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Application of Modern Technologies for the Improvement of Quality Services of Guwahati Municipal Corporation

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ABSTRACT

The Guwahati Municipal Corporation is the urban local body responsible for governing, developing and managing Guwahati. Under the Swachh Bharat Mission introduced by the Central Government of India, the Guwahati Municipal Corporation responsible is to make Guwahati city clean. For this use of latest technology is immensely important. It is observed that as compared to top metropolitan Indian Cities like Bengaluru,Chandigarh, Indore, etc, the Guwahati Municipal Corporation is able to apply only 20 to 30% of various technologies to make Guwahati a metropolitan city in true sense, so far as solid waste management, public toilet, electrification and garage are concerned. Considering the fact and circumstances, the study on "Application of Modern Technology for the improvement of quality services of Guwahati Municipal Corporation" is urgently required. The paper aims at discussing basically three dimensions such as solid waste management, public toilet and electrification & garage on which the application of technology will be examined to make the concerned functioning efficient and effective. The solid waste management has various methods that can be adopted along with the implementation of 3 R's. The demand of public toilets emerged from increasing population in Guwahati could not be fulfilled along with its hygienic part. It is observed that not more than 1% solar lightening has been installed. The lack of modern transportation is the cause of failure in overall achievement of its goal. All the above factors warrant a careful research work on the given topic.

Keywords: Solid waste management, Technology, Guwahati Municipal Corporation, Toilet, Electrification.

INTRODUCTION:

Guwahati is the oldest and biggest city of the North Eastern region of India, situated on the Bank of River Brahmaputra and surrounded by hills, it is a beautiful city. It administers an area of 216.70 square km (Choudhury, 2012) .Construction of roads, water supply, electrification, beautification including gardening, garbage management etc are the responsibilities of Guwahati Municipal Corporation(Choudhury2012). Guwahati is going to be a smart city. As such responsibilities of GMC have increased enormously. Inspite of having so, still the GMC can apply on 20 to 30% which is found to be very less than that of the other metropolitan cities of India such as Bengaluru (Pavan, et al.,2014), Chandigarh (Gupta Namita et al 2015 and Rohtaki,2017) and Indore (Khanna,2017).To make Guwahati a clean and smart city, application of modern technology is of great importance. Swachh Bharat Mission, introduced by the Central Government of India, has also to be considered(De,L.C,Singh.D.R.,etal 2016) .Under these circumstances seven dimension have been

taken into account where application of modern technology will give fruitful result(GMC,2018). However, out of those dimensions, basically three dimensions are selected for our study, considering their demand and work load. These are- i) Solid Waste Management ii) Public Toilet and iii) Electrification and Garage sections. The study will be conducted in such a way so that it will be helpful for formulating various schemes and policies by the corporation. In order to speed up the function of solid waste management and public toilet, application of modern technologies is of high importance. On the other hand beautification of the city is the motto of GMC and for this modernization of technology in electrification and garage is also essential. Keeping in mind all these aspects a discussion has been made on application of modern technology in the above three fields and it has been shown how these applications prove to be essential.

OBJECTIVE:

The general objective of the study is to examine how through the application of latest technology the GMC functions can be made speedy for more benefit with least cost. To fulfill this general objective three specific objectives have been taken under study. This are-

1. To examine the application of latest technology in solid waste management for its systematic and quick disposal.
2. To identify the rate of application of latest technology by the GMC in the field of public toilet to make it hygienic as well as to increase capacity.
3. To examine the application of modern electrical tools and technologies for better electrification purpose of GMC.

HYPOTHESIS:

In order to examine the above objectives following hypothesis have been formulated and these are tested in the appropriate content of the paper.

H_1: It is assumed that due to lack of the application of latest technology, the GMC has been miserably failing to Reduce, Reuse and Recycle the amount of gradually increased wastages of the city.

H_2: It is presumed that the shortage of e-toilet and portable toilet is the main reason why GMC is still unable to serve the demand of public in this regard.

H_3: It is assumed that without adopting the help of emerging source of light energy such as solar energy, GMC cannot fulfill the demand of electrification throughout the increasing routes and by lanes.

REVIEW OF LITERATURE:

J.Browne ,A.J.Morrissey (2004) studied on the waste management models and their application to sustainable waste management. Mufeed Sharholy,Kafeel Ahmed,Gauhar Mahamood etal (2008) they studied about the lack of resources which are in the main barriers for Municipal solid waste management. SM AL Salem, P Lettieri and J Baeyens(2009) .They studied on the various recycling technologies of plastic solid waste and how it can be contributed to eco image of waste management. Alexis M. Troschinetz, James R. Mihelcic(2009) they studied on recycling in developing countries as one form of sustainable municipal solid waste management and have identified barriers or incentives to recycling, which resulted in the development of factors influencing recycling of MSW in developing countries. Richa Gautam and Anju Singh(2010) studied to explore the various definitions and descriptions of Corporate Social Responsibility (CSR); elaborate upon development of CSR in India. Lakhimi Gogoi(2013) studied on the various factors of manmade disaster of municipal solid waste in Guwahati. Dr. Daisy Das and Dr. Ratul Mahanta and (2011).They have studied on the various factors related to the municipal waste disposal of Guwahati City. Utpal Goswami and HP Sarma(2006) they studied on the seasonal variation of municipal solid waste generation in Guwahati city and found that the waste generated by the daily household like vegetables ,fruits are more compared to the other solid waste and also they studied on the the chemical characteristics of the solid wastes that are spreading randomly in the city Guwahati and how it can be checked. Jahnabi Deka , Jagadindra Raychoudhury (2011) studied on the Human-Environment Interactions: An Ethical Perspective with Particular Reference to Assam, India where they found that the sound ecological balance is need to have integrity ,balance among the people of the state and also a sound environmental ethics is the moral basis responsibility to the environment. Pradip Baishya and Dimbendra Kumar Mahanta(2013) they studied a case study on the improvised segregation of recyclable materials in Guwahati City, and emphasized on the installation of mechanical plant segregation machines to make it more prominent and reusable.

METHODOLOGY:

The study is basically analytical as well as descriptive conducted empirically. Both the primary and secondary data are used where primary data are collected through field survey, personnel interview and questionnaire. It is estimated that there are 46 no of executive level and 70 no of supervisor in the GMC. Out of which 20% of the executive and 30% of the supervisor are taken as sample. Secondary data are compiled from various office memos of the GMC. All of these datas are analysed through tables and diagrams.

Solid Waste Management (SWM):

Waste is the by product of all the matter which is consumed by living organisms and also is used in the industry as well as in agriculture and other fields(Walia,(2015).. Managing of waste must be done by keeping the three R's which stand for Reduce,Reuse and Recycle in mind (Walia,(2015).In Guwahati City it is generally seen that in almost all the areas wastes are being dumped by the local people which in turn cause serious pollution. Dumping of garbages in the roadsides causes health hazard. Since last 4 years the GMC has been trying to clean the areas by providing dustbins in the localities(Gogoi,2013). But after the launch of Swacch Bharat Mission on 2nd October 2014, it stressed upon creating awareness among the people of Guwahati city and to make it garbage free and also making Guwahati defecation free(Gupta,2016and PHED,2018). Guwahati generates 600 Tonne Waste per Day (TPD)(GMC,2018). The different steps of the process of disposed solid waste are taken into consideration for cleaning and making the city beautiful and smart.

Primary Collection:

The GMC has engaged the NGOs to collect the garbages from the localities. There are over 1.6 lakhs residential and about 40,000 commercial establishments in Guwahati city (GMC,2018). The primary (door-to-door) collection is being done by RAMKY through a network of 2NGOs who are looking after different wards of the city(Patowary , 2013). The NGOs have deployed tricycles, auto-tippers, and labour for primary garbage lifting and cleaning purposes. The GMC deploys tricycles and labour for lifting the garbage generated from road sweeping, and transports the same to the nearest garbage pick-up points of bins.

Secondary Transportation:

Secondary transportation of garbage, which involves transport of garbage to the dump-site at Paschim Boragaon is being done by RAMKY. "A secondary transportation fee of Rs.152.07 per tonne of garbage transported, with an annual increase of 4% was paid to RAMKY" as per the discussion with a senior consultant of conservancy department (GMC,2018). As the capacity of RAMKY was insufficient to meet the secondary lifting requirements for the entire city(RAMKY2012), GMC was also deploying vehicles and machinery to lift the garbage by means of tipper trucks and JCBs/Skid loaders. GMC contributed to about 30% of the secondary transport of garbage(GMC,2018).

As per the survey the following number of household are listed below:

Table No 1: Ward Wise Household

Sl No	Ward No	House Hold
1	1	10153
2	2	8158
3	3	7543
4	4	7483
5	5	10835
6	6	6820
7	7	11451
8	8	8846
9	9	3011
10	10	5719
11	11	5504
12	12	5102
13	13	7235
14	14	8788
15	15	7659

Sl No	Ward No	House Hold
16	16	7987
17	17	7598
18	18	9958
19	19	7460
20	20	8073
21	21	7705
22	22	7959
23	23	7270
24	24	8642
25	25	9722
26	26	9018
27	27	7836
28	28	6989
29	29	7532
30	30	8905
31	31	8977
	Total	**245938**

Source: Compiled from field survey and GMC office Panbazar

Compost plant:
GMC is operating the 50 TPD compost plant on its own and Augmentation to 200 TPD is also in process as per the discussion with the senior manger of compost plant (GMC, 2018). The Compost is sold to the tea gardens and nearby horticulture farms.GMC has launched its organic manure "Compo Green"(GMC,2018). This composting process is aerobic & vermin composting with the help of potters & waste assimilator.

Street Sweeping and Drain cleaning:
The Major roads in and around city are swept by GMC and the minor roads, lanes and bye lanes are swept by NGO in respective wards, with a total road length of 2100.00 km(GMC, 2018). It is found through the survey and office record of conservancy department that there are about 600 sweepers and hand carters and 350 drain cleaner workers distributed in the six division of the Corporation area. Also it has outsourced the drain cleaning of all the major drains. Slit so collected is transported to dumpsite by GMC. The sweepers collects the waste in heaps along the roadside and the cart man deposit the waste in the secondary collection. Similarly the drain cleaner cleans the drains with the help of long forks and shovels and keeps it on the roadside and then it is picked by the handcarts.

Sources of municipal solid waste:
The primary generators of solid waste generation in the Municipal area are the local households, markets and commercial establishments such as hotels, restaurants, shops etc. The following major groups of waste generators are identified.

Table No 2: Sources of MSW

Sl No	Sources	No of Units
1	Households	245938
2	Commercial Establishments	67,000
3	Hotels & Restaurants	900 Approx
4	Markets	40 Approx
5	Temples	30 Approx

Source: Field survey and GMC office Ulubari Guwahati

Primary collection activities Charts of the GMC is depicted below:

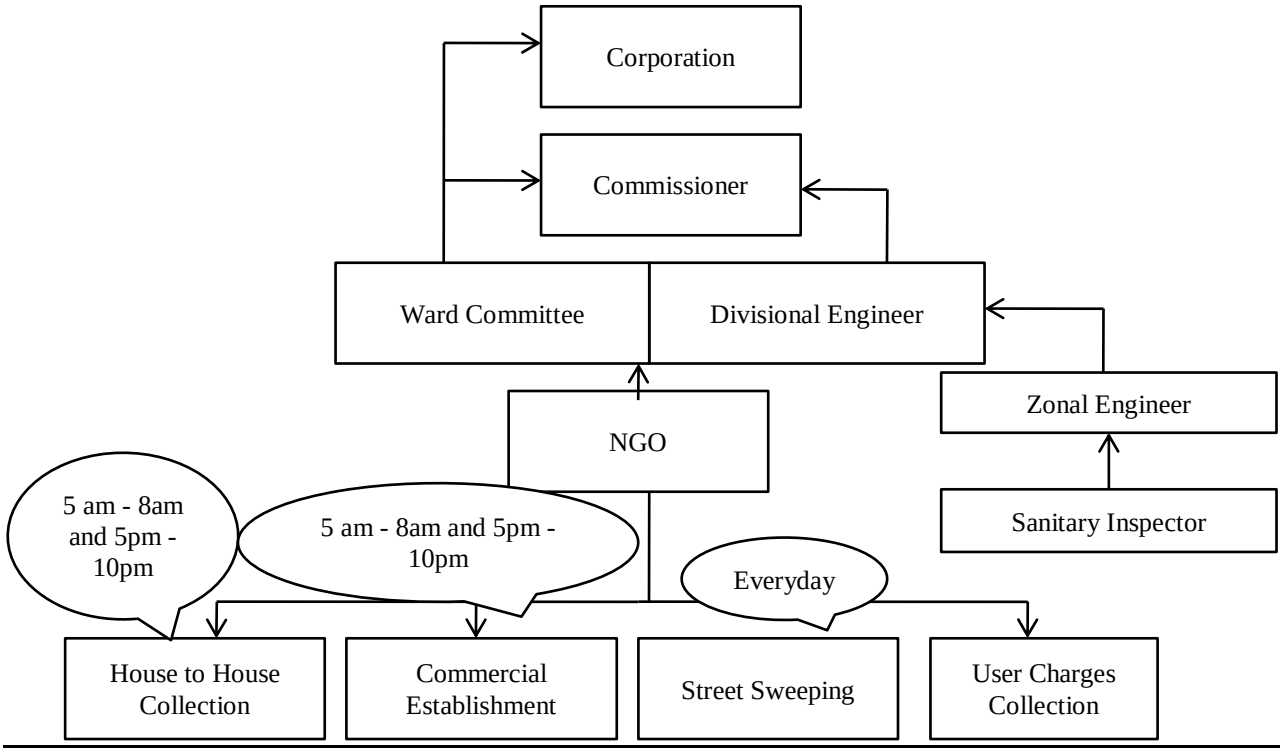


Table 3: Percentage table of collection and uses of Solid waste

Sl. No.	Indicators	Before 2015	After 2016 Onwards
1	Primary Collection Coverage	50%	100%
2	Source Segregation	NIL	Pilot Project Initiated
3	User Charges	NIL	Successful in all wards
4	Transfer Station	NIL	6 Planned,1 Functional
5	Awareness Generation	NIL	Print, Electronic and street plays done
6	Secondary Transportation	60%	100%
7	Feedback mechanism	NIL	Facebook & WhatsApp account created and grievances are redressed.

Sources: GMC office memorandum PMC branch Lakhtokia.

It is observed that the systems adopted in the city are not in general compliance with the Solid Waste Management Rules, 2016(MOEF,2016). Health & Environmental aspects are not integrated as required. It would be prudent to mention that there is no piped sewerage and drainage system in Guwahati city. There is provision of Septic tank with soak pit at all the household.

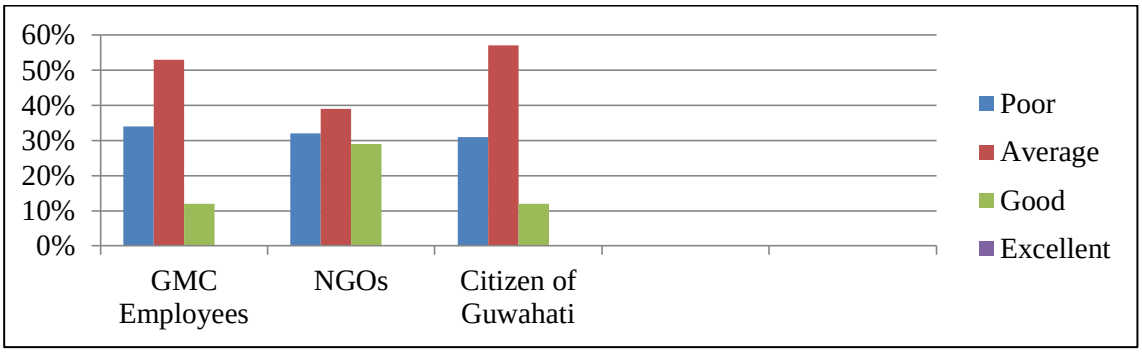
Q1. Is GMC using modern technologies in their services for Swachh Bharat 2015?

Poor		Average		Good		Very Good		Excellent	

Table 4: Respondent of uses of modern technologies

Sources	Total	Poor	Average	Good	Excellent
GMC employees	116	No:40 %:34	No: 62 %:53	No:14 %:12	No: nil
NGOs	31	No:10 %:32	No:12 %:39	No:9 %:29	No: nil
Citizenof Guwahati	68	No:21 %:31	No:39 %:57	No:8 %:12	No: nil

Source: Field survey



From the above data table of 4, it is found that the GMC is not using all the modern technologies which can make the Guwahati cleaner. It is seen that no one responded in favour of excellent and that the percentage of poor is more as compared to the good . It has just started utilising some new technologies in some places for Transfer station. Total of Six Transfer Stations have been planned in an around the City to maximise the collection and transportation efficiency in the City. Accordingly, one Waste Purchase Centre with Transfer Station has been constructed near Rajdhani Nursery on R.G. Baruah Road and under Athgaon Flyover, Guwahati. Further, five new transfer stations and dry waste collection centres have been proposed as told by the senior consultant of Solid waste management branch GMC Ulubari. It has encouraged the people for organic waste generates in area wise that is in house compositing. It is found that installation process of Organic Waste Converter which is yet to function(GMC,2018). But at present there is lack of new technologies which are otherwise being adopted by other municipal corporation of India. The GMC is just dumping the dustbins in the roadsides without any proper barricades and after wards when it is filled up it is transported by the vehicles to the dumping sites. Also it is found that many cities are converting themselves to a smart city by applying Swachh Bharat Mission and using new techniques and technologies(Pradhan , 2017). City like Indore at present has no dustbin the people are now solely responsible for their garbage to be thrown properly when the persons come for collection **(**Contributor,2017) . Even in Cities like Bhubaneswar GPS is provided for tracking routes and activities of the garbage-carrying vehicles(Ramanath,2016). As per the norms defined by World Health Organization (WHO) for different purpose different types of dustbin should be used and specially it has emphasised on the healthcare sector (WHO,2007). There are many modern technologies that are used countries like Japan, France etc(Jouhara,H,Czajczynska,D, etal, 2017) but it is found that Gas plasma, gasification ethanol production, anaerobic digestion, biodrying are not used by the Guwahati Municipal Corporation (MEMS,2012 and Kreith 1994).

Public Toilet:

In response to the present scenario of sanitation and hygiene in Guwahati some critical locations have been identified around the city to erect toilets for public convenience. These sites are all located at prime locations where there is high necessity of toilets. In respect to the public convenience the facilities for ladies have been kept under strict consideration. The GMC on 17th May, 2015 installed two blocks of e-Toilets, one each for ladies and gents near the foot bridge of Maligaon Chariali, in pilot phase in Guwahati and thereby starting a new chapter in the sanitation sector of the city(GMC 2018). Due to the space constraint faced in Guwahati, GMC has taken up the initiative to install portable toilets in various locations of Guwahati city. Guwahati Municipal Corporation has also plans for installing waterless urinals for ladies and gents in various locations of the city.The following are the locations and their present status about the various public toilets in Guwahati city.

Table 5: Location and status of public toilets in Guwahati

Sl. No.	Type of Toilet	Location of public toilets	No. of units for male	No. of units for female	Current status	Need for toilets
1.	Conventional	Fancy Bazar	Toilet– 4 Urinal- 9	Toilets – 10	Functional	Male-7 Female-10
2.	Conventional	Khanapara	Toilet – 2 Urinal-5	Toilet– 2 Urinal-5	Functional	Male-3 Female-3
3.	Conventional	Nepali Mandir	Toilet – 1 Urinal-1	Toilet– 1 Urinal– 1	Functional	Male-5 Female-4
4.	Conventional	GMCH, Bhangagarh	Toilet – 1 Urinal-2	Toilet – 1 Urinal – 2	Under Construction	Male-6 Female-5

Sl. No.	Type of Toilet	Location of public toilets	No. of units for male	No. of units for female	Current status	Need for toilets
5.	Conventional	Panbazar	Toilet – 2 Urinal-4	Toilet – 3	Const. could not be started due to site constraints.	Male-4 Female-4
6.	Conventional	Six Mile	Toilet – 1 Urinal-3	Toilet – 1 Urinal -3	Const. could not be started due to site constraints.	Male-3 Female-3
7.	Conventional	Bhangagarh	Toilet – 2 Urinal-5	Toilet – 1 Urinal-4	Const. could not be started due to site constraints.	Male-3 Female-5
8.	Conventional	Opp. B.Baruah Cancer Inst.	Toilet – 4 Urinal-8	Toilet – 4	Const. could not be started due to site constraints.	Male-2 Female-4
9.	Conventional	Fancy Bazaar	Toilet – 2 Urinal-5	Toilet-2 Urinal-5	Const. could not be started due to site constraints.	Male-2 Female-2
10.	Conventional	Mathgharia	Toilet – 2 Urinal-5	Toilet-2 Urinal-5	Tendering process going on	Male-3 Female-2
11.	Conventional	DC Office Premises	Toilet – 1 Urinal-2	Toilet-1 Urinal-2	Tendering process going on	Male-5 Female-4
12.	Conventional	Basistha Temple	Toilet – 4 Urinal- 9	Toilet-10	Tendering process going on	Male-4 Female-3
13.	Conventional	Jalukbari			As no other land available, authorities of Gauhati University were requested for allocation of land.	Male-3 Female-3
14.	E-Toilet	Maligaon (Pilot Project)	Toilet – 1	Toilet – 1	Functional	Male-3 Female-2
15.	E-Toilet	Bhootnath	Toilet – 1	Toilet – 1	Process going on	Male-4 Female-2
16.	E-Toilet	Kamakhya Temple	Toilet – 2	Toilet – 2	Process going on	Male-2 Female-3
17.	E-Toilet	Bharalumukh	Toilet – 2	Toilet – 2	Yet to be Process going on	Male-4 Female-4
18.	E-Toilet	Near Judges Field	Toilet – 1	Toilet – 1	Tendering Process going on	Male-2 Female-2
19.	E-Toilet	Nabagraha Temple premises	Toilet – 1	Toilet – 1	Tendering Process going on	Male-2 Female-2
20.	E-Toilet	G.S. Road	Toilet-3	Toilet-3	Tendering Process going on	Male-8 Female-6
21.	E-Toilet	VIP Road	Toilet – 1	Toilet – 1	Tendering Process going on	Male-4 Female-4
22.	E-Toilets	Paltan Bazar	Toilet – 1	Toilet – 1	Tendering Process going on	Male-7 Female-6
23.	E-Toilets	HatigarhChariali	Toilet – 1	Toilet – 1	Tendering Process going on	Male-5 Female-4
24.	E-Toilets	NakkataPukhuri	Toilet – 1	Toilet – 1	Tendering Process going on	Male-4 Female-5
25.	E-Toilets	Dighalipukhuri	Toilet – 1	Toilet – 1	Tendering Process going on	Male-3 Female-4
26.	Portable	Under Six mile	Toilet – 1	Toilet – 1	Functional	Male-8

Sl. No.	Type of Toilet	Location of public toilets	No. of units for male	No. of units for female	Current status	Need for toilets
	Toilets	flyover				Female-5
27.	Portable Toilets	Zoo Road Tiniali	Toilet – 1	Toilet – 1	Functional	Male-6 Female-5
28.	Portable Toilets	Near Reserve Bank of India	Toilet – 1	Toilet – 1	Functional	Male-10 Female-10
29.	Portable Toilets	Near Dispur College	Toilet – 1	Toilet – 1	Functional	Male-7 Female-5
30.	Portable Toilets	Near S.B. Deorah College	Toilet – 1	Toilet – 1	Functional	Female-4 Male-3
31.	Portable Toilets	Near GMC Water Works Deptt.	Toilet – 1	Toilet – 1	Functional	Male-5 Female-5
32.	Portable Toilets	Near Rukminigaon	Toilet – 1	Toilet – 1	Functional	Male-4 Female-4

Source: Field Survey and GMC Office memorandum .

It is found from the above table that there are only 3 Conventional toilets functioning at present and 7 portable toilets are functioning whereas others are yet to be started and still there is a need of more toilets in the Guwahati city .A question was put forwarded to the public for their opinion about the installation of toilets by the GMC.

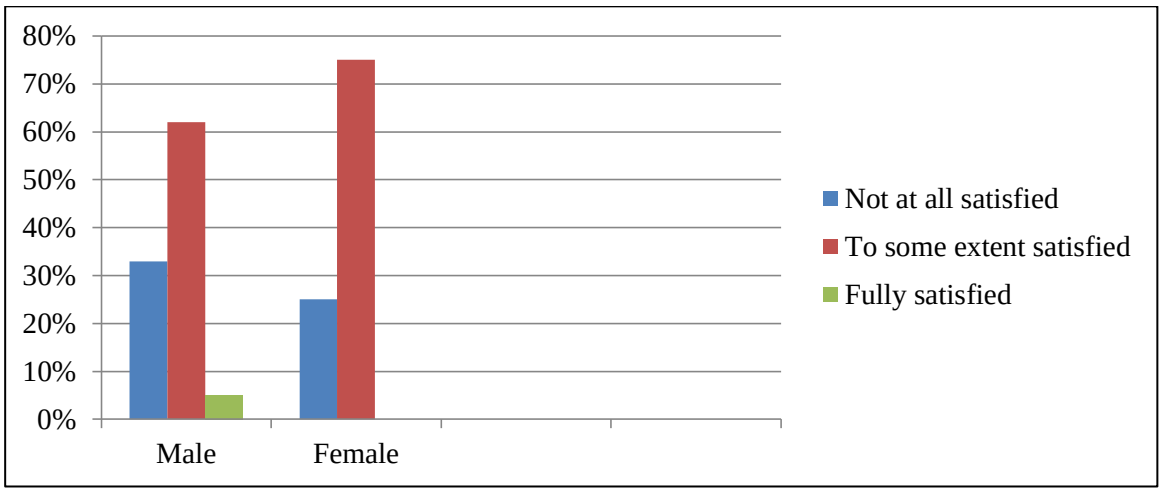
Q.2. Are the toilets provided by the GMC useful and hygienic?

Not at all satisfied	To some extent	Fully satisfied

Table 6: Respondent of percentagewise for the usefulness and hygienic of toilets

Respondents	Not at all satisfied	To some extent satisfied	Fully satisfied
Male	33%	62%	5%
Female	25%	75%	0

Sources: Field survey



The answer to the above question is that most of the respondents are of the opinion yes, it is indeed useful and has made the nearby area clean. Even the female has responded in positive mode but the cleanliness part needs to be improved. But all the public toilet sites have a DRDO patented Bio digester tank for its sewage treatment.

Electrical and Garage:

The function of electrical branch are as follows:

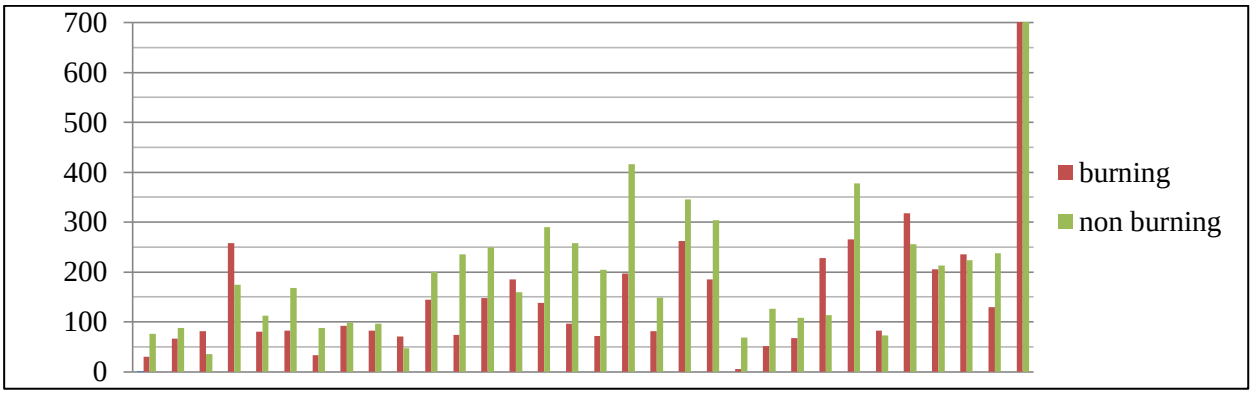
- Street light installation and its maintenance.
- Maintenance of office electrification works of GMC.

The coverage of street light is grossly inadequate especially in the interior lanes and bye lanes of the city. There is constant demand from the citizen of Guwahati City to provide street lights in their areas citing security as major concern Guwahati Municipal Corporation has decided to convert the existing street light by LED street lights. Also in all the new projects undertaken at present are all LED based lights. As per the talk with Executive engineer in-charge of Garage and Electrical branches GMC ,the project "Project Jyoti – Own Your Street Light" was conceived with the intention to facelift the image of the City and to improve the security concern without any financial burden on the Guwahati Municipal Corporation.

Table 7: Table of the installation of lights in different wards.

Sl No	Ward No	Penal Board	Total no of lights installed	Burning	Non Burning
1	1	6	106	30	76
2	2	12	154	66	88
3	3	7	116	81	35
4	4	9	443	258	175
5	5	5	192	80	112
6	6	19	251	83	168
7	7	28	121	33	88
8	8	2	190	92	98
9	9	2	179	83	96
10	10	2	118	71	47
11	11	11	345	145	200
12	12	15	309	74	235
13	13	11	397	148	249
14	14	10	345	185	160
15	15	7	42	138	290
16	16	16	354	96	258
17	17	2	276	72	204
18	18	43	613	197	416
19	19	18	230	81	149
20	20	14	608	262	346
21	21	19	489	185	304
22	22	9	75	6	69
23	23	10	177	51	126
24	24	9	176	68	108
25	25	21	341	228	113
26	26	28	643	265	378
27	27	20	156	83	73
28	28	26	574	318	256
29	29	9	419	206	213
30	30	14	459	235	224
31	31	15	368	130	238
		417	9652	4050	5592

Source: GMC office ulubari Guwahati



From the above table it is seen that though the GMC has installed lights in all the wards still it needs more lights to be installed in the bye lanes. Out of this installation it is found that the number of non burning of lights are more as compared to the burning status. It is very high in ward no 18 and also in ward no 26 and 20. It is found that in ward no 10 the non burning is less compared to the other wards. The total number of lights is found to be 9652 of which 5592 are in non –burning status. In ward no 22 only 6 lights are burning whereas 69 are not burning out of 75 installed lights. The people of GMC need to look into this kind of issue in a serious way as it relates to the safety of the society.

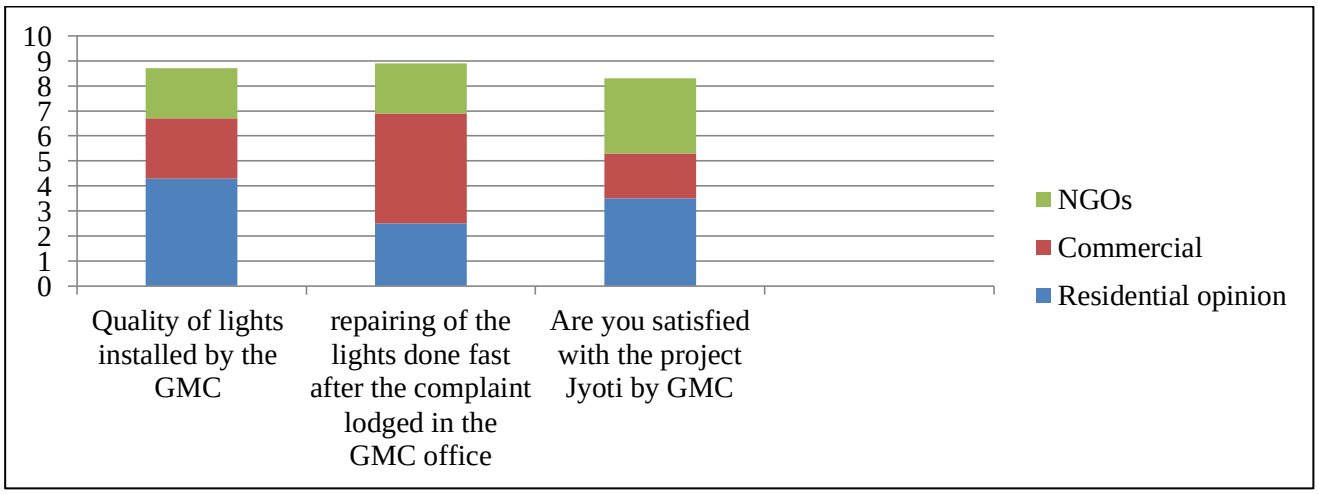
As per the field survey few questions are being asked to the people of Guwahati in different wards. In this connection the residential people, NGOs and the commercial establishment areas were asked about the streetlights of Guwahati.

Table No 8: Questions asked on the lights installation by the GMC

Sl No	Questions	Residential People		Commercial	NGOs
1	How is the quality of lights installed by GMC?	Good	45%	32%	75%
		Bad	55%	68%	25%
2	Is the repairing of the lights done fast after the complaint lodged in the GMC office?	Yes	32%	45%	50%
		No	68%	55%	50%
3	Are you satisfied with the project Jyoti by GMC?	Yes	89%	80%	90%
		No	11%	20%	10%

Source: Field Survey.

From the above table the following diagram is depicted.



It shows that for the question 1, 45% of residents were of the opinion that they are good and 55% are of the opinion that they are bad whereas the most commercial are of the opinion that they are of bad quality that is 68% and only 32% have said they are good. The NGOs have opted as 75% good and only 25% are of the opinion that they are not good. For the question no 2, 32% residents have said yes whereas the commercial are of 45% in positive response and 50% NGOs are also in the opinion of yes. For question no 3 the most prominent reply got from the NGOs of 90% in positive, 89% of residential and only 80% of commercial are in the opinion of yes. It been observed that most of the Guwahatian Citizen are satisfied with the project Jyoti which has started to remove the darkness of the city and also trying to prevent crimes in the bye lanes or in the main street as far as possible. The GMC needs to install many more lights in the form of solar lights which will be more beneficial to the people and have less maintenance work which will enhance in the beautification of the Guwahati city.

The main function of Garage is the maintenance of all vehicle and machineries of GMC along with issue POL. The relation of Garage branch with electrical branch is that it provides street light maintenance vehicle to electrical branch.

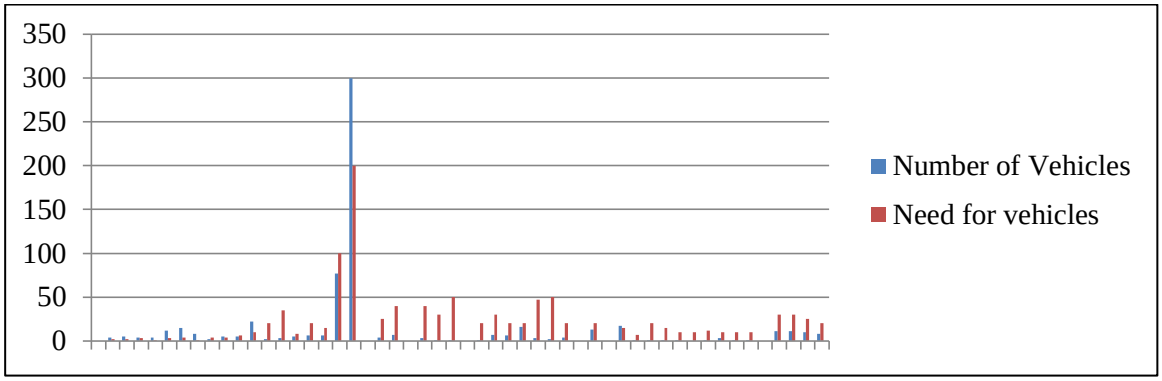
The following is the list of the vehicle present at the GMC :

Table 9: Vehicular Assets of GMC

Serial No.	Types of Vehicle	Number of Vehicles	Need for vehicles
A. Conservancy			
1	76 HP Excavator (CASE	4	2
2	2 DX Excavator	5	2
3	3 DX Excavator	4	3
4	4 DX Excavator	4	1
5	A. Leyland Dumper (5 cum)	12	3
6	Eicher Dumper	15	4
7	TATA Dumper (5 cum)	8	1
8	709 TATA Mini Truck	2	4
9	12 cum Dumper	5	4
10	3.5 cum Dumper (Mahindra)	5	6
11	Garbage Compactor	22	10
12	Portable Compactor	2	20
13	Sweeping Machine	3	35
14	Mini Skid Steer Loader (CASE)	5	8
15	Mini Skid Steer Loader (Robot)	6	20
16	Mini Skid Steer Loader (Bobcat)	6	15
17	Auto Tipper	77	100
18	Tricycle	300	200
B. Cesspool:			
19	Big Cesspool	4	25
20	Mini Cesspool	7	40
C. de-silting Machine:			
21	Desilting Machine	3	40
22	Bollero mounted de-silting machine	1	30
23	Tractor front loader	1	50
D. Electrical and Misc. Work			
24	Hydraulic ladder	1	20
25	D I Pick up Van	7	30
26	Xenon Pick up Van	6	20
27	Motor Bike	16	20
28	Tractor	3	47
29	Auto Van 2	2	50
30	Road Roller 4	4	20

Serial No.	Types of Vehicle	Number of Vehicles	Need for vehicles
E. Water Tanker:			
31	Water Tanker	13	20
F.LMV:			
32	Maruti Van	17	15
33	Maruti Esteem	1	7
34	TATA Sumo	1	20
35	Maruti 800	1	15
36	TATA Safari	1	10
37	Swift Dzire		10
38	Bollero	1	12
39	TATA Indica	3	10
40	Ecco Van	1	10
41	Innova	1	10
G. De-watering Pump set			
42	De-watering Pump set Auto mounted	11	30
43	De-watering Pump set trolley mounted	11	30
44	Pumps handed over by GMDA, LPS 10 nos., 350 LPS 10 nos	10	25
45	Kerosene Honda Pump set	8	20

Source: Field survey and GMC Garage branch



The diagram above states the current status of the vehicles and the need of vehicles to run the organisation in a better manner, which shows that due to lack of vehicles the work progress is slow.

Also it is seen that as per the work and branches the number of vehicles are less and also no new modern vehicles are available in the GMC. It has very few machinery in order to carry out all the works at a time. The different works done by different types of vehicles - Solid waste management , Night soil removal , Mobile water supply , Street light electrification, Carcass lifting, Fogging operation etc.

Following are some pictures of the GMC work activities:

Vermi Composite:

Aga System Introduced by GMC

IAS Colony Khanapara & Pragjyotish Apartment

Beltola

Collection of Garabges and drain cleaning system done by the GMC

FINDINGS:

- It is found that the citizens of Guwahati are dumping their wastes in and around nearby areas without considering the fact of ill health.
- The daily collection of garbages are not done in some areas and no proper ragpickers are kept to collect the different types of waste.
- Guwahati Municipal Corporation is trying to follow the path of Swachh Bharat Mission and also trying to make Guwahati defecation free by the help of NGOs.
- Guwahati Municipal Corporation collects 600 tons of waste per day from Guwahati city and it has engaged the NGOs for collection of wastes door to door .
- It has placed various dustbins on roadside and these are then collected by the GMC vehicles to the dumping site but the works delay due to lack of transportation.
- GMC has started producing 50 TPD compost plant on its own and augmentation to 200 TPD.
- GMC has started taking care of cleaning the street frequently and also to clean the roadside drainage and have started generating awareness and installed 6 transfer stations.
- GMC is still lacking in the uses of technologies to make Guwahati a clean city.
- Due to insufficient capacity of the processing plant, the entire plot of land is being used as an open dumping area filled with untreated garbage resulting:
  a) Under utilization of the rest of the plot.
  b) Existing plot will be filled up and there is no alternate plot for dump yard.
  c) Violation of MSW Rules and objections from National Green Tribunal
  d) It may lead to serious environmental pollutions

- The Corporation has installed some public toilets for the health and hygiene of the people. It has also installed some portable toilets but functioning of many toilets is yet to be done.
- GMC needs some more sweepers and in some areas cleanliness needs to be taken care a lot.
- Lack of vehicles with modern facilities suppresses the corporation from advancing into the new world of smart city.
- Regular maintenance of the vehicles was found to be inappropriate.

SUGGESTIONS:

1. The vehicles used for door to door collection must be increased and it should be on daily basis with increased number of vehicles as per area requirement.
2. Domestic hazardous waste is produced occasionally and so such waste need not be collected from the doorstep instead people could be advised to put such waste separately as per the direction given by the Corporation.
3. The collection of wet garbage and dry garbage must be done in a proper way by making the people aware of it and its advantages.
4. Transfer should not involve dumping of waste on the ground and improve the productivity by reducing loading and unloading time.
5. The biodegradable waste must be separated and should go to the treatment plant and the recycle waste may go the recycling industries for further process.
6. The wheel barrows and box type carts used by sweepers have to be replaced by multi bin carts for direct transfer of waste to containers.
7. More litter bins to be put in the city so that later the sweeper can collect it daily and keep it clean.
8. Secondary transportation process also need to be upgraded and some waste like garden waste ,hotels waste as required must be directed to go directly to the compost plant.
9. Public toilets construction in all the areas must be completed as fast possible and should be monitored by the authority for its proper maintenance.
10. Regular maintenance of the vehicles should be done to keep the vehicles proper and should buy some latest technology vehicles in order to clean the streets, drains in lesser time more effectively.
11. Public awareness campaign must be put forward so as to maintain the city clean and beautiful.
12. Appointment of rag pickers must be done so that the proper segregation of waste and its various types of waste can be known on daily basis.

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