Sorting it out: Precarious livelihoods of recycling collectors in Siem Reap, Cambodia

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Abstract

Cambodia, like other post-colonial states, is struggling to manage a growing amount of waste following the country's abrupt introduction to modern consumerism and globalized markets. Problems with the unchecked proliferation of single-use materials are exacerbated by the limited reach of Cambodian waste management services and reliance on private contracting companies for services, in addition to significant international tourism. A growing population of urban surplus labor, regional demand for recyclable materials, and gaps in waste services prompted recycling collection to become an emerging livelihood in Cambodia's tourism center, Siem Reap. Recycling collectors—or *ed jai* in Khmer—find or buy recyclable materials and sell them to recycling depots for variable prices. Collectors' underpaid labor enables the trade of materials up a commodity chain leading abroad, primarily to recycling centers in Thailand or Vietnam. This study aims to understand the economic vulnerability and marginalization of recycling collectors in Siem Reap, Cambodia. Additionally, this study hopes to provide insight into how the functioning of the domestic and regional commodity chain may enforce recycling collectors' exploitation. Exploring the experiences and challenges of informal waste collectors, our team conducted 50 surveys of recycling collectors living on the outskirts of Siem Reap along with 13 semi-structured interviews of depot owners. Survey and interview responses revealed how access to capital operates as a critical limiting factor within the recycling commodity chain, leaving recycling collectors on the ground most vulnerable to the impacts of price fluctuations and other market changes. Lack of capital, in addition to poor education, age, caretaking responsibilities, and other factors operate as primary drivers of workers' entrance and eventual entrapment into a line of work with little economic security.

Introduction

Trash to Treasure: The Meaning and Rebirth of Waste

The amount of waste on Earth—and the urgency of enacting methods to manage it— has grown exponentially within the last century, spurred by the spread of market economies and consumerist-oriented production. In the 1950s, Western powers emerged from wartime with burgeoning economic wealth and demand for consumer goods, prompting the development of new markets with a shifted focus towards disposability.[1, 2] Single-use goods increasingly consisted of synthetic materials like plastic, as mass production seemingly outpaced what sources of "natural" material could provide.[3] In 2017, more plastic was made than nearly any other material in the world, yet production rates continue to increase. Of an estimated 8.3 billion metric tons of plastic currently in existence, three-quarters is fated to become waste, transforming the spatial composition of our landfills, oceans, and societies.[4] Virtually every corner of the world now experiences the unfettered proliferation of waste, as globalized trade creates flows of single-use goods and packaging from the West.

The term "waste" takes on multi-faceted meanings and roles under current political-economic frameworks. Bagchi & Mitra (2017) note that under a globalized economic system designed to accumulate capital or utility, the accumulation of waste is an undesired "disutility" needing to be managed.[5] Gidwani and Reddy (2011) also pose waste as the "political other of capitalistic 'value,'" or a material excess that is spatially disruptive.[6] Gidwani and Reddy further suggest the disruption goes beyond economic practicality, taking on a moral meaning as

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[1] Roland Geyer, "A Brief History of Plastics," in *Mare Plasticum - The Plastic Sea: Combatting Plastic Pollution Through Science and Art*, edited by Martina Streit-Bianchi, Matilde Cimadevila, and Wolfgang Trettnak (Springer International Publishing, 2020), https://doi.org/10.1007/978-3-030-38945-1.
[2] Max Liboiron, "Introduction," in *Pollution is Colonialism* (Durham: Duke University Press, 2021).
[3] Liboiron, "Introduction".
[4] Kathrin Eitel, "Oozing Matters: Infracycles of 'Waste Management' and Emergent Naturecultures in Phnom Penh," *East Asian Science, Technology and Society: An International Journal* 15, no. 2 (July 14, 2020): 135–52, https://doi.org/10.1080/18752160.2021.1896123.
[5] Dipayan Bagchi and Keya I. Mitra, "Life, Labour, Recycling: A Study of Waste Management Practices in Contemporary Kolkata," in Indranil K. Mitra, Ranabir Samaddar, and Samita Sen (eds.), *Accumulation in Post-Colonial Capitalism* (Singapore: Springer, 2017), doi:10.1007/978-981-10-1037-8.
[6] Vinay Gidwani and Rajyashree N. Reddy, "The Afterlives of 'Waste': Notes from India for a Minor History of Capitalist Surplus," *Antipode* 43, no. 5 (November 2011): 1625, doi:10.1111/j.1467-8330.2011.00902.x.

something unruly and uncivil.[7] In this light, waste lacks ethical value in addition to economic value. Waste scholars argue that social value, too, can find its opposite in waste, as societal elites discarding usable objects as trash demonstrates their high worth.[8] In each of these dimensions, waste serves as an opposite or barrier to what is useful and wanted.

Beyond managing waste, capitalist structures incentivize its material transformation, creating commodities from waste and waste from commodities. Petrochemical corporations produce single-use packaging destined to become waste immediately after purchase. Recycling collectors find and sort the same discarded waste to sell to recycling depots. Recycled materials become another product to sell and eventually discard again. As garbage unceasingly propagates and engages with markets, holding a dual utility and disutility as a resource and unwanted excess, there is an increasingly unclear "distinction between waste and treasure."[9] As pollution from plastic products compromises both human health and people's right to autonomy over clean landscapes,[10] waste takes on even more societal roles, becoming synonymous with risk, hazard, or filth beyond simple value and lack of value.[11] Waste plays an increasingly complex role as it permeates virtually every material and immaterial landscape—cluttering landfills, street drains, and water sources as much as economic, social, and moral spheres.

In Cambodia, a mass inflow of market goods in the 1990s brought new scales and forms of garbage, shaping the meaning of waste. In one sense, garbage symbolizes the promise of "modernity," or the allure of a consumer-oriented society imported from Western countries.[12] Under French rule for ninety years, Cambodia became sensitized to the West's equivocation of product consumption with wealth, status, and comfort, and capitalist values began to take their first roots.[13] Simultaneously, waste from consumer goods is a potent reminder of Cambodia's

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[7] Gidwani and Reddy, "The Afterlives of 'Waste'".
[8] Julie Reno, "Wastes and Values," in David Sosna and Lenka Brunclíková (eds.), Archaeologies of Waste (Oxford: Oxbow Books, 2016), pp. 17–22.
[9] Jacob Doherty and Kate Brown, "Labor Laid Waste: An Introduction to the Special Issue on Waste Work," *International Labor and Working-Class History* 95 (2019): 9, doi:10.1017/S0147547919000048.
[10] Liboiron, "Introduction".
[11] Sarah A. Moore, "Garbage Matters: Concepts in New Geographies of Waste," *Progress in Human Geography* 36, no. 6 (2012): 780–799, doi:10.1177/0309132512437077.
[12] Katherin Eitel, *Recycling Infrastructures in Cambodia: Circularity, Waste, and Urban Life in Phnom Penh* (1st ed.; New York: Routledge, 2023), doi:10.4324/9781003244264.
[13] Eitel, *Recycling Infrastructures in Cambodia.*

low position in the pecking order of global trade. Countries like Cambodia, entrapped in neocolonial relationships, serve as both a resource extraction site for the West's manufacturing hubs and a dependent consumer of their products.[14] In this way, waste left behind is a physical manifestation of the processes continually enriching post-colonial powers and impoverishing their previous colonies.

Recovering recyclables to transform into commodities again resembles the same colonial processes of natural resource extraction—underpaid labor removes material from the landscape to be processed abroad, where most of its economic value is realized. Though recyclable goods are far from "natural" resources, extraction of synthetic resources perpetuates an equally exploitative system of labor to those that remove natural material.

The Informal Sector: Movements of Money and People

Waste does not become a commodity without informal labor, a key counterpart of the larger assemblage that cycles waste's utility and disutility. The globalized economy both spurs the demand for transforming waste into value as well as recruits laborers deprived of other livelihoods to complete this task.[15,16] Amidst post-industrial overproduction and competition, agricultural prices fall below survivable rates while prices of manufactured goods from urban centers continually rise. This phenomenon, alongside population growth and decreasing land availability, has pressured non-Western agricultural societies to abandon farming for wage labor. Nations like Cambodia are undergoing rapid urbanization as a result; however, with too little industry to employ the influx of rural migrants to cities, many cannot obtain formal jobs.[17] Remaining surplus labor therefore joins the ranks of the "informal sector," a term encompassing

[14] Eitel, *Recycling Infrastructures in Cambodia.*
[15] Doherty and Brown, "Labor Laid Waste".
[16] Carrie L. Mitchell, "Altered Landscapes, Altered Livelihoods: The Shifting Experience of Informal Waste Collecting during Hanoi's Urban Transition," *Geoforum* 39, no. 6 (2008): 2019–2029, doi:10.1016/j.geoforum.2008.07.006.
[17] House, "Nairobi's Informal Sector," *Economic Development and Cultural Change* 32, no. 2 (1984): 277–302, doi:10.1086/451386.

90 percent of workers in developing countries.[18] The informal sector includes self-employed workers that operate their own enterprises as well as workers that lack formal labor protections.[19]

Cambodia is experiencing a particularly rapid transition to urban informal economies, intensified by the nation's late entrance into the global market. A violent political history under the genocidal Khmer Rouge regime from 1975 to 1979, followed by Vietnamese occupation and the fall of the People's Republic of Kampuchea, curbed opportunities for economic or infrastructure development until the 1990s.[20,21] From 1991 to 1993, the United Nations Transition Authority in Cambodia reinstated democratic elections and facilitated an abrupt shift to marketization.[22] As land frontiers for farming disappear due to economic land concessions, development, and conservation efforts, Cambodia is now experiencing vast migrations from rural areas to cities. With urban populations growing by over 160 percent, Cambodia will have the second fastest urbanization rate in the world.[23]

Insufficient formal labor opportunities in Cambodia's urban centers have prompted migrants to pursue informal work like driving, street vending, domestic work, construction, and other self-employed or informally contracted jobs.[24] By 2003, informal sector work accounted for 62 percent of gross domestic product and 85 percent of the labor force when including rural informal laborers in agriculture.[25] Within the informal economy, laborers are particularly susceptible to the whims of a changing market, lacking the protection of a formal contract or consistent wage. During the onset of the COVID-19 pandemic, informal workers globally were three times more likely to become unemployed than their formal sector counterparts.[26] Informal

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[18] M. Rosaldo, "Problematizing the 'Informal Sector': 50 Years of Critique, Clarification, Qualification, and More Critique," *Sociology Compass* 15, no. 9 (2021): 1–14, doi:10.1111/soc4.12914.
[19] International Labour Organization (ILO), *World Employment and Social Outlook: Trends 2022* (International Labour Organization, 2022), 29.
[20] A. E. Gaughen, M. W. Binford, and J. Southworth, "Tourism, Forest Conversion, and Land Transformations in the Angkor Basin, Cambodia," *Applied Geography* 29, no. 2 (2009): 212–223, doi:10.1016/j.apgeog.2008.09.007.
[21] Eitel, *Recycling Infrastructures in Cambodia.*
[22] Eitel, *Recycling Infrastructures in Cambodia.*
[23] C. Jing, H. Tao, T. Jiang, Y. Wang, J. Zhai, L. Cao, and B. Su, "Population, Urbanization and Economic Scenarios over the Belt and Road Region under the Shared Socioeconomic Pathways," *Journal of Geographical Sciences* 30, no. 1 (2020): 68–84, doi:10.1007/s11442-020-1715-x.
[24] Economic Institute of Cambodia (EIC), *Handbook on Decent Work in the Informal Economy in Cambodia* (Cambodia Series) (International Labour Organization, 2006), 7.
[25] EIC, *Handbook on Decent*, International Labour Organization, 8.
[26] ILO, *World Employment and Social Outlook*, 26.

laborers can also earn significantly less income when unrecognized by minimum wage laws, such as those that apply to garment factory workers in Phnom Penh.

Doomed to Recycle?

Recycling collection is one of the growing livelihoods emerging from the informal sector, in which laborers find or buy used materials to sell to recycling depots for small profits. In 2007, as people faced a global economic crisis and dispossession, an estimated two percent of the world's urban population turned to salvaging recycling.[27] Though many will flee to this livelihood out of necessity, it is far from easy work, as participants lack job security,[28, 29] suffer poor working conditions,[30, 31] and risk health problems and exposure to toxins.[32, 33] Indeed, a labor force's readiness to engage in waste work demonstrates "the social unevenness of rapid and intense development."[34] Surplus laborers and waste, both seemingly displaced and "hav[ing] no use" on their own, are made productive on the margins of accepted society.[35]

Simultaneously, informal work can accommodate the specific needs and conditions of workers, free from the typical restraints of wage labor. For instance, as men gain improved access to other career paths, recycling collectors are an increasingly female workforce, making up 94 percent of collectors in Hanoi, Vietnam in 2006.[36] Despite the tradeoffs of informal work, women are better able to manage domestic responsibilities and childcare without a strict work schedule, which may play a key role in their decision to pursue recycling collection.[37] Many recycling collectors also see their job's self-guided nature as a form of "freedom,"[38,39] creating a

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[27] Doherty and Brown, "Labor Laid Waste," 8.
[28] Bagchi and Mitra, "Life, Labour, Recycling".
[29] Costas Velis, "Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era," *Waste Management & Research* 35, no. 4 (2017): 329–31, doi:10.1177/0734242X17702024.
[30] Mitchell, "Altered Landscapes, Altered Livelihoods".
[31] Bagchi and Mitra, "Life, Labour, Recycling".
[32] Naiara F. Ramos, Armando Borges de Castilhos, Fernando A. Forcellini, and Odacir D. Graciolli, "Profile Survey of Waste Pickers in Brazil: Requirements for the Development of a Collection Vehicle and Optimized Routing," *Journal of Urban and Environmental Engineering* 7, no. 2 (2013): 231–46.
[33] Velis, "Waste Pickers in Global South".
[34] Mitchell, "Altered Landscapes, Altered Livelihoods".
[35] Doherty and Brown, "Labor Laid Waste," 7.
[36] Mitchell, "Altered Landscapes, Altered Livelihoods".
[37] Bagchi and Mitra, "Life, Labour, Recycling".
[38] Eitel, "Oozing Matters: Infracycles of 'Waste Management' and Emergent Naturecultures in Phnom Penh".
[39] Ramos et al., "Profile Survey of Waste Pickers in Brazil," 231–46.

more nuanced narrative about the agency of laborers within global markets. Nevertheless, the increasing presence of waste workers, like waste itself, is symptomatic of the market economy's overproduction and Western-oriented development at the (in)expense of non-Western labor.

Predating the arrival of disposable imports into Cambodia, waste collectors, known in Khmer as *ed jai*, were already locally collecting and buying scrap metals and cloths for several decades.[40] Exponential growth in disposable waste has expanded the number of Cambodian recycling collectors (though the work's informal nature complicates attempts to count them) and the scale of the commodity chain.[41] Today, recycling collectors serve a key role in the international recycling trade by bringing material from households and businesses to recycling depots, which can transport or process it en masse. Two kinds of recycling collectors participate in Cambodia's waste trade: waste pickers and junk buyers. Waste pickers typically salvage discarded plastics, metals, and cardboard from public spaces, landfills, or garbage bags and containers; an estimated 3000 people in Cambodia pursue this kind of collection.[42] Junk buyers, meanwhile, will purchase recyclables from households, businesses, and sometimes waste pickers, driving through neighborhoods honking a small horn to get potential sellers' attention. Junk buyers commonly have relationships with their buyers, returning to the same people to purchase their waste.[43] Both groups may sell collected material directly to a recycling depot or to a middleman if they lack the mobility or proximity to transport their findings themselves. Cambodian recycling depots will buy recyclables by the kilogram and sell them further up the commodity chain, eventually to foreign recycling centers, such as Thailand and Vietnam.[44] Cambodia lacks large-scale recycling centers or waste treatment facilities that can process materials domestically, forcing a dependence on foreign infrastructure that reflects greater trade imbalances.[45] Occasional exceptions include a bottle factory outside Siem Reap that can recycle plastic bottles.

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[40] Eitel, *Recycling Infrastructures in Cambodia.*
[41] Dek Vimean Pheakdey, Nguyen Van Quan, Tran Dang Khanh, and Tran Dang Xuan, "Challenges and Priorities of Municipal Solid Waste Management in Cambodia," *International Journal of Environmental Research and Public Health* 19, no. 14 (2022): 8458, doi:10.3390/ijerph19148458.
[42] Pheakdey et al., "Challenges and Priorities".
[43] Mitchell, "Altered Landscapes, Altered Livelihoods".
[44] Pheakdey et al., "Challenges and Priorities".
[45] Pheakdey et al., "Challenges and Priorities".

Waste pickers and junk buyers hold an integral role in global waste management, and their everyday labor sustains a valuable international market. However, societies fail to acknowledge the importance of recycling collectors' labor culturally and politically. Mitchell (2008) explains that waste collectors are "a source of embarrassment for cities," and despite their role in managing waste—effectively bringing order and utility to waste's *dis*order and *dis*utility—they are perceived as an obstacle to modern development.[46] Recycling collection is inherently biopolitical, given the lives of the workers managing and transforming waste for the greater population's health and well-being are not assigned equal value.[47]

Scaling Down: Waste Generation and Composition in Cambodia

Underdeveloped public and private waste management services are a key reason for Cambodia's urgent demand for recycling collectors. Many non-Western countries, including Cambodia, fail to provide universal access to services managing the collection and deposit of municipal solid waste (MSW), much less sorting recyclables.[48,49] Beyond exposure to global markets, other factors like population growth, economic development, and improved standards of living have triggered an increase in MSW generation across the country.[50] MSW generation in Cambodia is expected to increase by 36% between 2030 and 2050.[51] Though organic food waste still makes up 55% of total waste, recyclables like plastic (10%), glass (8%), metals (7%), and paper (3%) make up the majority of the remaining waste.[52] In recovering these materials, Cambodian recycling collectors decrease the volume of waste in landfills and generate revenue, which totaled $56 million USD in 2021.[53]

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[46] Mitchell, "Altered Landscapes, Altered Livelihoods", 2020.
[47] Bagchi and Mitra, "Life, Labour, Recycling".
[48] Diego Coletto and Lieselot Bisschop, "Waste Pickers in the Informal Economy of the Global South: Included or Excluded?" *International Journal of Sociology and Social Policy* 37, no. 5/6 (2017): 280–94, doi:10.1108/IJSSP-01-2016-0006.
[49] Pheakdey et al., "Challenges and Priorities".
[50] Pheakdey et al., "Challenges and Priorities".
[51] The National Council for Sustainable Development (NCSD) and Ministry of Environment (MoE), "First Biennial Update Report of the Kingdom of Cambodia" (2020), 15.
[52] Pheakdey et al., "Challenges and Priorities," 14.
[53] Pheakdey et al., "Challenges and Priorities," 12.

Accurate national data on waste management is limited and inconsistent across sources, hindering governmental creation and implementation of MSW policy.[54,55] While waste management legally falls under sub-national administrations, the lack of budget or general guidelines from higher authorities has led city officials to instead contract private companies. Yet, 46% of solid waste is still left uncollected, which has led to the continued discussion on how to expand waste management in Cambodia.[56] Lacking sufficient infrastructure, Cambodia will likely be unable to handle future waste production without significant reforms.

In an effort to improve waste management and protect the health of Cambodian citizens, national authorities have implemented various policies. Sub-decree No. 36 on Solid Waste Management, enacted in 1999, categorized waste into different types and established guidelines for disposal.[57] However, the implementation of this sub-decree faced challenges, including unclear expectations at lower government levels and inadequate budget and infrastructure. Sub-decree No. 113 was later introduced to address these issues, granting more responsibility to municipality and district authorities, and allowing them to engage private operators.[58] Despite a budget allocation and efforts to universalize waste management services, the execution has been limited, and the burden of waste management falls on the informal sector, including waste pickers. The most recent policy, the Municipal Solid Waste Management 2020-2030 Policy, aims to strengthen the existing framework, establish new mechanisms and legal frameworks, and encourage private sector involvement.[59] However, sub-national authorities still lack clear guidance for effective implementation, leaving room for the informal sector to fill the gap in waste management.

Siem Reap: Where There is Tourism, There is Waste

Siem Reap has a particularly unique waste management landscape given the influence of tourism. Due to the limited bandwidth of privatized companies, waste management in Cambodia

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[54] Pheakdey et al., "Challenges and Priorities".
[55] Sour Sethy, Chin Sothun, and Rachel Wildblood, "Municipal Solid Waste Management in Cambodia," in *Municipal Solid Waste Management in Asia and the Pacific Islands*, edited by Agamuthu Pariatamby and Masaru Tanaka, 77–94, Environmental Science and Engineering (Singapore: Springer Singapore, 2014), doi:10.1007/978-981-4451-73-4_5.
[56] Pheakdey et al., "Challenges and Priorities," 11.
[57] Royal Government of Cambodia (RGC), "Sub-decree No. 36 on Solid Waste Management" (1999).
[58] Royal Government of Cambodia (RGC), "Sub-decree No. 113 on Municipal Solid Waste Management" (2015).
[59] Royal Government of Cambodia (RGC), "Policy on Urban Solid Waste Management 2020-2030" (2021a).

is almost exclusively concentrated in the urban areas—correlating with the areas tourists typically visit. Additional services regarding waste management, such as street sweeping, are predominately in tourist towns like Siem Reap.[60] Despite the comparably high development of waste collection services in Siem Reap, only about 65% of the total city population has direct or indirect access to them.[61] A 2021 source estimated that Siem Reap produced 316 tons of waste daily, but only 234 tons were collected per day.[62] These approximations exclude the suburban area surrounding the city, where over 100,000 people have no formalized waste management in place.[63]

Waste collection in Siem Reap's urban communes is privately contracted to Global Action for Environment Awareness Waste Management Company (GAEA). The city compensates GAEA for the collection of waste from the main roads and riverbanks, while households must pay GAEA a monthly fee for waste collection services.[64] WEGREEN, another private company contracted by Siem Reap, helps with trash management in the Angkor temple complex, airport, and public museums. Both companies dispose of waste in a private dumpsite managed by GAEA, approximately six kilometers from the city center. The dump site has only five or six remaining years before reaching capacity.[65] Neighbors and waste pickers have erupted into protest against the dumpsite for complaints of smell, contamination, and the construction of a metal fence that prevents waste pickers from collecting recyclables on the site.[66] These protests demonstrate the shifting perceptions of waste as both valuable and disruptive.[67]

Tourism is one of the main drivers of economic growth, and accompanying waste, in Siem Reap. The city attracts millions of tourists to the ancient Angkor temples every year, playing a critical role in many local livelihoods and economic development.[68] Though tourists only accounted for an estimated 3.5% of total waste production in 2020 due to the pandemic,

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[60] Sethy et al., "Municipal Solid Waste Management," in *Municipal Solid Waste Management in Asia and the Pacific Islands*.
[61] Japan International Cooperation Agency (JICA), "Data Collection Survey on Urban Improvement in Siem Reap City in the Kingdom of Cambodia" (2022), https://openjicareport.jica.go.jp/pdf/12342044.pdf.
[62] Pheakdey et al., "Challenges and Priorities".
[63] JICA, "Data Collection Survey on Urban Improvement in Siem Reap City in the Kingdom of Cambodia."
[64] JICA, "Data Collection Survey on Urban Improvement in Siem Reap City in the Kingdom of Cambodia."
[65] JICA, "Data Collection Survey on Urban Improvement in Siem Reap City in the Kingdom of Cambodia."
[66] (*Dumpsite pollution*, 2020)
[67] Gidwani and Reddy, "The Afterlives of 'Waste'".
[68] Ministry of Tourism, *Cambodia: Tourism Statistics Report*, 1-8.

sources predict that tourists will generate 27.6% of total waste in 2035.[69] The "Tourism Development Master Plan Siem Reap 2021-2035" new technologies and strategies, such as GPS tracking, will help manage the sharp increase in waste produced by tourists.[70] However, the plan fails to specifics on how to execute ground level changes or establish a new landfill (RGC, 2021b). Strategies also fail to acknowledge recycling collectors and their increasingly pertinent role in waste management.

Policy in Action or Lack Thereof?

The national government's sub-decrees and reports have yet to truly address the growing waste problems that Siem Reap and greater Cambodia face. Gaps in policy goals and waste management implementation in many non-Western countries mean the importance of recycling collection for reducing urban waste "cannot be overemphasized".[71,72] Despite these collectors' essential role in global urban infrastructure, they are rarely recognized as crucial workers and instead equated with the waste they scavenge.[73] Current policies on waste push for a formalized system of management, with increasing pressure on districts to use private companies as a way for waste collection, and its impacts on informal labor could be transformative.

Societal perceptions (or imperceptions) of recycling collectors' role in waste management will greatly influence the inclusion or exclusion of informal labor from future Cambodian policies. In places like Hanoi, Vietnam, public disregard for informal collectors has enabled waste pickers to continue co-existing with formal waste management systems that fail to serve all urban areas.[74] In others, like Delhi, India, privatization of MSW management has encroached on previous chains of trade with recycling collectors and middlemen, as well as restricted collectors to timed schedules and off-site sorting.[75] Anierobi and Efobi (2013) recognize the economic importance of informal waste work in Nigeria but use this point to argue for its integration into the formal sector to promote efficiency.[76] Despite the security and stable

[69] JICA, "Data Collection Survey on Urban Improvement in Siem Reap City in the Kingdom of Cambodia."
[70] Royal Government of Cambodia (RGC), "Tourism Development Master Plan Siem Reap 2021-2035" (2021b).
[71] C. Anierobi and K. Efobi, "Waste Pickers and Urban Solid Waste Management System in Nigerian Cities: Between Sustainable Policy Gap and Survivalist Strategy," Developing Country Studies 3, no. 8 (2013): 184–197.
[72] Coletto and Bisschop, "Waste Pickers in the Informal Economy," 280–94.
[73] Doherty and Brown, "Labor Laid Waste".
[74] Mitchell, "Altered Landscapes, Altered Livelihoods".
[75] Gidwani and Reddy, "The Afterlives of 'Waste'".
[76] Anierobi and Efobi, "Waste Pickers and Urban Solid Waste Management System."

wages that formalization may offer, loss of personal agency and failure to accommodate recycling collectors' unique needs may cause the costs for laborers to outweigh the benefits.[77] Thus, the future nature of informal waste work and its relationship with formal MSW systems is unknown, lying at the mercy of public opinion and governmental action.[78]

Objectives and Aims

Our study aims to map the sociopolitical marginalization and economic vulnerability of recycling collection as a livelihood in Siem Reap, Cambodia. We first examine the functioning of the recycling commodity chain domestically and regionally, specifically how capital dictates a laborer's position within the chain. This information reveals how the trade of recyclables extracts value from thin margins, a process primarily reliant on the underpaid labor of recycling collectors. We then explore how recycling collectors' unique conditions and demands—including minimal education, access to land, and domestic responsibilities—may contribute to their entrance and entrapment into this precarious livelihood. Understanding what factors pull laborers into the recycling trade may provide insight into the best strategies for promoting the economic security of recycling collectors and other informal laborers.

[77] Rosaldo, "Problematizing the 'Informal Sector'," 1–14.
[78] Rosaldo, "Problematizing the 'Informal Sector'," 1–14.

Methods

Survey Sites

Surveys took place in seven small, low-income villages on the outskirts of Siem Reap City where recycling collectors live and follow collection routes: Poom Veal Sambour, Poom Veal Kok Chak, Ron Ta Eik, Pom Thmei, Phu Tek Sen Tbong, Poom Anjanh, and Slo Kram. Selected villages had a known population of recycling collectors or a recent history of resettlement and migration, which may correlate with more individuals pursuing recycling as a livelihood.[79] Surveys of recycling collectors were also administered at 13 recycling depots (*Figure 1)*, as recycling collectors typically visit these dropoff points to sell material. Six additional surveys were conducted roadside when our team came across people collecting recyclables while driving to villages or depots. Data collection took place in the afternoons for the first five days and in the morning for the final four days during mid-November 2022.

Figure 1: Map depicting the location of depots interviewed labeled in chronological order of visitation (Depot 5 asked for their location to remain private)

[79] Rosaldo, "Problematizing the 'Informal Sector'," 1–14.

Data Collection

Surveys designed to assess recycling collectors' various identities, histories, daily routines, and livelihood challenges were read to participants on-site for data collection. Previous academic studies with similar objectives and topics, specifically Mitchell (2008) and Ramos et al. (2013), informed the framing and design of survey questions.[80,81] Following the methods of Ramos et al. (2013) in a survey of waste pickers in Brazil, there was no predetermined number of participants due to the lack of available data on the number of waste pickers in the area.[82] We gathered 50 surveys of waste collectors by the final day of data collection.

Participants at each site were chosen through convenience sampling based on their availability and willingness to take part in the study. Separate surveys of 38 questions were administered to waste pickers and junk buyers with questions adjusted to their specific line of work. Some surveys were done in groups when there was a high willingness to participate among communities of recyclers. Surveys lasted 20 to 30 minutes, with group surveys lasting 45 minutes to an hour. Participants received small gifts upon completion.

Our research team consisted of two student researchers and three translators fluent in Khmer, with one to two translators always present during surveys. Translators asked survey questions to participants in Khmer and interpreted their verbal responses into English, which student researchers recorded on paper. Occasionally, additional questions were included to explore emergent themes or triangulate data found within previous surveys, as Mitchell (2008) does in her study of waste pickers in Vietnam.[83] Supplemental information on the value, composition, and destination points of recycled materials was obtained through 13 semi-structured interviews with depot owners or staff. Student researchers and translators both asked relevant lines of questioning and translated responses to be written down in English. Participants that consented to audio recording had their responses recorded via a Sony audio recording device to verify written data.

[80] Mitchell, "Altered Landscapes, Altered Livelihoods".
[81] Ramos et al., "Profile Survey of Waste Pickers in Brazil," 231–46.
[82] Ramos et al., "Profile Survey of Waste Pickers in Brazil," 231–46.
[83] Mitchell, "Altered Landscapes, Altered Livelihoods".

Limitations

By relying on local surveys and interviews, this study investigates economic processes on the micro level without sufficiently capturing regional and global interactions. As briefly discussed in the Introduction, forces beyond Cambodia's borders, including consumerist markets, neocolonialism, and COVID-19, have shaped and continue to influence the formation of the local waste trade. Though greater systems of political economy created these conditions, this research serves primarily to understand local phenomena in Cambodia that emerged from these influences. As a case study, this research provides a detailed profile of livelihoods without data that can directly connect these experiences to more global systems. While this study offers insights into the intricate local dynamics at play within Cambodia's waste trade, further research exploring the interplay between local practices and broader economic structures could provide a more holistic understanding of the complexities inherent in the contemporary global waste economy.

Ethics Approval

Ethics approval was sought for the project research protocol under the Institutional Review Board (IRB). Approval was granted by the IRB administration of the SFS Office of Academic Affairs and the project was determined Exempt from full IRB review under Type B, Category 2. Respondents gave verbal consent to participate in student research on recycling collection before participating in surveys or interviews.

Results and Discussion

Mapping the Commodity Chain: Recycling Capital

Beyond the day-to-day viability and challenges of recycling collection, survey and interview responses helped depict the functioning of the local and international recycling commodity chain. Waste pickers and junk buyers each represent a segment of a complex assemblage of labor, capital goods, and recycling materials moving from Cambodia's streets, garbage cans, and households to neighboring Thailand and Vietnam. As is typical to other commodity chains, recycling collectors occupying the lowest segment of recycling production hold the least amount of financial capital, while their counterparts at large-scale recycling depots and buyers abroad have the most funds to re-invest into creating more profits.

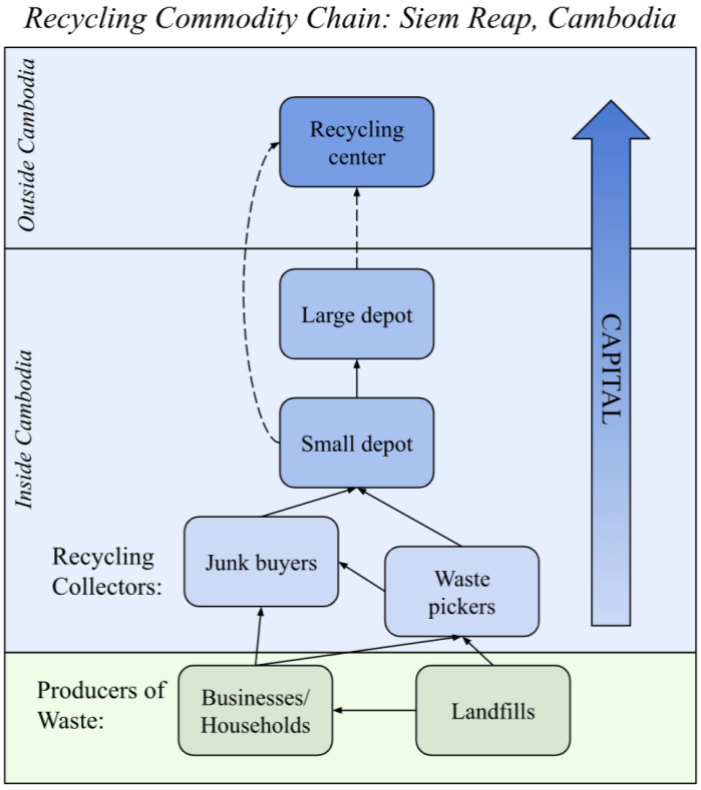


Figure 2: Chart depicting the flow of recycled materials from the producers of waste to recycling collectors and depots, ultimately traveling outside of Cambodia to be processed.

In an ecosystem of underpaid labor where recyclables flow upstream, capital acts as a critical limiting factor that shapes the niche that each type of labor inhabits. The greatest

distinction between a waste picker and junk buyer, for instance, is the junk buyer's need for capital to purchase recyclables from households and businesses. Waste pickers require very little besides transportation to carry out their daily collection. Survey respondents used motorcycles, bicycles, or pushcarts on foot (see Appendix A, B, & C), with about one-quarter of waste pickers borrowing or renting needed vehicles because they do not own them. Meanwhile, junk buyers use capital to purchase materials of greater volumes and values, with the potential to earn greater profits while also taking greater risks.[84] A group of eight male and female waste pickers squatting in Phu Tek Sem Tbong village explained that they do not pursue junk buying simply because they do not have the necessary capital. Three recycling collectors in various areas of Siem Reap described switching from waste picking to junk buying when they had more money to invest, while another collector in the Phsa Duem Kra Lanh area had switched to waste picking from junk buying after losing available capital. Of the fifty total survey respondents, eight reported doing both waste picking and junk buying, using available capital when they have it.

Within the categories of waste picker and junk buyer, extra funds can also elevate a recycling collector's competitive edge and ability to earn more income. According to a female respondent from Phu Tek Sem Tbong village, waste pickers that can afford motorcycles and fuel can reach areas with valuable recyclables faster than she can on a bicycle. Multiple others referred to their ability to afford gas as the deciding factor for how long and how far they can travel to find materials. A woman living in Poom Veal Kok Chak, having access to a bicycle and a motorcycle, could find more material on a longer route using the motorcycle, but frequently had to ride the bicycle instead due to lack of money for gas. Capital can translate into resources that can earn collectors more profits.

[84] Mitchell, "Altered Landscapes, Altered Livelihoods".

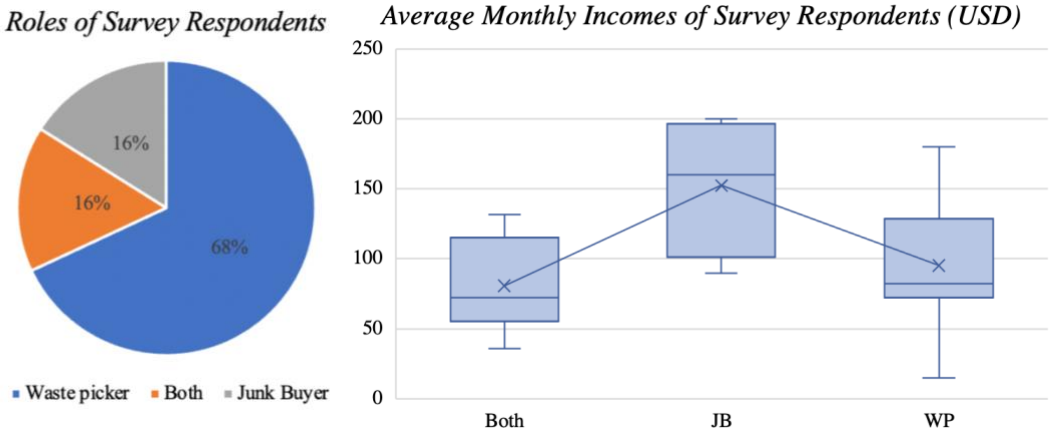


Figure 3: Roles of surveyed recycling collectors and their average monthly incomes, as marked by the "x" within each box plot. Box plots do not include survey participants that had other sources of income.

Similar to junk buyers and waste pickers, capital operates as the distinguishing element between junk buyers and recycling depots. Depots purchase and accumulate recyclable goods to sell to larger depots or recycling centers, simply doing so on a larger scale than junk buyers can. Of thirteen interviewed depot owners, five had previously worked in junk buying and waste picking before accumulating enough capital to rent or buy the land, machinery, and trucks needed to operate a depot. Another depot owner's spouse previously worked in junk buying, and two more depot owners had previously worked as staff of a recycling depot, earning income and connections within the industry. At a small depot operating for over thirty years, the elderly owner referred to herself as a "large-scale junk buyer," summing up how capital can elevate the scale and position of recyclers within the commodity chain.

The largest in-city depots have enough spare capital to hire daily workers, executing large operations to sort materials and ship them to factories or recycling processing centers abroad. One depot in Kok Chak had fifteen to twenty ad hoc workers removing lids and labels from one ton of plastic bottles daily, in addition to eight salaried staff for driving trucks and manning machinery. Small-scale depots, meanwhile, usually had a couple of staff—sometimes relatives—and anywhere from 5 to 20 recycling collectors selling materials to them each day. Small depots sell their materials either to large depots or to bordering countries Thailand and Vietnam, which have recycling processing centers (and capital to build these centers). Excluding a bottling factory near Siem Reap that buys some plastic bottles and demand for metals in Phnom Penh, all

materials flow outside of Cambodia, typically from the city of Poi Pet bordering Thailand. Beyond Cambodia, there is greater infrastructure and available investment in processing recyclables, completing the trend of growing capital at the top of the chain.

This commodity chain, when described in isolation from outside forces, presents the tempting illusion of a trading relationship that facilitates movement up the socioeconomic ladder. Indeed, many depot owners successfully accumulated the necessary funds to shift from junk buying to a higher position within the trade of recyclable materials. However, most survey responses of waste pickers and junk buyers suggested a different reality, particularly their dangerous vulnerability to market forces, failure to earn living wages, and social ostracism. Given these challenges, many communicated their livelihoods were not enough for daily survival, much less achieving financial security or elevating their socioeconomic status. Understanding interactions between segments of the commodity chain helps illuminate why waste pickers and junk buyers face such intense exploitation—while recyclables flow up the chain, unlivable conditions cascade down. In a climate of ever-changing values of recyclables, combined with economic shifts and downturns, recycling collectors on the ground suffer the most difficulties.

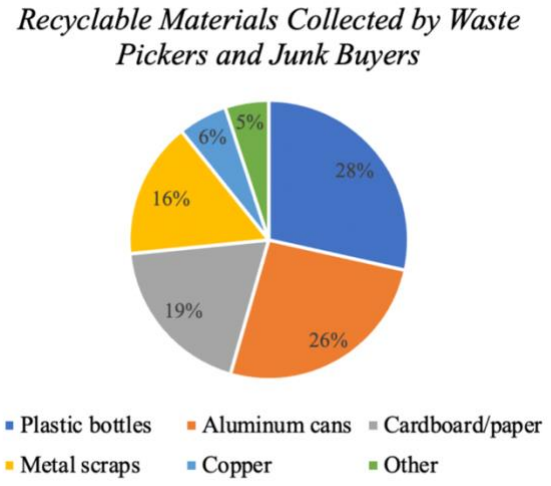
Fluctuating Prices, Fluctuating Incomes

As discussed in the introduction, recyclable materials seamlessly shift between unwanted waste and valuable commodity in differing economic and social contexts. The upstream exchange of these materials—from a plastic bottle's abandonment on the street to the trading of plastic bottles by the ton over borders—demonstrates how differing interpretations of value coexist. That said, within the binary of "waste" and "commodity," one must consider how a recyclable material's *use value* is interpreted and distorted by the *exchange value*, or prices per kilogram, of collected materials. Depot owners and recycling collectors alike report that these prices are constantly fluctuating, subjective to the whims of global market demands, available supply, and the general health of the economy. Rising and falling prices distinguish what kinds of recyclables are wanted and unwanted by depots and collectors, serving as a measure of what markets deem as truly waste or worthy to be reborn into another consumer good.

Prices reported by survey respondents and depot owners demonstrate how markets define and redefine materials' values, shaping what recycling collectors seek out or leave behind.

Aluminum cans, for instance, with a high value of $1.25 to $1.50 per kilogram, are a highly demanded material. Many waste pickers reported seeking out areas where they can find more cans, particularly in urban Siem Reap. “A lot of people drink in town,” said a 41-year-old collector in Poom Veal Sambour, to explain why his routes primarily target urban areas. Metal scraps and copper are also valuable finds, seen more as a commodity than discardable waste. At a relatively large depot in the Kok Chok district specializing in metal and electronic materials, mechanics would sell their unneeded scraps directly, recognizing their high value and bypassing middle traders.

Some materials fetch too low of a price to justify their collection. To maximize their time and resources, waste pickers will ignore certain items that would otherwise get a second life in recycling centers. For example, glass bottles, though recyclable, are worth too little per kilogram to realistically profit from—not one waste picker or junk buyer reported gathering glass. Plastic bags, too, despite their abundance and potential to be recycled, still litter the landscapes surrounding Siem Reap, because reprocessing this material is not profitable at any level of the commodity chain. Traveling near villages of recycling collectors, our team noticed that roadside waste often consisted primarily of “unvalued” materials, while aluminum, metals, and Type 1 plastics were usually already removed.



Material	USD/kg	R/kg
Plastic bottles	0.23	950
Aluminum cans	1.4	5800
Cardboard/paper	0.096	400
Metal scraps	0.25	1050
Copper	3.86	16000
Glass bottles	0.024	100

Figure 4: Recyclables collected by waste pickers and junk buyers and their accompanying values when sold to recycling depots in mid to late November 2022.

The constant shifting of price not only determines what materials are left or removed from the landscape, but it also makes recycling a volatile and challenging livelihood. Informal laborers, though sometimes misconstrued as independent from the systems of supply and demand shaping the formal sector, are inextricably linked with the global markets that define the exchange value of materials. Without a formal contract or monthly salaries, recycling collectors are vulnerable to price changes accommodating economic cycles—they have no protective barrier to ensure their labor will result in a stable or livable income. When asked about the biggest challenges associated with their jobs, about one-third of waste pickers and junk buyers mentioned fluctuations in prices as a difficult problem. Four depot owners mentioned that the values of materials were ever-changing, sometimes even changing daily. Nevertheless, when comparing interview responses, depot owners typically offered similar prices to one another, usually only varying by $0.02 to $0.04 per kilogram within each material category. Consistency across depot locations, despite how prices may change with time, demonstrates the exacting, pervasive pressure of Thailand and Vietnam's market demands on Cambodian depots. With little power to negotiate shifting exchange values, depots take what little profit can be made, leaving next to none for struggling and exploited recycling collectors.

Aside from shifting market demand, changes in gas prices and currency exchange rates also induce fluctuations in the profitability of the recycling trade, bringing cascading impacts down the commodity chain to already vulnerable recycling collectors. Waste pickers and junk buyers with motorcycles feel the direct impacts of increasing gas prices during their daily routes. However, recycling collectors feel the effects of financial pressures faced by higher positions in the commodity chain. Depot owners, for instance, must carefully consider the costs of transporting materials to their buyers. Depot owners selling to Poi Pet reported sending one to four truckloads of recyclables per month, with trucks carrying up to 25 tons and traveling about 150 kilometers each way (See Appendix D). Gas prices are thus a substantial cost that can prevent access to more favorable markets, such as Vietnam, that are further away. In turn, depot owners settle for lower prices in closer markets, and recyclables collected on the ground are traded for less value.

Interviews with depot owners confirmed how changing costs influenced their trading behavior. The owner of the largest depot we visited, located in Kok Chak, reported previously selling some materials to Vietnam, where prices were higher than Poi Pet. However, the

location's distance from Siem Reap meant that post-pandemic travel costs were too high. Another relatively large depot owner in Sambour claimed to sometimes sell material to Vietnam, as profits could be $200 higher, but high gas prices meant the trip was sometimes less profitable. A smaller depot owner responded to steep transportation costs to Poi Pet by instead selling to a larger, in-city depot. The growing expense of accessing other markets leaves Siem Reap's depot owners with less agency to pursue competitive prices, often having little choice but to accept unfavorable deals in Thailand or locally. For the same reason, depot owners must also tolerate disadvantageous exchange rates between the Thai Baht and Cambodian Riel. These conditions, limiting revenue along the commodity chain, mean collectors selling to depots cannot be compensated livable wages for their labor.

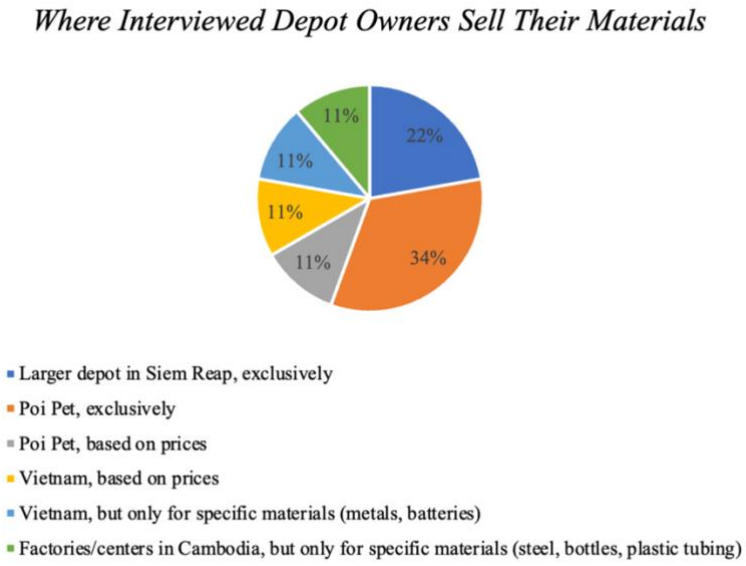


Figure 5: Destinations of materials sold by large-scale and small-scale depots owners

Economic slowdowns from the COVID-19 pandemic further exacerbated the financial pressures weighing on members of the recycling commodity chain. During the initial phases of lockdowns, closed borders brought regional trade to a full stop until protests in Poi Pet allowed materials to enter Thailand on foot. Vietnamese border closures made Vietnam's market even less accessible than previously, reportedly forcing depots to sell exclusively to Thailand for some time. Despite today's easing trade restrictions and improving economy, the long-term impacts of the pandemic still linger, creating painful impacts throughout the commodity chain. Among

depots, three owners reported a decrease in prices since the pandemic, though another observed that aluminum cans have recently increased in value. Five owners also cited the problem of decreasing availability of recyclables, as the post-pandemic tourism slowdown in Siem Reap has reduced waste production. Lower volumes of materials are shared among growing numbers of waste pickers, junk buyers, and even depots, as people move into the recycling industry from lines of work severely impacted by the pandemic. Fifteen recycling collectors (30%) believed that the presence of too many other collectors was a significant challenge to their work.

Though conditions brought on by fluctuating market demands, changing gas prices, and the pandemic initially impacted the highest segments of the recycling commodity chain, the associated costs transmit down the trading network to be felt most acutely by waste pickers and junk buyers, who lack significant capital. Capital can serve as a shield to absorb losses from shifting prices, costs, or slowdowns, an asset that large-scale depots can use most effectively. The large Kok Chak depot, which focuses most on accumulating plastics, can collect 15 tons of plastic bottles in one to two weeks from smaller depots and junk buyers. The owner, a man with fifteen years of depot experience, framed the fluctuating prices of materials not as a source of loss, but as an opportunity to clear or expand current inventories of recycling material. While prices in Thailand are low, he buys more plastic bottles, cardboard, and aluminum cans and stocks the neighboring warehouse with these materials (see Appendix E). When prices increase again—which he predicted will occur six weeks from now—he will sell stocked materials for a better profit. During COVID-19 lockdowns, depots did not usually operate, but given the scale of the Kok Chak depot's current operations, their business was able to rebound from loss of time and income.

One step down the commodity chain, small-scale depots have less surplus capital than their large-scale counterparts to soften economic blows. Particularly since Covid-19, many struggled to manage fluctuating prices and costs, appearing more akin to struggling junk buyers and waste pickers than large-scale depots. The owner of a small depot since 2009 lamented that she could not make a sufficient profit anymore with current rent, gas, and food prices, so she will close the depot once her land contract ends. Another small depot owner operating in the Sambour district for two years claimed he would lose less money as a recycling collector without such high rent and debt costs. Other owners simply alluded to recent difficulties, though they appeared confident they could continue this work in the future. Despite having more capital available than

the average junk buyer or waste picker, these depots still suffer troublesome losses from the changing values and costs of the recycling trade—though, the Sambour depot owner's claim to be worse off than recycling collectors contrasts other responses.

Equipped with the least funds to adapt to fluctuations and economic shifts, waste pickers and junk buyers endured the greatest hardships and impacts on quality of life. Unlike large-scale depots, several survey respondents said they needed revenues from collection for daily expenses like food and firewood. Thus, Covid-19 lockdowns were not a mere loss of income but a direct threat to basic needs. A middle-aged junk buyer in Poom Anjanh said her inability to find sufficient recyclables during lockdowns meant her family began running out of food. A grandmother of two young waste pickers in Poom Veal Kok Chak said that lockdowns cut off all household income, and if it were not for government supplies of rice delivered to their village, "we would have starved." A middle-aged resident of squatter village Phu Tek Sen Tbong chose to sneak out during lockdowns to do waste picking, with his household having no other sources of revenue.

Given recycling collectors' dependence on this livelihood for immediate needs, they lack the same tools and negotiating powers that depots with capital can enjoy. Waiting for better prices to trade in found materials, for example, is not typically an option. Most junk buyers and waste pickers reported bringing materials to a depot every few days, while those who collected less frequently would bring materials every one to two weeks. Only a few of the waste pickers and junk buyers waited three to four weeks before trading in. Of fifty survey respondents, only one—a female junk buyer living in resettlement village Ron Ta Eik—mentioned stocking materials long-term in the hopes of achieving a better price. Others communicated that they were powerless in negotiating changes in material values—a female waste picker from rural Siem Reap pursuing recycling for over 15 years said that "whatever price [buyers] give, they give" and little can be done about it. The aforementioned depot owner planning on closing her business understood these conditions were why collectors, facing even worse hardships than herself, can "barely survive."

In the larger workings of the economy, recycled materials function as either a waste or a commodity—either discarded without a second thought, collected, and sold for their material values, or a combination of both given fluctuating market prices. To large-scale depots, materials are undoubtedly a commodity, traded during the height of market value and stocked during

unfavorable downturns. However, recycled materials are much more than merely "waste" or "commodities" to recycling collectors, who cannot stop selling regardless of changes in prices. Rather, recycled materials are a lifeline to survival, and for over half of survey respondents, they are the sole source of income for themselves and their dependents. Regarding whether junk buying was enough to support her family, a woman from Poom Anjanh simply answered that "some days" it was and "some days" it was not. The availability and prices of materials have a real, sometimes devastating potential to push individuals into deeper poverty and desperation.

Scavenging for Survival

To assess the economic precarity of recycling livelihoods, we must not only conceptualize the market forces at play, but we must also understand how laborers enter and remain within this line of work. Lack of capital, in addition to shaping power within the recycling commodity chain, drives workers into recycling collection and entraps them in the trade long-term. Survey respondents made this evident by emphasizing that recycling requires very little investment to begin—differing from other jobs in the informal economy such as street vending or tuk-tuk driving. Survey participants also highlighted that their motivation for entering junk buying or waste picking came down to desperation for income. The most cited reason when asked why participants began recycling was that "no other jobs were available" (30%). Waste pickers and junk buyers thus do not see recycling as an economic opportunity, but rather a last resort when otherwise lacking assets. While a majority of survey respondents said they planned to continue recycling in the foreseeable future (64%), this was often accompanied by an explanation that they anticipate few other options. A middle-aged female waste picker explained, "What are we supposed to do if we're not recyclers? How are we supposed to get food?" Those that planned to do something else in the future often coupled it with a precondition yet to be accomplished, with 12% of participants explicitly saying "if they could build up more capital" they will leave recycling to do another job. Yet, the poverty that forces people into recycling ultimately keeps them there, as tiny profits can only cover immediate daily costs and provide no avenues for higher income.

Land ownership is a tangible representation of how people in precarious working conditions also experience precarious living conditions. Among the survey respondents, over half (60%) were either renting or squatting on land. By not owning this physical asset—another

form of capital—people are cut off from other potential sources of income, such as farming or renting out land. Hence, without other skills, they have few means of making money besides putting their bodies through physical labor.

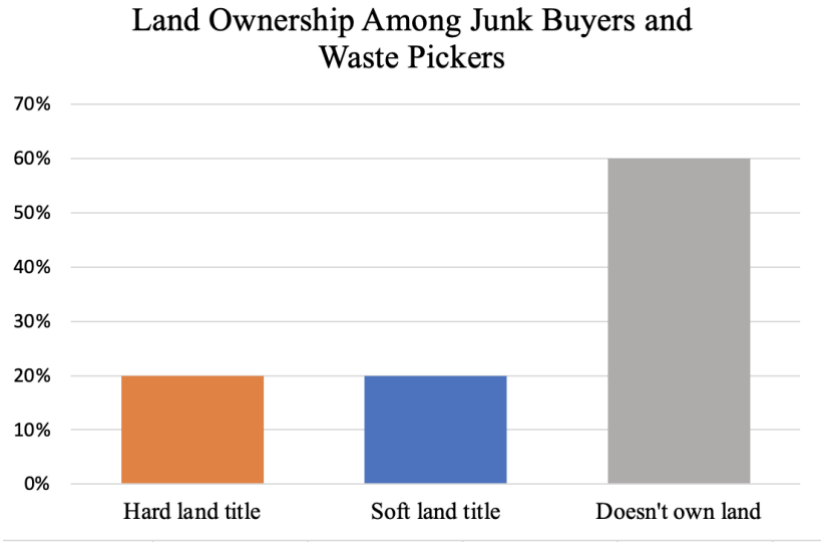


Figure 6: Percentage of land ownership among surveyed junk buyers and waste pickers

Resettlement adds an additional element of insecurity to recycling collectors' daily lives. Of the 10 participants that had a hard land title, six obtained their land from a resettlement package after facing eviction from an urban squatting site. Another eight landless respondents in Phu Tek Sen Tbong were notified of their community's impending resettlement, and they worried about where their future income would come from. Since resettlement locations are usually on the city outskirts, recycling collectors lose access to urban markets and businesses with valuable materials and may fail to find enough material. This phenomenon may explain why our team struggled to find recycling collectors in Ron Ta Eik, a resettlement site 24 kilometers outside of Siem Reap. The only recycler surveyed in Ron Ta Eik, a 50-year-old woman, said that the long commute to the nearest depot meant she lost nearly a third of her recycling profit to gas expenses. Relocation, even when it provides land to the landless, can exacerbate vulnerabilities rather than alleviate them.

While the survey results highlighted a myriad of factors that force people into recycling, one overarching theme was exclusion from the formal sector. Many respondents emphasized that

they could not pursue formal wage labor due to domestic responsibilities, low education, illiteracy, age, and other factors listed in Figure 7.

Figure 7: Reasons cited why junk buyers and waste pickers began recycling

Survey participants described the need to care for their children, parents, or sick family members at home as reasons for remaining in recycling, which provides them with a flexible work schedule and environment. Those with young kids specifically expressed that recycling allowed them to simultaneously care for their children and make an income. Ten respondents (20%) said that they brought their children along their recycling collection routes for the sole purpose of childcare. A woman living in Poom Veal Sambour explained her two youngest children "must go with [her] to collect waste" when no one else is home. Since they are too young for school, the children will often trail behind her as she collects recyclables on foot. In her survey, she explained that working in construction like her husband would earn a much better income, but construction recruiters will not allow her to bring children to work. Another woman living in Poom Veal Kok Chak described how waste picking allowed her 18-year-old grandson to work around his school schedule. The boy, who had collected recycling since he was eight, sometimes skipped meals in order to both attend school and collect sufficient material. These responses reveal that people do not choose to do waste picking or junk buying for the appeal of a

flexible schedule. Rather, other parts of their life cannot be adjusted—leaving recycling as the only option for accommodating these conditions.

Lack of education was also cited as an obstacle to pursuing more ideal work. The majority of respondents did not attend school past the second grade, and 38% of respondents had received no education. Some older survey participants pointed to their upbringing during the genocidal Khmer Rouge regime, when primary schooling consisted solely of political propaganda, as the reason for their poor education. Many respondents directly connected their low education level to their entrance into recycling, as 16% reported that their lack of education prevented them from doing another form of work.

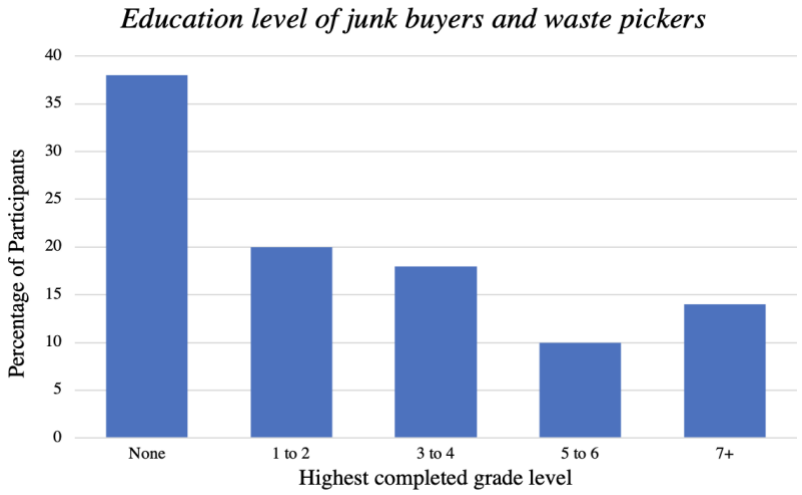


Figure 8: Percentages of surveyed junk buyers and waste pickers with their highest completed level of education

Age, whether it was being too young or too old, was also a reported driver of people's entrance into recycling and exclusion from formal work. Some participants started recycling as children to help their families make an income. A woman in her thirties from Poom Tral said that she "begged [her] mom as a child" to let her collect recyclables and help alleviate her mother's financial struggles. A pair of 35 and 40-year-old sisters, who stated they had been collecting recycling "since they were riding bicycles," further demonstrated how recycling is an accessible way to earn income even for children. Nine respondents said that their children either helped them with sorting and picking material or collected recycling independently, which may impede their education. While young age limits other work opportunities, old age was similarly cited

among respondents as a barrier to other jobs. Fearing they would not qualify for traditional labor at their old age, 14% of surveyed respondents disagreed that they would rather pursue formal job opportunities. A group of women, interviewed in Poom Veal Kok Chak and ranging from mid-thirties to fifties, explained they would prefer other work "if they would take us," referring to their age as the potential barrier.

The physical demands of recycling collection mean laborers face ongoing threats to their health, which can compound the effects of the aforementioned challenges and obstacles. Nearly half of the respondents said physical exhaustion was a consistent experience for them. Other participants reported bodily strain or harm from instances when they had to move recyclables on foot, either due to their vehicles breaking down (20%) or mud during the rainy season (10%). When asked about their work schedule, many recyclers said they went out as much as they could, only taking time off when they needed to rest. Yet, many feel pressure to push past their exhaustion to meet immediate economic needs. A woman in her forties noted, "We must go every day for it to be enough, and that income is only enough for that day." The income that recyclers earn is barely enough to cover everyday expenses, and according to a handful of participants, just enough to buy rice. Hence, few have the luxury of leaning back on previous savings if they do not work. "Being tired or sick is lost income," said a young woman in her twenties living in Kok Patri, explaining how making time to rest was the biggest challenge of her work.

Injuries were also a common reality for survey participants. Respondents most frequently reported getting cuts from handling materials, and hand cuts were especially common among waste pickers because they sort found recyclables. Though a majority of surveyed recyclers wear some form of protective equipment, a few still got cut nearly every day. Some respondents faced more serious harm, with 16% experiencing an injury from a bike or motorcycle accident during work. Said injuries can force workers to stay home, setting recyclers financially back until they must return to earning an income. Being tired, injured, or sick are not just physical conditions to recycling collectors, but rather are direct impediments to having an income—therefore, ignoring bodily conditions and persisting in their work is often the only available choice.

Even with many of the surveyed recyclers working over 40 hours a week, most lacked financial security in the present and foreseeable future. Recycling collection was rarely a stepping stone to more promising livelihoods, beyond a few depot owners that accumulated

enough capital to jump upwards from junk buying and waste picking. Over half of the survey respondents (56%) have been collecting recycling for over 10 years, further demonstrating how the occupation leaves few avenues to better conditions. Already lacking basic amenities and protections, waste pickers and junk buyers must weigh the tradeoffs between a range of factors that contribute to their daily income. Even while 76% of both junk buyers and waste pickers agreed that their line of work gave them "freedom from a boss or timesheet," it is evident that this is not the reason most began recycling. A female waste picker in her thirties acknowledged that the independence of the job "is only a type of freedom," given she must rely on the charity of others to have a sufficient income. Furthermore, survey participants demonstrated that the lack of freedom to pursue formal work lent them no alternative but to work as recycling collectors. "Freedom," as many understand the term, loses the same meaning when our immediate needs are a daily struggle.

Conclusion

Survey responses revealed the concerning, though unsurprising, precarity that recycling collectors manage in their daily lives. Waste pickers and junk buyers struggle to accumulate capital and economic security due to the pressures of the upstream commodity chain, leaving collectors vulnerable to painful price fluctuations and shifting markets. External factors such as land possession, domestic responsibilities, low education, and age often trigger collectors' entrance into recycling and eventual entrapment within the profession long-term. As informal workers struggle to earn a living wage, support from depot owners, outside community members, and fellow recycling collectors is essential for both recycling workers' survival and the continuation of their crucial waste management services to the city of Siem Reap. Current economic structures fail to properly recognize or compensate informal laborers for their role in transforming recyclables from waste to valuable commodities.

Our findings highlight the urgent need for formal and informal organizing of recycling collectors to push for protections from price fluctuations, dangerous working conditions, and exploitation by depots. Waste pickers and junk buyers already live within informal community networks, often brought together by economic desperation and landlessness to support one another. These support networks, in replacement of formal protection mechanisms, have the potential to radically change the power scheme of the current commodity chain. We hope that future recycling collectors can find change by expanding and fostering their current forms of community support, possibly in the form of unions, to provide more secure livelihoods and platforms for advocacy to informal laborers.

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Appendix

	Image	Description
A		Motorbike with pushcart attached, seen outside of a depot
B		Bicycle used by a waste picker
C		Pushcart that a waste picker would pull by foot

D		Large truck owned by small depot owner in urban Siem Reap
E		Wall of plastic bottles at a large depot in Kok Chak to be stocked by the owner until market prices improved