LISTS OF CORRECTIONS

The Corrections mentioned by the First Examiner in his/her report are listed below,

Major Comments

1. The abstract (p. I) is not a good representation of the research carried out as part of the thesis. The first two paragraphs just talk about MSWM and their various aspects in an introductory manner. Rather, what is in the last paragraph of the abstract should be expanded to convey the contents of the thesis accurately.

Correction 1: The abstract has been modified and incorporates the mentioned comments.

2. While the author does this somewhat in bits and pieces, a section in the first chapter should give the reader an overview of the thesis, how it is organized, what is done where and why. There are several examples of confusion which arises due to such poor organization. Every now and then author raises her research queries and methods, the associated plan, as she does on p. 100. But it does not convey which objective she refers to, how and where. There has to be an overarching overview, which contains the various pieces and how the various pieces fit in the overall scheme of things. It would be better to include a flow chart of methodology to enable an understanding of which data, methods are adopted to answer which questions, somewhere at the beginning.

Typically in a thesis, an introduction and background to the problem should be followed by a summary of the research questions and objectives, description of the relevant studies pre-existing, and the explanation of the theoretical framework followed, then a presentation of the full data sources (both primary and secondary), and overall methodology should follow. After this, the results chapter should summarize all the findings with respect to each of the questions, using various methods. A subsequent chapter should discuss the results, following which a final chapter should summarize and conclude. The policy implications should relate to ONLY the findings of this research, and not draw upon extraneous pieces of information which has been untouched by the thesis.

Correction 2: The introduction has been reorganized. The first section of the introduction discusses the background of the study and followed by the research questions, methodology and data sources in section 1.2 and chapter plan in section 1.3.

3. What is really important in a Ph.D. thesis is to highlight the contributions made by the research and summarize it, which I did not find any where. This should be there in the introductory chapter, as well as reiterated in the conclusions chapter. In its absence, I find it difficult to understand what has been done before, what is new, and the positioning of
this work in the literature. One example of this is on p. 65 where the author discusses Unit Based Pricing. This is a pricing mechanism which already exists? If yes what is the source citation? The author also discusses various volume, weight based and hybrid methods of UBP, but who devised these first? What is the relationship of this mechanism to the solid waste cess which is levied in a number of municipalities in the country? Another example is that I found the author going back and forth between own data and secondary sources, for instance, the discussion of PPP arrangements in various Indian cities (p. 96-100), comes interspersed with her own data, research and analysis. Such organization makes it really difficult to judge what work is the author’s own and what is existing already. It would be useful if the author could, at an appropriate point (not where it is currently), summarize the common features of the PPP arrangements and present the implications for the authors own research.

**Correction 3:**

- A new chapter (chapter 2) has been inserted after chapter 1 describing the the literature review, identification of the research gap and the contribution of the study. Section 2.2 describes the divergence in solid waste management practices in developed and developing countries. Section 2.3 provides an empirical evidence of that diverge practice. Section 2.4 describes the initiative of PPP and their achievement and failure in developed and developing countries separately. Finally observing the country case studies section 2.5 identifies the research gap and contribution of the present study.

- The unit based pricing already exists in the literature. The literature cited in p. 45-48 are the application of unit based pricing.

- Various methods of UBP like volume, weight and hybrid are undertaken by the municipal authorities as and imposed on the households as user charge.

- The amount of this kind of user charges varies with amount of waste generation. This works as an intensive to reduce the waste amount by the households.

- The discussion on the PPP initiative in India has been shifted in Appendix 5.A.1.

4. As related to the point made above, unless gaps in the literature are pointed out, it is not possible to highlight the contribution made by this research. I did not see a critical review of the literature, all that is done is to merely take the theoretical frameworks from the existing literature and apply them.

**Correction 4:** The critical review of the literature and the research gap has been discussed in chapter 2.
5. P.2 it’s not clearly why the author is putting the cart before the horse, and discusses adopted policies in developed and developing regions, mush before the theory or research is discussed. In the same thread, it is not clear why Table 1.1 on selected policy instruments for MSWM in Europe, comes so early in the thesis.

The standard practice is to explain the importance of the problem, provide the ground realities, socio-economic and climatic conditions, population density, and norms for the service, then go to talk about the theoretical framework, data, methodology, findings, then compare with international and national studies, before concluding with policy implications and directions of future research.

**Correction 5:** The policy implication section of chapter I (section 1.2) has been shifted and reorganized in to chapter VII.

6. P. 7, when the author speaks about the Indian experience, she should give a socio economic profile of the country and overview of services which have bearing on its waste generation, not just be descriptive and explain the state of SWM in the country

**Correction 6:** The country has witnessed a population growth from 1028.7 million in 2001 to 1210.2 million in 2011 (Census, 2011). The population growth rate in urban India is too high. The percentage of total population living in urban areas shows a continuous increase. Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011 Census. In India generation of solid waste has increased significantly over the few decades. Per-capita waste generation in India is estimated to increase at a rate of 1.3% p.a. (Agarwal, Pandey and Agarwal 2011). The per capita waste generation rate in India has increased from 0.44 kg/day in 2001 to 0.50 kg/day in 2011 (Census, 2011). MSW generation rates in small towns are lower than those of metro cities. But the metro cities perform better in terms of waste collection and transportation than small towns. Thus the growth of waste generation is outpacing the urban population growth (Singhal and Pundey, 2001). Therefore the urban population growth as well as the increasing growth of per-capita wastes generation will continue to amplify the problem of waste management (inserted in p. 94-95).

7. I was struck by the fact that in a thesis of this nature, there is no section on literature review, rather there are some studies which are cited all the way in the chapter on conclusions, which needs to be consolidated and put upfront much earlier in the thesis. Chapter II does this somewhat, but there are also a number of current studies which are missing, one representative article being: Sridhar, kala Seetharam. Solid Waste management in Asia-Pacific: What explains its coverage? Public Works Management and Policy (Sage), 21 (1) (January 2016): 53-70.
I also refer the author to the book Economics of Urban externalities: Analysis of Squatter Settlements in Kathmandu and Quito, by Shiva Adhikari, Springer, 2016. One reason for these recent omissions could be the fact that the thesis was completed a while ago, the literature certainly needs quick updating.

**Correction 7:** The critical review of the literature has been presented in chapter 2. The referred literatures have been included in the text. Some recent references have been incorporated in the relevant sections.

8. On P. 13 research question III, (ii), while the author hypothesizes that the difference in actual and perceived service quality is inversely related to WTP, the hypothesis could be either way, since it is plausible that the greater the differential between actual and perceived quality, the higher would be the WTP.

**Correction 8:** The hypothesis for this research question has been changed into: the sign of the difference in actual and perceived service quality is positively related to WTP.

9. Table 2.1 (p.21) is not related to the questions being asked - what, how and who needs to be involved. What would be helpful is for the candidate to include an extra column in Table 2.1 and indicate which study addresses which of the three questions.

**Correction 9:** There are various dimensions of integrated solid waste management. Integration refers to the simultaneous consideration of several dimensions. There are various ways to describe integration in case on solid waste management. In literature the integration had been describes in various ways. Table 2.1 (now table 3.1) is a representation of all the existing integration process highlighted in various literature.

10. On p. 22 the author also moves to the processes involved in MSWM, from market-based instruments, and it is not clear how and why. These relations need to be explained clearly. It is possible that the MBI are related to ‘what’ and the processes are related to ‘how’, but this needs to be mentioned explicitly.

**Correction 10:** The chart 2.1 (now chart 3.1) discussed the inter relation between the various aspects of solid waste management. In the ISWM the aim is to reduce the volume of waste which relates to the question what. MBI is related to the question how. Finally the stakeholders’ involvement gives the answer of the question why.

11. In the section on theory, pp. 24-33, I found the conspicuous absence of any discussion on externalities or public goods, which is directly related to SWM.

**Correction 11:** The discussion on public good and externality has been included in the context of the study (chapter 1).
12. On p.33, where the author discusses local governments as coordinators to process and handle waste, I would have expected her to discuss the Coase theorem and the role of local governments as coordinators.

**Correction 12:** The Coase theorem describes the possibility of trade even in the presence of externality under low transaction cost (Coase, 1960). The outcome under this condition would be a Pareto Efficient outcome. The Coase theorem holds if the government plays the role of a negotiator. Then with the PPP the ULB will be acted as a regulator who facilitates the negotiation between the private enterprise and households through the establishment of the property rights. The private without regulatory authority increases the negotiation cost (inserted in p. 5).

13. The section PPP in practice (beginning on p.46) is not related to the theoretical framework presented in the earlier sections. For every case study there should be a relationship presented with the theory. I am not sure what the purpose is of reviewing this country’s experiences, there is no focus.

**Correction 13:** The case studies have been discussed to picturise the difference in solid waste management practice in developed and developing countries. All the case studies are now presented in Chapter 2. The case studies in section 2.4.1 show the intense practice of public private partnership in developed countries and section 2.4.2 shows that the long term sustainability of PPP are present in developed countries. This section has been moved to first chapter to discuss the background of the study. The research gap has been identifies from these presented case studies.

14. Chapter III deals with cross country analysis. In the last paragraph on p. 55 the begins to explain data from the UN Statistics Division, there is no discussion of which research question/objective these data are related to, why they are being gathered and discussed.

**Correction 14:** This analysis has been removed from the thesis.

15. P. 58 is too late for the author to start discussing research questions. In this question, the focus is on the household. The author needs to convince why the hh is the focus here. What about the Resident Welfare Association (RWA), which is the next level of aggregation in the community? Another example of such disorganized content is on p. 159 (section 5.4.4), where the author starts discussing research questions! Please refer back to my comment 2. Similarly, the discussion of p. 150 on hypothesis regarding WTP should come much earlier. Refer back to my comment 2.

**Correction 15:** The discussion with the UN population division data has been removed from the dissertation.
The analysis of this chapter is focused on identifying the factors that confirms the long run sustainability of PPP. The households need an active intervention in the process in terms of source segregation. The segregation of waste according to the waste types will gear up the possibility of private involvement and their sustainability in future (inserted in P. 60).

The research questions are discussed first in the Introduction and repeated in respective chapters.

16. I also found very little information on methodology of the research – on p. 60, the author discusses in the first paragraph that the study transcribes information regarding SWM practices of various cities into data form, how was this done? There is no information. In a similar vein, I found an oversampling of developed countries summarized in Chart 3.3 (p.72), is this correct? Such data problems and inadequacies need to be highlighted.

**Correction 16:**

- Section 3.2 (now section 4.2) discussed the methodology of the study. The study first chooses the city level data for analysis. In the next section the data sources and data coverage has been discussed. The observed and identified dimensions that vary across city are discussed in the next section. The section 4.2.4 discusses the data transcription method for the identified dimensions.

- There are plenty of information on the waste management practice of developed countries are available in the public domain. Thus it is quite obvious the sample should have biasedness towards the developed countries.

17. Appendix 3.A.2 (p. 82-99), city wise data sources, presents a very heterogeneous group of cities in terms of size. Is it possible to control for city size and look at the practices of different groups of cities, classified by similar size?

**Correction 17:** The motive of this dissertation is not focused on the variation of the practices across size of the city. However, the intensity of source segregation and PAYT is dependent on population density. The the average density of population is higher in cities those who are engaged with higher order source separation. While the PAYT programme is widely practiced in the cities with low population density. But the constructed data fails to give any significant between population density, disposal method and PPP. That’s’ why the size wise classification has not been presented in the chapter (inserted in p. 72).
18. P. 93 there are some factual errors – the author states that in Bangalore and in certain other cities both collection-transportation and treatment is outsourced by the ULBs to the private sector. This is not entirely true. In Bangalore, in some zones the SWM is outsourced to private sector, whereas in some others, the SWM is done by the BBMP, The same may be the case with other cities, or make a blanket statement regarding the institutional arrangements without specific references to cities.

**Correction 18:** From literature variation in waste management practices has been observed within the ULBs also. But due to data inadequacy it was not possible to incorporate this variation in the analysis. The waste management practice that is ongoing in the major portion of the city is representing the pattern of the service for whole city (inserted in p. 97).

19. On p. 100 it has been stated that an OLS regression is done of the predicted efficiency scores on various market instruments and indicators such as segregated wastes, specific taxes, customer satisfaction, but I did not find household characteristics such as literacy or education of the HH here, although that is very important determinant of efficiency of the HH with respect to various aspects of efficiency with respect to SWM.

**Correction 19:** Household characteristics are also the important factors for determining the efficiency. As the motive of the study is purely concentrated on the relationship between the market related instruments that change the mode of the service from public to private and the PPP the HH characteristics were not the focal point of this study (inserted in 114 and future research agenda). This dimension is added in the future research agenda.

20. Table 4.1 (p. 102) merely states the MoUD benchmarks, that 100% efficiency is expected but the author fails to be analytical and does not discuss if the 100% benchmark is feasible, and what are the constraints in achieving the norm. The author mentions that since the objective was to compare actual performance with benchmarks, all indicators were normalized and indicated in % terms. Does this mean that all ULBs had 100% SWM collection efficiency? This is not right clearly.

**Correction 20:** In Service Level Benchmarking handbook the MoUD provided the actual status of SWM in the 1400 municipalities of India and side by side it provides the ultimate level (benchmark level) that should be achieved by the municipalities for the betterment of the service condition. The benchmarks can be achieved with respect to some physical and financial resource constrains. Non availability of appropriate land, non availability of collection vehicles and equipments, lack of public awareness, motivation and education etc falls under physical resource constraint while lack of opportunity to fund generation by the municipalities, lack of support from higher tire of government are

Here the comparison of the actual performance with benchmarks was the objective of the makers of SLB handbook. 100% is the benchmark for collection efficiency. That means all the generated waste should be collected by the service providing authority.

21. P. 104 contains an analysis of the performance of Indian States, with statements such as Maharashtra is a good performer, HP is bad performer and Odisha is moderate performer, with no reference to what benchmarks have been used to arrive at such rankings.

**Correction 21:** In terms of coverage and collection efficiency reported in the benchmark study MAH is a good performer [65% coverage with 75% efficiency], HP is a bad performer [13% coverage with 70% efficiency] and ORI is a moderate performer [40% coverage with 55% efficiency] making the effective outreach 49%, 9% and 22%, respectively (inserted in p. 103).

22. I am not sure that the data in Table 4.2 (p. 105) are credible. Since the variables are all city-specific policy measures, I am not sure that the data available at the state level are authentic. The author may want to write a disclaimer regarding the same, if it is not feasible to confirm this from every ULB of the states covered.

**Correction 22:** The disclaimer has been written in p. 104.

23. On p. 106-107, I found the discussion of figure 4.1 incomplete, as there is no discussion of the equilibrium point $E$ and new equilibrium $E^*$.  

**Correction 23:** Point $E'$ in figure 4.1 is a sub optimal situation which is satisfying the conditions for technical efficiency but not that of allocative efficiency. The point $E$ is an economically efficient point that satisfies both the conditions of technical and allocative efficiency (in p. 104-106).

24. Chart 4.3 (p. 108) represents a very superficial understanding of the parametric and non-parametric approaches, since the various components in each of the two methods are not explained.

**Correction 24:** This study concentrates only on the parametric methods. Among the parametric method COLS, GPA and MOLS suffer from serious limitations. In COLS method first the OLS method is applied which derives consistent and unbiased estimate of slope parameter and consistent but biased estimate of the intercept parameter. In the second step this intercept estimate is shifted up i.e. corrected to ensure that the estimated frontier bounds the data from above. In GPA the deterministic production
frontier can be expressed as a mathematical programming model. Here the goal would be to find a set of optimal values of parameter such that the observed output of no produces exceeds the maximum output feasible for its input vector. MOLS is a modified version of COLS where the modification is done using the mean of the estimates of the disturbance term instead of its maximum value as it’s done for COLS (inserted in p. 109).

25. For Table 4.3 (p.113), there is no discussion of a priori expectations with regard to each of the covariates, Also, the number of observations in not mentioned, although the degrees of freedom are mentioned. A similar comment applies to Table 4.4 (p. 115).

Correction 25: Positive sign of the input coefficients is expected to comply with the norms of production function. Positive sign of the coefficients of the control variables are also expected (inserted in p. 112).

26. There is no point in applying an OLS and Logit regression to the same set of data (discussed on p. 117), without explaining the need. The defense needs to be provided for the logit and explained, especially since the OLS and logit yield very similar results (p. 118).

Correction 26: Our PPP variable is a binary variable. To identify the influential effect of the market based instruments (SEG, RED and CHRGE) on PPP we use LOGIT regression. Moreover LOGIT provides the marginal effects which are important for policy implication.

27. The section 5.4.1 (p. 141) discusses the impact of program implementation on the enhanced tendency of both recipients and non-recipients to use municipal disposal services, post-program. I am not convinced that the impacts which are found, are entirely attributable to the program. The author needs to examine and investigate the other interventions which could’ve occurred during the intervening period, 2006-11. One way to capture this could be to talk to Bally Municipality’s concerned officials regarding this and probe, as to what else could’ve happened.

Correction 27: The objective of the survey was purely concentrated on the post program change in WTP. There must have other intervening factors but these are not accounted by the survey questionnaire.

28. It is not at all clear what is the purpose of Table 5.8 (p. 148). What is the objective in examining this change? Explain.

Correction 28: The categorization presented in table 5.8 would be helpful to figure out the presence of dissatisfaction from the service. If large number of households deviates
from the status quo then it can be assumed that the households are not satisfied with the quality of the service.

29. Table 5.9 (p. 149) needs further explanation. What the numbers represents, why its presented, and what the implications are.

**Correction 29:** Table 5.9 considers the changes in adoption desire in relation to satisfaction for program attributes. The proportion of sampled households who voted against the program has higher demand for the service than those who are fully satisfied with the program (i.e. status quo).

30. One other major problem I have with the discussion of the results from the primary survey is that whether Bally Municipality is representative of a number of such cities across the country? Are the results from a primary survey in Bally, West Bengal, generalizable to the entire country? Why or why not?

**Correction 30:** The municipality of Bally, in the district of Howrah extending over an area of 11.81 sq.km, is a populous urban area that displayed all the traits typical to the local bodies of developing countries. To begin with its per capita, waste generation rate in 2003–2004 amounted to 673 g placing it at the higher end compared to that of other Class I cities in India. As common in urban areas of developing countries, household garbage in Bally Municipality was collected in a mixed state either from the point of generation or from secondary collection points like roadside vats. The collected waste was dumped without treatment in a century-old vacant land that was fast nearing exhaustion. However, with the promulgation of MSWMHR the municipal authorities have to initiate changes in the existing collection and disposal practices in line with the proposed norms of waste management (inserted in p. 134-135).

31. I found that a majority of the initial discussion on research findings in the final chapter on conclusion (pp. 189-192), is unrelated to SWM or the research that has been conducted as part of the thesis. The section on policy implications (pp. 193 onwards) discusses a number of issues on which the thesis research doesn’t throw any light, e. g. incomplete devolution of functions to ULBs lack of autonomy in city management and so forth. A lot of the discussion is related to general public services and city planning, which have NOT been the focus of the thesis. I found some literature review in the section on future research! These should be organized properly in the spirit of comment (2).

**Correction 31:** The conclusion has been reorganized. Section 7.1 will briefly present the major research findings and the subsequent sections will talk about the over time initiation of environmental policies (Section 7.2) and problem in executing these policies in real term (Section 7.3). Section 7.4 highlights the policy implications that are identified from this study and finally the direction of future research is described section 7.4.
Minor Comments

1. There are outdated data quoted, for instance, p.3 last paragraph quotes that there is an increase in MSW per capita generation from 2.7 pounds per day in 1960 to 4.4 pounds in 1998, more recent data needs to be provided. Other examples of obsolete data are on p. 4 which quotes from EPA 1998, before Table 1.1. These need to be updated.

**Correction 1:** The updated data has been inserted in p. 14.

2. P. 3 in the section on Indian Experience, the author should give some details of variation in SWM within cities, across peri-urban and core city areas. The high powered committee report on urban infrastructure should have some norms/guidelines/ empirical evidence on this.

**Correction 2:** MSW generation rates in small towns are lower than those of metro cities. But the metro cities perform better in terms of waste collection and transportation than small towns (inserted in p. 94-95).

3. I found no reference to Chart 2.4 (p. 34) and chart 2.5 (p. 42) in the text.

**Correction 3:** The reference for Chart 2.4 (now Chart 3.4) and Chart 2.5 (now Chart 3.5) has been inserted in p. 38 and P. 43 respectively.

4. It is not clear what year the data in Figure 3.2 (p.57) belong to.

**Correction 4:** The figure has been removed from the thesis.

5. It seems that Table 3.10 (p.76) and Table 3.11 (p.77) repeat the Information which already exists in Figures 3.3 – 3.7; if yes the tables or the figures should be deleted.

**Correction 5:** The table 3.10 (now 4.10) and table 3.11 (now 4.11) presents the distribution of disposal methods and PPP with respect to the source segregation and UBP while Figure 3.3-3.7 (now 4.1-4.5) only depicts the variation in waste management practices in developed and developing region for each of the dimensions separately.

6. The tables and figures throughout the thesis need to be better explained. For example table 3.3 (p.64), what does ‘n’ stand for? Number of countries? Number of cities? Similarly with Tables 3.1. (p.76), what does the total # refer to? Number of cities? Same with Table 3.13 (p. 79), what do the numbers refer to? %s? Number of cities? In a similar vein, It is not clear what years the data in Table 4.2 refer to? Same problems with Table 5.2, the author needs to explain why some characteristics have negative and some positive signs, although there were increases and decreases in their values respectively, over the period 2006-11. Table 5.6 (p. 146), the author needs to explain what are various combinations of Yes – Yes and so forth. The reader is clueless. Table 5.7 (p. 147), the
author needs to explain for every sub-category in the table, the responses add up to 496, Table 5.12 (p. 158), are the numbers in the table %s or numbers? Explain the table for the reader.

**Correction 6:**

- For all the tables “n” stands for number of observation. For table 3.3 (now table 4.3) it is number of cities.
- Total (#) stands for total number of observation
- Number in table 3.13 (now table 4.13) refers to number of observation.
- Table 5.2 (now 6.2) has been explained elaborately.
- The various combinations of table 5.6 (now 6.6) are discussed explicitly.
- Every subcategory of table 5.7 (now 6.7) has been explained.
- The numbers in table 5.12 (now 6.12) are in rupees.

7. The beginning of chapter 5 (p.119) on voices from the field, my advice is to delete the first paragraph until …environmental standards, and just focus on why voices from the field are necessary, Hence the paragraph may be started from the : …efforts to revamp..”

**Correction 7:** The commented portion has been deleted from the chapter.

8. P. 122-123, explain compensating and equivalent variation in layman terms first.

**Correction 8:** Compensating Variations and Equivalent Variations is the amount of money that the consumer is willing to pay for the improvement in environmental quality to enjoy the same level of utility. E is the amount of money that the consumer is willing to accept for the environmental degradation and enjoy the same level of utility (inserted in p. 127).

9. The problems with the Contingent valuation method need to be stated upfront somewhere when the method is discussed (p. 119 onwards).

**Correction 9:** The problem with CVM is related to survey design and bid design. One needs to choose the correct estimation process to minimize this problem. Thus it has been stated in section 6.5.1 at the time of estimation.

10. For all tables, figures and charts throughout the thesis, there need to be specific source, for instance World Bank (2016). Although many figures and tables state the
author’s understandings as the source, the original specific source from where it was
drawn needs to be included, in addition to the author’s analysis, as is stated currently.

**Correction 10:** All the sources are inserted in the text.

11. There are a number of acronyms used without expansion; hence there should be a list
of abbreviations at the beginning such that the reader is familiar with their use and
context.

**Correction 11:** The list of abbreviations was inserted.

12. There are a number of grammatical mistakes and incomplete sentences throughout the
thesis need to be fixed and proofread thoroughly. The usage of strong words such as
“proved” (p.79, 1st line) is strongly discouraged, given the social science discipline and
the ambiguities associated.

**Correction 12:** The grammatical mistakes and incomplete sentences are checked.

13. There is also a lot of jargon usage such as hypothetical bias, warm glow effect,
anchoring bias and so on (p. 151) which are explained in appendix 5.A.3, but the author
that to refer the reader to them in the text where they are discussed.

**Correction 13:** All the appendixes were referred in the text.