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Household Solid Waste Management and the Composting-Utilisation Gap in Mawlai Kyntonmassar, Shillong, Meghalaya, Northeast India

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Abstract: ***Household solid waste (HSW) constitutes the dominant fraction of municipal solid waste in the hill towns of Northeast India, yet the household is the level at which waste management is least well characterised. This study examined HSW generation, segregation, disposal, recycling and composting practice in Mawlai Kyntonmassar, a peri-urban locality of the Shillong Urban Agglomeration in East Khasi Hills district, Meghalaya. A structured questionnaire was administered to a simple random sample of 127 of the 402 owner-occupied households (31.6%) across the locality's three blocks, of which 122 returned complete responses. Households generated an estimated 1.21 kg of waste per day, equivalent to approximately 0.22 kg per capita per day and about 0.48 t d^{-1} for the locality as a whole; 78.7% reported generating plastic, paper and organic waste together. Municipal collection served 45.9% of households and private operators a further 25.5%, while 17.2% burned and 11.4% openly dumped their waste. Although 59.5% of households reported segregating waste on an organic–inorganic basis, only 48.7% disposed of it separately, and the collection fleet consolidates segregated streams into a single vehicle, nullifying source separation. The central finding concerns composting. While 73.1% of households composted organic waste, overwhelmingly at home (83.2%), only 35.5% reported converting that compost into manure and only 29.0% actually used the manure they produced; 76.6% did not sell compost at all. Household composting in Mawlai Kyntonmassar therefore functions principally as a volume-reduction strategy rather than as nutrient recovery, and the productive potential identified in the study's premise remains largely unrealised. Awareness of waste management rules stood at 63.0%, and 77.6% of households expressed willingness to pay for improved collection, two-thirds of them at Rs 100 per month - a latent revenue of roughly Rs 4.5 lakh per year for the locality. Respondents identified awareness building (42.9%) and stricter penalties (31.1%) as the highest priorities. We conclude that the binding constraint in Mawlai Kyntonmassar is not household willingness but the absence of a segregated collection chain and of any downstream demand for household compost, and we propose measures to close both gaps.***

Keywords: Household solid waste; source segregation; home composting; willingness to pay; Shillong Urban Agglomeration; Dorbar Shnong; Meghalaya.

I. INTRODUCTION

Solid waste is conventionally defined as any waste substance that is neither liquid nor gaseous, although the term also extends to containerised liquid and gaseous wastes. Municipal solid waste, agricultural residue, industrial waste, thermal power plant ash and hazardous waste all fall under this umbrella (Goel, 2008). Within municipal solid waste (MSW), household solid waste (HSW) is the fraction generated at the domestic level and is composed principally of plastics, paper, glass, metals, organics and wood.

The consequences of poor HSW management are both direct and indirect. Direct consequences range from material deterioration and loss of aesthetic value to impairment of human health, with substantial socio-economic costs. Indirect consequences operate over longer horizons and include alterations in ecosystem structure and behaviour and, ultimately, contributions to climate change that feed back into the socio-economics and sustainability of the affected area (Hakami and Abu Seif, 2015). Sound HSW management is therefore a precondition not only for public health and environmental quality but for the conservation of the material resources embedded in the waste stream. Shillong illustrates the problem in acute form. The Shillong Urban Agglomeration and its surrounding villages now generate on the order of 196 tonnes of solid waste per day, of which roughly 160–171 t d^{-1} is transported to the single disposal site at Marten, Mawiong - a facility operating continuously since 1938, spanning about 18 acres, and leased from the Forest Department on an extension that expires in 2026 (Shillong Times, 2024; India Today NE, 2025). A significant share

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of the waste that arrives there is unsegregated, which impairs the performance of the co-located compost plant and forces otherwise recoverable material into the landfill. Beyond the Shillong Municipal Board area, responsibility for collection and disposal rests not with a municipal authority at all but with the Dorbar Shnong, the traditional village council - an arrangement that gives customary institutions decisive influence over household waste behaviour.

Studies of household waste behaviour across a range of settings converge on a consistent structure. Organic matter dominates the household stream, whether in Tabriz, Iran, where the high moisture content of food waste depresses the calorific value below the threshold for efficient incineration (Benis et al., 2019); in Harare, Zimbabwe, where organic waste constituted the majority of household refuse and non-organic fractions were seldom collected (Jerie and Tevera, 2018); or in the towns of Manipur, where organic waste exceeded paper and plastic and leather was least generated (Singh et al., 2015). Segregation practice, however, is uneven. In Panji, Kota Bharu, Malaysia, 50.3% of households separated their waste while 49.7% did not, even though 95.9% were aware that poor waste management transmits disease (Fadzullah et al., 2022). In rural Koraput, Odisha, separation of biodegradable from non-biodegradable waste was practised by only 3.63% of households, with 90% burning kitchen waste and 80.9% dumping it in the open, while composting reached just 4.5% (Mohanty et al., 2019). In Trivandrum, by contrast, 47% of households used compost bins, though 26% remained unaware of recycling and waste reduction (Babychan, 2022).

These studies establish that awareness, segregation and composting vary independently of one another, and that high adoption of one does not guarantee the others. What they do not resolve is what happens to household compost once it has been made. The stated premise of the present study was that domestic solid waste in Mawlai Kyntonmassar could be converted into profitable recyclable material or compost. Testing that premise requires following the material not only to the compost pit but beyond it - to the question of whether the compost is converted into manure, whether the manure is used, and whether any of it is sold. The objective of this study was accordingly to characterise household solid waste management in Mawlai Kyntonmassar with specific attention to the fate of the organic fraction, and to identify the constraints that stand between current practice and productive resource recovery.

II. MATERIALS AND METHODS

A. *Study Area*

Mawlai Kyntonmassar is one of the villages constituting the Mawlai constituency, in the northern part of Shillong, East Khasi Hills district, Meghalaya. The locality is predominantly residential and combines urban and semi-urban characteristics. It is divided into three administrative blocks - A, B and C - all of which were surveyed. There are approximately 402 owner-occupied households.

The locality lies outside the jurisdiction of the Shillong Municipal Board. Waste management is therefore administered by the Dorbar Shnong, the traditional village council, which plays a central role in community governance and exerts direct influence over household practice in segregation, disposal, recycling and reuse. Two features of the local context bear directly on the results reported below. First, waste collection in the locality is served by a single vehicle, into which organic and inorganic fractions are consolidated regardless of any separation performed at source. Second, Mawlai Kyntonmassar lies in the same locality complex as Marten, the Shillong Urban Agglomeration's only disposal site; residents are thus simultaneously producers of waste and neighbours to its terminal destination.

Population growth in Mawlai Kyntonmassar has driven a steady increase in household waste generation, while access to routine collection remains incomplete. Many households continue to bury, burn or openly dump their waste. Growing concern about health risk, environmental hygiene and the adequacy of prevailing practice motivated the selection of this locality for study.

B. *Sampling Design*

The study population comprised the 402 owner-occupied households of Mawlai Kyntonmassar. A sample of 127 households (31.6% of the population) was drawn by simple random sampling, ensuring that every household had an equal probability of selection and thereby preserving representativeness and preventing selection bias. This sample size was judged sufficient for reliable inference while remaining practicable within the time and resources available. Complete responses were obtained from 122 households; the remaining five returned partial questionnaires and were excluded item-wise. All percentages reported below are therefore based on n = 122 unless otherwise stated.

C. *Data Collection*

A No Objection Certificate was obtained from the Headman of Mawlai Kyntonmassar before fieldwork commenced. Survey equipment comprised a field notebook, a pen and a mobile telephone used to photograph sites and record GPS positions. All three blocks were covered.

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A structured questionnaire comprising both closed and open-ended items was administered. After recording the respondent's name and household composition, the instrument addressed five domains: (i) household profile, covering household size, type of dwelling and the primary occupation of the household head; (ii) waste generation, covering the types of waste produced and the quantity generated per day; (iii) segregation and disposal, covering the basis on which waste was segregated, whether it was disposed of separately, the route of disposal and satisfaction with the collection service; (iv) recycling and composting, covering participation in recycling, the materials recycled, the practice and method of composting, the conversion of compost to manure, the use of that manure and the price at which compost was sold; and (v) awareness and governance, covering knowledge of waste management rules, willingness to pay for improved collection, the monthly charge considered acceptable and the steps respondents considered most important. Most interviews were conducted in person; responses from households unable to participate in person were collected through a Google Form.

D. Data analysis and derived estimates

Responses were coded and analysed using descriptive statistics, and are reported as percentages of responding households. Two quantities were derived from the banded generation data. Mean household generation was estimated by assigning midpoints of 0.5, 1.5 and 2.5 kg d^{-1} to the bands "less than 1 kg", "1–2 kg" and "more than 2 kg" respectively, yielding 1.21 kg per household per day. Mean household size was estimated by assigning midpoints of 2, 5.5 and 8.5 persons to the bands "1–3", "4–7" and "more than 7", yielding 5.6 persons. Per capita generation follows as approximately 0.22 kg per capita per day, and total generation for the 402 households of the locality as approximately 0.48 t d^{-1}, or 177 t per year. These estimates are sensitive to the midpoint assigned to the open upper band and should be treated as indicative.

E. Treatment of the Source Data

Two response categories in the recycling item - metal and electronic waste - were recorded jointly and are reported here as a single combined category (6.2% of households) rather than disaggregated.

III. RESULTS

A. Household Profile

Households in Mawlai Kyntonmassar are predominantly of intermediate size: 51.6% comprised four to seven members, 27.0% more than seven, and 21.3% between one and three (Fig. 1a; Table 1). Nearly half the sample (49.6%) occupied independent houses, 40.5% rented accommodation and 9.9% lived in apartments (Fig. 1b). The primary occupation of the household head was self-employment for 30.3%, government service for 27.0%, private-sector employment for 22.1%, while 20.5% of household heads were unemployed (Fig. 1c). The locality is thus economically mixed, with a substantial salaried component alongside a self-employed majority-plurality and a non-trivial unemployed fraction - a composition that bears directly on the willingness-to-pay results reported in Section 3.8.

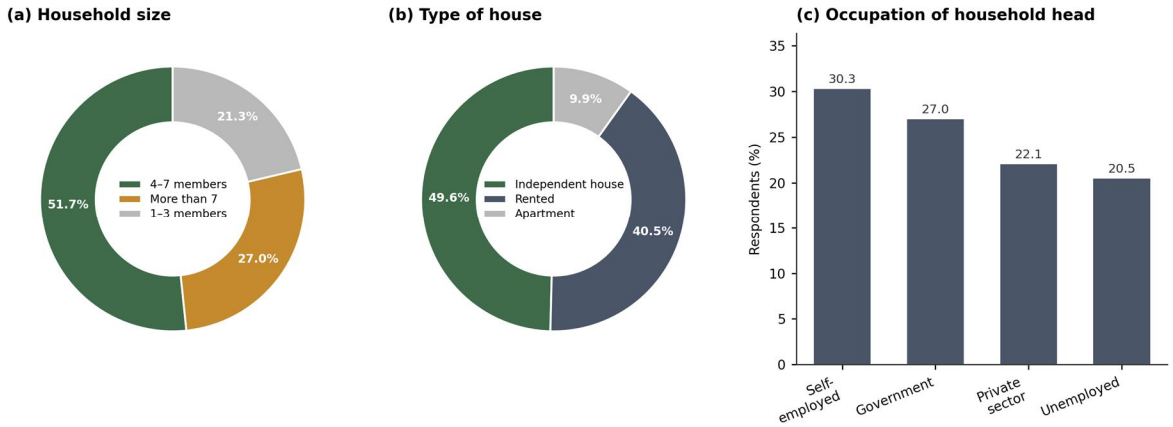

Fig. 1. Household profile of respondents in Mawlai Kyntonmassar (n = 122). (a) Household size. (b) Type of dwelling. (c) Primary occupation of the household head.

Table 1. Profile of surveyed households, Mawlai Kyntonmassar (n = 122).

Variable	Category	Respondents (%)
Household size	1–3 members	21.3
	4–7 members	51.6
	More than 7 members	27.0
Type of dwelling	Independent house	49.6
	Rented	40.5
	Apartment	9.9
Occupation of household head	Self-employed	30.3
	Government service	27.0
	Private sector	22.1
	Unemployed	20.5

B. Waste Generation and Composition

The overwhelming majority of households (78.7%) reported generating plastic, paper and organic waste together; 11.5% reported organic waste alone, 9.0% plastic alone and 0.8% paper alone (Fig. 2a). The household waste stream in Mawlai Kyntonmassar is therefore mixed rather than specialised, which is consistent with the residential character of the locality and which sets an upper bound on what any single-stream recovery intervention can achieve.

Daily generation was modest. Just under half of households (45.9%) produced less than 1 kg per day, 37.7% between 1 and 2 kg, and 16.4% more than 2 kg (Fig. 2b). Applying band midpoints (Section 2.4) yields a mean of approximately 1.21 kg per household per day and, given a mean household size of 5.6 persons, approximately 0.22 kg per capita per day (Table 2). This is well below the 0.34–0.40 kg per capita per day reported for the Shillong Urban Agglomeration as a whole (ADB, 2010; MSPCB, cited in Nongkynrih and Kharlyngdoh, 2018), which is to be expected: agglomeration-wide figures incorporate commercial, market and institutional waste, whereas the present estimate is confined to the domestic stream. Scaled to the 402 households of the locality, total household generation is approximately 0.48 t d^{-1}, or about 177 t per year.

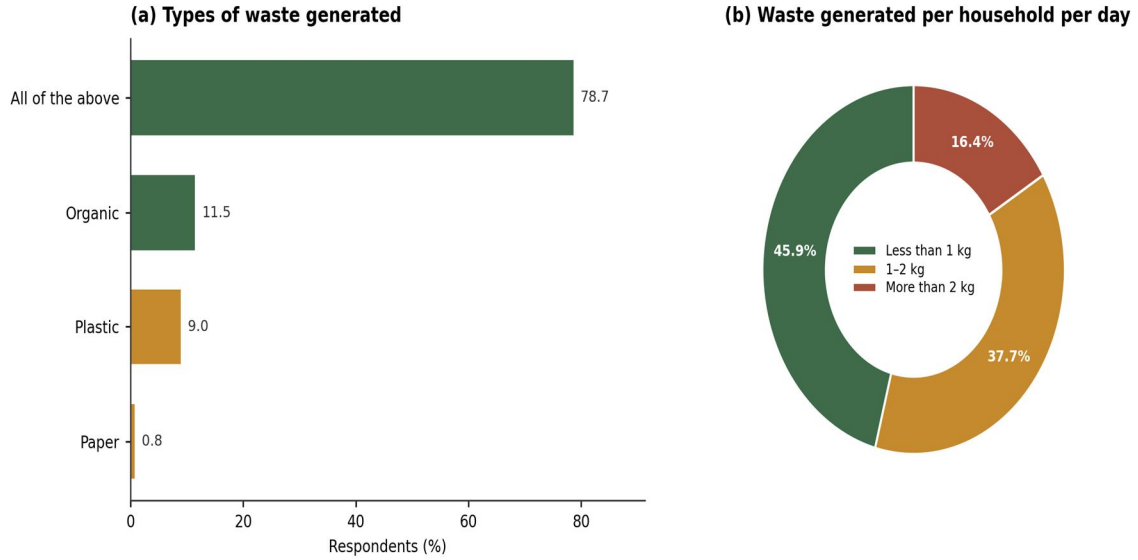

Fig. 2. Waste generation in Mawlai Kyntonmassar (n = 122). (a) Types of waste generated. (b) Quantity of waste generated per household per day.

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Table 2. Waste generation and derived estimates for Mawlai Kyntonmassar. Derived values assume band midpoints of 0.5, 1.5 and 2.5 kg d^{-1} and household sizes of 2, 5.5 and 8.5 persons, and are indicative.

Parameter	Value	Basis
Mean household generation	1.21 kg d^{-1}	Weighted band midpoints
Mean household size	5.6 persons	Weighted band midpoints
Per capita generation	0.22 kg cap^{-1} d^{-1}	Derived
Locality generation (402 households)	0.48 t d^{-1}	Derived
Annual locality generation	177 t yr^{-1}	Derived
Households generating organic waste	90.2%	Organic + all-of-the-above

C. Segregation and Disposal

Of the households that segregated their waste, 59.5% did so on an organic–inorganic basis and 40.5% on a recyclable–non-recyclable basis (Fig. 3a). However, only 48.7% of households actually disposed of their waste separately; 51.3% did not (Fig. 3b). Segregation as a stated principle therefore exceeds segregation as a practice by roughly eleven percentage points.

Municipal collection was the disposal route for 45.9% of households and private collection for 25.5%, together accounting for 71.4% of the sample. The remaining 28.6% relied on routes that place waste directly into the local environment: 17.2% burned their waste in the open and 11.4% dumped it (Fig. 3c). Nearly three households in ten in Mawlai Kyntonmassar therefore have no functioning collection service at all.

Satisfaction with the collection service was nonetheless high among those receiving it: 74.6% expressed satisfaction, 13.9% partial satisfaction and 11.5% dissatisfaction (Fig. 3d). This apparent contentment must be read against the collection arrangement described in Section 2.1. A single vehicle serves the locality, and organic and inorganic fractions are consolidated within it. The 48.7% of households that separate their waste at source therefore see that separation undone at the kerbside. Satisfaction with collection, in this context, measures the reliability of removal rather than the quality of the waste management chain.

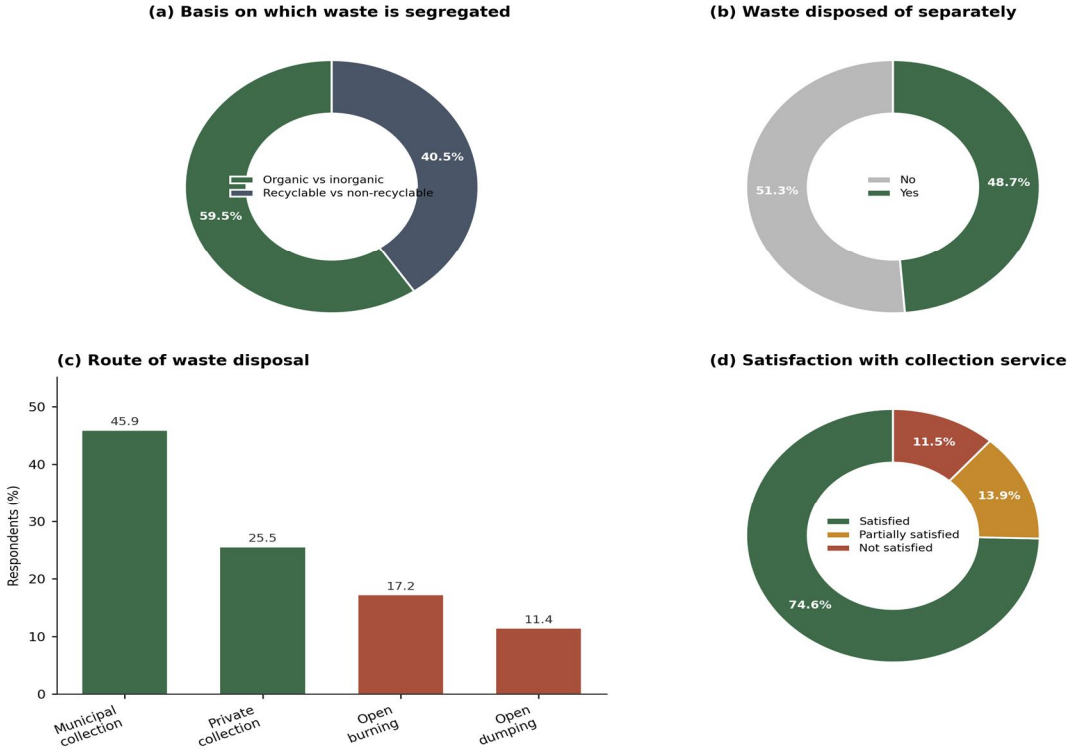

Fig. 3. Waste segregation and disposal (n = 122). (a) Basis on which waste is segregated. (b) Whether waste is disposed of separately. (c) Route of disposal. (d) Satisfaction with the collection service.

Table 3. Segregation, disposal and collection service, Mawlai Kyntonmassar (n = 122).

Variable	Category	Respondents (%)
Basis of segregation	Organic vs inorganic	59.5
	Recyclable vs non-recyclable	40.5
Separate disposal practised	Yes	48.7
	No	51.3
Route of disposal	Municipal collection	45.9
	Private collection	25.5
	Open burning	17.2
	Open dumping	11.4
Satisfaction with collection	Satisfied	74.6
	Partially satisfied	13.9
	Not satisfied	11.5

D. Recycling

Recycling was practised regularly by 38.8% of households and occasionally by a further 38.8%, while 22.3% did not recycle at all (Fig. 4a). More than three-quarters of households therefore engage with recycling to some degree, although the large "sometimes" fraction indicates that the practice is opportunistic rather than routine.

Among the materials recycled, 34.1% of households reported recycling all listed materials and 28.0% both plastic and paper-and-glass; plastic alone accounted for 20.7% and paper and glass alone for 11.0%. Metal and electronic waste together accounted for 6.2% (Fig. 4b). The low figure for metal and e-waste is expected: these fractions have established informal buy-back channels in Shillong and typically leave the household through the scrap trade rather than through any process the respondent would describe as recycling.

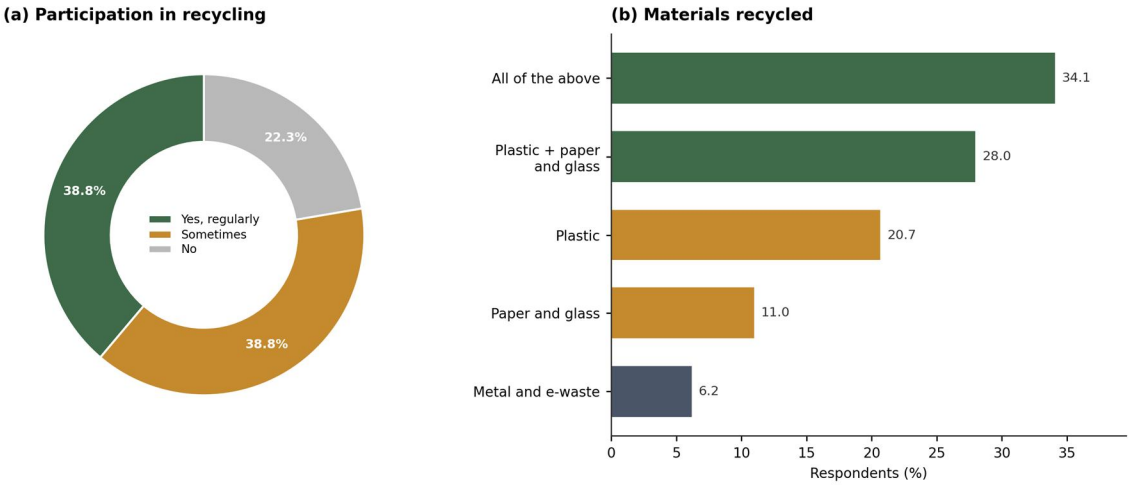

Fig. 4. Recycling practice (n = 122). (a) Participation in recycling. (b) Materials recycled. Metal and electronic waste are reported as a combined category.

E. Composting Practice

Composting of organic waste was widespread: 73.1% of households composted, against 26.9% that did not (Fig. 5a). Of those who composted, 83.2% did so at home and only 16.8% through any form of community composting (Fig. 5b). Household composting in Mawlai Kyntonmassar is thus a private, domestic practice, undertaken at scale but without collective infrastructure.

The subsequent steps in the chain, however, attenuate sharply. Asked whether they converted their organic waste into manure, 35.5% of households answered affirmatively, 32.2% answered "sometimes", 21.5% answered no and 10.8% were uncertain (Fig. 5c). Asked whether they used the organic manure so produced, only 29.0% answered yes; 71.0% did not (Fig. 5d).

The magnitude of this attenuation is the principal quantitative finding of the study. Composting is practised by 73.1% of households; the manure that composting produces is used by 29.0%. Somewhere between the compost pit and the vegetable plot, roughly six households in ten abandon the material.

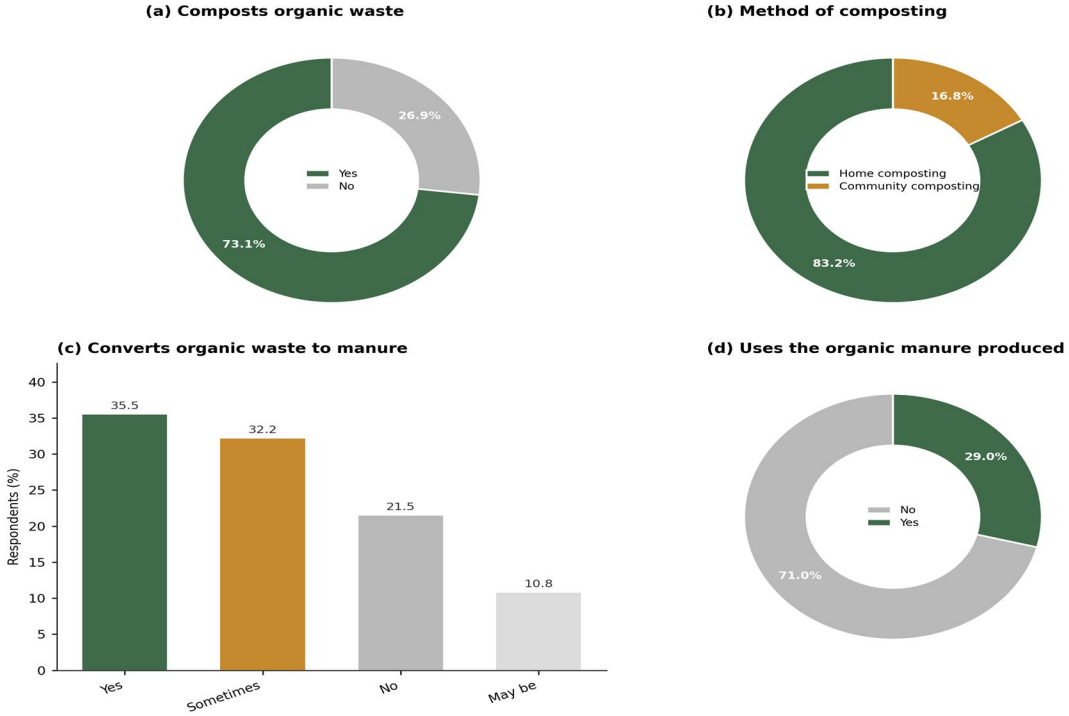

Fig. 5. Composting practice and the fate of the composted material (n = 122). (a) Whether the household composts organic waste. (b) Method of composting. (c) Conversion of organic waste to manure. (d) Use of the organic manure produced.

F. Valorisation of compost

Sale of compost was almost entirely absent. Three-quarters of households (76.6%) reported that the question of a selling price did not apply to them, since they sold no compost. Among the remainder, 10.0% cited a price of Rs 50, 6.7% a price of Rs 25 and 6.7% did not know what price compost would fetch (Fig. 6). No household reported a price above Rs 50.

Household composting in Mawlai Kyntonmassar therefore generates neither a material input to household agriculture in the majority of cases, nor any monetary return in the overwhelming majority. Its function, for most households, is the reduction of the volume of waste requiring disposal.

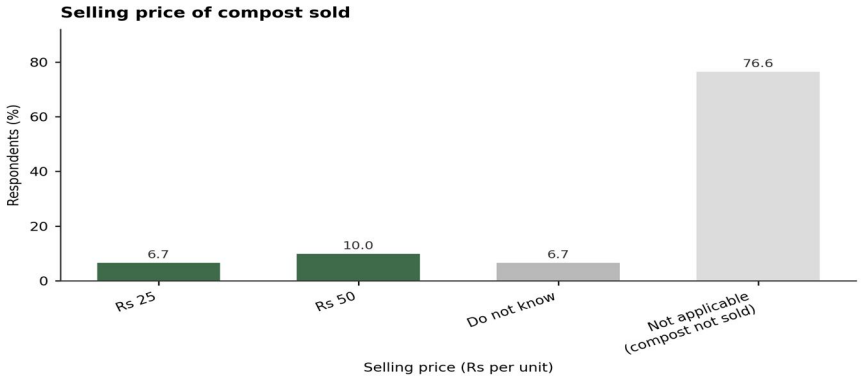

Fig. 6. Reported selling price of compost. The dominance of the "not applicable" category reflects that the great majority of composting households do not sell compost.

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G. Awareness, willingness to pay and priorities

Awareness of waste management rules and guidelines was reported by 63.0% of households, with 37.0% unaware (Fig. 7a). Willingness to pay for an improved collection service was considerably higher: 77.6% expressed willingness and 22.4% did not (Fig. 7b). Among those willing to pay, two-thirds (67.0%) considered a charge of Rs 100 per month acceptable, 20.6% Rs 150, and 12.4% more than Rs 150 (Fig. 7c).

Applying these figures to the 402 households of the locality gives an indicative revenue potential. If 77.6% of households (312 households) paid at the distribution of rates they endorsed - a weighted mean of approximately Rs 120 per month - the locality would raise on the order of Rs 37,000 per month, or approximately Rs 4.5 lakh per year. This is a non-trivial sum against the cost of a segregated two-vehicle collection round.

Asked which step would most improve waste management, 42.9% of respondents named greater awareness, 31.1% stricter penalties, 13.4% the promotion of recycling and 12.6% improved collection (Fig. 7d). It is notable that improved collection - the intervention that the disposal data (Section 3.3) most clearly identify as necessary - ranked last, and that awareness ranked first even though 63.0% of respondents already reported being aware of the rules.

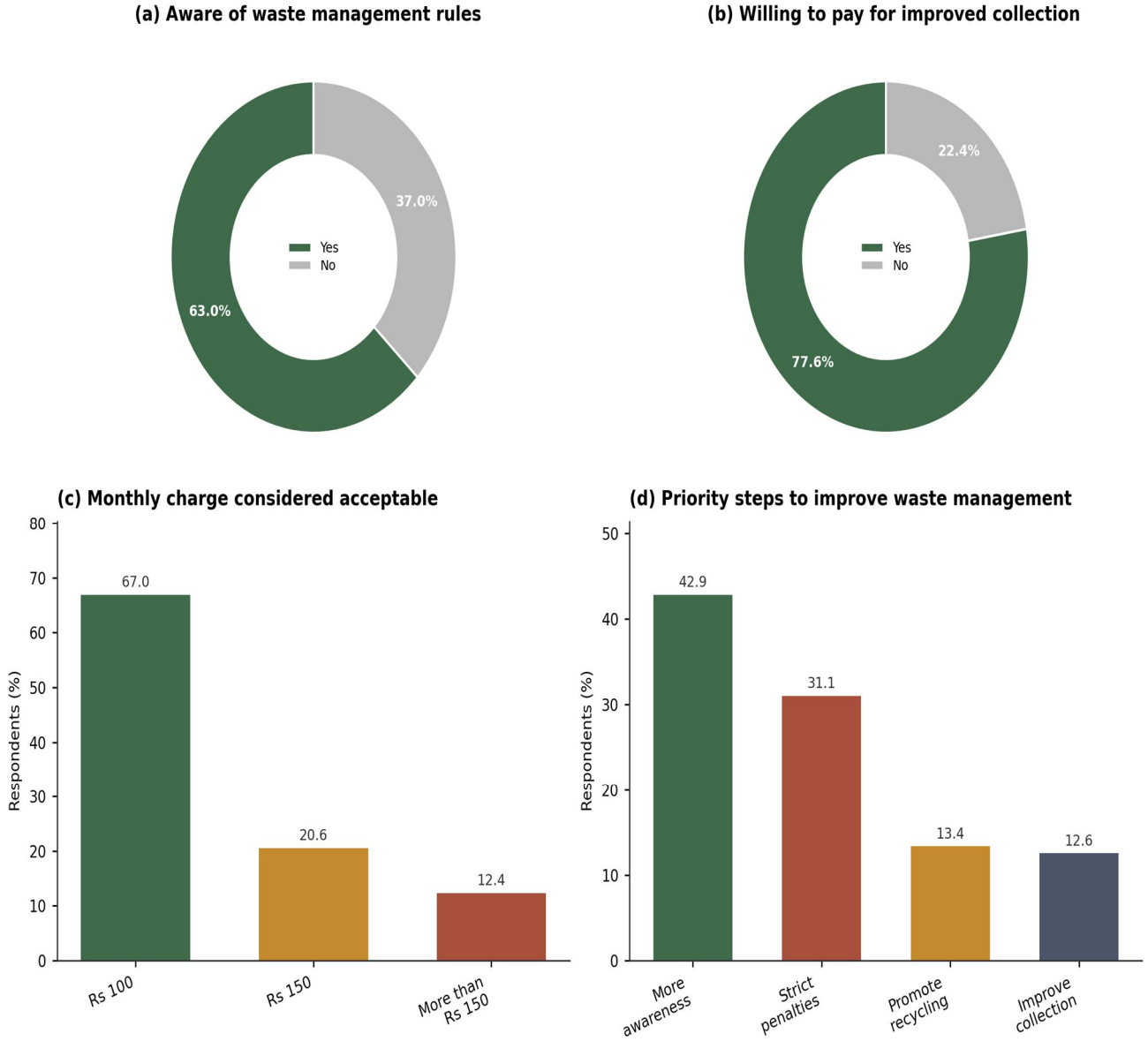

Fig. 7. Awareness, willingness to pay and priorities (n = 122; panel (d) n = 119). (a) Awareness of waste management rules. (b) Willingness to pay for improved collection. (c) Monthly charge considered acceptable. (d) Priority steps identified by respondents.

Table 4. Recycling, composting, awareness and willingness to pay, Mawlai Kyntonmassar.

Variable	Category	Respondents (%)
Participation in recycling	Yes, regularly	38.8
	Sometimes	38.8
	No	22.3
Composting practised	Yes	73.1
	No	26.9
Method of composting	Home composting	83.2
	Community composting	16.8
Conversion of organics to manure	Yes	35.5
	Sometimes	32.2
	No	21.5
	May be	10.8
Use of organic manure produced	Yes	29.0
	No	71.0
Aware of waste management rules	Yes	63.0
	No	37.0
Willing to pay for improved collection	Yes	77.6
	No	22.4
Acceptable monthly charge	Rs 100	67.0
	Rs 150	20.6
	More than Rs 150	12.4

IV. DISCUSSION

A. The Composting–Utilisation gap

The premise of this study was that household solid waste in Mawlai Kyntonmassar could be converted into profitable recyclable material or compost. The data support the first half of that premise and refute the second. Composting is not the constraint: at 73.1% adoption, Mawlai Kyntonmassar composts at a rate far above rural Koraput (4.5%; Mohanty et al., 2019) and well above Trivandrum (47%; Babychan, 2022). What fails is everything downstream of the compost pit. Only 35.5% of households convert the material into manure with any regularity, only 29.0% use it, and only 23.4% - the complement of the 76.6% for whom the question does not apply - sell any at all, at prices of Rs 25 to Rs 50.

Three explanations are consistent with the data. The first is spatial: Mawlai Kyntonmassar is a predominantly residential, semi-urban locality, and households that compost may simply have no land on which to apply manure. The 40.5% of households in rented accommodation and the 9.9% in apartments - half the sample - are unlikely to hold cultivable ground. The second is that composting is being performed as disposal rather than as production. A household that composts to reduce the volume of waste awaiting a collection vehicle has discharged its purpose the moment the material decomposes; whether the compost is subsequently applied is immaterial to that purpose. The near-absence of community composting (16.8%) is consistent with this reading, since community composting only makes sense where the output has a destination. The third is the absence of a market: with three-quarters of households not selling compost at all and a fifth of the remainder unable to name a price, there is no price signal to reward production.

The policy implication is direct and it is not the one the study's premise anticipated. Interventions aimed at increasing household composting in Mawlai Kyntonmassar would push against an open door and would achieve little; the marginal composting household adds compost to a stream that is already going unused. What is required instead is an outlet - an aggregation and offtake arrangement that collects household compost, standardises it and delivers it to a buyer, whether the Marten compost facility, the horticultural nurseries of the Shillong agglomeration, or the Department of Agriculture. Until such an outlet exists, household composting will remain what the data show it to be: a private volume-reduction practice with no productive terminus.

B. Source segregation Defeated at the Kerbside

The Solid Waste Management Rules, 2016 place a duty on every waste generator to segregate waste at source into biodegradable, non-biodegradable and domestic hazardous streams. Mawlai Kyntonmassar performs approximately half of this duty: 59.5% of households can articulate a segregation principle and 48.7% act on it. The figure compares favourably with rural Koraput (3.63%) and is broadly comparable with Panji, Kota Bharu (50.3%; Fadzullah et al., 2022).

It is, however, functionally void. A single collection vehicle serves the locality and consolidates the organic and inorganic fractions within it. Every kilogram separated in a Mawlai Kyntonmassar kitchen is remixed at the kerbside and arrives at Marten as mixed waste, where it degrades the performance of the compost plant and contributes to the roughly 23% of the agglomeration's waste that reaches the landfill unprocessed (India Today NE, 2025). This is a straightforward failure of the collection chain, not of household behaviour, and it produces a corrosive secondary effect: households that segregate and watch their segregation undone have every reason to stop. The 51.3% who do not dispose separately may be responding rationally to what they observe.

That 74.6% of households nonetheless report satisfaction with the collection service confirms that satisfaction is measuring removal, not management. The service is judged by whether the waste leaves, not by what becomes of it. This is a common finding in the literature - Jerie and Tevera (2018) report the same pattern in Harare, where non-organic fractions were generated but seldom collected - and it means that satisfaction data cannot be used as a proxy for system performance.

C. Living Beside the Landfill

Mawlai Kyntonmassar occupies an unusual position: it is a waste-generating locality situated in the same locality complex as Marten, the sole disposal site for the entire Shillong Urban Agglomeration, in continuous operation since 1938 and now receiving on the order of 160–171 t d^{-1} against a design premise that only a tenth of generated waste would be landfilled (Shillong Times, 2024; India Today NE, 2025). Residents of Mawlai have reported foul odour, degraded air quality and concern about contamination of nearby water sources. The households surveyed here therefore bear the external costs of the agglomeration's waste while contributing approximately 0.48 t d^{-1} - less than 0.3% of the total - to its production.

This asymmetry is relevant to the willingness-to-pay result. That 77.6% of households in a locality that hosts the region's landfill are willing to pay for improved collection is a considerable statement of civic commitment, and it should not be read as a routine finding.

D. Willingness to pay and the financing of a segregated round

The revenue implied by household willingness to pay - approximately Rs 4.5 lakh per year across the 402 households (Section 3.7) - is of the right order of magnitude to finance the single missing element in the chain. A second collection vehicle, or a two-pass round with the existing vehicle, would allow organic and inorganic fractions to be kept apart from kerbside to destination. The Dorbar Shnong, which already administers waste management in the locality, possesses both the collection authority and the fee-setting legitimacy to implement this. The constraint is neither money nor mandate; it is that no one has proposed it.

Two cautions attach to the willingness-to-pay figure. It is a stated preference, not a revealed one, and stated willingness routinely exceeds actual payment. And 20.5% of household heads in the sample are unemployed, for whom a Rs 100 monthly charge is not trivial; any fee structure would require a graduated or exempted lower band.

E. Comparison with other Studies

Table 5 situates the Mawlai Kyntonmassar findings alongside comparable household surveys. The locality is a high performer on composting and a middling one on segregation, but the studies compared here do not report the fate of the compost, which is precisely where Mawlai Kyntonmassar's practice breaks down. The composting–utilisation gap may well be a general feature of household composting in residential settings that has gone unmeasured because most survey instruments stop at the question of whether composting occurs.

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Table 5. Household solid waste practice in Mawlai Kyntonmassar compared with selected published studies. Blank cells indicate that the parameter was not reported.

Study area	Source	Segregation (%)	Composting (%)	Dominant fraction
Mawlai Kyntonmassar, Meghalaya	This study	48.7	73.1	Mixed / organic
Trivandrum, India	Babychan (2022)	-	47.0	Food waste
Panji, Kota Bharu, Malaysia	Fadzullah et al. (2022)	50.3	-	Food waste (74.3%)
Koraput (rural), Odisha	Mohanty et al. (2019)	3.6	4.5	Kitchen waste
Tabriz, Iran	Benis et al. (2019)	-	-	Food waste
Harare, Zimbabwe	Jerie & Tevera (2018)	-	-	Organic
Three towns, Manipur	Singh et al. (2015)	-	-	Organic
Jeddah, Saudi Arabia	Hakami & Abu Seif (2015)	-	-	Organic

F. Recommendations

Five measures follow from the findings, ordered by the directness with which they address the constraints identified:

1) Segregated collection before segregated behaviour. The single highest-value intervention is a two-stream collection round, funded from the household charge that 77.6% of respondents have already endorsed. Until the collection vehicle stops remixing the streams, no household-level segregation campaign can succeed, and the 48.7% who currently separate their waste are being asked to perform work that is destroyed on collection.

2) An offtake channel for household compost. Aggregation points at block level, with periodic collection by the Dorbar and delivery to the Marten compost facility, horticultural nurseries or the Department of Agriculture, would give household compost a destination. A guaranteed floor price - the reported Rs 25 to Rs 50 per unit provides a starting reference - would create the price signal that is presently absent.

3) Community composting where household land is absent. Half the sample lives in rented or apartment accommodation and cannot apply manure. For these households, home composting is the wrong instrument. Block-level community composting, currently practised by only 16.8% of composting households, is the appropriate one, and the low current uptake indicates substantial headroom.

4) A graduated user fee administered by the Dorbar Shnong. A charge of Rs 100 per month, with a reduced or waived band for households whose head is unemployed (20.5% of the sample), would raise on the order of Rs 4.5 lakh per year - sufficient to fund the segregated round in measure (1).

5) Awareness reframed. Respondents ranked awareness the highest priority (42.9%) despite 63.0% already reporting awareness of the rules. This suggests that what is lacking is not knowledge of the rules but knowledge of what to do with the organic fraction. Awareness effort should be redirected from segregation messaging - which is already understood - to compost use, compost quality and the availability of the offtake channel proposed above.

V. CONCLUSION

Households in Mawlai Kyntonmassar generate a modest and largely mixed waste stream of approximately 0.22 kg per capita per day, of which the organic fraction is composted by nearly three-quarters of households. On the strength of that figure alone the locality would appear to be a model of domestic resource recovery. It is not. The compost that these households produce is converted to manure with any regularity by only a third of them, used by fewer than three in ten, and sold by almost none.

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Household composting in Mawlai Kyntonmassar is a volume-reduction practice, not a nutrient-recovery practice, and the study's founding premise - that domestic waste here could be converted into profitable compost - is at present unfulfilled not because households will not compost but because the compost has nowhere to go.

The same structure governs segregation. Approximately half of households separate their waste, and a single collection vehicle remixes it. Both failures lie downstream of the household, in the collection chain and in the absence of any market for the recovered material, and both are therefore susceptible to institutional rather than behavioural remedy. The Dorbar Shnong holds the collection authority and the fee-setting legitimacy required; the households have already stated, at a rate of 77.6%, their willingness to fund the necessary service. What remains is to build the two links that are missing - a segregated collection round, and an offtake channel for household compost. Future work should weigh a sorted sample of the household stream to replace the self-reported composition data, and should test whether the composting–utilisation gap documented here recurs in other localities of the Shillong Urban Agglomeration.

VI. ACKNOWLEDGEMENTS

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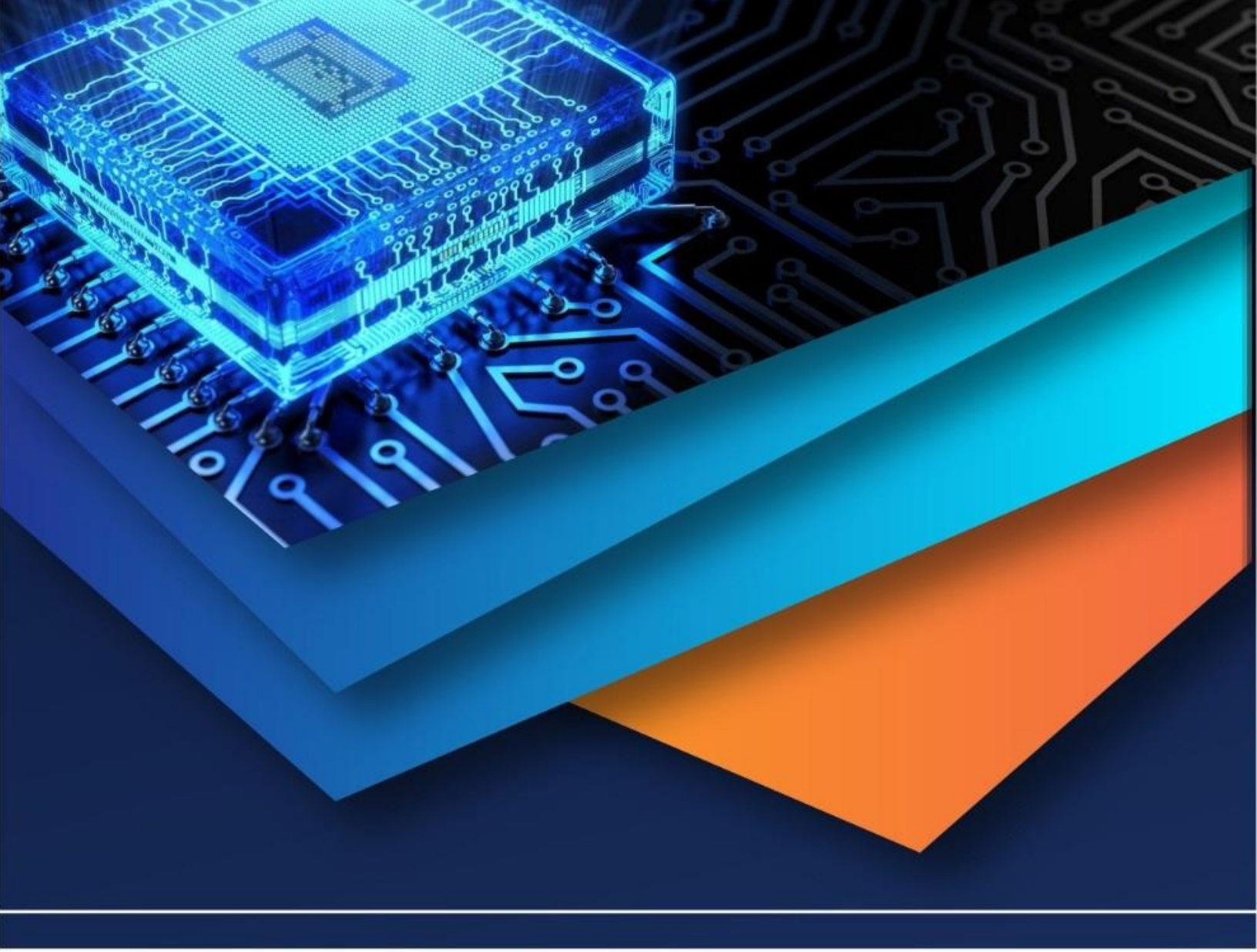

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