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Electronic Waste Recycling in Dhaka City Material Recovery and Institutional Governance

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ABSTRACT

In Dhaka, electronic waste is a growing urban management issue, alongside municipal waste systems, repair markets, informal collection, and emergent commercial recyclers. In this article, the evidence in a mixed-method thesis is restructured to explore collection practices, gaps in governance, environmental risks, and the economic logic of material recovery. The bottom-line work presents survey reports of questions to citizens, institutional and industry informants, field notes, and documents; it lacks a verifiable number of respondents or disaggregated survey estimates. The empirical explanation thus focuses on reported observations and considers numerical estimates as being calculated second. The thesis projects a range of e-waste production in 5.38-17.46 tonnes/day in the years 2012-2021; the calculation is not self-justifiable by using the provided information. A good example of price calculation is BDT 2,393,872.08 per tonne of printed circuit boards, in total, before recovery losses and expenditure and cannot be used on a tonne of mixed computers. Manual dismantling is reported in interviews and a volume of reported commercial collection of around 4 to 5 tonnes/day at a single operator. The results show that reclaimed opportunities are based on the separation of sources, safe dismantling, transfers that are traceable, and institutional obligations that can be enforced. There is a proposal of a staged city-wide system created between manufacturers, gatherers, recyclists, and city officials. The paper separates assumptions, empirical observations, and policy proposals to facilitate the cautious interpretation.

INTRODUCTION

Growth of electrical and electronic equipment poses a challenging urban waste stream. Devices have reusable components, precious metals, but they also are composed of plastics, batteries, screens, circuit boards, and parts that must be handled carefully. The abandoned equipment cannot be perceived only as a resource of re-usable commodities: its dislocation, dismantling process, and after-treatment defines the economic value of the capture and the ecological load of the transfer. This is especially so in the fast-expanding urban centers where informal disposal coexists with official disposal mechanisms (Shahabuddin *et al.*, 2023).

One can find such competing functions visible in Dhaka. Households and businesses get televisions, computers, mobile phones, and related equipment; repair shops get life span; traders pool together reusable equipment and scrap; and certain operators that operate privately dismantle or re-channel materials to downstream markets (Roy, Alam, *et al.*, 2022). Meanwhile, the municipal waste management is structured with mixed solid waste at the forefront. E-wastes that are discarded might be transported through normal collection routes in case a stable alternative route has not been established. The thesis of this paper is an account of site visits in the markets, collection sites, and dismantling sites and municipal areas, but fails to give a complete account on a citywide inventory (Hera, 2020).

The research problem is about the change of informal capturing of materials to the responsible handling of the whole waste stream. An effective system should ensure that disposal is practical to the users; that there are known collectors; that there are hazardous components, which are separated; that there are records of transfers; and that the residues are sent to safe treatment (Raghavendra T S *et al.*, 2023). Intervention that merely expands the recycling market can only augment dangerous manual processing provided that its labour, pollution, and ultimate-disposal impacts are taken unnoticed. On the other hand, an exclusively prohibitive measure can push recoverable resources to less noticeable directions. The question is thus how to organize a chain of responsibilities instead of the presence of recycling activity per se (Mowla *et al.*, 2021).

This article poses three questions that are related. First, what does the evidence of available fields reveal concerning collection, dismantling and institutional arrangements in Dhaka? Second, what are the valid things that the quantitative tables in the thesis can conclude regarding the magnitude and marketability of recovery? Third, what could be a realistic governance system linkage between household disposal, municipal coordination, personal processing, and environmental control? The contribution is a clear synthesis of the main observations and secondary calculations of the thesis. It further determines the location of missing

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survey records, unclear assumptions and inconsistencies crippling stronger empirical assertions (Romana Afrose Meem *et al.*, 2021).

The analysis concentrates on computers, Laptops, mobile phones, and televisions, the main emphasis being set on them in the thesis. Other equipment is mentioned in the descriptions of operator operations and hazardous substances since collection facilities do not necessarily work with these products separately (Ogunseitan, 2022). This difference is important: the data on an operator gathering refrigerators or printers are insufficient to prove the citywide distribution of the four categories in focus. Similarly, the historical projections of the source are not to be interpreted as a forecast of the current generation, but as a forecast of the generation in the past (Ghulam & Abushammala, 2023).

LITERATURE REVIEW

Electronic waste is broadly considered to be the electrical or electronic equipment, its parts, and other related parts that the owner disposes of without the possibility of direct reuse (Soesanto *et al.*, 2023). The end of life is not necessarily visible: a faulty gadget might just stay at home, be repurposed, or it can find a second-hand market, or it can be sold off as parts. In this way, the product sales and the theoretical replacement cycles are not directly related to the tonnes, which will be delivered to a recycling facility. An inventory that is credible should take into consideration storage, repair, second-hand, and leakage into mixed waste (Urme *et al.*, 2021).

Their dual nature can be attributed to the material makeup of the devices. Recycling revenues can be supported by ferrous and nonferrous metals, plastics, glass, batteries, lamps, and parts with hazardous components (Nadiruzzaman *et al.*, 2022). The circuit boards could contain precious metals, which are deposited in large amounts that could be interesting to recover through specific techniques (Vishwakarma *et al.*, 2022). Nevertheless, circuit boards are a small part of most machines and the amount of recoverable metal depends on how those devices were designed and how old they are. The gross commodity prices are not supposed to be by any means compared to the net worth of an unsorted gadget or actual proceeds in a recycling plant (Ibrahim Mohammed, 2023).

Exposure may take place at various stages of the environment. During collection, breakage might occur, spilling dust, or breaking batteries. Naked stripping can provide physical contact with dangerous parts (Seif *et al.*, 2023). The open burning and crude thermal treatment form various routes of exposure as compared to the controlled industrial processing. General municipal waste disposal may cause the transfer of risks to soil and water. The risk profile relies upon a certain material, process, exposure route, and local controls; a hazardous substance remaining listed in a device alone does not

constitute the degree of actual human exposure in Dhaka (Priyashantha *et al.*, 2022).

The capacity of institutions impacts each of these stages. Rules should specify who does the collecting, transportation, dismantling, treatment, monitoring and paying (Parvez *et al.*, 2022). The involvement of producers can fund the collection and enhance product information. Access and coordination of existing waste services can be done by the municipal authorities. In areas with equipment and skilled personnel and final purchasers, materials can be safely separated by specialized recyclers. Monitoring authorities should ensure that there is a check on environmental performance and that an observed handover does not translate into an untraced handover to dangerous processing (Ankit *et al.*, 2021).

The State consciousness of citizens is not purely an attitudinal in nature, but quite practical. Citizens should be made aware that electronic waste must be sorted out, although this may not be much unless there is easy access to collection points and valid incentives (Roy, Islam, *et al.*, 2022). In the same vein, a device can be quickly transferred into an ineffectively monitored chain due to a monetary incentive without bottom-up management (Ahmed *et al.*, 2022). The outcome of interest is the proportion of equipment supplied into the traceable and safe system and not whether respondents report that they are aware of electronic waste. The proper study would monitor the mentioned knowledge and real disposal pathways (Rahman *et al.*, 2020).

In this work, a four-part analytical framework is applied, which includes generation and storage; collection and transfer; processing and residual management; and governance between these stages (Malak *et al.*, 2022). The model separates data available in the field, assumptions in estimations and suggested interventions. The thesis discusses institutional preparedness, legal implementation, and awareness of the people as candidate explanations of management performance. No respondent level data, validated constructs, or statistical estimates of association are provided and therefore they are considered here as organizing concepts and not statistically determined determinants (Rimantho, 2021).

Another difference is that of recovery, reuse and final treatment. Repair and reuse can delay the disposal stage and maintain the activity of the product; dismantling provides fractions of the materials and components; specialized recovery converts concentrated fractions into secondary raw materials (Strobl *et al.*, 2021). Every step can relieve stress on first resources, and every produce residue. A city plan must emphasise safe reuse when possible and the safety of workers in dismantling, recover value under controlled conditions and record the fate of unrecovery material. The recycling environmental argument is conditional, based on these controls (Jain *et al.*, 2023).

MATERIALS AND METHODS

The paper is a secondary rewriting of an original mixed-method dissertation (Laser, 2020). The thesis outlines citizen questionnaires on equipment use and disposal, semi-structured interviews with service providers and institutional informants, field and site visits, and policy and review of other documentary material. Descriptions cover Elephant Road electronics markets, Nimtoli and Dholikhal trade or processing areas, Mirpur, and municipal areas in Dhaka. The case account on an institutional basis is on Azizu Recycling and E-Waste Company Limited. These streams of data can be used to conduct a qualitative analysis of recorded practices and critically analyze numerical table.

There are major limitations to the documentary record. It does not mention a uniform survey sample, all field activities dates, sampling frame, response rate, questionnaire responses by item, transcribed interview corpus, code audit trail, or ethical approval. The methods chapter encompasses the planning language in the future tense and the account of the visits done. We thus are not giving percentages of citizen awareness, direct quotes of unnamed interviewee, causal effects, significance tests, and assertions of representativeness. The facts testify to a descriptive case study and cannot be an inference on the residents of Dhaka.

To synthesize quantitatively we transcribed the table of the mass of devices and their lifespan used in the thesis, the historical series of waste-generation, and a metal-value example. Where input values were present, we verified arithmetic and stored the period and units as printed where there was uncertainty. The waste-generation table gives the result of this as Mt/day, whereas the narrative presents the result as tonnes per day; in this paper, the tonnes per day is tentative and the source-label ambiguity is noted (He *et al.*, 2022). The final column is denoted by the number kg/inch. and does not have a unit that is interpretable, hence, it is not included in the analysis. Population statistics are only reproduced where necessary since no reproducible estimation model was given in the document.

In the case of the economy, we can single out one tonne of printed circuit boards against one tonne of mixed computer equipment. The metal-content and revenue table is the former whose denominator is complete computers and printers but the surrounding text is that of complete computers and printers. The table sums up nominal metal prices as at a given date, 15 September 2021. It does not indicate the procedure of assays, the number of useful boards per discarded device, the recovery rate, an expenditure on labour and capital, the energy used, transportation, management of hazardous-residues, or the price of selling the boards. These exclusions render a profit, return-on-investment, or citywide revenue estimate. The qualitative analysis silenced statements into collection and repair, manual dismantling and downstream transfer, institutional responsibilities, environmental protection, and financing (Barua *et al.*, 2020). Findings that are explicitly

observed in the thesis are reported as source-based findings. Reported operator statements are not considered measurements but are reports attributed to the operators. Recommendations are known as policy proposals. This division minimizes the possibility of misconstruing a proposed capacity, an estimate of an interviewee, or a past projection with a modern observable result.

RESULTS AND DISCUSSION

Work and materials flows and practices observed

Electronics markets, small collection shops, informal dismantling sites, and personal recycling activity are all found in the field account as significant nodes. The account sets repair and resale as onward uses of some devices and other units are divided into component and material fractions (Barua *et al.*, 2020). The interviewed private operator stated that he collected around 4 -5 tonnes of electronic waste on a daily basis, but he has no weighbridge documentation or time of observation. This figure refers to a single reported operation; it cannot be extrapolated to the overall production of Dhaka or the volume in formal control.

The deconstruction was characterized as mostly manual. Operators said that they took away cables and metals exposed and pulled parts viewed as unsafe. According to one of the answers, during the interview, the operator had a special metal-separation plant that was not accessible, and there was a situation that some of the materials were exported to be further processed. These assertions indicate a separation of local collection or upstream processing and focused downstream recovery. They are also establishing a traceability question: the local account fails to determine the identity, capacity, or environmental compliance of all subsequent recipients.

The thesis has named the views of municipal disposal and landfill sites, but it says that the separated electronic waste was not found at the municipal landfill sites that were visited (Shevchenko *et al.*, 2021). This point should not be interpreted as evidence that there is no electronic waste that is added to mixed municipal waste. It only states that there was no different stream of e-waste that was recorded in the field account. Likewise, reports of an informal market determine the presence of trading and dismantling activities, but not the ratio of city-wide quantities of waste managed by the participant.

Equipment mass and useful life

The assumptions of all the devices that have been reproduced in the thesis are compiled in Table 1. These are indicative input values and not measured averages of a sampled Dhaka product inventory (Shahabuddin *et al.*, 2023). The ranges also have very divergent product generations. A TV set with a 25-inch cathode-ray tube weighs so much more than a small mobile telephone that the contents of the discarded ones have a strong impact on tonnage when all things stay the same as the number of discarded units.

Lifespan figures would only be able to support the

Table 1: Indicative equipment assumptions reproduced from the thesis

Equipment	Assumed mass	Assumed life
Desktop computer	18.80 kg	2–4 years
Laptop computer	2.15 kg	2–3 years
Mobile phone	0.10 kg	1–3 years
32-inch LED television	11–14 kg	5–13 years
50-inch television	15–25 kg	5–13 years
25-inch CRT television	45 kg	5–13 years

modelling of scenarios in such a way that the product stocks, purchases, repair, storage and collection rates were also subject to independent determination. They fail to show how all devices are wasted after a predetermined duration of time. Particularly, the source does not provide any justification to weight an average lifespan by product types (Roy, Alam, *et al.*, 2022). The ease of replacement of phones and computers could encourage higher rates of possible disposal, whereas the bulk of televisions is significantly greater, and a smaller number of televisions may add a lot of tonnage. The fact that purchases were associated with local waste generation thus still is a problem.

Historical generation estimates

The thesis claims an increasing trend in 2012-2021, provided in Table 2 at few intervals. Values increase from 5.38 in 2012 to 17.46 in 2021. The implication is around 3.25 though the original lacks measured collection documentation or a reproducible device-stock calculation that would determine the series to be an observed inventory. The given 2021 estimate seems to be based on the older entries with an unexplained adjustment. It is to be understood as an approximate historical forecast and not a proven statistic.

The difference between generated and collected waste lies

Table 2: Selected entries from the thesis generation series

Year	Thesis estimate (tonnes/day, provisional)
2012	5.38
2015	8.00
2018	12.13
2019	14.00
2020	15.61
2021	17.46

at the core. Generation is defined as the equipment that is discarded or on its way to waste pathways at a given

time. Collection refers to the quantity that is supplied to an individual network. The 45 tonnes a day of a single operator is not sufficient to confirm or deny the projected city total due to the lack of knowledge of collection catchment, duplication, time period, and product mix. There are also no uncertainty intervals, sampling basis, and comparison to municipal records given in the table. It has value in that it is a way of demonstrating the problem of planning, and of encouraging measurement, rather than in the quantification of an established trend (Raghavendra T S *et al.*, 2023).

Metal-value calculation

Table 3 replicates the nominal machine of PCB per-tonne of the thesis. The gross value listed is dominated by gold and palladium. The seven revenue lines with the use of the printed values amount to BDT 2,393,872.08, which is the same as the declared amount. The arithmetic agreement does not justify either the supposed concentrations of metals or the market prices. Neither does it specify the quantity of PCB that can be derived out of a tonne of mixed devices. The numbers represent a hypothetical valuation of a specific content of a material at historical prices.

Table 3: Historical illustrative gross metal valuation per tonne of printed circuit boards

Recovered item per tonne PCB	Assumed quantity	Gross value (BDT)
Gold	390 g	1,642,563.00
Palladium	90 g	526,039.20
Silver	1.5 kg	92,092.60
Copper	190 kg	95,874.00
Lead and tin	31 kg	8,378.68
Aluminium	145 kg	17,324.60
Other metals	Assumed	11,600.00
Total		2,393,872.08

Discussion

The overall outcome is an organizational incongruence. The markets in Dhaka can store, refurbish, repurpose and re-manufacture devices and meaningful collection is reported by a private operator. However, this thesis fails to record a pathway throughout a city where users can dispose of their waste and have it finalized through a certified treatment facility (Mowla *et al.*, 2021). Market action exhibits a possible collection base without of itself providing protection against the hazardous exposure. These missing components are common classification, intake records, safe-processing requirements and responsibility of transfers outside of the first collector. One of the potential methods of transporting stored or discarded devices into a regulated chain is by using economic incentives. Formal handover could be more

appealing with a deposit or repayment; an agreement with current collectors might be motivated by providing functioning equipment and separated hazardous materials. The payment should however be pegged on traceable delivery and compliant processing. Only recoverable metals would favour valuable fractions and plastics, glass, batteries, and contaminated residues would lack a destination with a funded destination. The PCB case study shows the attractiveness of concentrated material although its gross cost is not a business model of a complete municipal waste system.

A feasible urban model might start with registered collection points within convenient markets and municipal institutions. Intake must include product category, approximate weight, type of origin, date of handover and receiving processor. Registered aggregators would be able to maintain the current trade relationships and work with basic storage and transportation requirements (Romana Afrose Meem *et al.*, 2021). Disassemblers would require employee education, appropriate personal protective gear, dust and breakages, and separate containers of batteries, lamps, screens, boards, and others. Documentation would be needed on destination and method of treatment in downstream transfers. These are suggested controls, rather than practices that have been practiced throughout Dhaka in the source.

The specialization of institutional functions is needed. Local access can be coordinated by the municipal authorities to ensure that separated e-waste is not reintroduced in a mixed waste. The environmental authority is able to establish technical, inspection timelines and reporting regulations (Ogunseitan, 2022). Financing, product information and take-back infrastructure can be made by producers and importers. Recyclers are able to document the inputs, outputs, residuals, and occupational safeguards. A multiagency structure requires a lead agency and common reporting structure; nominal responsibilities should be assigned to agencies without a check on how these duties can be verified would create a duplication of fragmented responsibility.

The thesis suggests a pilot processing capacity of five tonnes/day and draws a sketch of government-to-government coordination or a facility operated by a trade-association as alternative institutional pathways. These are suggestions, not a review of options. A baseline waste audit, feedstock contract evaluation, site specific environmental examination, occupational risk evaluation, and open financial analysis should be followed by a pilot decision (Ghulam & Abushammala, 2023). The pilot should be able to measure his success in the form of confirmed collection, safe treatment, diversion of the hazardous fractions, protection of the workers and audited residual disposal, as opposed to throughput alone. The historical projection and commercial estimate also illustrate the importance of data governance as the same way treatment hardware is significant. A register of weight by category and source would enable generation estimates to be made in comparison with actual

collection. Periodic household surveys would be able to recognize all the devices kept at home, causes of non-return, and access barriers (Soesanto *et al.*, 2023). Facility audits might determine the proportion of incoming mixed equipment that is converted to reusable products, marketable materials, hazardous fractions, or disposal. A typical mass-balance form would show missing material and would discourage unsubstantiated self-reported full recycling.

It should be proportional when it comes to interpretation. In the qualitative material, there is no indication of how awareness, legal implementation, and institutional preparedness are predictors of management efficiency. It does not dismiss possible points of failure and makes a record of what actors characterize. The next study may establish measurable constructs, articulate sampling and recruitment, report the item-level responses, and test the association that would be necessary in some instances. This analysis would be used to supplement physical-flow records rather than to substitute them due to the difference between stated awareness and actual collection (Urme *et al.*, 2021).

Interpreting Recovery Potential

The recovery of the materials ought to be measured by a mass balance as opposed to the quotation of a single commodity. When a tonne of mixed devices reaches a facility, its printed circuit boards constitute just one portion of the intake (Nadiruzzaman *et al.*, 2022). Any metal in such boards can be recovered at a further fraction, and the actual recovery is even less when processing losses happen. All the denominators should be mentioned. An illustration is gross value/tonne of computer boards cannot be directly multiplied by the weight of computers received. Further still, a quotation of a price of a metal does not always translate to the price being paid of a scrap fraction the purity and assay of which has not been certified. An acceptable feasibility study would quantify measurements of inputs per type of device, weighing separated fractions, acquiring laboratory assays where necessary, recording refining yields, and actual invoices. The description of about 53 computers and printers per tonne in the source is an illustration where the weight is assumed to be 18.80 kilograms per assembled unit. The surrounding text treats a computer, its peripherals and a printer as one unit, whereas Table 1 allocates the same 18.80 kilograms to a desktop computer. The assumptions can thus not be harmonized unless a new definition of the equipment bundle. The printers are also not certain whether they have the same valuable board fractions as computers in the scenario. The illustration emphasizes that the number of units and mass should be connected and are not to be used as an established bill of materials in engineering (Vishwakarma *et al.*, 2022).

Another concern is the value ownership along the chain. Each household, repairer, brokers, dismantlers, transporters and specialized processors cost and demand payment. High-value materials can be sold to buyers

who will provide the highest instant price, and low-value hazardous components will be retained by the actor who is the least in a position to dispose of it correctly (Ibrahim Mohammed, 2023). The environmental cost aspect of the transaction should be brought to the fore in regulation. Collection contracts may contain the purchase prices of recoverable fractions as well as payments of safe handling of residuals. It would be possible to record the recipient of each fraction and conduct audits of both streams.

Reuse must be counted separately. An operating computer sold to be put back into use is not the same as an untested broken machine that was sold or transferred with a reuse label. To create actual reuse, testing, documentation of repair, and justifiable market demand are required (Seif *et al.*, 2023). Provided a device is not able to pass the test, the treatment it will receive should still be traceable. The thesis makes the right observation of the repair market activity, but does not provide data on the survivability of repaired units, the quality of testing, and the amount of residual waste produced during refurbishment. These are appropriate outcome measures of a pilot to come.

Governance and Implementation Sequence

Progressive plan would allow Dhaka to obtain experience through records of operational data prior to capacity-building around questionable generation estimates. In an early due diligence stage, municipalities and environmental control agencies might map large markets, permitted plants, equipment on hand, and established disposal locations. Weight and condition on intake would be captured in structured spot audits (Priyashantha *et al.*, 2022). A latter gathering stage might present identifiable and definite return locations and understanding with reassigned dealers. Authorities should only size a central treatment facility when the amount and the content of material have been measured and only negotiate specialized downstream contracts. Such an order would minimize the risk that a historical projection of nominal processing capacity is established that is not reliable.

The transition is centred on workers. Informal dismantling is not merely a regulatory category, but rather a source of income based on an in-depth understanding of the devices and local purchasers. Training programmes need to state the components that can be safely stripped using existing equipment and the way that broken batteries and screens have to be isolated and when a facility must cease processing a material that it cannot safely treat (Parvez *et al.*, 2022). Incidents, replacement of protective equipment and storage limits must have clear procedures by supervisors. It is possible to evaluate performance by observation and transfers recorded rather than just by one registration certificate.

Spatial constraints should also be dealt with in the institutional structure. Incidents of collection within high-density business areas should be equipped with safe storage facilities, fire safety, and a regulated traffic movement and timely transportation. A downstream plant should have a suitable location, equipment and

environmental protection (Ankit *et al.*, 2021). The thesis refers to a one-acre location and different shed sizes as the operator recommendations; however, these are not a design requirement. Site requirements are to be based on the actual throughput, product mix, fire and ventilation evaluation, utilities available, land use around and quantities of hazardous fractions that are likely to accumulate.

Communication of the people should outline a specific action: what is accepted, batteries or accessories do not have to be removed, in which places devices can be turned over, is there any payment to be made and how personal information is kept safe (Roy, Islam, *et al.*, 2022). Messages that dwell solely on the general environmental danger may also be a cause of concern without behavioural change. Follow-up measurement might compare the volumes of returns prior to and after the communication and household interviews might be used to determine the residual barriers. The following are programme evaluation hypotheses; the current thesis lacks estimate of behavioural effects.

A few operational indicators with clear denominators are required to monitor. The examples can be kilograms received by category per collection point and month, percentage of received items with an identified origin, share of tested to be reused, tonnes of each fraction by a specific destination, hazardous residues sent to approved treatment, and incidents of workers per hour of operation. These measures could be verified against purchase records, transportation documents and physical stocks. Aggregated results should be published to allow public examination but not the individual transaction, which is commercially sensitive.

Policy Implications and Research Priorities

A documented collection-to-treatment chain is a policy priority in the near term. The scarcity of available return sites will be able to provide credible operational data and enable authorities to optimize specifications packaging, storage, and transport (Ahmed *et al.*, 2022). The design of registration requirements should involve existing repair and scrap businesses since they already work with devices and can provide most of the collection network. The participation ought to be based on viable compliance milestones and inspections on actual practices. A system without current collectors not provided to make an accessible alternative is likely to record waste flows beyond it.

Second in priority are low-value and hazardous fractions financing. Copper and concentrated circuit board sales can offset some of the chain, which are variable and skewed in the types of products (Rahman *et al.*, 2020). The cost of safe residual treatment should be provided in advance by the producers or contract collection or service charges, or a combination of these. The data of cost required to choose or price a certain mechanism is not available in the source. Staff, protective equipment, transport, and facility controls, downstream treatment,

and monitoring, and audit costs should all be considered as part of any financial model.

Measurement is a third priority. The estimation of citywide generation must be based on a clear population and device-stock approach and compared to the collection records. Equipment that is kept in the house, business, or institution and equipment that is being kept in storage or being reused should also be sampled (Malak *et al.*, 2022). There should be seasonal and market specific variation. Published estimates must differentiate tonnes produced, tonnes into formal collection, tonnes refurbished, and tonnes recycled, and tonnes eventually discarded. Such vocabulary would not allow the various daily receipts of an operator to be shown as the total waste output of the city.

The living condition of both workers and households should also be looked into in the future. Equipment, ventilation, protective practices, damaged batteries and screens, transfer records can be documented on-site. Interviews may describe why companies prefer specific purchasers and why residents use, sell, give away or dispose of devices (Rimantho, 2021). Life follow-up of a pilot would decide whether registered collection would substitute unsafe handling or it would simply establish a parallel system. Health effects cannot be measured in any manner other than by exposure measurement and a suitable study design; the descriptive hazard table in the thesis cannot measure these effects.

Limitations

The theory is not a wholesome archival data. It lacks tabulation of its survey results; it lacks the number of respondents and informants and the area and date of observation of the site is not fully reported. Certain paragraphs report on suggested processes as opposed to analysis that has been carried out (Strobl *et al.*, 2021). Estimates of life cycle of the devices, future waste generation in a city and the amount of metal do not have enough provenance to be replicated in the future. The generation table has a questionable unit, and the metal table overlaid with an incongruent mixed-computer example. Such gaps invalidate representative prevalence estimates, causal inference, and specific economic forecasting, and statements about current circumstances.

The current article is thus a synthesis that is critically restricted. It maintains the recognizable field observations and only states numerical examples, with their assumptions and limitations. Its governmental system is a rational suggestion on the issues found in the thesis but not an intervention the impacts of which have been tested. A current investment appraisal must not be prepared using historical prices and estimates, unless using fresh market, compositional and cost information.

Evidence Needed for Journal Submission

The submission of a journal would be accompanied

by a complete account of the original fieldwork that is audible. The authors ought to present data collection year and period, eligibility criteria, sites of recruitment, individuals approached, those who filled out the questionnaire, the types and number of the interviewees, as well as questionnaire contents (Jain *et al.*, 2023). In the event of consent or institutional review procedures, they should be explained in an accurate way. Provided that such records are not recoverable, then the article should be a descriptive case synthesis and not pride itself as a survey-based estimate of the behaviour of residents. This paper adheres to the latter option since the thesis fails to provide the relevant information.

Similarly, the financial figure also entails having a documented source with respect to the individual metal concentration, price per unit, and conversion. To provide the example with a significant amount of strength the local board fractions are to be independently assayed or a defensible compositional dataset published (Laser, 2020). An appropriate economic analysis would indicate that quoted prices are actually buyer quotations or spot prices, they would include recovery losses, and they would indicate the sensitivity to varying prices and processing costs. Those inputs are essential to a mathematically sound sum that may form an unrealistic expectation of revenue.

The manuscript has sequential IEEE-style citation markers as requested, and the provided thesis lacks thirty recoverable, identifiable bibliographic entries individually. Each marker has to be matched to a real source and a reference record before being submitted to a journal that will need the verification of the source. The absence of a reference list in this case adheres to the requested format and leaves the bibliographic verification without.

CONCLUSION

The thesis portrays a dynamic yet disorganized e-waste situation in Dhaka. Pathways already exist in repair markets, collectors, manual dismantlers, and private recyclers to recover value. With their presence, there is a chance of a controlled chain, but the data does not indicate that all the material gathered is handled safely, and that citywide generation was quantified. The estimated 2012/2021 values and the PCB valuation should be used as planning examples with boundaries on display.

A successful response would be the connection between available collection, identification of already existing traders, protective dismantling guidelines, checked downstream remedial and defined institutional obligations. Records and safeguards designed to make outcomes observable should be a starting point of a pilot. The system can then be tested by subsequent surveys, material-flow audits and cost studies whether it is enhancing the collection process and minimizing unsafe handling. Until such evidence can be provided, it is the best inference, that Dhaka requires a traceable

and responsible e-waste route that is both able to capture material value as well as address the hazards that recovery cannot.

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