Municipal Solid Waste Management
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Lecture – 43
Public-Private-Partnership (PPP) in MSWM Projects

So, hello students, we are in the last lecture of model 14 on finance and PPP in MSWM projects; under this lecture, I targeted especially to give some case studies of public-private partnership, and before that, some of the critical points under the PPP projects and also some data was complicated to collect regarding especially success stories and failure stories under the PPP projects for the different states or different cities of the country. So, I had found one PhD thesis also based on that few points on the PhD thesis also I had added into the slides.

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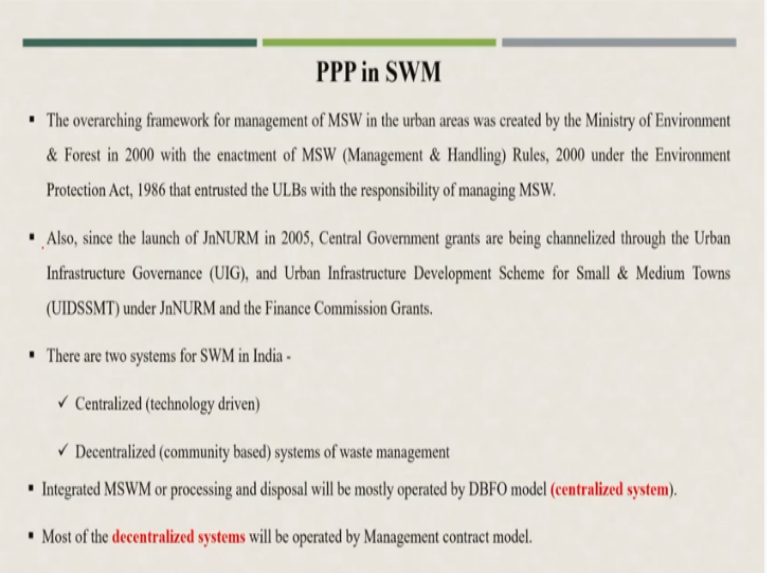

So, firstly, the PPP in solid waste management like I just created by the Ministry of Environment and forest in 2000 based on the like environmental production 1986. So, because in these production act 1986, the ULBs had responsibility for managing municipal solid waste. Since the launch of the JnNURM program in 2005, central government grants are being channelized through urban infrastructure governance.

And urban infrastructure development scheme for small and medium towns under the JnNURM and finance commission grants. So, there are two systems for MSW in India; one was centralized, like technology-driven. One was decentralized the community-based system for waste management and the integrated municipal solid waste management. So, our processing or disposal will be the mostly operated by the DBFO model that was a centralized

scheme that was technology-based. Most of the decentralized systems will be operated by a management contract model.

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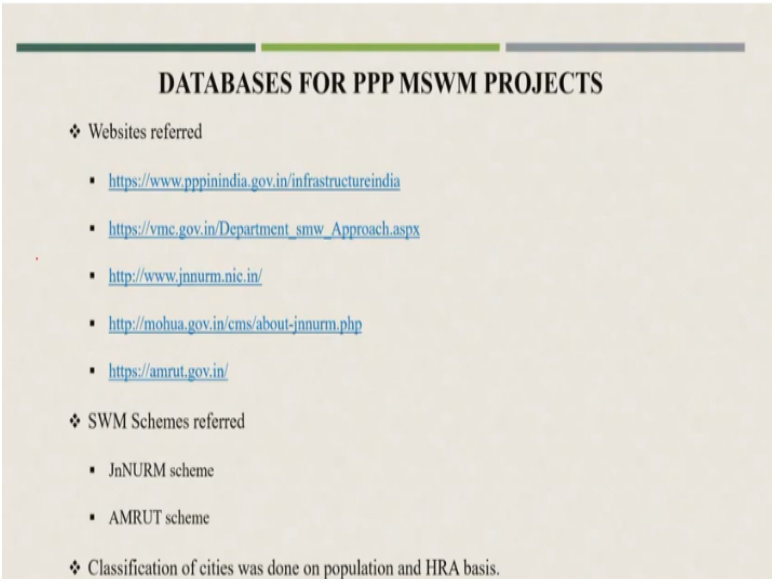

Now, database for PPP, Solid Waste Management projects, if you want to have the complete data of the PP projects in India, you can visit these websites like PPP in India these the major one is also JnNURM scheme you can go or AMRUT, this is also another scheme from I think this is readily available this data and there are signs the solid waste management scheme efforts, JnNURM scheme and AMRUT scheme, which I am going to discuss here. So this classification of the cities has been done on a population and HRA basis.

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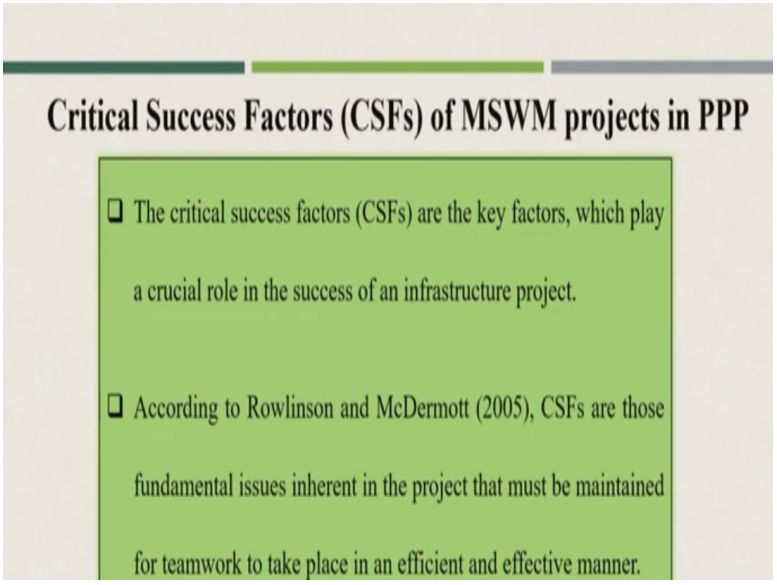

So, what was the critical success factor was found under? Why is it very important? Because; critical success factors are the key factors that play a critical role in the success of infrastructure projects.

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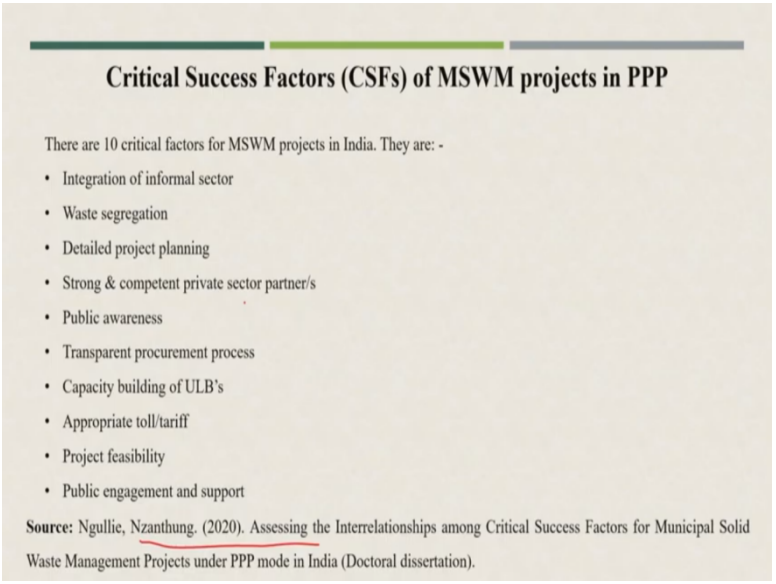

And are these are the few critical success factors? Ten crucial factors were found in India; I think this is one source of PhD thesis at IIT Guwahati. I think this thesis has come up with ten critical success factors like integrating of the informal sector because, in India, the informal sector is a law the quantity is more and almost 10% to 50% of waste management is under the informal sectors, where segregation is one of the essential criteria of the treatment and processing of waste. A detailed project planning likewise, public awareness was another one like applicable toll, and tariffs were there.

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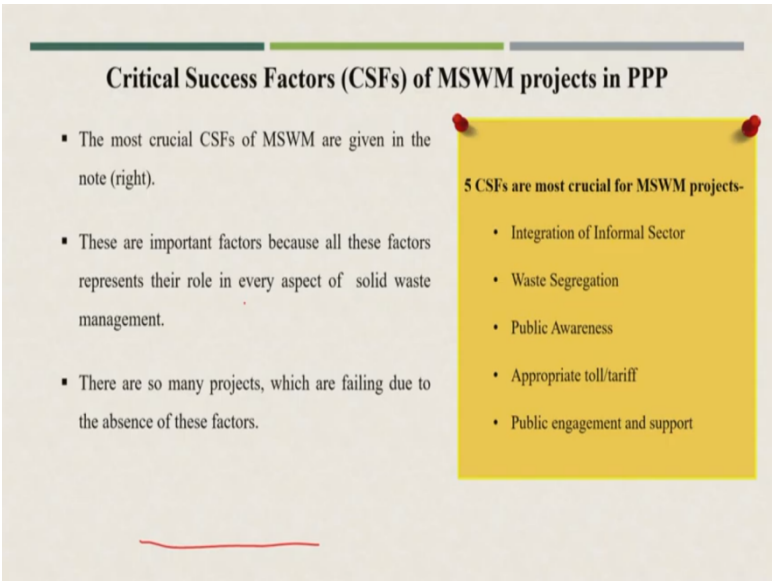

And most crucial critical success factor was found that was five most essential factors of success are crucial. First is the integration of the informal sector, where segregation, public awareness, appropriate toll and public engagement and support. So I think there are five

crucial critical success factors for solid waste management PPP projects. I think these kinds of success without seeing the critical success factor have failed.

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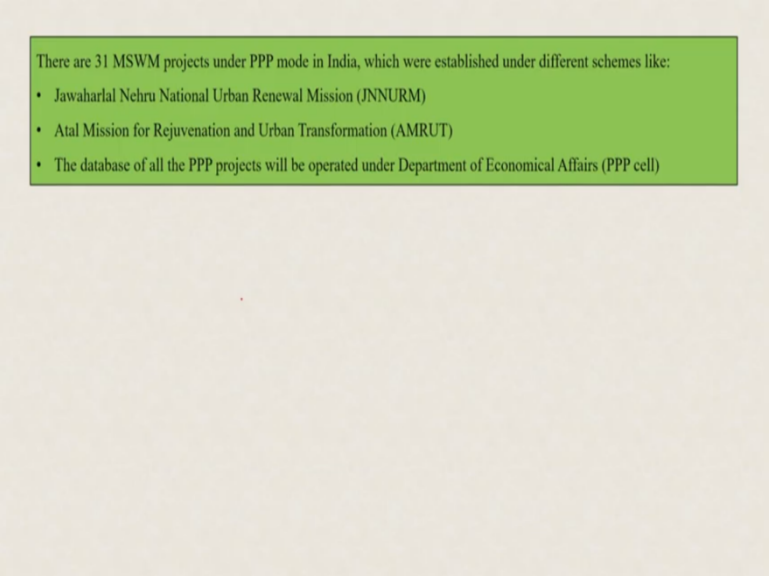

And so, there are 31 MSWM projects under PPP mode in India which are established under the scheme of JnNURM or AMRUT Atal mission of regeneration and urban transformation and the database you can find very quickly under the PPP cell.

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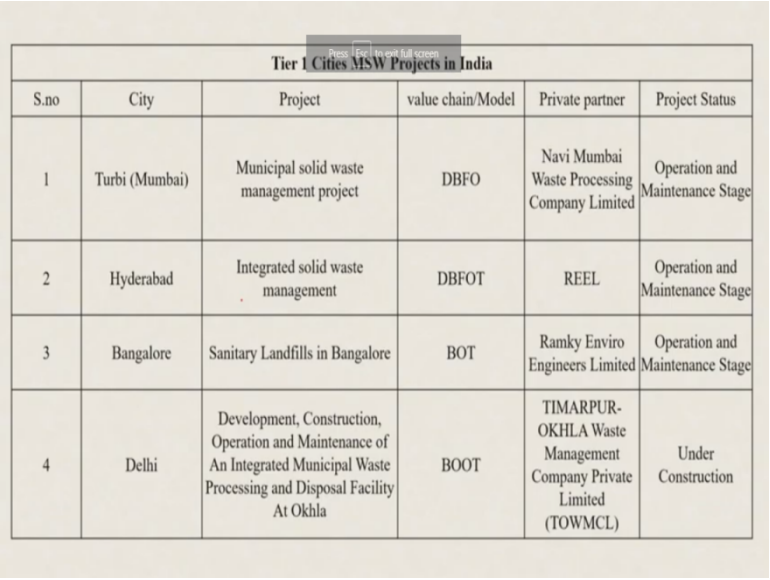

Tier 1 Cities MSW Projects in India

S.no	City	Project	value chain/Model	Private partner	Project Status
1	Turbi (Mumbai)	Municipal solid waste management project	DBFO	Navi Mumbai Waste Processing Company Limited	Operation and Maintenance Stage
2	Hyderabad	Integrated solid waste management	DBFOT	REEL	Operation and Maintenance Stage
3	Bangalore	Sanitary Landfills in Bangalore	BOT	Ramky Enviro Engineers Limited	Operation and Maintenance Stage
4	Delhi	Development, Construction, Operation and Maintenance of An Integrated Municipal Waste Processing and Disposal Facility At Okhla	BOOT	TIMARPUR-OKHLA Waste Management Company Private Limited (TOWMCL)	Under Construction

So, the different projects this was for the tier 1 cities or MSW projects in India. The first was in Mumbai, Hyderabad, Bangalore, Delhi, and there are different kinds of projects Hyderabad integrated solid waste management project, in Bangalore sanitary landfill likewise. So, the different module also used the PPP models under different companies like Ramky was in Bangalore. The first TIMARPUR-OKHLA waste management company Private Limited was in Delhi; I think this is based on the data available on the websites.

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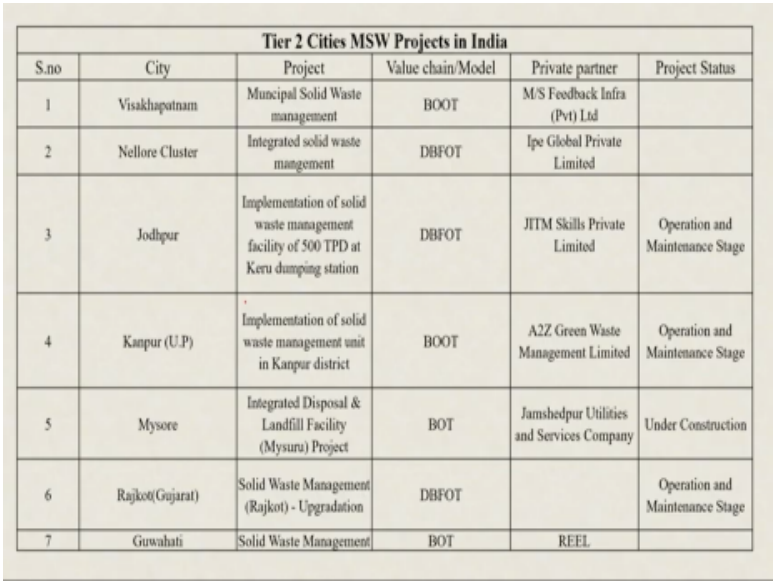

Tier 2 Cities MSW Projects in India					
S.no	City	Project	Value chain/Model	Private partner	Project Status
1	Visakhapatnam	Muncipal Solid Waste management	BOOT	M/S Feedback Infra (Pvt) Ltd	
2	Nellore Cluster	Integrated solid waste mangement	DBFOT	Ipe Global Private Limited	
3	Jodhpur	Implementation of solid waste management facility of 500 TPD at Keru dumping station	DBFOT	JITM Skills Private Limited	Operation and Maintenance Stage
4	Kanpur (U.P)	Implementation of solid waste management unit in Kanpur district	BOOT	A2Z Green Waste Management Limited	Operation and Maintenance Stage
5	Mysore	Integrated Disposal & Landfill Facility (Mysuru) Project	BOT	Jamshedpur Utilities and Services Company	Under Construction
6	Rajkot(Gujarat)	Solid Waste Management (Rajkot) - Upgradation	DBFOT		Operation and Maintenance Stage
7	Guwahati	Solid Waste Management	BOT	REEL	

Like entire tier 2 cities, like Visakhapatnam, Nellore, Jodhpur, Kanpur, Mysore, different PPP projects.

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8	Calangute (Goa)	Implementation of 100 TPD solid waste management facility unit at Calangute	DBFOT	Hindustan Waste Treatment Private Limited	Operation and Maintenance Stage
9	Deharadun	Door to Door Collection of Solid waste Composting and Landfill at Dehradun	Primary Collection	M/s SPML Consortium	Under Construction
10	Ahmedabad	Development of 1000 TPD solid waste management in Ahmedabad	DBFOT	Abellon Clean Energy Limited	Under Construction
11	Asansol(West Bengal)	Solid Waste Management (700 TPD) at Asansol UA	BOOT	Consortium of Gujarat Enviro Protection Infrastructure Ltd. and Hanjer Biotech Ltd.	Under Construction
12	Vadodara(Gujarat)	Secured Engineered Landfill Facility (Vadodara)	BOOT		Under Construction
13	Madurai(Tamili Nadu)	Integrated Municipal Solid Waste Management Facility for Madurai City	BOT	Subhash Projects and Marketing Ltd	Under Construction
14	Bhubaneswar	Development of a regional municipal solid waste management facility in Bhubaneswar	BOT	Essel Bhubaneshwar MSW Limited	Operation and Maintenance Stage

So likewise and some was technology-based, like here, you see a secure design landfill facility in Vadodara, but it was in Deharadum doing door to a door collection facility and was solid waste composting and landfill site facility. So, like in Goa, the implementation of 100 tons per day solid waste management facility unit in one particular location. So, likewise, the different projects under a lot of info private company or private sector were engaged.

And under the solid waste management project, the thought was that these all private sectors thought they would get a lot of benefits from these kinds of infrastructure projects because they will get a lot of money from the local people or the local authority for collecting waste.

Once they are, they will be able to treat the trash. So they can quickly get a lot of revenue by composed by biogas or by energy.

And a lot of recyclable matters are available was available into that. So obviously, most of the private company they want to under the PPP mode with the local authorities because many benefits were there in the tier 2 cities.

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Tier 3 Cities MSW Projects in India

S.no	City	Project	Value Chain/Model	Private partner	Project Status
1	Katni(M.P)	Implementation of integrated solid waste management project at Katni	DBFOT	Katni MSW Management Private Limited	Under Construction
2	Moradabad(U.P)	Solid Waste Management (Moradabad) Project	DBOOT	A2Z Waste Management (Moradabad) Limited	Operation and Maintenance Stage
3	Pernem	Setting up of 10 TPD solid waste management unit at Pernem	DBOOT	MK Aromatics Limited	Under Construction
4	Lingadheeranahalli (karnataka)	Municipal Solid Waste Management (Lingadheeranahalli) Project	DBFOT	Karnataka Urban Infrastructure Development and Finance Corporation	Completed
5	Ferozepur	Municipal Solid Waste Management (Ferozepur) Project	DBFOT	JITF Urban Waste Management (Ferozepur) Ltd.	Operation and Maintenance Stage
6	Belgaum(Karnataka)	Development of Integrated Solid Waste Treatment (100 TPD) and Landfill Facilities at Belgaum	BOT	M/s. RAMKY Enviro Engineers Ltd., Hyderabad	Under Construction

Like, few minor cities like Katni in Madhya Pradesh, Moradabad in U.P likewise and different projects. And there are some local companies, some very well known like A to Z waste management in Moradabad company, Ramky was in Belgaum Karnataka.

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7	Mandur(Karnataka)	Waste to Energy Project Mandur	BOOT	M/s Srinivasa Gayathri Resource^^Recovery Ltd (SGRRL)	Under Construction
8	Tiruppur (Tamil Nadu)	Solid waste management at Tiruppur	BOOT	IVR Infrastructure & Projects Ltd	Operation and Maintenance Stage
9	Varanasi(bihar)	Solid Waste Management (Varanasi)	DBOOT	A2Z Waste Management Limited	Under Construction
10	Pallavapuram(Tamil Nadu)	Solid Waste Management (Tambaram-Pallavapuram) Project	DBFOT	Essel Private Limited	Operation and Maintenance Stage
11	Koyambedu(Tamil Nadu)	Integrated Solid Waste Management at Koyambedu wholesale market complex	DBFOT	Ramky Enviro Engineers Ltd. (REEL) & Ramky Energy and Environment Ltd. (REnEL)	Operation and Maintenance Stage
12	Nainital(Uttarakhand)	Door to Door Collection of Solid waste Composting and Landfill at Nainital	DBFOT	A2Z Waste Management Limited	Under Construction
13	Kacchar	Implementation of common municipal solid waste management facility with a capacity of 180 TPD at Kacchar	DBFOT	Delhi MSW Solutions Limited	Pre-construction Stage

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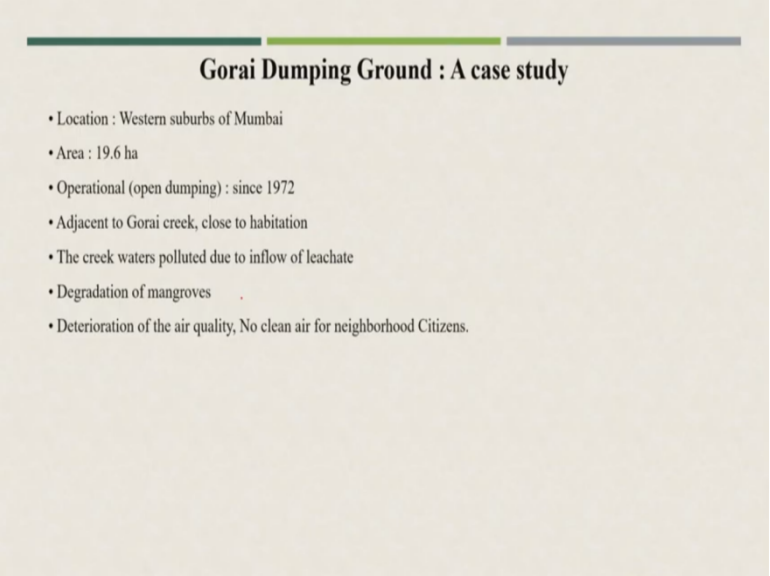

So, likewise, like Tiruppur in Tamil Nadu, Varanasi. So, this is one case study like go ride dumping ground. It was in Mumbai, it was well-known projects like it was located in western suburbs of Mumbai area was 19.6 hector and we it was open dumping since 1972 and adjacent to Gorai creek close to habitation and creek water polluted due to inflow leachate. And because of that, lot of degradation of mangroves and deterioration of air quality, no clean air was a neighbouring city.

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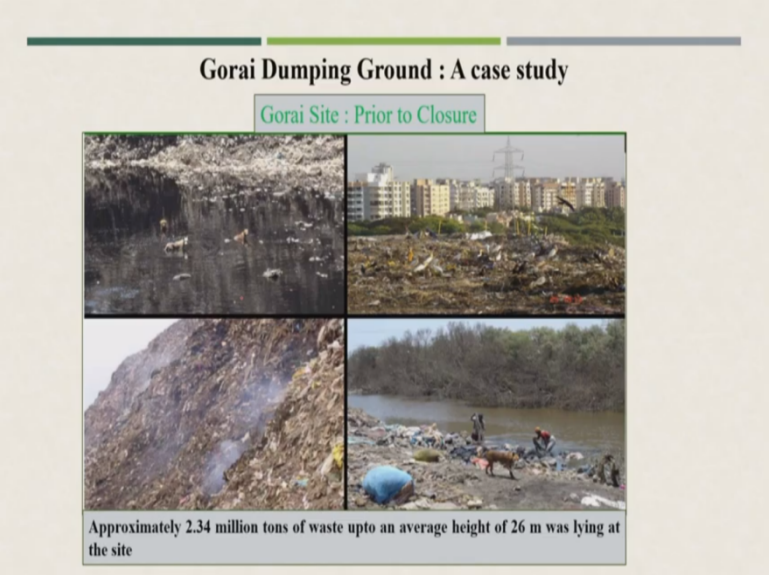

These were the issues they said before closure. I think you can see here by this photograph, you can see so, approximately 2.34 million tons of waste up to an average height of 26 meters was lying at the site. So, it was utterly a hill was created because of waste dumping.

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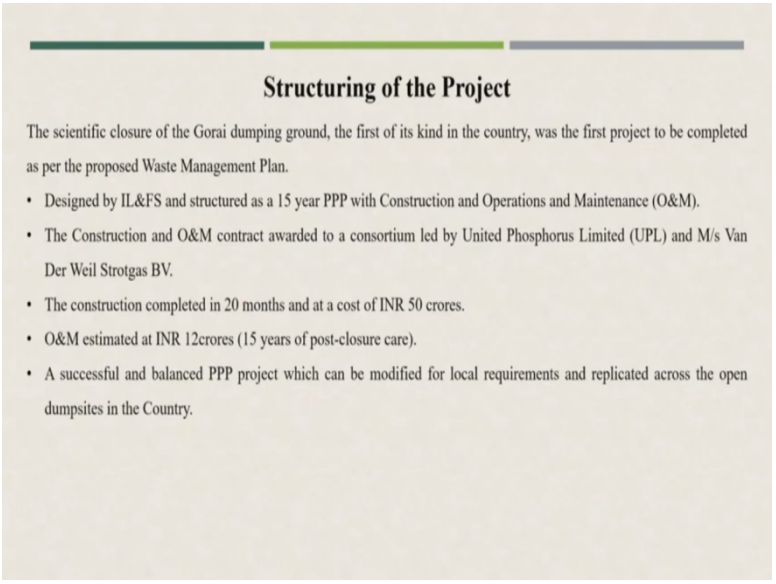

And was structuring like, as a scientific closure of a dumping ground was found for was thought is a first of its kind in the country was the first project to be completed as a waste management plan under the PPP more, so, it designed by IL and FS and structured it 15 year PPP with construction operation and maintenance contract was awarded to United Phosphorus Limited, and this is another company and this construction completed in 20 months at the cost of 50 crores and operation maintenance costs estimated was 12crores after the 15 years of post-closure.

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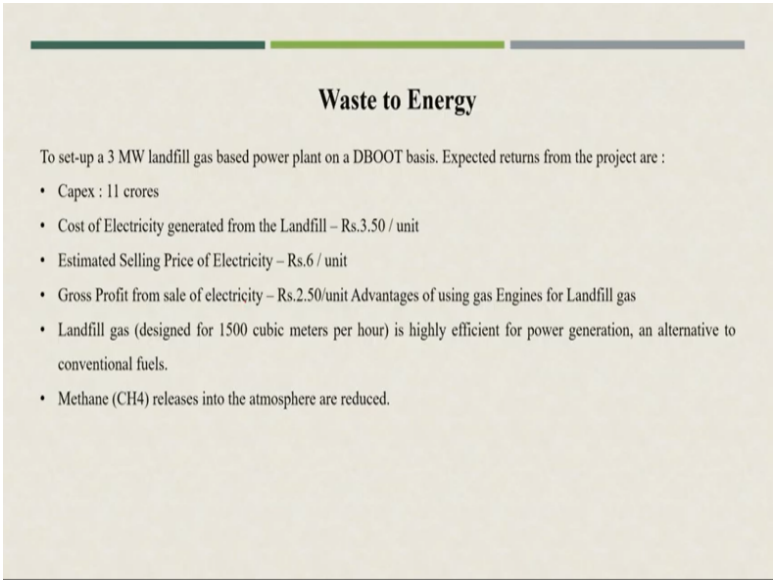

And also, it was set up for three-megawatt landfill gas power plants on a DBOOT PPP model base. So, was expected return from the project was Capex was 11crores cost of electricity generated from the landfill was 3.5 rupees per unit. So, likewise because the waste to energy because the water the landfill after the closure of landfill they will collect the gas and on that gas, the waste to energy plants will run.

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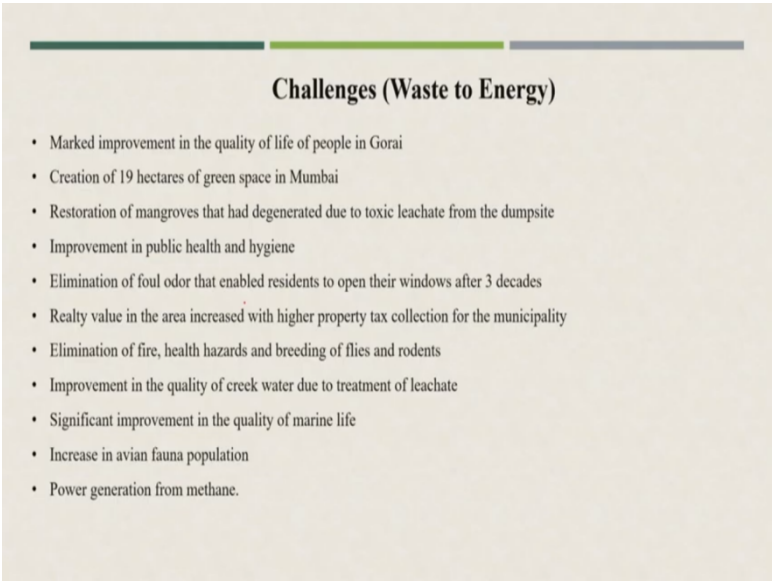

And the challenges were like a marked improvement in the quality of life, the local people creation of 19 hectare of green space in Mumbai, restoration of mangroves improvement of local health, their elimination of foul odour because of the waste dumping and elimination of fire health hazards and also the improvement of quality of creek water due to treatment of leachate and obviously, that was an important point was a significant improvement the quality of marine life.

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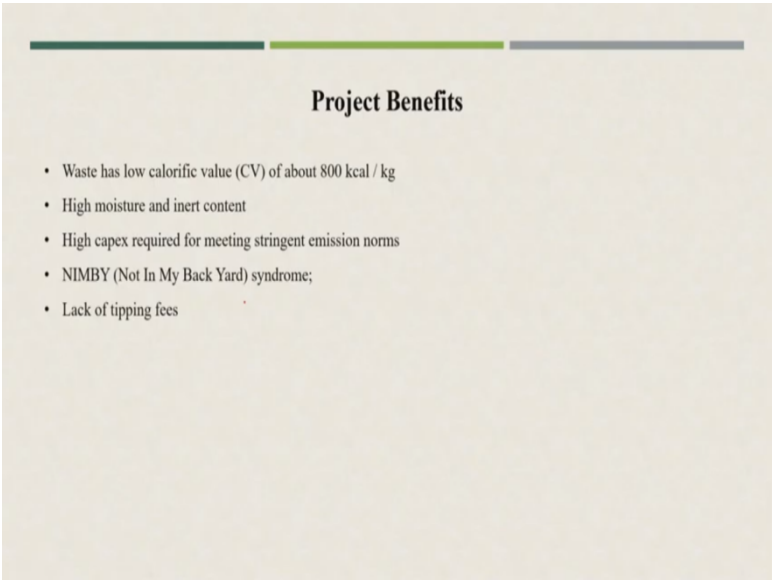

So like on project benefit, the waste has a low calorific value and high moisture static content and higher CAPEX required for meeting stringent emission norms. NIMBY was also the problem and lack of tipping fee.

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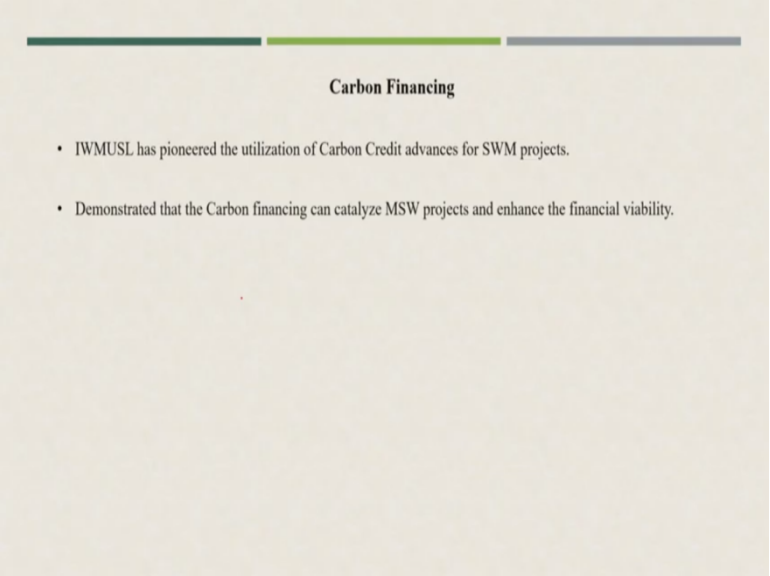

Those were a few challenges, and the project's benefit was getting some carbon credit for this project.

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And after scientific closure, now you can see that so, it was before was like this. Now, you can see how converted this was the earlier I think they started like this. Now, you can see here the entire area. So, this current you can see the Gorai dumpsite has been converted under these this is I think first of a kind of project or successful project.

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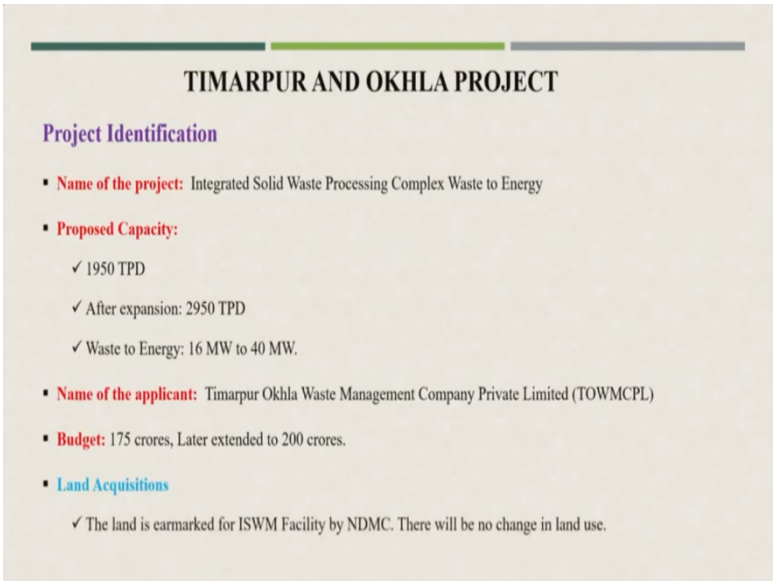

If you see different case studies like TIMARPUR and OKHLA project in Delhi, so is integrated solid waste processing complex waste to energy proposed Capacity was 1950 TPD per day after the expansion 2950 TPD per day. So it was thought was that a waste to energy 16 megawatt to 40 megawatt energy and the name of the applicant was this was the private company budget was 175 crores later extended to 200 crores land equation like land is inbound for ISWM facility for the local authority. So there will be no change in land use.

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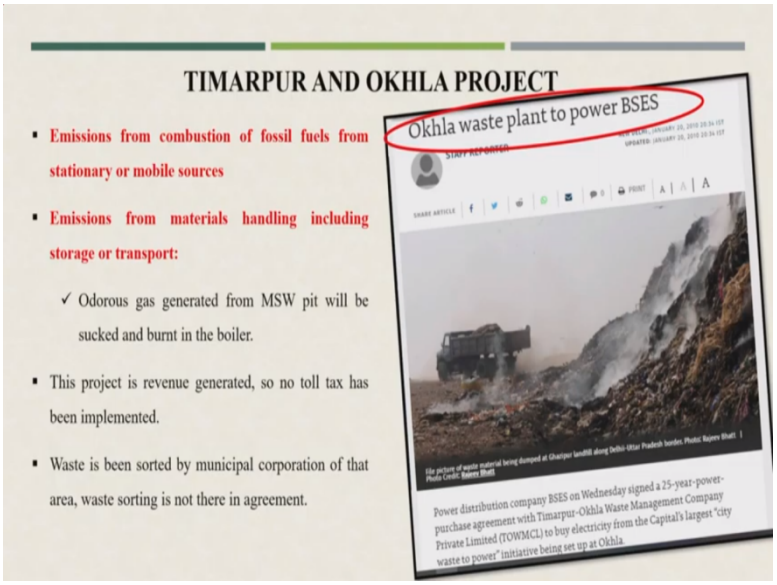

So, the emission from fossil fuel combustion from the stationary or mobile sources, emission from material handling including storage and transport odorous gas generator MSW pit will be sucked and burnt in the boiler. The project is revenue generated, so no toll tax has been implemented. Waste is being stored by the municipal corporation of that area where sorting is not there in agreement. So, this was the news.

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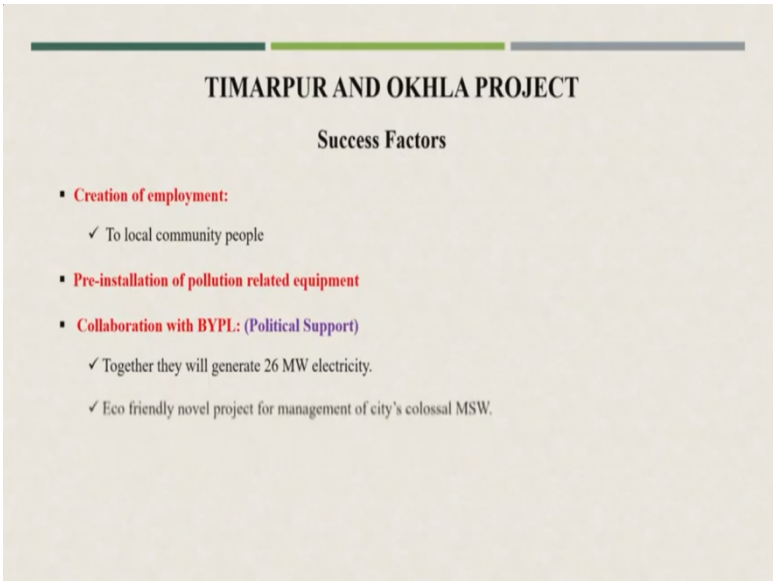

Like a lot of employment, the success factors have been generated to the local people, pre-installation of pollution-related equipment, pollutant treatment equipment, and a lot of political supports because they were generating 26-megawatt electricity.

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You see, the failure factors have faulty logic and inadequate assessment of its socio-economic and environmental implications. Unavailability of EIA report to the public, insufficient or unreliable waste characterization or quantification and protest against the plant, like this was the local habitations was in Sukhdev Vihar another close area there is a lot of protest against the plants so if you ask me the central problem or this particular project, the inadequate and unreliable waste characterization contribution data.

See, for any city you can think about, producing 500 tons per day waste and characteristic says that 50% is a dry waste our combustible material. So, you can easily say that these are

around 250 tons will come to the insulation facility. But, without the proper characterization, whether that driveway will have how much moisture content is there, how much is the volatile percentage in the drivers itself drivers is not like everything is an explosive you need to have proper characterization.

Even the quantity also I think this kind of data is most of the times is unreliable. Because I see already in one of the modules, I explained that how complex is the waste quantification characterization and that this is one problem with the technologies kind of side, but in the operation side if you see that, if it is not segregated source souls and if the entire mixed race is reaching to the waste to energy plant, how is possible to go for conversion of mixed waste because 50% is only dry.

But the remaining 50% is wet or maybe an inner core inert material that is not volatile or not combustible. So having the segregation facility at a centralized facility is not possible at all. You can have different kinds of promises. So you can set up a different number of pledges you can install, but it is tough to get a segregated centralized facility. That was the major problem again in the operation way; there was no segregation.

And when this kind of plants also came, the idea was that up to 30% of moisture could be added to the combustion chamber. But I think you know in India 3 to 4 months is the rainy season what you will do in that period because a lot of moisture will add into the waste. After all, waste is getting disposed into the particular community does mean in the open area. So, lot of humidity. So, how you will run the waste to energy plants that I think is a known fact.

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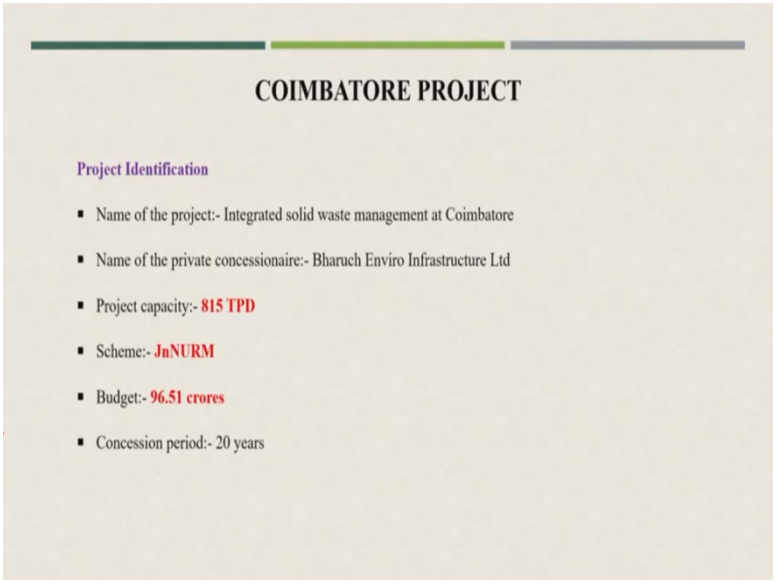

Another project, like the Coimbatore project, was an integrated solid waste management project, and project capacity was 815 TPD per day scheme JnNURM and concern period was 20 years.

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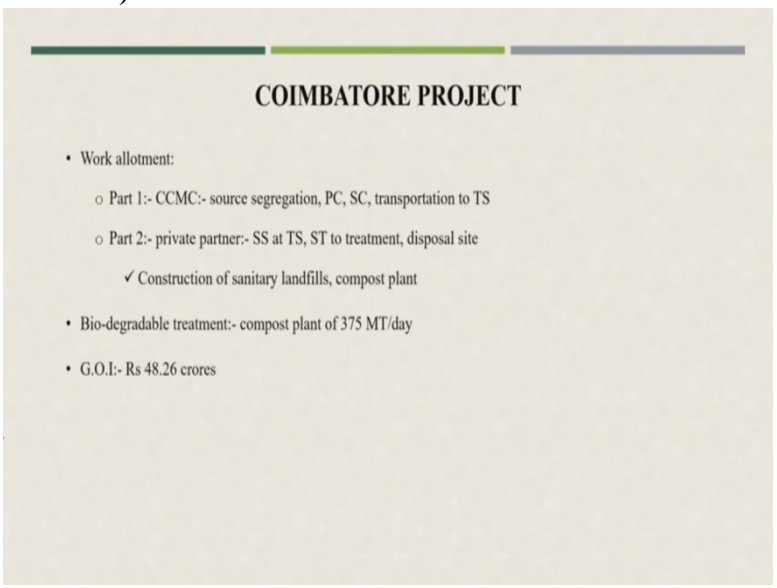

So what was the work was given like segregation and transportation to the transfer stations. So that was the task for from the local authority, and the personal jurisdiction of the private sector will do sourcing the treatment facility and disposal facility and was asked from the private sector to construct the sanitary landfill and compost plant and the, in that case, the composting plan the capacity was found 375 metric tons per day.

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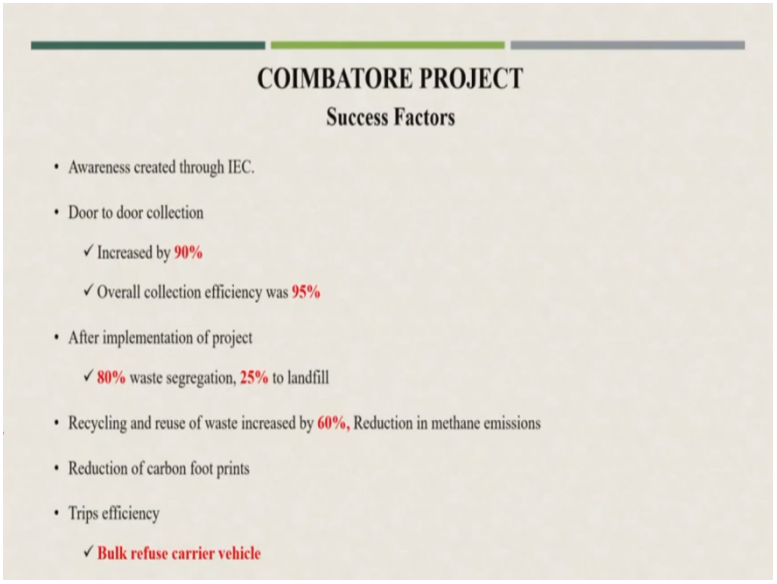

So, the success factor was good because the sole segregation was there door to door collection increase up to 90% overall correction efficiency was 95% after implementation of projects 80% waste segregation, 25% was only reaching to the landfill area recycling reuse of waste increased by 60% and reduction of methane emission, less amount of debris was reaching to the landfill area, and a reduction of carbon footprints and under and also the trip efficiency like the bulk refuse carrier vehicle had been used.

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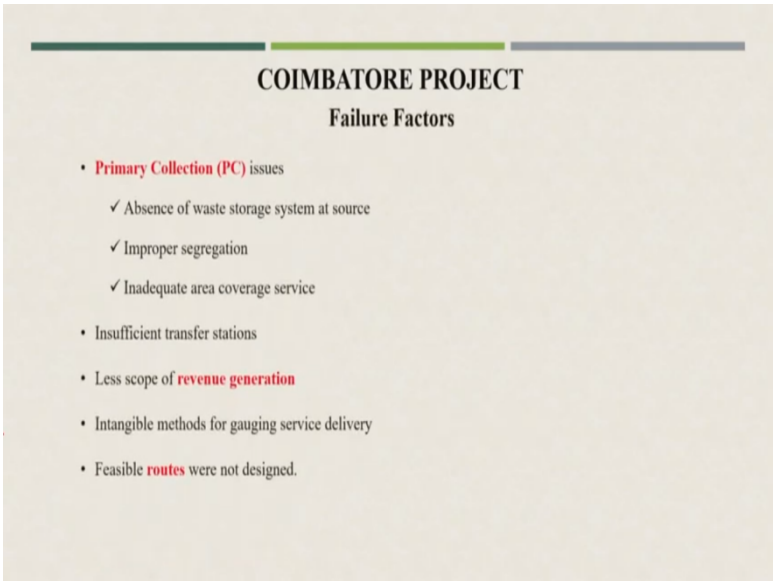

But if you see the failure factors, the primary collection issues like absence of waste storage system its source, improper segregation, inadequate area coverage service, insufficient transfer station, less scope of revenue generation and intangible method for gauging service delivery and physical route were not designed. So, first, some failure factors of the Coimbatore project.

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And this one of the news you can see the Coimbatore corporation they approach to manage the waste generation.

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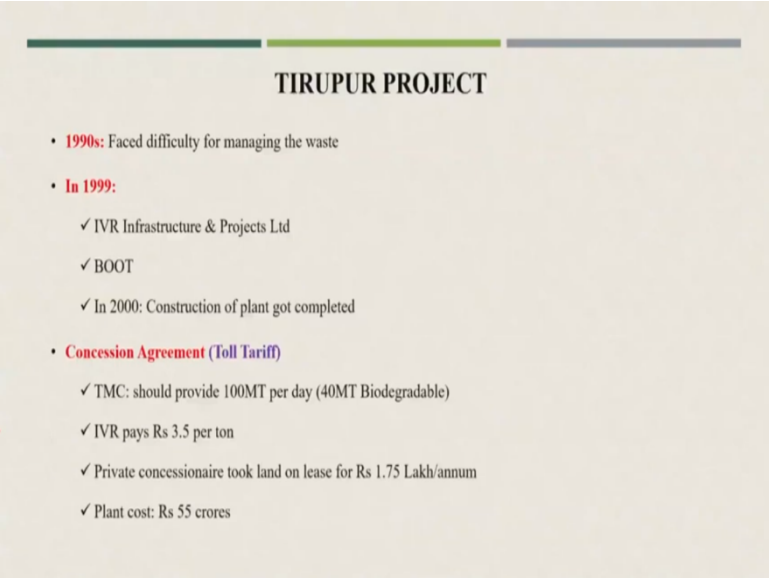

So, is it another project like the Tirupur project in Karnataka, like phase difficulty managing the waste in 1990 in 99, the PPP projects have been started under the boot model. Concession agreement with (())(22:05)Corporation and one private sector company and these private company will pay 3.5 rupees per ton of waste collection. So, they should provide this local authority will deliver to the private sector 100 metric ton per day waste out of that 40 metric tons was biodegradable.

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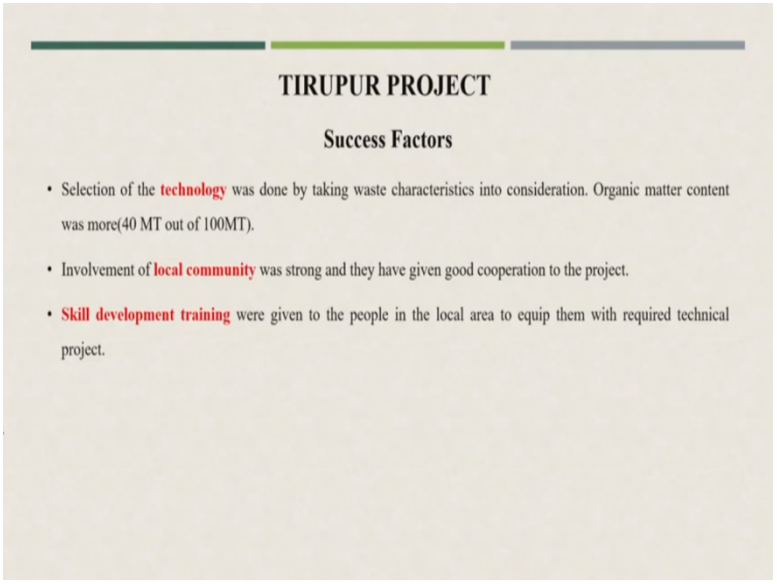

So, the success factor was a selection of technology by taking waste characteristics into characterization. Organic matter content was more into that, and the involvement of the local community was strong. They have given more cooperation to the project skill development training given to the people in the local area to equip them with required technical projects by the local authority and the private sector.

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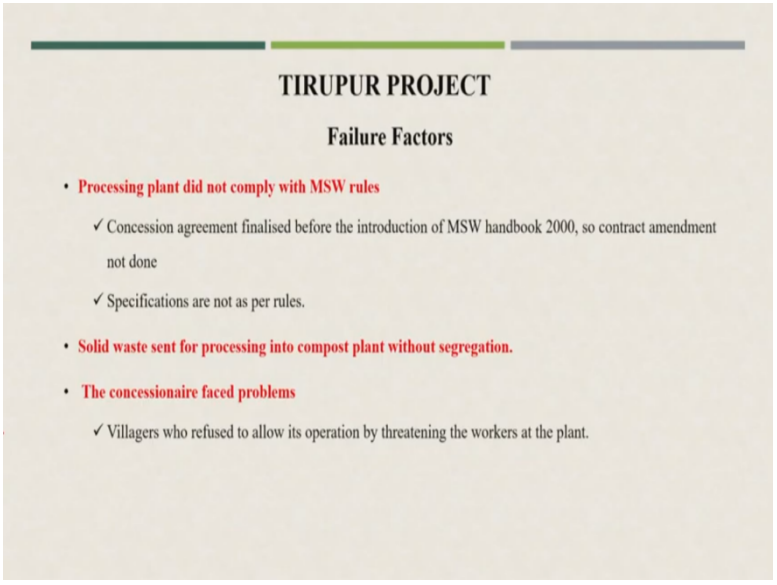

But the failure factors, if you see the processing plant did not comply with the MSW rule. The concession agreement finalized before introducing the MSW handbook that 2000 on contract amendment has not been done. Specifications are not as per the rule. Solid was sent for processing into compost plant without segregation. That is why the villagers refuse to allow its operation by threatening the workers at the plant. This was also one of the news.

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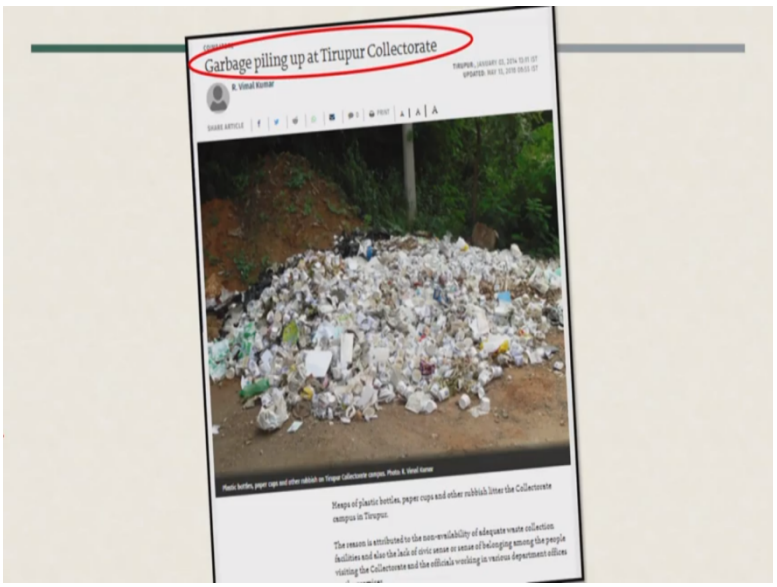

So, because of that, a lot of garbage was piling up in the Tiruppur collectorate.

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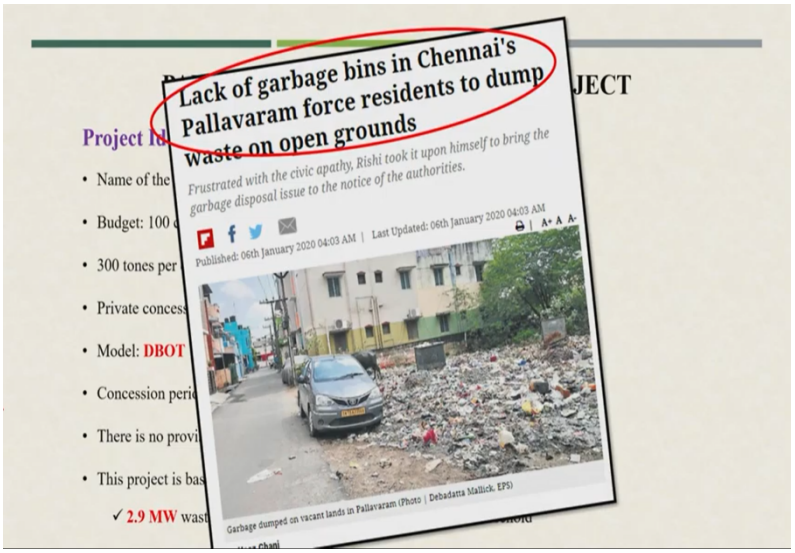

The local area said Pallavaram and Tambaram project, so the project's name was the same for the two corporations budget was 100 crores 300 tons per day capacity and model was DBOT concern period was 20 years the project is based on waste to energy. So the idea was 2.9 million megawatt wastes to energy dispose of because of waste disposal from 3.5 lakhs household. So this was one of the news the lack of garbage being in Chennai, Pallavaram forced residents to dump waste in the open round.

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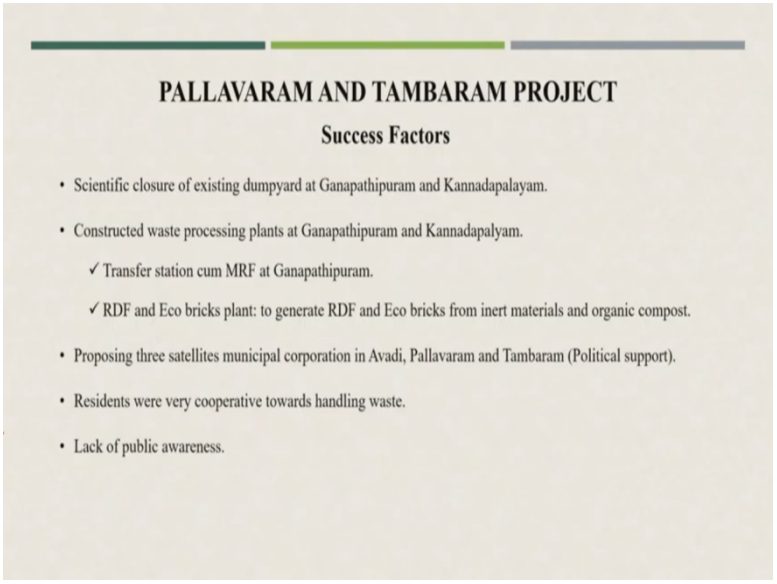

So what was the success factor here? Scientific closure of the existing dumpyard is that constructed waste processing plan in particular locations, like transfer station company MRF, RDF and eco bricks plan, was being built proposing three satellite primary civil operations in specific areas. Residents were very cooperative towards handling waste, but there was a lack of public awareness.

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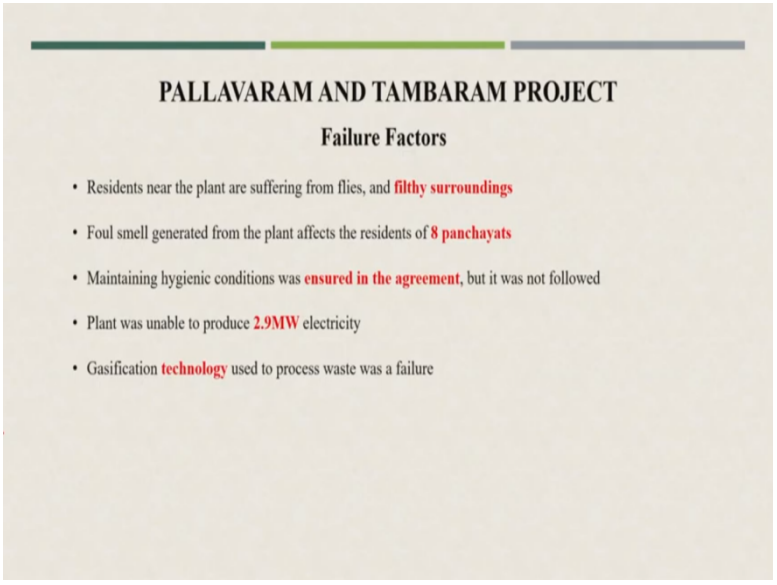

But the failure factor was like residents near the plant was suffering from flies and fill the surrounding. So foul smell generated from the plant affected the residents of 8 panchayats, and maintaining hygienic condition ensured the agreement. Still, it was not followed plant was unable to produce 2.9 megawatt electricity and gasification technology used to process waste was a failure. This was very important to share here, like gasification technology has

been proposed. In one of the modules, I already explained that these gasification projects are not that good for commingling waste or mixed waste.

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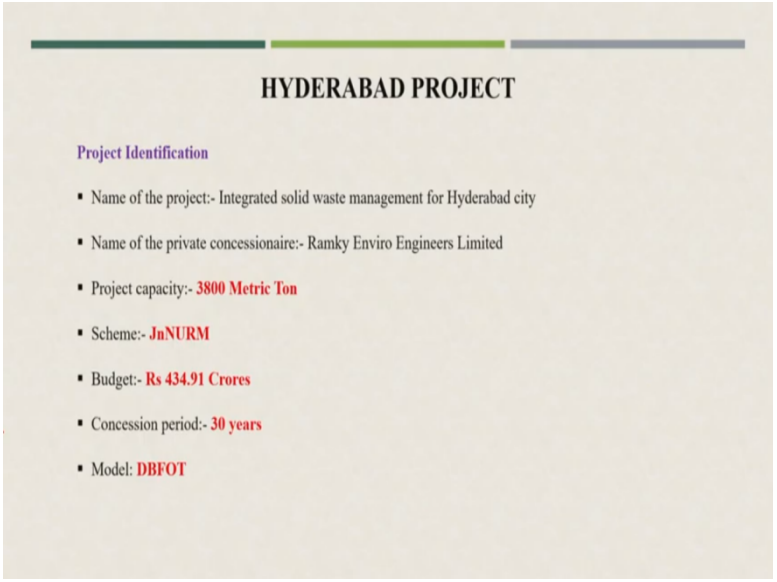

Now is very popular, like Hyderabad projects was a project capacity was here 3800 metric tons is also in the JnNURM program is a perfect amount of budget.

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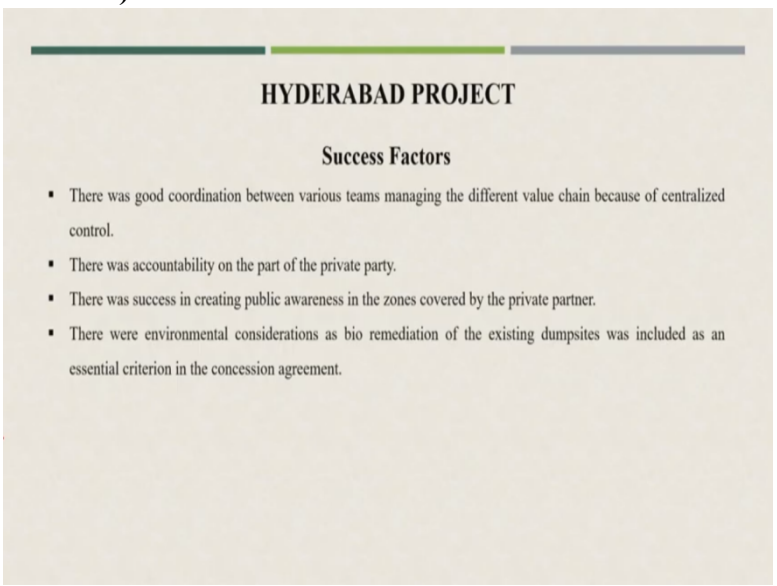

The success factor was there was good coordination between various teams managing the different value chain because of centralized control. There was accountability on the part of the private party. There was a success in creating public governance in the zones covered by the private partners. Environmental considerations as bioremediation of existing dump sites were included as essential criteria in the concession agreement.

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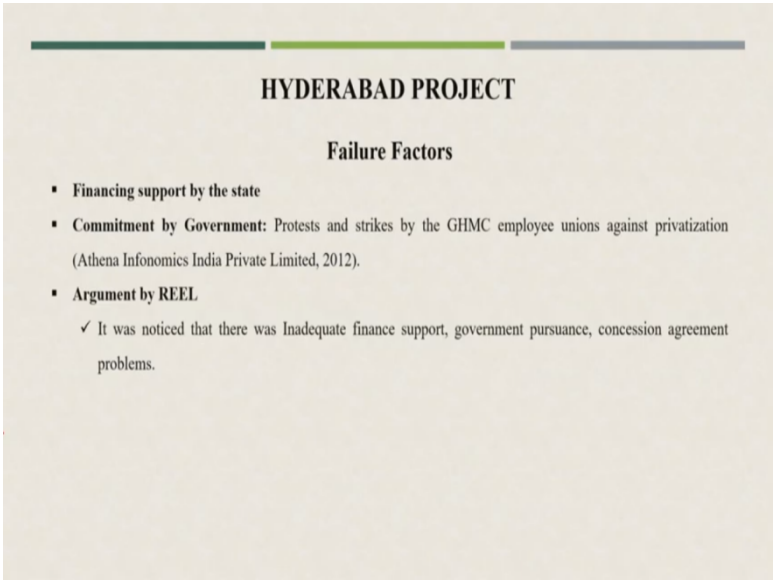

But the failure factor was that financial support by the state. So, that was also I explained in one of the lectures like central fund was not available for that and commitment by the government like protests and strikes by the local Corporation Employees Union against the privatization and this was the one private company that was working the real it was noticed that there was in an in a to get financial support government in the concession agreement was another problem.

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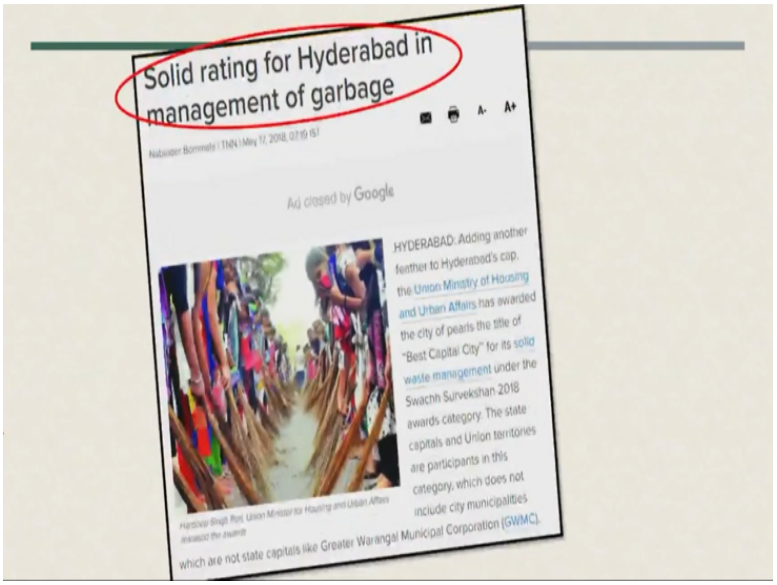

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This was the news, like only 25% of 5000 ton of waste segregated.

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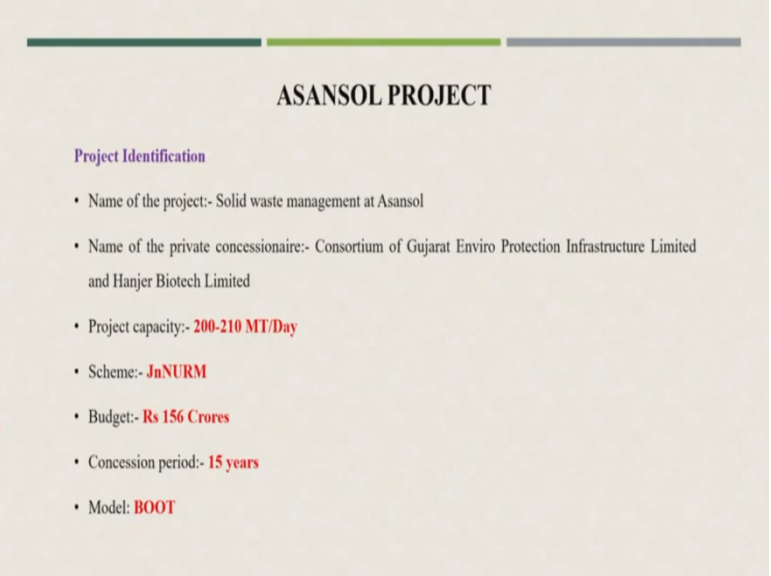

The Asansol project in West Bengal's projected capacity was 200 to 210 metric tons per day budget was 156 crores under the boot model.

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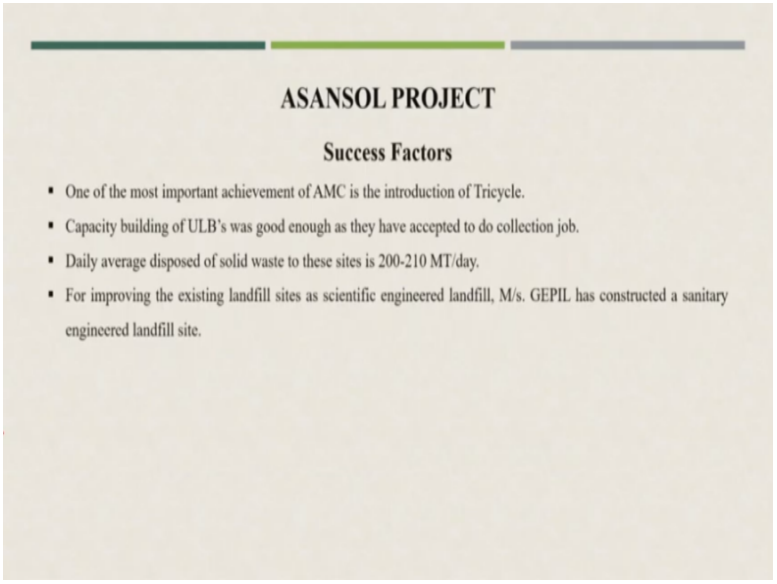

Success factor one of the most critical achievements of Asansol mutual corp introduction of tricycle for primary collection and capacity building of ULB was good enough as they have accepted to do the collection job. The average daily disposal of solid waste of these sites was around 200-210 metric tons per day for improving the existing landfill site, a scientifically engineered landfill by the private sector, and constructing the sanitary landfill.

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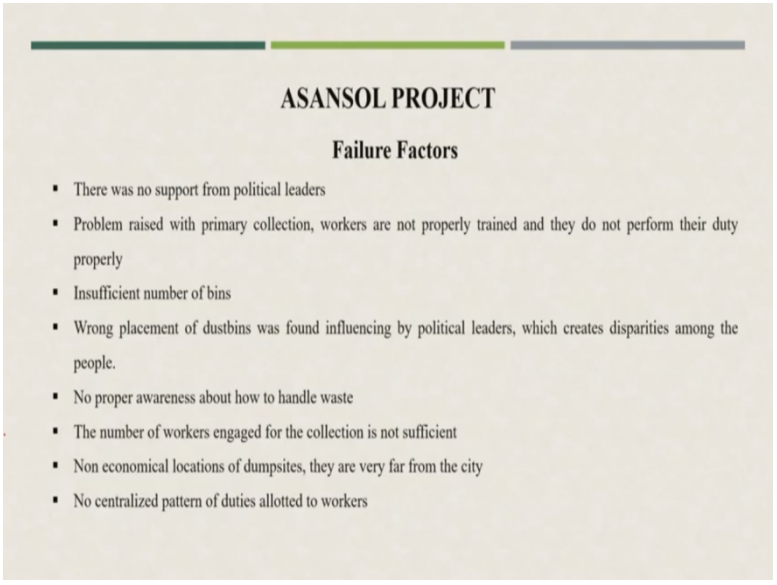

But, the failure was there was no support from the political leader in the particular state. The problems raised with primary collection workers are not adequately trained, and they do not perform their duties correctly insufficient number of bins. Wrong placement of dustbin was found influencing the political leader, which creates a disparity among the people no proper awareness about how to handle the waste. The number of workers engaged in the collection is not sufficient, non-economic location of downsides. They are far from the city no centralized pattern of duties allotted to the worker.

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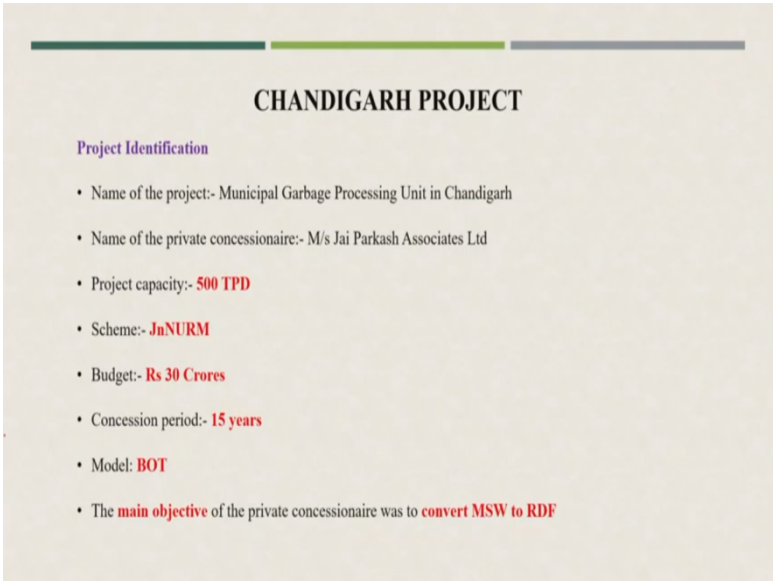

A project in Chandigarh project was project capacity 500 tons per day budget was 30 crore under the BOT model. The main objective was private concession was to convert MSW to RDF.

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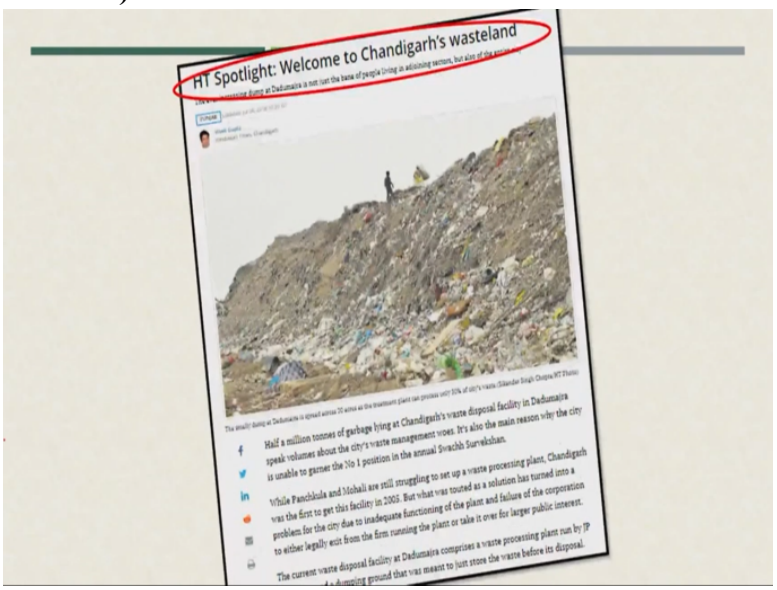

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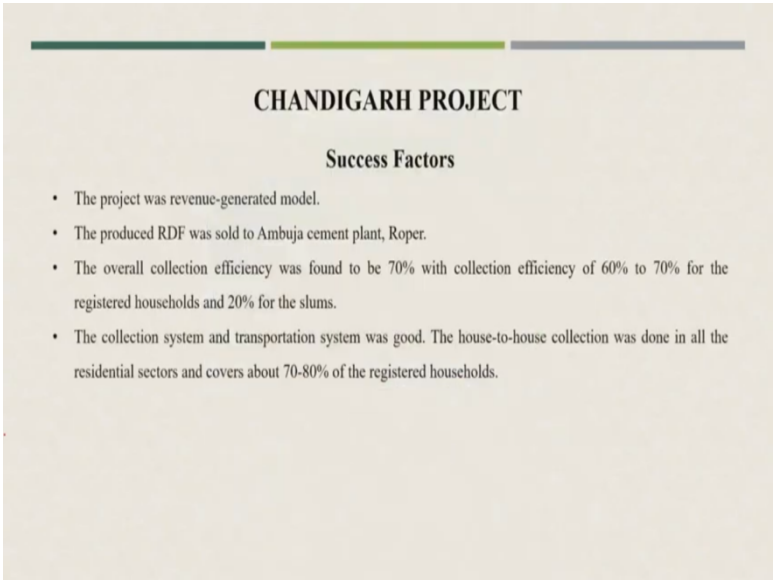

So, this was the photograph you can see Chandigarh wasteland. The success factor was the revenue generated model because the produce was RDF and was sold to the Ambuja cement plant, Roper. Overall collection efficiency was 70%, with a collection feature of 60 to 70% for the registered household and 20% for the slump and the collection system transfer issue. Some were good house to house collection was done in all the residential sectors cover about covers about 70 to 80% of registered household.

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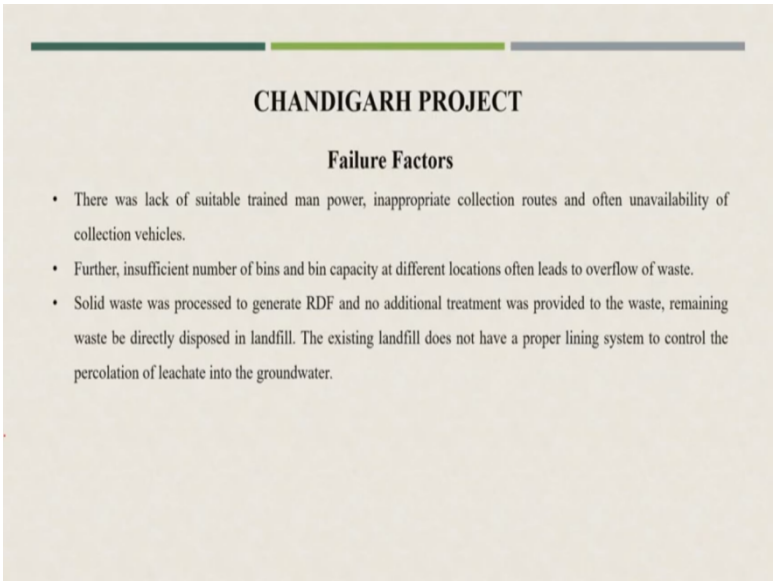

But the failure was there was a lack of suitably trained manpower, inappropriate collection routes and often unavailability of collection vehicles. Other insufficient bins and bins capacity, solid waste was processed to generate RDF. No additional treatment was provided to the waste remaining ways to dispose of it in the landfill directly. There was no proper lining, and no good sanitary condition was maintained in the landfill area.

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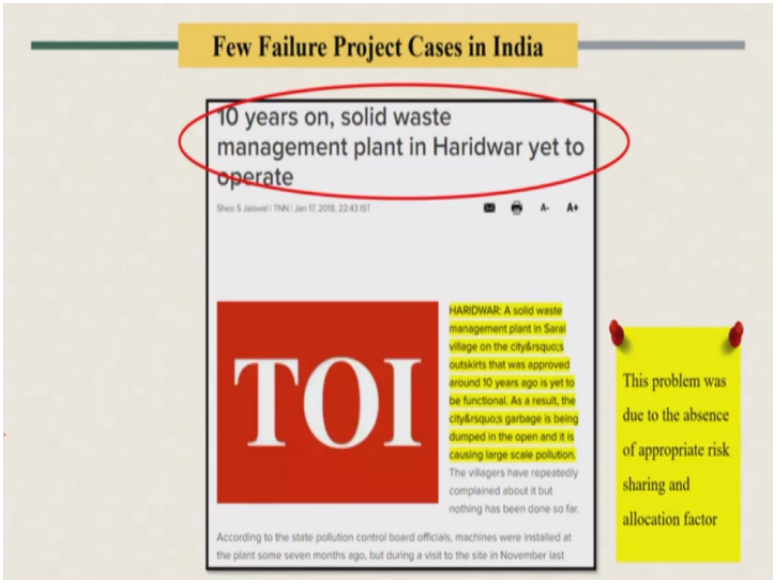

So, this was the news. So, few failure projects I think there was some news based on that I found that few failure projects like ten years on solid waste management plant in HARIDWAR operated.

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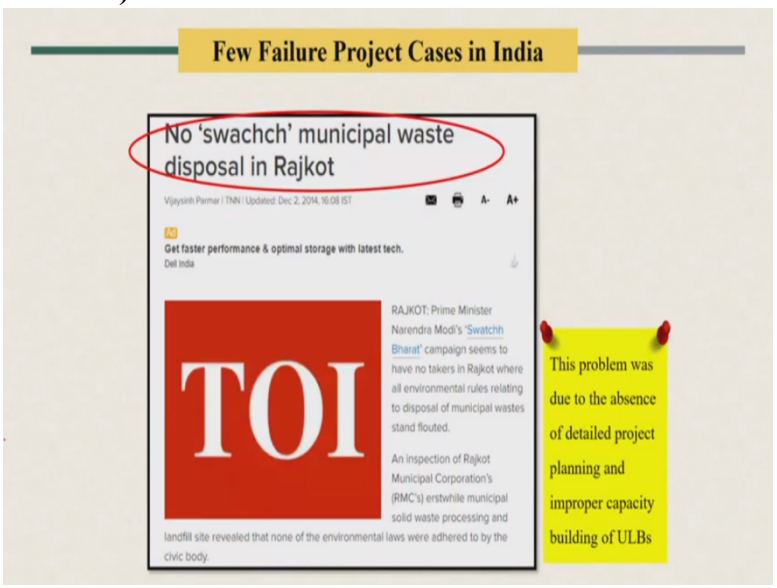

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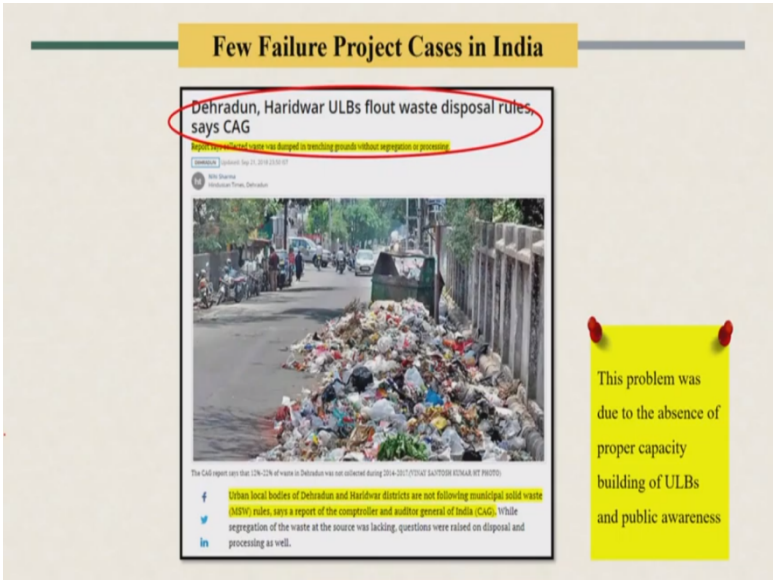

So, no swachh municipal waste disposal in Rajkot. So, Dehradun, Haridwar ULB flout waste disposal rule says that was one of the reports from CAG.

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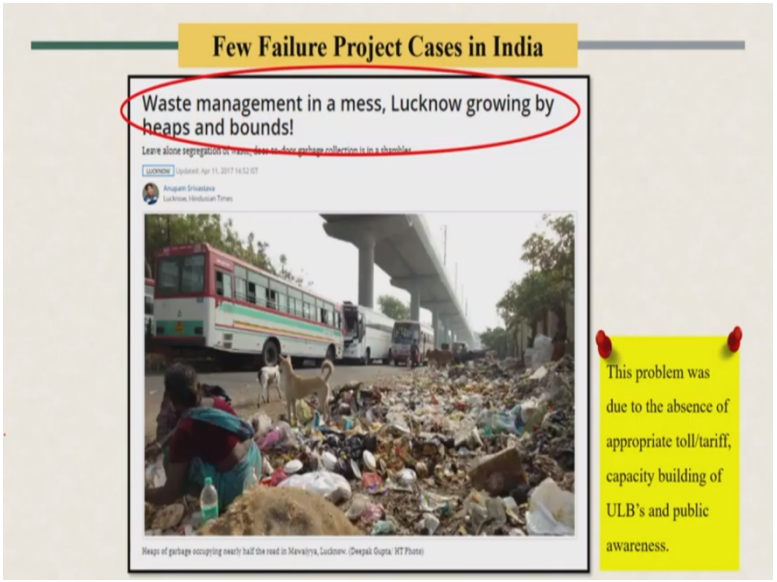

So, this was in Lucknow waste management mess, government lock now growing by leaps and bounds. So, there are several failure projects; you can see that. So, see, in the end, I put it some failure stories. Why: Because again, I am explaining that this entire solid waste management is the technology side of the poor management side. It is a combination of management and technology sites.

Both and also financing was one of the critical issues under the waste management program. See, I even see technology as on their way I think all the technologies are well-known literature available, whether you take on composting, incineration, RDF recycling all the

technologies are well popular, but only the problem here major the issues are there, how best you will be able to collect segregated waste that was the critical point.

So, there the issue is that you will be required a lot of awareness in the local area because still the does not people do not want to work for the waste collection sites. Even though getting manpower is also is not that easy. Once you get it, they will continue the same task that is also not well informed. So, the See, I think technology will have the capital fund you can have the different technology, but you need to also look upon the how based you will be able to do a primary collection.

Followed by secondary collection, you design the transfer station, but if you are not getting proper waste in the transfer station, then how what is the benefit of having the transfer station? So, let us see, I think under Swachh Bharat mission a lot of projects has been implemented under the PPP mode only like indoor is one of the examples and now let us see that other cities also will follow the similar kind of way and also has to be looked upon that is not that now indoor is a cleaner city.

But is it possible to sustain that cleanliness up for 20 years or 25 years minimum? I am saying this because now the population in the urban areas is increasing, many infrastructure facilities are coming, and many commercial facilities are coming into the metropolitan area. So the waste quantity will increase; obviously, even the characterization also will change with time. So, whether those kinds of technologies are available or we do not require the new technology.

But at least your management part, like the collection and transportation part, need to be well modified from time to time and well designed is required to run the particular treatment facility. So now today, we will end here the entire syllabus of this specific course. And I believe that you liked the syllabus of this course. We started from the evolution of solid waste, followed by characterization sources, generation, and all 6 functional elements I discuss in detail.

And also to because that all functional element was particularly technical and measuring management issue. So, I also had a 2 extra module I had been explained like spatial waste also I explained in this course, and also the financing and PPP was one of the critical issues in

the solid waste management project. So, I hope you like the entire syllabus of the course and hope you enjoyed the entire my lectures and best wishes for the exam for this course. Thank you.