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Waste pickers as fabricators: An exploratory study to upcycle waste cardboard as a building resource in Asuncion, Paraguay

Abstract

The work presented in this paper aimed at understanding the material and human cycles around waste cardboard collection and recycling in the Asuncion's Metro Area in Paraguay with the focus on the work of waste pickers. The main goal is to propose a model where pickers could not only collect but also produce low-cost building parts with waste cardboard—potentially increasing recovery rates and revenue. An exploratory study including key informant interviews and field observations were held as part of the investigation. Major findings include an identification of critical stakeholders, material cycle pointing out at the advantages of upcycling waste cardboard, and a recollection of waste pickers' major challenges to improve their working conditions. The work lays down the basis for a collaborative model where waste pickers work is revalued, and waste cardboard recycling rates increase.

Keywords: upcycling, cardboard, waste pickers

Introduction (269)

The rapid growth of solid waste is currently a critical challenge in urban areas worldwide and specially in low- and middle-income countries where the total waste production is expected to double by 2050 (Silpa Kaza, Bhada-Tata, and Van Woerden 2018, 27). In Latin America, only 7% of urban solid waste is recycled (IADB 2015), nevertheless, this rate is increasing as grassroots informal waste picker groups transition from “scavengers” to “self-employed environmental entrepreneurs” (Martinez 2010, 200). Recent development studies have demonstrated that when these groups receive support and integrate formally to society, they not only help to increasing recycling rates but also contribute tackling other critical sustainable development targets (Gutberlet 2021). What remains unexplored, however, is whether waste pickers can also play a role in upcycling waste materials such as cardboard.

The work presented in this paper sought to understand the material and human cycles around waste cardboard recovery in the Metropolitan Area of Asuncion, Paraguay (AMA). The investigation put down special focus on the work of informal waste pickers and explored the possibility of them not only as pickers, but as potential producers of building components made with waste cardboard. Upcycling what they would otherwise recycle, down-cycle, or discard could add value to their work and increase revenue. This extended abstract presents the results of an exploratory study that included key informant interviews and field observations and it's part of a broader research that experiments with waste cardboard as a resource for low-cost building

materials. The results helped to identifying critical stakeholders, mapping material sequence from production to disposal, and to documenting some of the waste pickers at work.

Background Context (249)

Waste pickers' lack of infrastructure and access to tools still "prevent them from adding value and increased revenue" to waste management systems, affirmed Tello Espinoza et al. in a 2010 report about urban solid waste in Latin America (2010, 142). In this region, however, they have transitioned from "pickers" or "scavengers" to "self-employed environmental entrepreneurs" during the first decade of 2000 (Martinez 2010, 200). Waste pickers in Colombia, Brazil, and Argentina for example, have achieved a remarkable level of organization through cooperatives and associations and are today fully legitimized to participate in the formal waste management system. Today, Latin America is one of the most organized regions concerning urban waste scavenging with more than a thousand picker organizations (Medina 2015, 24). Recent development studies have demonstrated that when these groups receive support and integrate formally to society, they not only help to increasing recycling rates but also contribute tackling other critical sustainable development targets (Gutberlet 2021).

This movement has had an echo in Paraguay, where this study is situated and where the movement grew from one single association in 2005 (WIEGO 2005) to around twenty associations representing approximately 5,000 waste pickers in Paraguay in 2016 (The Latin American and Caribbean Network of Waste Pickers 2016). The most representative and inspiring outcome of this movement in Paraguay is probably the *Cateura's Landfill Harmonic*, an orchestra born in the country's largest landfill that utilizes trash-made musical instruments empowering local communities through music and add value to their collections (Lopez Inigo 2015).

Materials and Methods

The study sought to understand the material and human cycles and assess the potential of supporting waste collectors in upcycling waste cardboard for potential future uses as a construction material. An exploratory study consisting of semi-structured interviews and a field observational study was undertaken¹. Exploratory studies are useful when there are not many earlier studies about the subject of interest, according to Labaree (2020)—in this case, studies about informal waste cardboard collection methods and its recycling in AMA. The first part consisted of semi-structured interviews with key informants where discussions focused on talking face-to-face to people who work in the production, collection, or recycling processes of waste cardboard in the area. With this instrument, the researcher tried to determine the critical aspects and identifying the key stakeholders of the cardboard production-collection-recycling process. The informants where selected based on their role in process and the technique adopted for the interview comprised an open-ended questionnaire organized by themes and audio recorded.

The second part consisted of a field-observational study to record and document the work of waste pickers *in situ*. Observation is one of the most critical methods in social sciences and as

Malgorzata and Dariusz affirmed, it has a “low level of control over the field of study” (2018, II:36), allowing the researcher to adapt to the situation without interfering the subjects activities. The topics observed were the physical setting from where the material was taken, interactions, basic demographics and educational characteristics of the subjects, type of material collected, transportation means used, and physical setting of the destination place of the harvested materials. The techniques adopted for this work included a partial participation of the observer without taking part of the waste collection activity itself, notetaking, video, and audio recording.

Results

Key informants were interviewed in-person during the data collection period (27/12/2018-03/01/2019)ⁱⁱ. The first key informant was the head of an NGO with extended experience working in the field of community development and more specifically with waste collectors placed in *Cateura*—Paraguay’s major landfill. The interview helped define which are the companies that currently buy and recycle waste cardboard in AMA, as shown in Table 1. The second key informant was a CYSA manager—the country’s largest packaging manufacturer. The informant affirmed the use of waste cardboard for fabricating new cardboard occupies only 30% of the total production and they did not expect to increase the percentage soon due to their clients high-quality and structural product requirements for which they only use virgin fiber pulp.

Table 1: Recyclable materials destination in AMA

Material	Material Recyclers/Buyers	Observation
Scrap metals (copper, bronze, aluminum, and steel)	<i>Brassur SA</i> <i>6A SACI</i> <i>Metalpar SA</i>	The first two companies export compressed or melted and formed scrap metals to Brazil.
Waste Cardboard	<i>Cartones Yaguarete SA</i> (CYSA), <i>Corrugadora Paraguaya SA</i> , and <i>Don Marcial</i>	Although there are several buyers, most of the recovered cardboard ends at CYSA
Paper (white, color, and mixed)	<i>Corrugadora Paraguaya SA</i> , and <i>Don Marcial</i>	Abate affirmed that most of the recovered paper is exported to Brazil.
Glass (green, brown, and clear)	<i>Fabrica Paraguaya de Vidrios SA</i> (FPV)	
Plastics (mostly PET, HDPE, PVC, and PP)	<i>Compañía Recicladora SA</i> (CORESA)	

Following the key informant’s advice, the field observations were held in highly commercial and residential area in Asuncion that produce large amounts of waste daily attracting many collectors. The first task was to identify the places where the collectors stop for materials and next, the subjects were approached for consent. Most of them were minors, consequently, it was possible to document and record the activities of only three adult subjects all of them working in the mentioned area (Figure 2).



Figure 1: Waste collectors in Asuncion

The subjects affirmed they collect all kind of recyclable materials including any kind of dry and uncontaminated waste cardboard—otherwise they cannot sell it. They use three-wheelers and take the unsorted materials to their homes where they segregate everything with their relative's help, including children. They sell everything to intermediaries who sometimes advance money to the collectors creating a complicated dependency situation. There were negative comments about the price fluctuation and dependency on intermediaries—recycling companies that could pay them better are faraway. One informant stated that although many people still portrayed them as marginal, the amount of people who support their work and help them was growing incrementally.

Figure 2 below illustrates the flow of municipal solid waste in AMA (including waste cardboard) and point out the three main actors: a) the municipal collection system; b) waste management companies, NGOs, and startups; and c) informal waste pickers. Municipal coverage is extensive though users do not segregate waste and trucks take absolutely everything to landfills where people living and working under the worst conditions, scavenge to save valuable materials (Abate 2009; Cunningham, Simpson, and Keifer 2012). NGOs and startups do business with private companies or institutions that have the interest or must send their waste to be recycling and some of them collaborate with waste pickers.

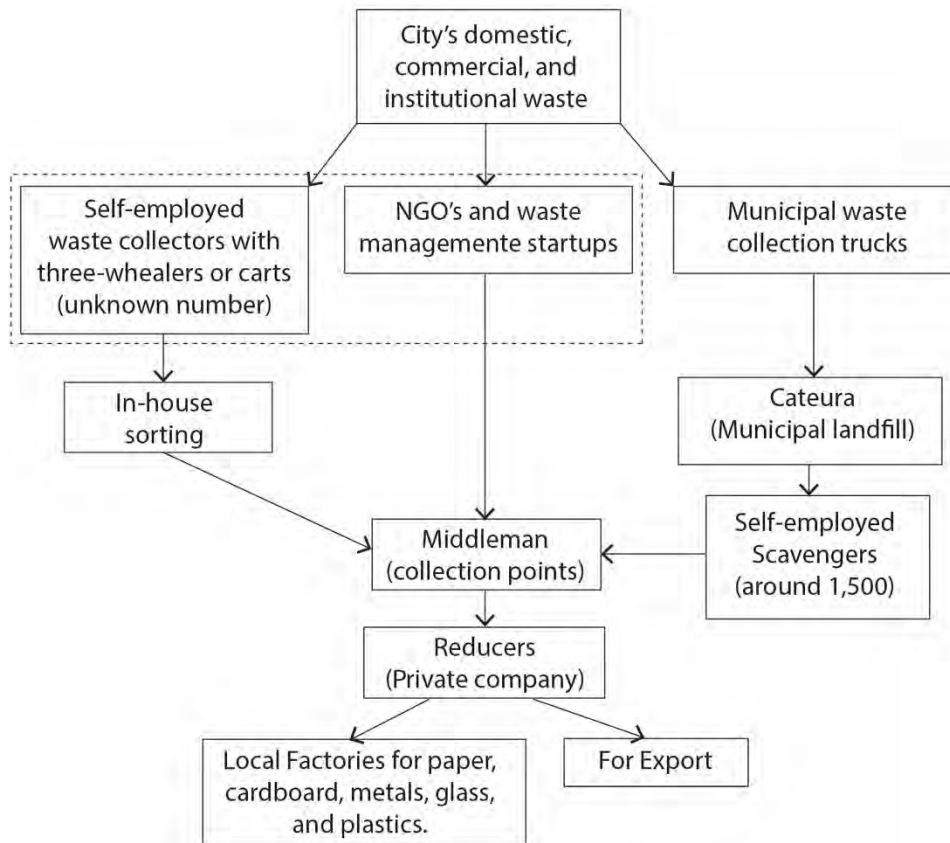


Figure 2: Municipal solid waste circulation in AMA

Conclusion

The aim of the present work was to understand the waste cardboard ecology in the Metropolitan Area of Asuncion, Paraguay. To do this, the researcher held an exploratory study interviewing key informants and observed the work of waste pickers in AMA. The findings suggest there is an interest in upcycling waste cardboard among stakeholders. Its low value among recyclable materials makes it highly accessible or almost free and does not prevent companies or pickers from using it as an alternative building material. Formally recognizing waste pickers remains a critical challenge, meanwhile, their work continues being discriminated against by public and public entities and intermediaries determine the money they receive. Notwithstanding the study limitations, the results provide an overview of waste cardboard recycling in AMA. Future work will focus on proposing a collaborative model to capitalizing on the material's affordability, availability, and the limited production of recycled cardboard products. In this model, stakeholders could effectively contribute to establishing a new value chain for waste cardboard, with pickers as fabricators of building components and beneficiaries simultaneously.

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ⁱ Institutional Review Board approval on December 4, 2018, by the Office of Research Protections at Penn State University (Study ID: STUDY00010849)

ⁱⁱ This time is characterized by high commercial activity related to local holidays, Christmas, and new year holidays, therefore, the presence of waste pickers in the selected area was very noticeable.

Personal reflection on the importance of design driven research.

The abstract submitted was part of a PhD research defended in 2020. The research started by asking how to upcycle waste cardboard as a building material for sustainable architecture. At first glance, the question seemed to be a material design problem; however, the investigation intersected two important aspects: material cycles (re: waste cardboard) and communities impacted by these materials (re: waste pickers). Understanding this intersection was critical to propose a meaningful solution to these issues. Consequently, the work presented in the abstract was important because it laid the foundations for a collaborative model where waste cardboard could be upcycled, and pickers work revalued. The experience taught me about the intricacies of material processes and the importance of participation of affected people as well as how research methods from social sciences can enrich design solutions.