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Upstream approaches to reducing the generation of plastic waste in Ghana

An Experiment by UNDP Accelerator Lab in Ghana

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List of abbreviations

UNDP	=	United Nations Development Programme
UNCTAD	=	United Nations Conference on Trade and Development
ACCLAB	=	Accelerator Lab (United Nations Development Programme)
MSMES	=	Micro, small and medium sized enterprises
GHANA NPAP	=	Ghana National Plastic Action Partnership
EACCE	=	Education, Awareness Creation and Community Engagement Taskforce of the Ghana NPAP
UNEP	=	United Nations Environment Programme

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About the UNDP Accelerator Labs

The UNDP Accelerator Labs, established in partnership with Germany's Federal Ministry for Economic Cooperation and Development and the Qatar Fund for Development, is a global network dedicated to addressing complex sustainability issues. It is the largest and most rapidly growing learning network in the world, encompassing 115 countries. By harnessing local innovations, the labs generate practical knowledge and envision new approaches to sustainable development in the modern era. Learn more at acceleratorlabs.undp.org or follow us @UNDPAccLabs



Summary

At the 2022 UN Environment Assembly, 175 nations agreed to combat plastic pollution and create a binding international agreement to curb plastic pollution by 2024.

In Ghana, only 5% of the 1.1 million tons of plastic waste generated annually is recycled, and plastic pollution (including pollution due to single-use plastics) is rampant. Single-use plastics could take thousands of years to decompose and are harmful to ecosystems, but they are widely used in Ghana, often due to their low cost and perceived convenience. To support efforts to curb plastic pollution, the UNDP Accelerator Lab (AccLab) in Ghana, has run an experiment into upstream approaches to reducing plastic pollution, focusing on alternatives to plastic packaging.

To understand the potential for alternative packaging, the study involved interviews with businesses that have introduced different approaches to reducing plastic pollution, including more sustainable packaging. Melcom Limited (Ghana's largest chain of department stores) has offered reusable bags to its customers, and generally, awareness and take-up have been good. Melcom has also introduced oxo-biodegradable bags. Koko King, a food company, shifted to paper cups after realizing the harmful environmental impacts of plastic packaging.

Online polls conducted by the AccLab and TroTro Diaries (a large Facebook community) point to the public's increasing preference for environmentally-friendly packaging, and concerns about excessive use of plastic bags (multiple-bagging). However there are also concerns about the affordability of alternatives to plastic packaging.

A field experiment was conducted at commuter stations (TroTro stations) in Ghana's capital city Accra, focusing on food-vendors who sell a popular breakfast porridge (Koko). In the experiment, the vendors offered their customers free branded paper cups (supplied by UNDP), instead of the usual multiple, single-use plastics bags. The aim was to test the hypothesis that the free offer would influence customer behavior, support customers to develop new environmentally friendly habits, and over time reduce the use of plastic bags.

The results point to a willingness to use alternatives to plastic packaging. Overall, the report highlights the need for more targeted and innovative awareness campaigns to sustain behavior change in communities, and the significant investment potential for innovative packaging and business processes to tackle plastic pollution in Ghana.

Introduction

At the 2022 UN Environment Assembly (UNEA-5), 175 nations endorsed a historic resolution to End Plastic Pollution and forge an international legally binding agreement by 2024. The resolution addresses the full life-cycle of plastics, including design, production and disposal.

In Ghana, it is estimated that [just 5%](#) of the 1.1 million tons of plastic waste generated annually is recycled, contributing to poor sanitation and pollution. A [significant](#) proportion of the plastic waste is single-use and non-biodegradable, i.e. even when correctly disposed of, these plastics could still take [thousands of years](#) to decompose, while releasing harmful chemicals such as [phthalates](#) into soil and groundwater.

Single-use plastics often end up in rivers and oceans, threatening fish and other marine life, disrupting the balance of ecosystems, and contributing to the depletion of finite resources, such as the oil and natural gas, used in producing plastics.

Despite the negative environmental impacts, there remains a significant preference for single-use plastics in Ghana, because they are cheap and alternatives are limited.

There are [notable examples](#) of good practice in plastic waste management in Ghana as set out in

[Ghana's approach to managing plastic waste](#), and [Roadmap for Radical Reduction of Plastic Waste in Ghana](#)). However plastic pollution is a highly complex development challenge, in which causality analysis is often characterised by conflicting perceptions about the underlying causes of the problem and its potential solutions.

Key actors (government, the public, manufacturers and retailers) may have different perceptions about cause and effect. Typically, solutions to such complex problems are not solely 'technical' i.e. tackled by technical experts or single authorities such as Government. Instead, solutions are likely to have behavioural elements, with social, cultural and political dimensions that are best tackled by ecosystems working together at different levels.

In response to such increasingly complex and inter-related development challenges, UNDP created the global network of [Accelerator Labs](#) (AccLabs) to help identify, test and scale up potential solutions. In Ghana, the AccLab has applied different methods including [behavioural insights](#), and [collective intelligence](#) to experiments in plastic waste management. So far, the focus has largely been on downstream issues.

The [Ellen MacArthur Foundation](#) defines the upstream approach as tracing the waste problem back to its root causes and tackling those causes. To strengthen UNDP Ghana’s portfolio of experiments on plastic pollution which currently focus on downstream activity (mainly approaching plastic pollution through the lens of recycling), this upstream experiment focused on how businesses and communities prevent or reduce the generation of plastic waste, by rethinking packaging, products and practices. To achieve this, UNDP tapped into diverse sources of data, and collaborated with an “unusual partner”, [TroTro Diaries](#). TroTro Diaries is a grassroots-driven, Facebook community of about 450,000 members. It focuses on issues of mass transportation (TroTros are privately-owned minibuses). The experiment aimed to:



Leverage social-media and on-line communities to generate new conversations about plastic-waste.



Increase levels of awareness about environmentally-sustainable packaging for food and beverages.



Elevate the voices of ‘everyday people’ in conversations about plastic pollution.



Encourage different purchasing behaviours among commuters, and selling behaviours among female-led micro-enterprises selling Koko (a popular “street food”).



Build capacity of the micro-enterprises to participate in conversations about plastics, and work with them to run an experiment to test the potential for sustainable packaging as part of their business models.



Track about 600 commuters who took part in the experiment (who are also members of an online community) to see if they were more likely to engage in environmentally-sustainable behaviours after the experiment.

Setting the context: alternatives to plastic packaging

To understand whether businesses (ranging from large department stores to MSMEs) see opportunities from introducing alternatives to plastics, we approached five businesses to share their insights. Here are experiences of two of them, Melcom Limited and Koko King Limited.

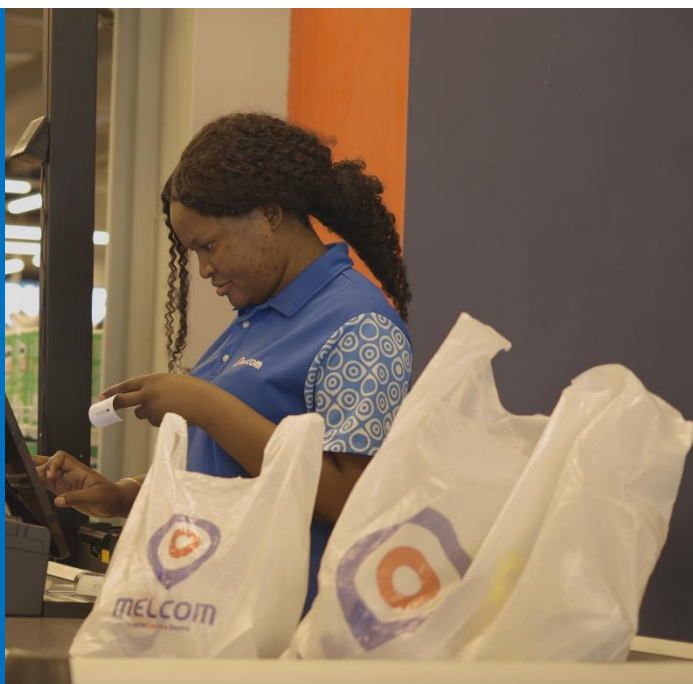


Figure 1: Oxo-biodegradable bags from Melcom

Case Study 1: Melcom Limited

Melcom Limited is Ghana's largest chain of department stores with average footfall of 25,000 to 35,000 per day. About 40% of visitors convert into retail sales, hence a significant number of plastic carrier-bags are given out daily. Some years ago, Melcom began to implement a multi-pronged strategy to reduce its environmental impact. In its engagement with relevant regulators, Melcom has raised and discussed different approaches to tackling plastic pollution, including banning some plastics, and additional fees on certain plastics to influence consumer behaviour towards reduction. However, these approaches appear to have been difficult to

implement across board for all retailers, from a regulatory perspective. Hence, Melcom's efforts have focused on raising awareness among its customers and staff, while investing in more sustainable packaging options including reusable bags and oxo-biodegradable carrier bags. Generally, uptake of reusable bags has been good, and the company has partnered with different suppliers to supply the bags.

Melcom is one of the first, large retailers in Ghana to introduce oxo-biodegradable plastic bags in all its retail shops, following approval by Ghana's regulatory authorities. Oxo-biodegradation is defined in the [scientific literature](#) as "degradation resulting from

oxidative and cell-mediated phenomena, either simultaneously or successively” meaning that plastic degrades by oxidation until its molecular weight is low enough to be accessible to bacteria and fungi, which recycle it back into nature. Contrast this with oxo-degradable materials such as ordinary plastics, which abiotically degrade by oxidation in the open environment and create microplastics, but do not biodegrade except over a very long period. [Oxo-degradable](#) materials can be recycled, but not composted. There is significant debate in the literature about the benefits and potentially negative impacts of oxo-biodegradable technologies. [UNEP](#) has noted how innovations based on modifying plastics and plastic substitutes could be part of a package of measures to curb plastic pollution, but the focus must remain on changing human behaviour towards requiring fewer plastics.

Melcom imports oxo-biodegradable bags despite the cost implications (a bag costs 2.5 times a standard bag) because of local technology and capacity constraints. Currently, this additional cost is absorbed and not passed to customers. During this study we spoke to customers who were generally positive about the oxo-biodegradable bags. Melcom stressed the need to raise public awareness about plastic pollution, and alternatives to plastic packaging.

Case Study 2: Koko King Limited

Koko King is a local food company, which specialises in selling Koko, a popular breakfast cereal of millet, sorghum, or maize flour. Koko is

made by combining flour and water to make a dough, which is boiled into a porridge, and may be served with sugar and milk, spices such as cinnamon or nutmeg, bread, fried plantain or koose (deep-fried bean cakes).

An average meal at Koko King currently costs about 12 GHS, almost twice the cost of Koko from the traditional street vendors who are part of the experiment described in this report. Initially, Koko King’s business model relied heavily on plastic bags and styrofoam cups, but two events led it to change strategy towards paper cups. First, attendance at a start-up training programme on environmental sustainability, which covered opportunities to use sustainable-packaging as part of business-branding. Second, a flood in Accra (exacerbated by blockages in the city’s drains) during which the Koko King team saw first-hand how discarded styrofoam cups contribute to flooding. The team shared a number of observations about their “journey to paper”.

Pushback: Expect some push-back from customers. In Koko King’s case, this was mainly due to cost – changing to a quality paper product increased the cost of Koko by 50%.

Cost: Not all packaging costs can be passed to customers. Koko King had to absorb some costs. A key driver of cost is importation. Locally manufactured cups are reportedly expensive and can be of variable quality.

Awareness: It can take almost a year, to convince some customers about benefits of sustainable purchasing and packaging.

Online Polling

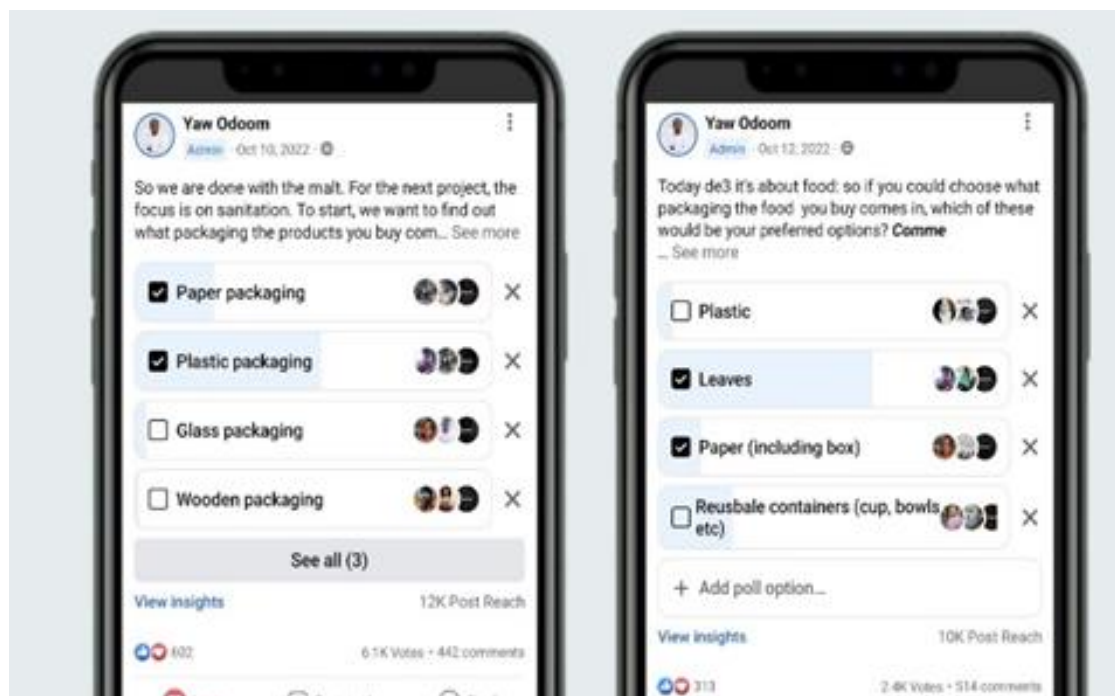


Figure 2: Snapshots from the first batch of community polls run on TroTro Diaries Facebook Group

There are about 6.6 million social-media users in Ghana¹, most of them on Facebook (5.65 million) and the rest on platforms such as Instagram (1.7 million) and Twitter (1.15 million). Potentially, this is a very rich, complex source of data on public opinion, both attitudes and potential behaviours. Guided by an appropriate framework, this could also be a source of collective intelligence about potential solutions to complex development challenges such as plastic pollution. For this experiment on plastic pollution, UNDP tapped into the 450,000 members of the TroTro Diaries on-line

community, initially through Facebook polls, which then generated insightful, moderated online conversations. Informal language (including pidgin English) was used to ensure polls resonated with a wide cross-section of the public. There were 11,339 responses in total, with follow-up questions to enable further probing about food-packaging, waste generation and the community's views on potential solutions.

The first poll (which had 6,100 respondents) asked what kind of packaging people most often

¹ Source: <https://datareportal.com/reports/digital-2023-ghana>

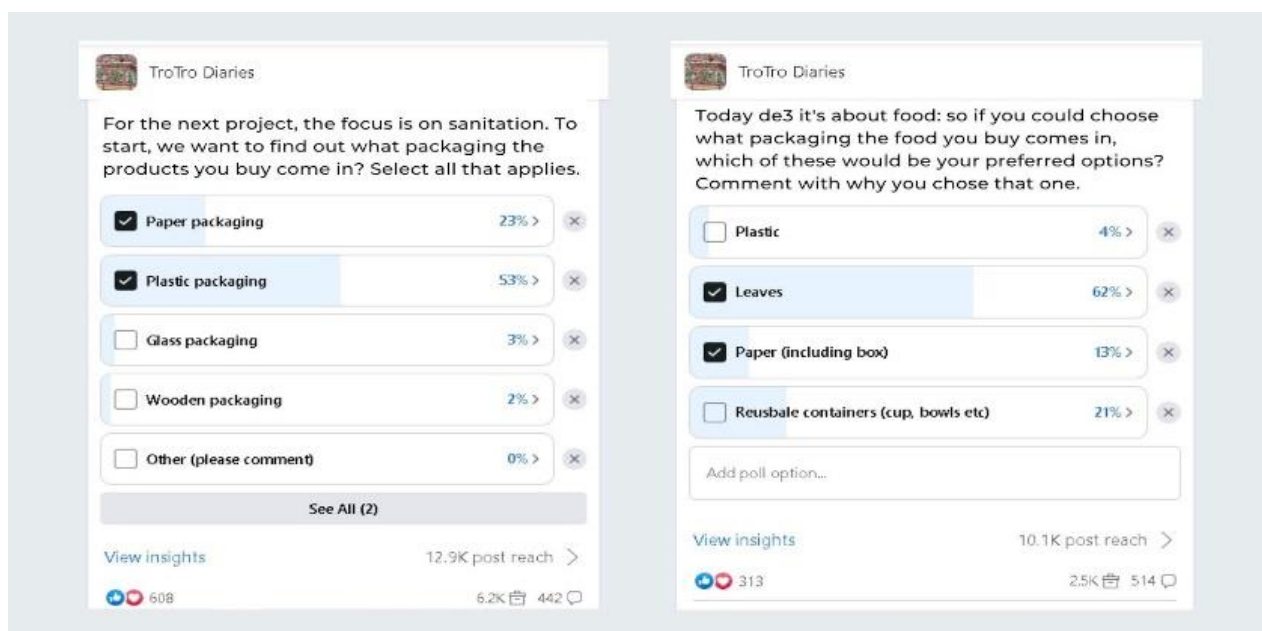


Figure 3: Snapshots from the second batch of community polls run on TroTro Diaries Facebook Group

receive when making purchases. The majority (53%) said plastics, followed by paper (23%).

A second poll (with 2,480 respondents) asked which food packaging respondents would prefer given the option. The majority (62%) said leaves (as used for waakye (see Fig.4), 21% said reusable containers and 13% paper. Only 4% would opt for plastic packaging given the choice.

Waakye is a popular dish (made of rice and beans). It is traditionally sold in katemfe leaves as food-wrapping, but plastic packaging is now predominant. The use of katemfe leaves creates economic benefits for leaf-growing communities, and [UNCTAD](#) has predicted that demand for this and other sustainable and eco-friendly options will increase, as customers become more environmentally conscious.



Figure 4: Waakye in katemfe leaves

#howmanyplastics campaign

The online polls and conversations revealed widespread concern that unnecessary multiple-bagging (i.e. putting one or more plastic bags inside another) contributes to plastic pollution. Clearly, this may be unavoidable if items are heavy or have sharp edges, as a single bag might rip, leading to spillage and contamination. However, many respondents said that multiple-

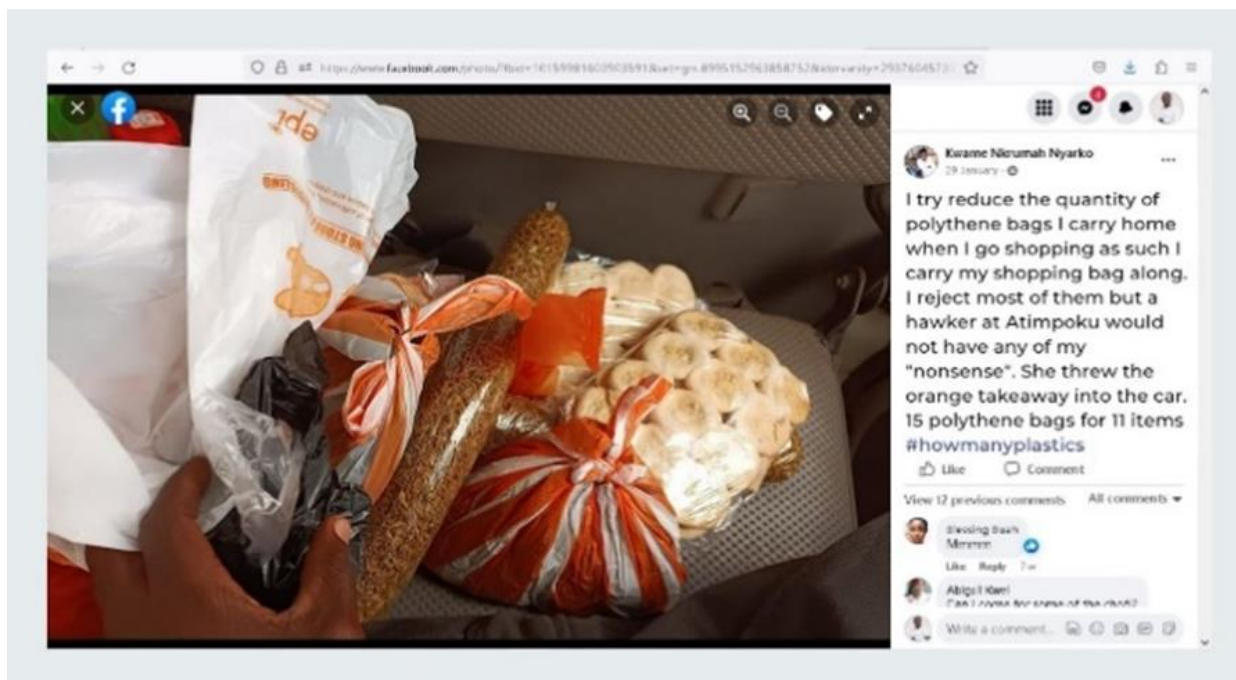


Figure 5: User generated content from #howmanyplastics campaign

bagging has become a habit, with vendors providing, or buyers requesting more bags, simply out of habit. To explore this issue further, UNDP and TroTro Diaries launched an innovative **#howmanyplastics** campaign, to encourage the public to share user-generated content on the number of plastic bags they receive with purchases. The data was extracted and analysed (with respondents permission), with an example in Fig. 5 above, where despite refusing extra plastic bags from a food vendor, these were given anyway.

In our field visits, commuters often said they received 3-4 plastic bags per item purchased, even when spending about 1 USD (GHS 12.99) on Koko for breakfast. This issue was also highlighted in a previous AccLab [study](#):

“You buy toothbrush and you request plastic bag, you buy Rush (an energy drink) ... [another] plastic bag, you buy ... yoghurt and pie, pie gets its own plastic bag, yoghurt gets its own plastic bag, then they both get overall plastic bag.”

Field Experiments

TroTro station approach

We hypothesised that commuting and related activities such as hawking and buying food (including Koko) “on-the-go”, contribute significantly to the generation of plastic-waste in major cities like Accra. Why? It has been estimated that about 65% of Accra’s population use TroTro as their main mode of transportation ([World Bank](#) and [others](#)) i.e. of Accra’s 2.7 million residents, as many as 1.7 million may be TroTro users. If only 50% of these commuters buy breakfast and lunch, and receive 6 plastic bags a day (3 for breakfast and 3 for lunch due to multiple-bagging) then about 5 million single-use plastic bags are disposed of daily. Potentially 30 million bags (almost equivalent to Ghana’s population) could be turning up in landfills, gutters and the sea weekly.

Clearly, this is a context ripe for source reduction by redesigning packaging and business-

practices. Working with selected Koko vendors, we designed an experiment to reduce plastic waste generated from selling Koko to commuters at bus terminals at strategic points in Accra. Terminals were segmented into three according to their size and estimated numbers of daily commuters. Tier 1 (Kwame Nkrumah Circle (10,000+ commuters)); Tier 2 (La Paz (5,000+ commuters) and Tier 3 Nungua (2,000+ commuters) – see Fig.6 below. The experiment focused on female Koko vendors and their assistants across these terminals.

Koko Experiment

Over a 4 week period, commuters who bought Koko from specific vendors were offered free branded paper-cups (see Fig. 7 above). By scanning the barcodes, commuters were able to access and respond to an initial online survey, and

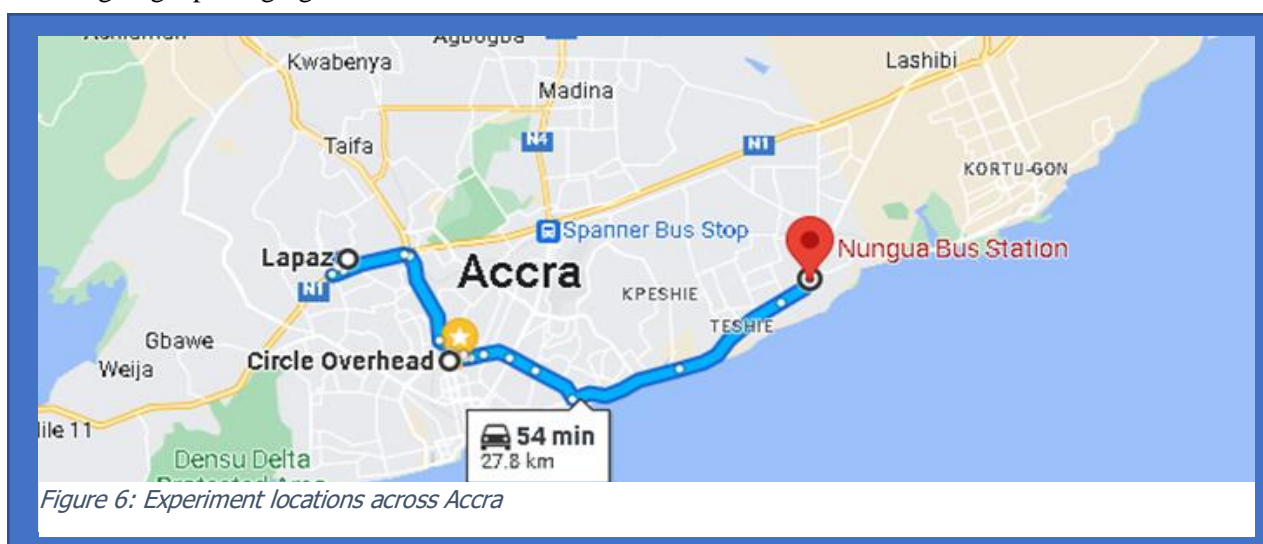


Figure 6: Experiment locations across Accra



once completed they received GHS 5 (40 US cents) airtime incentive. These commuters were tracked to understand their individual experiences. Through interviews and surveys, we analysed which mental frames or schemas the free offer triggered among commuters, and whether these frames were associated with changes in behaviour towards more environmentally friendly packaging.

Mental frames are unconscious structures we all use to make sense of the world around us. We hypothesised that explaining the negative environmental effects of plastic pollution to a commuter, then offering a paper cup (as a more environmentally-friendly alternative to a plastic bag) would lead to a significant proportion of

consumers accepting, and in time requesting, a paper cup.

This experience would in turn influence Koko vendors to reduce the number of plastic bags given to consumers.

Insights from the experiment could also raise manufacturers' awareness of investable packaging opportunities.

Trigger posts were also shared on social media, giving locations of Koko vendors, and encouraging commuters to try paper cups and share their experiences via the TroTro Diaries community.

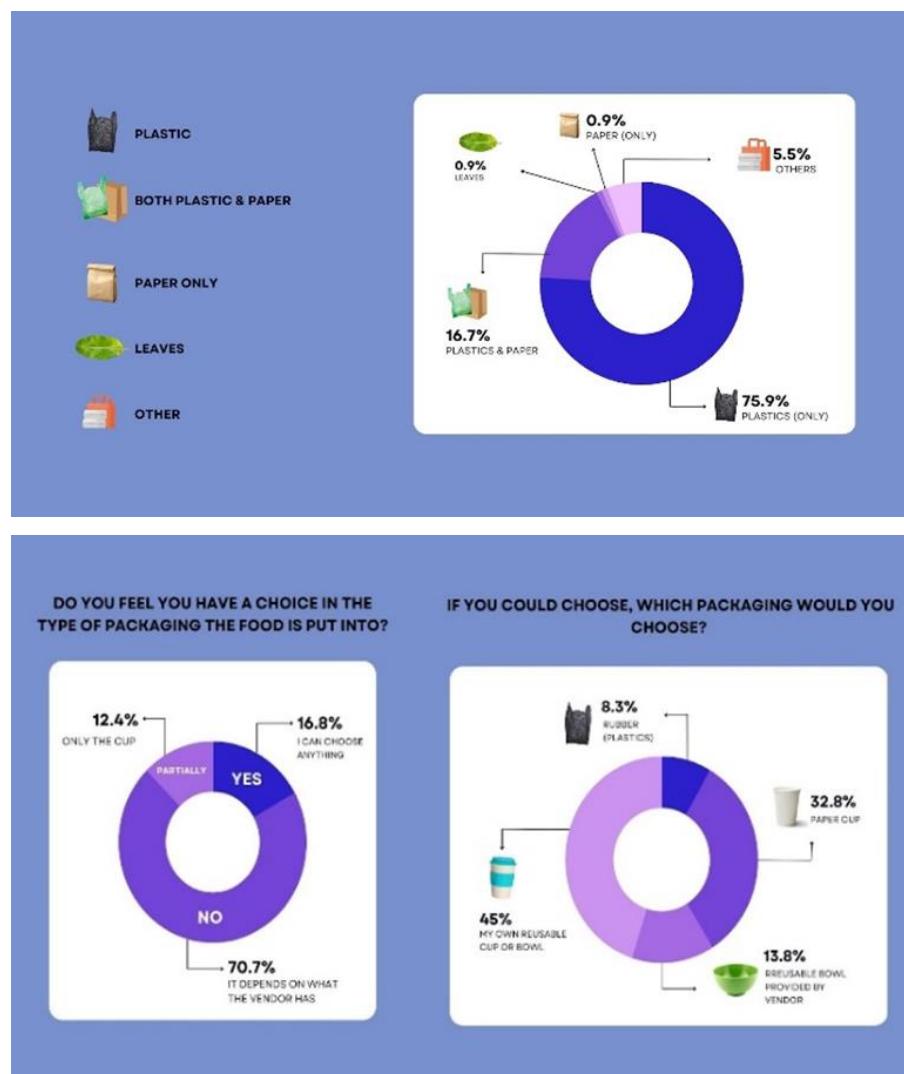


Figure 8: Which types of packaging do your purchases come in, do you have a choice, which packaging do you prefer?

Results and Analysis

There were 564 respondents to an initial survey, mostly youth under 35 (80%) and female (60.8%). While this age distribution is to be expected for largely working age commuters, females are proportionally over-represented. From Ghana’s 2021 census, the population’s gender distribution is 50.7% female and 49.3% male. Many commuters reported receiving up to

six items of plastic packaging daily. Most (75.9%) said their food comes in plastic packaging only (see Fig. 8). Most respondents (70.7%) do not feel they have a choice about packaging, but given the choice 45% would use their own reusable cup or bottle, 32.8% would choose paper cups. Only 8.3% would opt for plastic bags.

"Some years ago, most commuters who bought [Koko] came with their flasks or cups to take the porridge, and the "koose" and puff loaf were usually wrapped in paper. But as some vendors opted for plastic packaging, offering it as a more convenient alternative to carrying a container from home, I succumbed to increasing demand from customers, even though this has increased my production costs. I believe most customers would embrace eco-friendly alternatives to plastic bags, if they would come at an affordable price, in different sizes, and were easily portable." (Hajia Barikisu, Koko vendor).



Figure 9: One of the Koko Vendors who participated in the experiment

As one vendor noted (see above) issues of cost and convenience featured very prominently in the mental frames used by commuters and Koko vendors to explain their choices. We also observed widespread concern that the volume of Koko in a plastic bag is often much greater than what a standard cup can hold, and hence being more environmentally conscious often meant getting less Koko to consume, but paying more for packaging and having less to spend on additional food items.



Figure 10: Willingness to pay extra for packaging

58 % of respondents are willing to pay extra for the type of packaging they wish to use - up to about 1 Ghana Cedi (0.10 US cents) extra. 14% want it for free, and almost 28% might pay more.

98.2% also said they had heard about plastics recycling while 1.8% had not. So it appears that a lack of environmental awareness about the dangers of plastic pollution is not the problem.

Tracking Changes in Behaviour

Two months after the experiment ended, there was a follow-up, online survey on TroTro Diaries, and semi-structured interviews with a sample of the respondents to track behavioural change. There were 650 respondents to the survey. About 1 in 2 (51%) said that after the experiment (having had the opportunity to try paper cups), they now prefer their Koko in paper cups, a very positive outcome. Just over a quarter (28%) said that after the experiment, they now accept fewer plastic bags with their purchases, also a very positive outcome which should reduce multiple-bagging. 15% are now using reusable cups or bowls. Only 6% said they still preferred plastics. The results suggest that the experiment was successful in influencing the behaviour of some commuters towards more environmentally-friendly options, at least over the 2 month period.

One commuter noted:

“Paper cups obviously reduce pollution caused by polythene bags. If usage can be sustained and broadened, we should see a massive reduction in polythene pollution.”

(Nana Kofi)

The experimental design, created around an existing online community, enabled this study to

harness the power of social proofing i.e. the tendency for people’s decisions to be influenced by groups or communities. Instead of communicating only with the individual, we situated the plastic pollution issue firmly at group or community level, triggering interest particularly among networks of youth. However, unlike a standard digital-marketing exercise, conversations were shaped by the public, providing fertile ground to shift mental framing away from downstream approaches such as recycling) to upstream. The *#howmanyplastics* campaign was very useful in generating relevant conversations, while the experiment provided opportunities to try out more environmentally-friendly packaging, activating positive mental frames. During the free-trial period (when the vendors offered free cups), the shared experience became habit-forming. Reverting to plastics became more difficult for some commuters.

“I take fewer plastics. It's too much waste. I go to the market with a shopping bag and prefer koko in paper cups because I can reuse for drinking water and it decomposes when dumped” (Daphine)

However, where vendors chose not to continue offering free paper-cups, opportunities to form new habits disappeared, as one commuter noted:

“Would love to have Koko in the paper cup always but where I mostly buy my koko now, they don't have any. They have plastic [bags] and small reusable bowls for those who eat there. I don't have any choice than to go for the plastic” (Betty)

Recommendations

As plastics become ever more tightly woven into the fabric of modern life, tackling plastic pollution requires a step change from seeing environmental protection solely in terms of compliance with regulations, towards it being part of the implicit social contract governing citizen’s behaviour, within a holistic approach.

1. Plastic packaging is ubiquitous. 53% of those surveyed receive only plastic packaging when purchasing food. However, there is growing interest in more environmentally friendly packaging. When asked which food packaging (not just for Koko) they would choose if they could, 3 in every 5 respondents would opt for indigenous leaves where possible.

- **Government, civil society, the private sector and development partners must collaborate to develop innovative ways of responding to growing interest in alternatives to plastic packaging. However, this must be genuinely inclusive, with the active involvement of the informal sector and grassroots communities. Existing initiatives such as the Ghana Waste Recovery Platform (coordinated by UNDP) and Ghana National**

Plastic Action Partnership could help drive this agenda.

- **There are opportunities for packaging designers and manufacturers in Ghana to explore and develop new versions of traditional, indigenous packaging that are more suited to people’s changing lives.**

2. Those who took part in the experiment are aware of the negative impacts of plastic pollution, and 92% are aware of recycling – a downstream approach. However awareness does not necessarily translate into more environmentally friendly decision making. This is made more complex by frames or schemas through which we see plastics. Interactions with the public show how many simultaneously hold different frames which may appear contradictory, e.g. being aware of plastic pollution and benefits of alternative packaging,

while still perceiving plastic as convenient and affordable. Which frames are usually activated in an individual's mind and why?

- **Further experimentation is required to answer these questions, including through the UNDP Accelerator Lab network and EACCE² Task Force of the Ghana National Plastic Action Partnership.**

3. While advocacy for the adoption of more environmentally-friendly alternatives is critical, advocacy must also be upfront about the affordability of alternatives for the average Ghanaian. A lack of transparency may only serve to strengthen frames around greater affordability of plastics. 58% of survey respondents were willing to pay extra for alternatives to plastic bags - up to 1 GHS extra. 14% would only accept alternatives for free, while 28% said they might pay extra. The challenge is to provide alternative packaging but ensure that additional costs do not reduce interest in environmentally-friendly options.

- **Provide local manufacturers of alternative packaging, for example paper cups, with technical and financial assistance and other support. This should enable them to price their products competitively, compared with plastics, particularly imported plastics and other packaging materials.**

4. Leveraging social media to drive moderated online conversations provides an efficient way to generate collective intelligence. Through the *#howmanyplastics* campaign, the online community captured and shared thoughts and images of multiple bagging. There is huge potential to use these platforms in Ghana to raise awareness about the SDGs and drive grassroots experimentation, particularly given the country's high mobile penetration. Following this experiment, we saw a trend of people spontaneously sharing (online) their efforts to reduce the number of plastic bags they accept or reusing old bags. This is already having a positive 'ripple effect'.

- **Create digital spaces where individuals and communities can play an active role in developing creative strategies to tackle plastic pollution.**

5. The Koko vendors with whom we co-designed the experiment are part of Ghana's large informal-sector, which accounts for over 70% of economic activity, with associated and significant environmental impacts – not always positive. Through experimentation, we built the capacity of 20 female vendors and assistants, to make their own decisions about plastic pollution and test the scope to include different packaging for their businesses.

- **Tackling plastic pollution requires the involvement of all communities, including**

² EACCE – Education, Awareness Creation and Community Engagement

the grassroots, not just as passive recipients of messages about plastic pollution, but actively involved in defining the problem, testing solutions and sharing unique perspectives.

6. Communication about plastic pollution must be more nuanced. We realised that often, saying ‘Ghana generates over 1 million tons of plastic waste annually’ had little impact on many people, as they have no idea what 1 million tons of plastics looks like. We changed the narrative to say: ‘imagine if each commuter [like you] gets about 6 plastics a day while buying food. If there are just 5 million people like you, the number of plastics discarded in a day is almost equal to Ghana’s population (32 million)’ ... that caught people’s attention.



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