimbatore - Tamil Nadu	46. Karimnagar – Telangana	67. Amritsir - Punjab
5. Aurangabad – Maharashtra	26. Madurai - Tamil Nadu	47. Nizamabad – Telaganana	68. Jalandhar - Punjab
6. Bhivandi – Maharashtra	27. Tiruchirappalli - Tamil Nadu	48. Nalgonda - Telangana	69. Patiala – Punjab
7. Calcutta - West Bengal	28. Salem - Tamil Nadu	49. Guntur - Andhra Pradesh	70. Muzaffarapur - Bihar
8. Durgapur – West Bengal	29. Tirunelveli - Tamil Nadu	50. Vijayawada - Andhra Pradesh	71. Patna - Bihar
9. Haldia – West Bengal	30. Bangalore – Karnataka	51. Kurnool - Andhra Pradesh	72. Gaya - Bihar
10. Habra – West Bengal	31. Gulbarga – Karnataka	52. Chittoor – Andhra Pradesh	73. Bhagalpur - Bihar
11. Jangipur – West Bengal	32. Bidar – Karnataka	53. Kanpur - Uttar Pradesh	74. Bihar Sharif – Bihar
12. Ahmedabad – Gujarat	33. Bijapur – Karnataka	54. Allahabad - Uttar Pradesh	75. Faridabad - Haryana
13. Surat – Gujarat	34. Badami – Karnataka	55. Lucknow - Uttar Pradesh	76. Gurgaon - Haryana
14. Vadodara – Gujarat	35. Pattadakal – Karnataka	56. Jhansi - Uttar Pradesh	77. Panipat - Haryana
15. Rajkot – Gujarat	36. Mahakuta – Karnataka	57. Faizabad - Uttar Pradesh	78. Ambala – Haryana
16. Bhavnagar – Gujarat	37. Thiruvananthapuram – Kerala	58. Varanasi - Uttar Pradesh	79. Guwahati – Assam
17. Junagadh – Gujarat	38. Kollam – Kerala	59. Jaipur – Rajasthan	80. Tinsukia – Assam
18. Gandhi Nagar – Gujarat	39. Kottayam – Kerala	60. Ajmer – Rajasthan	81. Obalguri – Assam
19. Bhopal - Madhya Pradesh	40. Tiruvalla – Kerala	61. Bharatpur – Rajasthan	82. Tangla – Assam
20. Indore - Madhya Pradesh	41. Ernakulam – Kerala	62. Bikaner – Rajasthan	83. Goalpara – Assam
21. Gwalior - Madhya Pradesh	42. Cochin – Kerala	63. Jodhapur – Rajasthan	84. Bhubaneswar - Odisha
			85. Cuttack - Odisha
			86. Rourkela - Odisha
			87. Sambalpur - Odisha

88. Balasore - Odisha
89. Shimla – Himachal Pradesh
90. Dehradun - Uttrakhand
91. Haridwar - Uttrakhand
92. Roorkee – Uttrakhand
93. Jamshedpur – Jharkhand
94. Dhanbad – Jharkhand
95. Ranchi – Jharkhand
96. Gangtok - Sikkim
97. Pelling - Sikkim
98. Yuksam – Sikkim
99. Bishnupur – Manipur
100. Chandel – Manipur