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STUDIES ON WASTE WATER SYSTEM PROBLEMS FOR DEVELOPING A TECHNICAL MEDIATOR TREATMENT MODEL IN DHAKA CITY CORPORATION

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ABSTRACT

Miah MAM, Mannan ANMM (2012) Studies on waste water system problems for developing a technical mediator treatment model in Dhaka City Corporation. *J. Innov. Dev. Strategy*. 6(1), 10-16.

Studies were conducted on waste water system problems for developing a technical treatment model in Dhaka City Corporation identifying the causes and residents need absorbing the present unchangeable parameters considering the habitants environmental safety. The sites were Old Dhaka- Lalbag, Mid Dhaka-Mohammadpur, and New Dhaka-Uttara. The respondents were residents and staff. The major parameters of data were house and slum designs, tank sizes, line slopes, infrastructures and colony integrations. The results study show that among the major problems studied 56% and 22% of the respondent as per cause and groups prioritized wrong system planning structural inadequacy respectively, which caused total inactivation of the system. It led to the needs for developing a model for waste water treatment at the community level. The results also reveal that the user group and the field staff of WASA responded to these points very significantly. According to them only 55% of the poor get tap water and none of the slums get sewerage services and 9% of this get solid waste management services. Unsanitary lifestyle, inadequate access to safe drinking water, increased health risks, continuous growth of slum population, limitation of resources were reported by the most beneficiaries of the township. The residents as a group gave significantly higher response for developing these model to solve the problems. The present services show conventional water borne sewerage system (30%), separate sewerage system (20%), septic tank (11%) and pit sanitation (18%). It also indicate the need for establishing community safety tanks for more decomposition of the wastes of the water.

Key words: waste water, mediator treatment, system problems

INTRODUCTION

Dhaka, the capital of Bangladesh is a city of about 400 years which were continuously under change by the both government and private agencies. These type of multifarious dimensions of development could not maintain the uniformity in services and utility designs what ultimately resulted is the creation of complexities in water, waste water, solid waste and other material disposal, processing recycling and finally bio-environmental safety. The population of Dhaka (DCC) stands at approximately 7.0 million last decade. The city, in combination with localities forming the wider metropolitan area, is home to an estimated 16.6 million as of 2011. The population is growing by an estimated 4.2% per year, one of the highest rates amongst Asian cities. The continuing growth reflects ongoing migration from rural areas to the Dhaka urban region, which accounted for 60% of the city's growth in the 1960s and 1970s. More recently, the city's population has also grown with the expansion of city boundaries, a process that added more than a million people to the city in the 1980s. According to Far Eastern Economic Review, Dhaka will become a home of 25 million people by the year 2025 (Atiqullah and Khan, 1965, McGee 2006; World Bank 2009). However the city is now a mega-city carrying all its previous disadvantages which can not now be allowed to continue. Thus it was found important to know the present state of art of the system for its improvement in the of the global experience specially for waste water treatment. Dhaka city though called a unplanned city, but it has to survive using the current status, water bodies and rivers around and in-city structures absorbing the future needs.

In Bangladesh, industrial units are mostly located along the banks of the rivers. Unfortunately as a consequence, industrial units drain effluents directly into the rivers without any consideration of the environmental degradation region, which comprises about 49 per cent of the total sector. About 33 per cent of the industries in the NC region are textiles, apparels and tanneries, of which Dhaka district accounts for almost half and Narayanganj about 32 per cent. About 65 per cent of the total chemicals, plastics and petroleum industries are also located in the NC region, and concentrated in and around Dhaka, Narayanganj and Gazipur districts (Ahmed and Reazuddin, 2000). The National Environmental Quality Standards are given in the Environmental Conservation Rules of 1997. These set a range of water quality criteria and limits depending upon the intended uses, including use for human drinking water, livestock drinking, fisheries, recreation, irrigated agriculture and industry. Discharge standards are also specified by sources, including public sewage outfalls, irrigation water and specific types of industrial discharges by size. There is an Ambient Water Standard, that cover none of the many chemical pollutants known to be discharged. Water of the surrounding rivers and lakes has already exceeded the standard limits of many water quality, and aquatic parameters such as dissolved oxygen (DO), biological oxygen demand (BOD), combined oxygen demand (COD) and reaction or pH (BCAS 2000).

The underlying reason for this dynamic is that for a rational decision maker, the individual benefit–here waste discharge–is almost always greater than the cost of abuse (reduction in ecosystem services) which is typically shared. These type of researches were conducted in both arid and humid cities from the early twentieth century including highly populated old but rapidly expanding cities lite Dhaka and Kolkata (Amirahmadi 1987). Since

this is true for everyone, the logical consequence is the destruction of the shared resource. This happens even if there is awareness about the ongoing destruction. Pollution is tightly connected to concentration. We consider wastewater treatment as a water use because it is so interconnected with the other uses of water. Much of the water used by homes, industries, and businesses must be treated before it is released back to the environment. If the term "wastewater treatment" is confusing to you, you might think of it as "sewage treatment." Nature has an amazing ability to cope with small amounts of water wastes and pollution, but it would be overwhelmed if we didn't treat the billions of gallons of wastewater and sewage produced every day before releasing it back to the environment (Hise 1997; Smith 1997). Treatment plants reduce pollutants in wastewater to a level nature can handle. Wastewater is used water. It includes substances such as human waste, food scraps, oils, soaps and chemicals. In homes, this includes water from sinks, showers, bathtubs, toilets, washing machines and dishwashers. Businesses and industries also contribute their share of used water that must be cleaned. Wastewater also includes storm runoff. Although some people assume that the rain that runs down the street during a storm is fairly clean, it isn't. Harmful substances that wash off roads, parking lots, and rooftops can harm our rivers and lakes.

In the context, the present piece of research has been outlined and formulated with the specific objectives such as to: i. identify the cause of waste water drainage congestion and need for treatment; ii. explore the role of unplanned urbanization for waste water systems; and iii. developing a model for improving the water treatment process at the community spaces.

METHODS AND MATERIALS

The methods and materials used in the study are presented here with its descriptions. The sites were Old Dhaka-Lalbag, Mid Dhaka-Mohammadpur, and New Dhaka-Uttara. The respondents were Habitants -50, Field WASA staff- 35, and Senior WASA staff-15.

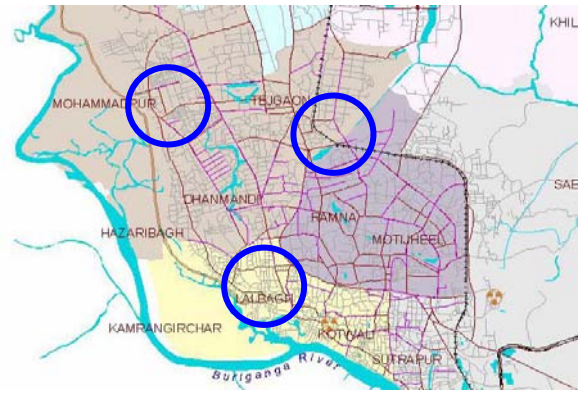

Fig. 1. The selected study areas having different engineering designs

Dhaka Water Supply and Sewerage Authority (DWASA) under the Ministry of Local Government and Rural Development (LGRD) is presently responsible for operation and maintenance of the sewerage system and sewage treatment plants, the total sewerage management, and supply of drinking water within the defined area of Dhaka city (WASA 2009).

There exists six WASA zones in Dhaka city for this crucial utility service. Zones 1 and 2. The sites were selected as per database of BARC (2009), BBS (2008).

Mainly cover the southern part of Dhaka (Hazaribagh, Lalbagh, Sutrapur, Motijheel, Shampur), Zone 3 the western side (Dhanmondi and Mohammadpur), Zone 4 the northern part (Kallyanpur, Agargaon and Mirpur), Zone 5 covers partly central and north-east Dhaka (Tejgaon, Gulshan, Baridhara, Uttara) and lastly Zone 6 covers eastern and central parts of Dhaka (Khilgaon, Shabujbag, Ramna). According to WASA, the existing sewerage system holds 49,803 sewer connections, 26 sewage lift stations and 785.82 km long sewers (WASA 2004). The length of the sewer lines varies in different zones with the maximum in Zone 1 that holds 168 km and minimum in Zone 5 that covers 88 km. The size of the sewer line also varies from 4 inches to 72 inches in diameter. However, the area and the type of current sanitation coverage of Dhaka city is as follows (personal communication and The Daily Star, 13 July 2003).

Parameters considered in data collection

The major parameters were: Unplanned Urbanization- House design: size of tanks, line slope, inadequate statistics. The structural parameters were: structural inadequacy- characteristics of the wastes, infrastructure service performance, sizing/timing/lining of infrastructure and physical resources. The technical managements were: slum designs, colony based management, level of integration of sub-components and use of laws. The client related parameters were: cliental non-awareness- technical topographic constraints, multiple service ways

roads and drains, subways, and participations. Supplementary elements for the study were about 35 including: How confident are you that the data being used in the planning study is reliable? Is the planning be considered as integrated for environmental safety? Has there been adequate analysis of environmental impacts? Are you confident that the strategy is optimal for environmental outcomes? Stakeholders involved in development of the environmental planning? The studies were conducted using questionnaire, FGD and Case study Guidelines as per objectives and expected outputs of the research as and when necessary supplementing the main primary database.

RESULTS AND DISCUSSION

The results obtained from the studies and here as identification of the cause of waste water treatment need followed by developing a model modeling as a part of urban planning.

The salient findings are also mentioned here briefly and required illustrations, designs, equipment and situation evidences are mentioned and interpreted comprehensively. The major aspects of the research as per objectives were: A. Unplanned Urbanization, B. Structural Inadequacy, C. Less Technical Management, D. Cliental Non-awareness. The important components of unplanned urbanization considered were: Components leading to effects of unplanned urbanization wrong all alignment slowed down water flow, poor drainage and Environmental degradation.

Identification of the need for waste water treatment

The results obtained from the study conducted in order to identify the causes of drainage water congestion and need for treatment are presented in the Fig. 2, 3 and 4. The results show that among the major problems studied about 56% of the respondent prioritized wrong urban planning followed by structured inadequacy about 22%, which ultimately caused total inactivation of the water service delivery system. The response of all the respondent groups was found to be similar in identifying the major cause for the water drainage congestion problem in the Dhaka city. These results directly lead to the needs for developing a model for waste water treatment at suitable place before it reach the final outlet.

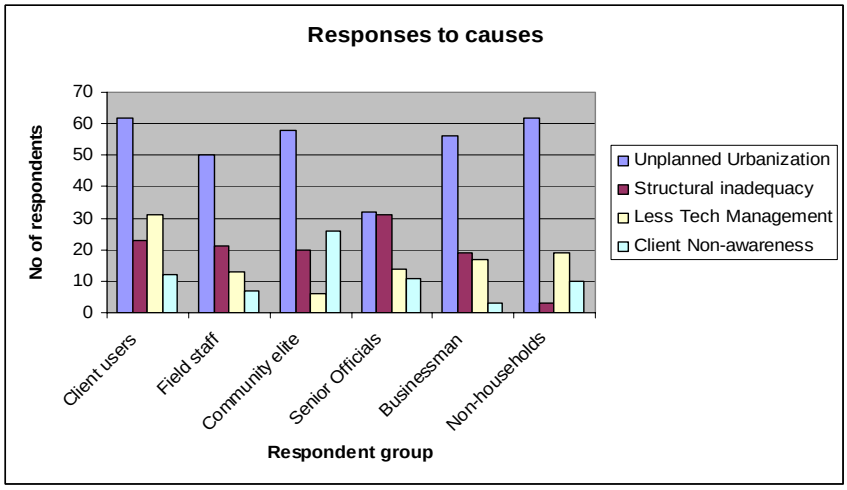

Fig. 2. Number of responses stating Causes of waste water problems

The Fig. 3 reveal that the user group and the field staff of WASA responded to these points very significantly. The mean response were (Fig. 4, 5 and 6) significantly higher for the unplanned program activities being highest in number of respondent and in percentage average being 53%>

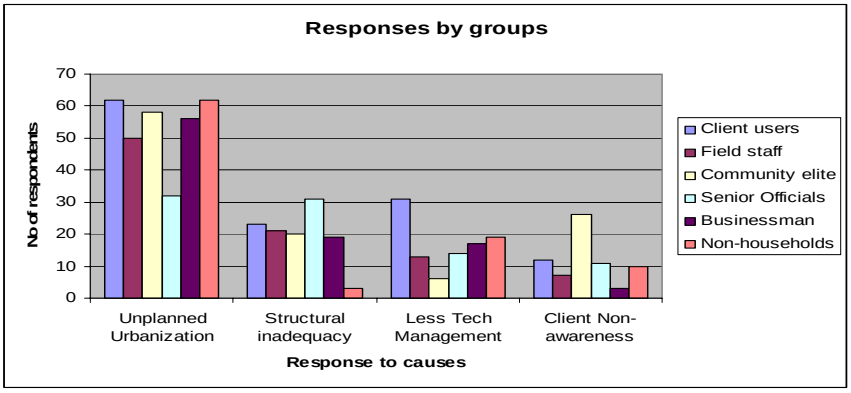

Fig. 3. Number of responses stating Causes of waste water problems

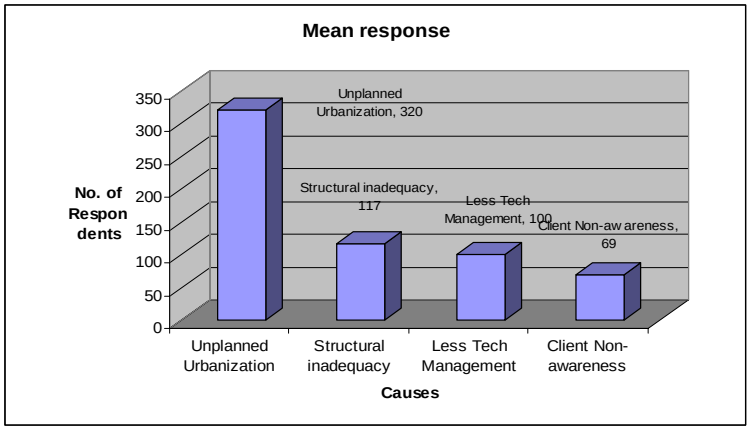

Fig. 4. The mean responses stating Causes of waste water problems

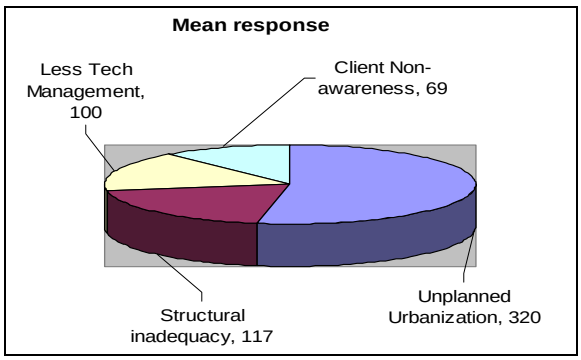

Fig. 5. The mean number of respondents stating Causes of waste water problems

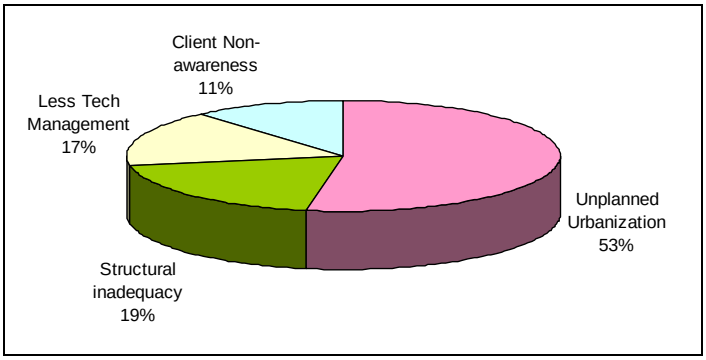

Fig. 6. The mean percent respondents stating Causes of waste water problems

The Technical Parameters of Severe Causes

The most dominant technical parameter used to identify the problems was found to be the wrong design of the house followed by size of tanks (Fig. 7 and 8) by all respondent groups.

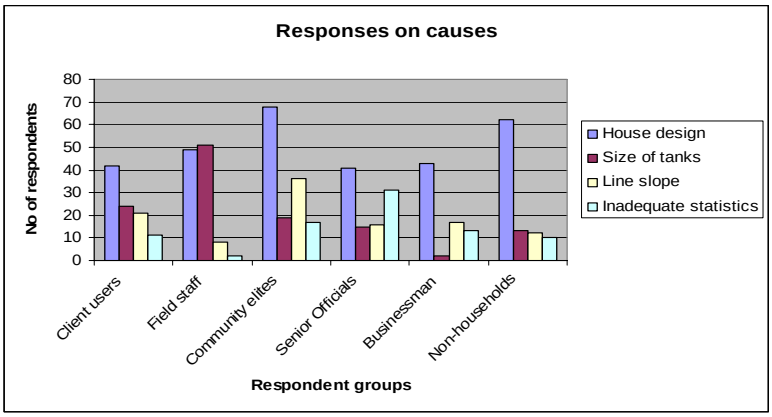

Fig. 7. The Parameters of the Severe Causes

Water supply has improved a bit, but sanitation service is still very poor and does not meet the requirements of this huge population. Only 55% of the poor households currently receive tap water. Another report states that less than 40% of the slum dwellers have access to safe drinking water. On the other hand, none of the slums get proper sewerage services from WASA and only 9% of this population manages to get solid waste management services. As a result, both household waste and human generated wastes go directly or indirectly into the low-lying lands, open spaces or water bodies of the city and causes a number of problems (WHO 1999; EPA/DHS 1999; BCAS 2000; BBS 2008). Moreover, inadequate safe drinking water in slums and squatters causes many problems, which were Unsanitary lifestyle, Inadequate access to safe drinking water, Increased health risks, Excessive continuous growth of slum population, Limitation of resources and Excessive demand of water within the service delivery areas.

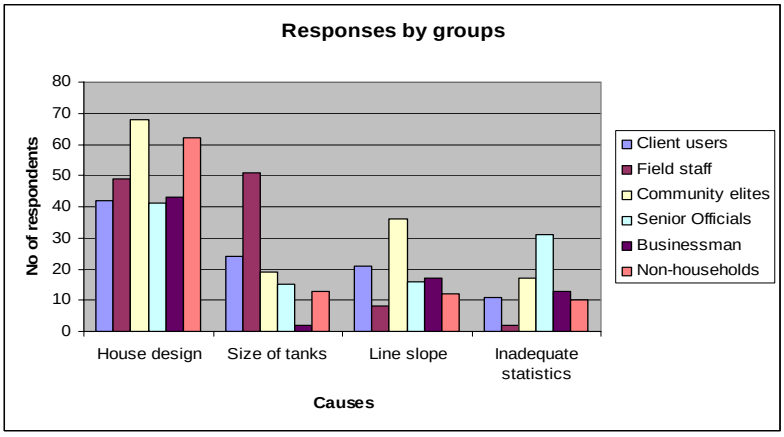

Fig. 8. The Parameters of the Severe Causes by groups

Developing Improved Treatment Model

The results obtained fro non-planning status of the urban were found to be the lack of planning integration followed by Sizing/timing/Lining of infrastructure. The results show that highest number of respondent Fig. 9, 10, 11 and 12) as for causes and groups gave opinion (27%) for community tanks followed by compressive integration of the plan.

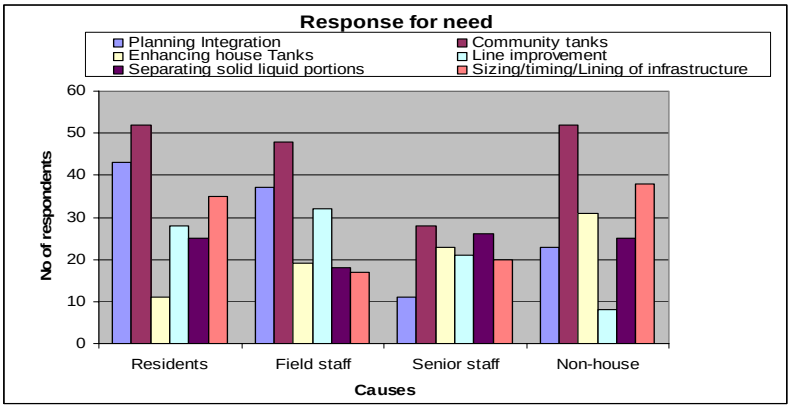

Fig. 9. Responses for improved treatment model

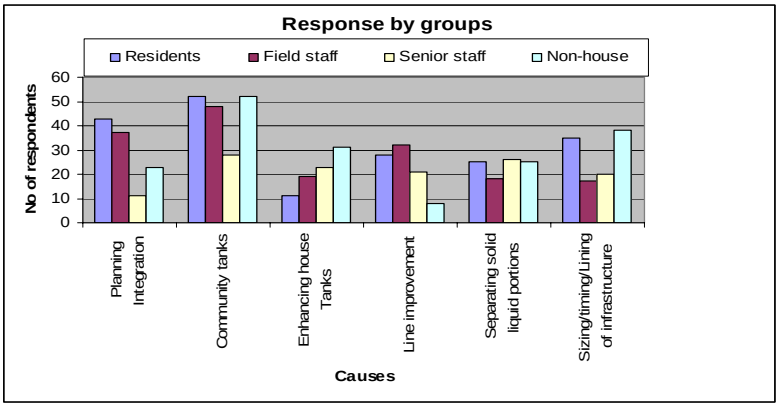

Fig. 10. Responses for improved treatment model by groups

The residents as a group gave significantly higher response for developing these model to solve the problems (Fig. 12). Dhaka Water Supply and Sewerage Authority (DWASA) under the Ministry of Local Government and Rural Development (LGRD) is presently responsible for operation and maintenance of the sewerage system and sewage treatment plants, the total sewerage management, and supply of drinking water within the defined area of Dhaka city. The present services show conventional water borne sewerage system (30%), separate sewerage system (20%), septic tank (11%) and p it sanitation (18%).

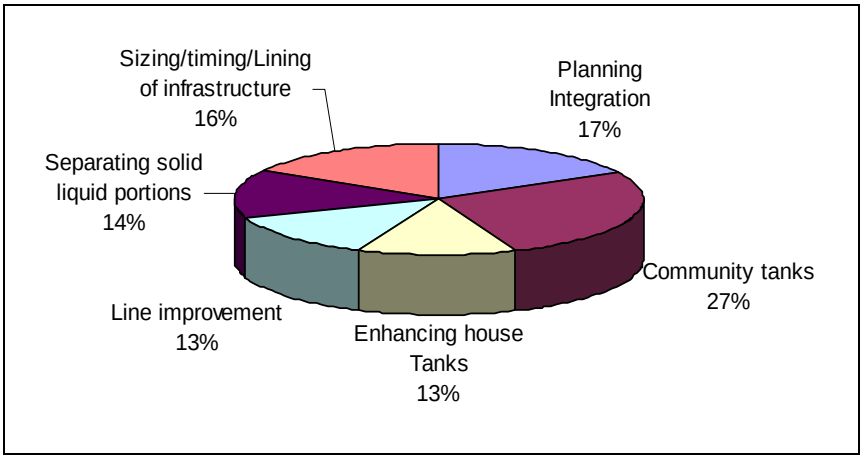

Fig. 11. Percent Responses for improved treatment process model

It also recognize the problem and indicate the need for establishing community safety tanks for more decomposition of the wastes of the water. The type of models were previously suggested by many workers (DOE 1993; WHO 2004; WSAA 2004). DWASA operates a sewage treatment plant a Pagla, namely Pagla Sewage Treatment Plant (PSTP) that treats wastewater of millions of people of Dhaka city. The capacity of this treatment plant is only 0.12 million cubic meters, while the total sewage generated by the city, as estimated by DWASA, is about 1.3 million cubic meters. However, the following are the current flagrant concerns that require immediate consideration by the policy makers for environmental sustainability of the city. 3.7.3. Damage of Sewerage System A recent study by JICA on the sewerage system reveals that Dhaka city sewerage suffer from extreme improper management and operation. Many points of the sewerage network are extensively damaged, for example, the sewerage lines from Tejgaon to Pagla either have leakages or are broken (The Daily Star, Photo 3.21. Different stages of sewage treatment of the plant 70 Dhaka City State of Environment: 2005.

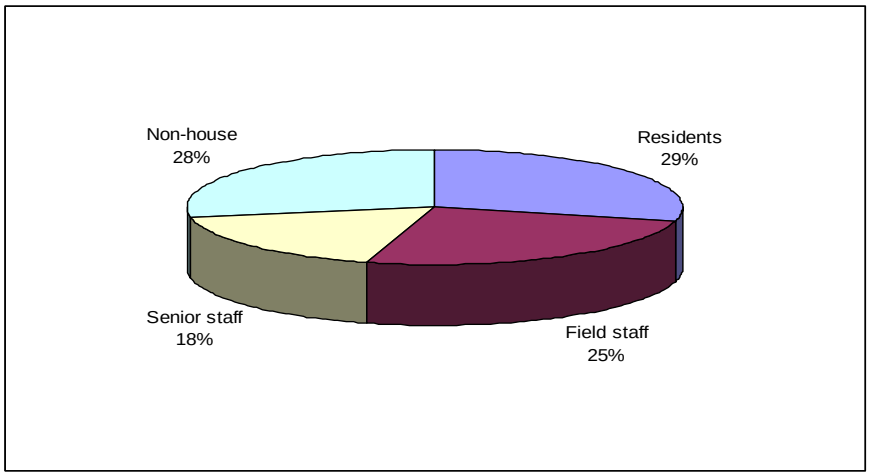

Fig. 12. Percent Responses for improved treatment model by groups

CONCLUSION

Studies conducted on waste water system problems for developing a technical treatment model in DCC clearly identified wrong design and structural inadequacy as main causes. It has been found that there is now no scope to redesign the system over old houses and colonies though the effects of the problems were found to be increasing causing the township livelihood more miserable. In the context it may be concluded that separate mediator community structures should be installed in public and institutional spaces. The results led to the recommendation that one community structure may hold waste water of around 100-500 houses/flat which may reduce its volume by up to 34% decomposing further the solid contents. However, it is recommended that the major parameters of house designs, tanks, slopes, infrastructures and colony integrations must be complied by

the respective authorities. Any new plan must be shared with the field staff and all types of residents and beneficiaries. The use of the treated water should be ensured considering health, agriculture and environmental safety. It is recommended that the most potential use of the outlet products are the sources of irrigation, industrial and manual uses. Not the least, the manpower development for the purpose of community based integrated design and its operation should be the vital technical part of continuous effort to run the waste water treatment and reuse for national interest.

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