

Waste Livelihoods Amongst the Poor – Through the Lens of Bricolage

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ABSTRACT

This paper examines two social enterprises and 25+ informal economy micro-entrepreneurs in Kenya who utilize waste materials to generate income, considered through the conceptual lens of bricolage. Waste materials can all be considered as sources of free or discounted materials that in resource-constrained and poor communities might be leveraged to generate income in the absence of employment. This paper explores three key themes that emerge from the research findings, namely the various strategic dimensions of the cases, the networks and social capital they leverage and how these livelihood models relate to various dimensions of bricolage such as improvisation, making do and the process of ‘fiddling’ or recombining resources. The findings also suggest that differing waste livelihoods have different rates of return, or profitability, and differing input requirements of capital, skills and knowledge. The paper also stresses the role of boundary spanning organizations such as NGOs and hybrid/social enterprises. Copyright © 2016 John Wiley & Sons, Ltd and ERP Environment.

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Introduction

IN THE ABSENCE OF FORMAL EMPLOYMENT OR STATE SUPPORT THE VERY POOR IN THE DEVELOPING WORLD OFTEN TURN TO selling goods and services informally – this may be their bodies (e.g. prostitution), their labour (e.g. sweat equity) or the things that they grow or make. Most production and retail activities require raw materials, capital, know-how and access to a market. Raw materials if ‘free’ or at a discounted price – for instance waste materials – may offer the very poor opportunities for income generation. Waste picking is a significant income stream for many across the developing world, with informal economy workers playing an integral part in municipal waste management. In Delhi alone up to 100 000 workers earn their living in this sector (Talyan *et al.*, 2008.) In this paper we consider how in resource constrained environments ‘free’ or discounted resources associated with waste materials are used to create livelihood income models by individual entrepreneurs and social enterprises. We adopt the conceptual framing of bricolage, which is suggested by Linna (2013) as a suitable lens through which to consider market-based innovations in developing country environments. Using an inductive, exploratory approach (after Stebbins, 2001) and a purposive, snowball sample of cases, we explore the business models associated with waste materials such as flip-flops, plastic bags, advertising flyers, human waste and eggshells through this conceptual framing.

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Literature Review and Theoretical Framework

Exploring Waste

Waste is defined as ‘any substance or object... which the holder discards, or intends or is required to discard’ (SEPA, 2006). Wastes are ‘underutilized’ resources that have embedded value (Kabongo and Boiral, 2011). Growing markets are opening up for ‘green’ goods associated with recycled materials (Holt, 2011), with sustainability practices increasingly positioned as opportunities for competitive advantage (Albino *et al.*, 2009).

For individuals existing within the poorest segments of society, capturing the ‘value’ embedded within others’ waste offers an opportunity to generate a subsistence income (Schenck and Blaauw, 2011; Linna, 2013). Waste pickers collect, bundle and sell their materials to buyers in both formal and informal markets who trade wastes as commodities. This is a highly imitable business model with little skill required and few barriers to entry (see, e.g., Ashenmiller, 2011). In developing nations it can be a highly competitive activity with many new entrants (Njoroge *et al.*, 2013), and typically has a capped income unless value is added through other activities such as dismantling e-wastes or conversion to other products (Oteng-Ababio, 2012). However, earning an income from collecting waste is not just a developing world phenomenon. In many US states deposit-refund programmes are used as an economic trigger to promote recycling – offering opportunities for low-wage earners to pick the recyclables from garbage and generate income (Ashenmiller, 2011).

Waste materials, scavenged or bought at a reduced price, can also be an important raw material for the creation of other sellable items: for instance, toy cars made from drinks cans or artistic crafts made from recycled materials. Linna (2013) identifies affordability as the key to innovation in low-income contexts, through using locally available ‘hidden’ resources, such as waste resources and vacant land.

Waste materials also now form significant sources of imported materials in the developing world, for instance used kitchen items or second hand clothing (Holt and Littlewood, 2014). Consumers in richer nations are encouraged to donate used items that still have full utility to reduce waste going to landfill and as an altruistic gift to charity. These enter the vast global trade in used items. Used clothing exports from OECD countries were worth \$1.9 billion in 2009 and support hundreds of thousands of street sellers (see, e.g., Hoskins, 2013). Thus wastes of varying forms have a cost (to discard), an embedded value, and offer an opportunity for income generation. Considered through the perspective of the waste hierarchy they are either reused (e.g. second hand clothes resold in the market place), recycled (e.g. metals made into another product) or recovered (e.g. waste materials burnt for energy). Different livelihood models and associated input costs may emerge depending upon the type of waste and what use it may be put towards.

Whilst a body of work has emerged on waste pickers, other waste livelihood models remain underexplored and undertheorized. Linna (2013) suggests that bricolage as a conceptual lens offers interesting insights in developing country contexts, which are typified by chronic resource shortages. Given that ‘bricoleurs’ are considered to ‘make do’ with cheap and free resources, recombining them for new purposes (Baker and Nelson, 2005; Baker, 2007), using bricolage as a framing to explore our examples of waste livelihoods is potentially very insightful.

Bricolage as a Conceptual Framing

The bricolage concept has been deployed across a range of disciplines in the study of varied phenomena (Di Domenico *et al.*, 2010), first introduced as ‘intellectual bricolage’ by Lévi-Strauss (1967), and reinterpreted subsequently as ‘making do’ by acquiring and using resources ‘at hand’ (Baker and Nelson, 2005). The themes of improvisation (Ciborra, 1996; Baker *et al.*, 2003; Di Domenico *et al.*, 2010; Duymedjian and Rüling, 2010) or innovation (Weick, 1993; Linna, 2013) are present across a number of bricolage definitions. We adopt the broad definition of bricolage as ‘making do, the refusal to be constrained by limitations... and improvisation’ (Di Domenico *et al.*, 2010, p. 686), recognizing the parallels between innovation and improvisation. Salimath and Jones (2011) further explore the process of bricolage, suggesting that the relevant actors need an intimate understanding of the resources to hand, their inventory, and to undertake a trial and error process of recombining resources to address a specific problem; essentially a process of ‘fiddling’ (after Ciborra, 1996).

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The concept of bricolage has been applied in varied research contexts. In *entrepreneurial bricolage* (Baker, 2007; Baker *et al.*, 2003) a key component is the refusal to accept limits imposed by lack of resources. Baker and Nelson (2005) consider resource constrained small firms who create 'something from nothing' through the exploitation of physical, social or institutional inputs that other firms reject or ignore. *Network bricolage* meanwhile is described by Baker *et al.* (2003) as a process that occurs within organizations that mobilize others within their network to obtain resources. Mair and Marti (2009) consider *institutional bricolage* as used by the Bangladeshi organization BRAC, which helps poor women access markets for income generation. Within institutional bricolage, Cleaver (2002) stresses the need to consider both socially embedded (informal) and bureaucratic (formalized) institutions. The idea of *collective bricolage* is raised by Duymedjian and Rüling (2010), identifying bricoleurs as part of collective groupings. *Social bricolage* is suggested by Di Domenico *et al.* (2010) as a distinct form that demands social value creation, stakeholder participation and persuasion. Linna (2013, p. 2) finds bricolage amongst the extreme poor where 'diverse and innovative approaches are employed by entrepreneurs who resort to bricolage sources as an immediate means of mobilizing resources locally'.

The application of bricolage to entrepreneurship in the developing world, and social enterprises more specifically, remains relatively underexplored, and is particularly applicable when considering how low-income individuals generate livelihoods from waste materials. Additionally, in an African context where the informal economy is a legitimate and robust socially embedded institution (Cleaver, 2002; Webb *et al.*, 2009), focusing on bricolage offers interesting conceptual and practical insights.

Methodology

This paper is based upon fieldwork undertaken in Kenya in 2011–2013 focusing on those who utilize waste materials in their business models, using a qualitative, interpretive methodology and a purposive sample (see, e.g., Coviello and Jones, 2004), set within a wider study across Southern and Eastern Africa (see www.trickleout.net). We consider two Kenyan social enterprises that support entrepreneurs in generating income through waste materials. Both were initially selected as they promote positive social and environmental impact and specifically support those in low-income/poverty contexts. One is based in Nairobi, with waste materials 'picked' by community members in the Mombasa region. The second is based in Kisumu, and selects local businesses using waste materials to sell their products in their 'green' gift shop.

In addition, we draw on interviews undertaken with Kenyan informal economy street sellers in the capital Nairobi and along a 360 km journey to Kisumu by Lake Victoria. Selection of these street-based respondents was opportunistic and exploratory (after Stebbins, 2001), reflecting the difficulties in accessing groups who are located without fixed premises operating in the informal economy. There are 20 respondents (from the sample of 60) who made/sold materials from waste or discarded (recycled) items, comprising 13 who sold recycled items such as recycled/second hand textiles (clothes – children's, men's, women's, mats, sheets), bags (rucksacks, handbags), shoes (plastic, boots, trainers), kitchen pots, pans and sundries, and a further seven who sold items made from waste or discounted materials: baskets, furniture and household sundries from papyrus or hyacinth; jewellery and sculptures from waste metal; garden pots made from clay collected from the riverbank and baked by the roadside. These two cases and the informal economy entrepreneurs (summarized in Table 1) showcase a wide range of examples, allowing theory development from diverse perspectives (Eisenhardt and Graebner, 2007).

Findings: Exploring Waste Livelihoods

The main organizational case study we explore in this paper is Ecofinder Kenya, which is a hybrid social enterprise and non-governmental organization (NGO) based in Kisumu. It is a grassroots organization formed in 1995 as a self-help group initially focused on young people, working with communities across the Lake Victoria Basin, and committed to co-created sustainable development solutions. Ecofinder demonstrates many aspects of institutional

Patience (paper)	Beads strung into necklaces, bracelets and curtains – made from waste paper collected from flyers left abandoned within the local shopping centres. Local church group initiative to train disabled individuals in producing sellable crafts.
Gloria (waste plastic and foil)	Individual micro-entrepreneur who makes sellable items in her home using strips of waste plastic/foil woven into hats, bags and pots.
Benson (water hyacinth)	Furniture, mats, gift cards and baskets are made from the invasive plant water hyacinth by a local family business, sold by case study. Trained a community group to process the hyacinth as 'waste pickers' and buy from them.
Daniel (eggshells)	Local artist using waste eggshells to form art, purchased and sold in the gift shop.
Kisumu community (human waste)	Ecosan toilet collects human waste and converts this to fertilizer that can be sold. Ash from cooking is also recycled as part of the digestion/conversion process. Case study trains local builders to build them.
Mombasa community group (flip-flops)	Flip-flops washed up on beaches/river banks collected by women/community groups (as waste pickers). Processed in Nairobi by artisans trained by case study.
Across Kenya	20 individual micro-entrepreneurs selling items in the informal economy at the roadside from Nairobi to Kisumu.

Table 1. Waste livelihood examples

and network bricolage. They began as a drama group and started with funding from the Kenya Gender Based Violence and Human Rights Group, followed by a project for Population Services Group promoting the use of condoms and family planning services. In each case the learning from these activities was rolled into the next, and used to identify further opportunities. Over the years they have developed a wide ranging network of international partners whom they leverage to access information and additional resources for their new programmes, each growing out of a need they recognize within their community. Particularly pertinent is the role of international volunteers, who bring new ideas into the organization, as well as linking them to new external networks. One of their current programmes is a women's group savings scheme in association with a national bank and another international NGO. Their project portfolio and historical evolution resonates with the idea of 'fiddling' and recombining resources (Ciborra, 1996).

They are keen to encourage all types of environmental activity and have developed a gift shop in their store selling products from local artisans whilst earning income for Ecofinder. They reach out to those producing products that have an environmental theme or potential social impact, offering these individual entrepreneurs an opportunity to reach a market: something they struggle to do alone. For example Ecofinder buys artworks made from waste eggshells by artist Daniel selling these within the shop, purchasing three to five pieces per month (approximately 16–30% of his monthly sales).

Daniel's business also demonstrates aspects of institutional bricolage and shows the complexity that exists in these highly informal environments. He is unregistered and for the last two years has rented a space at the side of the road for approximately 1500 Kenyan shillings per month (approximately \$17), though he had to build the shack. The business is what is called in Kenya a *jua kali* business as it is in the informal sector. However, he is part of a registered society formed in 2008 of about 15 artists who all went to the same art school, and use their group registration to gain access to exhibitions.

The importance of offering access to market is also recognized by Benson, who is part of a family business selling furniture and other goods made from the invasive plant, water hyacinth.

So many people come [to Ecofinder]... me I don't have internet... they take me to exhibition (Benson, local entrepreneur, furniture maker, water hyacinth).

Set up by his father in the late 1960s, their business employs seven staff (young people aged 17 upwards, including two women and mostly relatives), making furniture and other household items sold in a shack at the side of the road, where they have been based for the last eight years. Benson describes how he and his father came up with the idea to use the waste material water hyacinth:

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...[the water hyacinth] is something useless... you cannot make anything so we just tried to make the basket with it. We saw it was useful. One day my dad just woke up and said he needs some three pieces of hyacinth... he asked 'what can I make with this' the first thing he made was a table mat, he made baskets to hats and we use it in the seats [of the chairs].

This process suggests elements of bricolage – making something from 'nothing'. Also of interest is how they then secured their supply, and shared their skills on how to process it with others. The hyacinth is a floating plant that moves with the currents in Lake Victoria and is not actually prevalent in the area where they are based. However, it is present in thick mats further along the lake.

There are some women in xxx. They can't do fishing there [due to the hyacinth] so... we taught them how to make hyacinth, we supply them the chemicals, we apply a chemical to the hyacinth to make it useful, so they are just making hyacinth that we buy from them.

The idea to reach out to this village came from his father, who is the main networker in the business – Benson works in the workshop and his father travels around selling. The women produce the hyacinth in 10 m long strips sold to at a discount to Benson's business for 45 KSh per strip. Typically 300 m is used to make an armchair. Benson also notes his own high levels of social capital: 'like me [his father] I am connected to so many people'. He has also taught a colleague how to use the hyacinth and this person has subsequently opened his own workshop. The highly imitative nature of entrepreneurship within informal economies also means that successful ideas, such as necklaces made from waste paper, are mimicked by other aspiring entrepreneurs.

Ecofinder is also currently working with a women's group that collects papyrus from Lake Victoria, akin to waste picking. It is a labour intensive and dirty job but requires few skills so is again highly imitable.

This job for harvesting papyrus was considered as... a dirty job...for the, like, the real poor people. And then... many women who lost their husbands were mostly into this job. And so that, they started doing it because that was the only way out they could survive.... They go into the wetland, they undress themselves because it's full of water. So they dress dirtily, with dirty clothes.

The Ecofinder gift shop showcases environmental products, especially those that use waste materials. Six of the examples in Table 1 are exhibited in the shop – and each individual entrepreneur is using a waste material to substitute for another higher cost alternative, making do with waste products to hand.

The idea to use these materials emerged in different ways. Patience (waste paper beads) was taught by a local church group set up to help disabled people in the community, perhaps demonstrating 'improvisation' but by the organization that trained her. Gloria (waste plastic and foil) and her sister make baskets and hats from woven waste materials she buys in strips from a local supplier. She was not specifically trained, picking up the idea from other examples she saw – this again reflects the highly imitative nature of these kinds of product. As Gloria describes, 'I just learnt it from my friends... they learnt it from their friends'.

The sources of waste materials can vary. In Gloria's case the waste plastic is 'picked' by a third party or bought from a wholesale site. Demand is sufficiently high in the area that it is supplied in pre-shredded bags from their local supplier. Patience meanwhile collects advertising flyers from her local shopping centre, sorting them to produce a wide range of colours in her products. Daniel sources his eggshells from family sources – in a form of creative bricolage – looking at free materials in the environment and experimenting with how they might be used. A similar experimental process occurred with the water hyacinth. Whereas both Gloria and Patience were working to fairly standard designs and templates that are easily copied, Daniel and Benson were already making their products, redesigning them to utilize waste materials as part of a creative redesign process. Both noted the added 'difference' in texture and look that these alternative waste materials generated. Daniel and Benson needed a slightly higher level of basic training (learning from art school and from the family business in the workshop) compared with those making necklaces and hats, who needed a much lower level of initial skill and training.

Another waste material is human waste, collected in the ecosan toilets and utilized as a fertilizer. Here it is Ecofinder who is the innovator, looking for ways to solve the problem of lack of toilets and raw sewage when Lake

Victoria floods. They then recruit local community members, training them in constructing the toilets and marketing their building services to the local community, in perhaps a bootstrapping manner (after Winborg and Landström, 2001) funded by a grant or through their own reserves.

The second social enterprise we consider grew from an initiative led by a Kenyan-born marine conservationist working in the Kiunga Marine National Reserve in the late 1990s. Inspired by the toys local children were making from the waste plastic (mostly flip-flops) washing up on the beaches, the founder encouraged their mothers to collect, wash and cut discarded flip-flops into colourful products for sale. These initial endeavours led to the founding of the Flip-flop Recycling Company in 2005. Now trading as Ocean Sole, the business puts 5% of its profits back into the foundation, as well as 25% of profit from its giant sculptures (Ocean Sole, 2015). This is now a thriving business involving transformation of discarded flip-flops into sellable products by their local artisans in their studios in Nairobi. This example demonstrates the creation of a market for the waste product (the flip-flops washed up on the beaches), and the emergence of a group of informal economy waste pickers who collect these items for payment, comprising mostly of women in the beach communities near Mombasa or the urban slum areas. The company operates as a formalized entity firmly embedded within the formal economy of Kenya, though the waste pickers are located within the informal economy as suppliers. The company's overarching aim is to deliver social, environmental and economic value to its employees, suppliers and the wider marine conservation movement.

The enterprise did not initially grow out of a desire to create a business but rather as a way to address a marine conservation problem and the poverty within beach communities. The local children using waste materials to make toys were undeniably demonstrating aspects of bricolage. It was then the founder of the business who recognized how this could be expanded and developed, undertaking a process of trial and error over the years to develop a viable business model and product range (Salimath and Jones, 2011), fiddling (after Ciborra, 1996) with different types of material and design, and testing the viability of these through the shop attached to the studio in Nairobi. Commercializing this waste material needed the input of the social enterprise. Whilst input into designs and process does come from the groups collecting waste material and those producing the items in the workshop, the resources needed to fully operationalize this business emerged from the organizational bricolage demonstrated by the management team running the company.

The interviewed informal economy entrepreneurs who either sold and/or made products using recycled or discarded 'waste' materials could be clustered into those who (i) bought and sold on items that could be reused, such as clothing, kitchen pots, shoes and bags, or (ii) those creating new items with recycled/waste raw materials, e.g. furniture made from pallets and packing boxes, shoes made from tyres etc. There were also other examples of 'artistic bricolage' where the materials used were not discarded but bought at a reduced cost, such as wire used to make Christmas decorations and jewellery sold by street sellers.

By far the largest waste income model in use across our fieldwork sites by informal economy entrepreneurs was the trade in second hand imported recycled items – clothing and used kitchen items (Holt and Littlewood, 2014). These items are donated in the UK and other developed countries, shipped in bales to ports such as Mombasa and then sold to traders. Distributed from the markets at the coast across the country through a network of middlemen, small scale sellers and market stalls, they are picked over by purchasers at each site until the most damaged or low value items end up in markets in the most remote villages. In resource constrained environments everything has a use – unwearable textiles can be converted into stuffing for mattresses, cloths for cleaning or indeed makeshift sanitary pads (Hawley, 2006).

One respondent started her first business in late 1998. She began selling children's clothes but when that business failed moved to pots and pans and household items. In 2001 she moved to buying bags, making 50–150 KSH on each mark-up. Damaris was 'at home with children and needed to get money... I thought of [selling] children's clothes'. Kennedy sold jackets along the Ngong Road in Nairobi. He previously sold baby clothes but complained that this was not a steady trade as 'mothers are limited customers'. He runs his unregistered stall with a partner, selling a mixed stock of men's leather jackets, coats and hats (1500–12 000 KSH per item) bought from a retail warehouse, which sources from overseas shipments sold at Gikomba Market.

The stories told by each of these sellers of their imported second hand items are remarkably similar. Depending on their capital they buy small or large bales from markets or intermediaries along the distribution chain from Mombasa port, experimenting with the products they sell. They have a clear idea of the cost they typically pay at their location and then add a small mark-up. The businesses are typically not registered, although they pay a street charge.

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The main challenge they face is that of capital – typically provided by family members. Knowledge about pricing and this market is available as tacit knowledge in the community rather than needing explicit skills. The products themselves are ‘wastes’ discarded by affluent markets, and the value reclaimed by selling in developing world marketplaces.

Our social enterprises are also sourcing finished products such as baskets from such informal economy sellers or raw materials from waste pickers. The main differences between them are the training element provided by the social enterprises and the access they give to an alternative market, primarily tourists, who would not typically be available to the informal street sellers. In none of the interviews with these informal economy suppliers and producers were comments made about environmental protection. These ‘waste’ materials were seen purely as opportunistic resources, whereas both social enterprises saw environmental protection as the primary mission of their organization, and managing waste through turning it into something ‘useful’ and sellable was part of that mission.

Discussion

We present a small number of the innovative and creative ways in which individuals and organizations are earning an income from waste seen during our fieldwork in Sub-Saharan Africa. We can cluster the waste livelihood activities we observed in our cases and wider fieldwork into three categories: *collectors* (waste pickers, dismantlers, e.g. e-waste, plastics), *retailers* (buy items and resell, e.g. clothing, pans) and *transformers* (remake into new items, e.g. tyres to shoes). Whilst broad classifications are not mutually exclusive, with some entrepreneurs undertaking more than one of these, these clusters do allow us to explore variability in aspects of the bricolage concepts across dimensions such as improvisation or recombining/fiddling.

Strategic Considerations

In the business strategy of all our various Kenyan waste bricoleurs the market they target is crucial to their success and rates of return. In the case of the informal economy sellers and producers they typically either wait for passing trade, or they are helped to a marketplace by the boundary spanning social enterprises. As Benson describes, the furniture he sells in the Ecofinder gift shop reaches a different target market and customers that are typically not prepared to drive along a street in Kisumu for their products. Waste pickers profiled by WIEGO (2014) reported selling ‘eggshells, and bottle tops, bones and cans to artists and designers’ in Nakuru in Kenya – similar to the materials used by Daniel in his art in Kisumu. FFRC work with groups of waste pickers collecting flip-flops, where they play a critical role in providing the market and reaching out to communities to incorporate them into supply chains, creating the demand for this waste material and a use for it.

A strategic ‘vision’ was mostly lacking within the informal economy producers and sellers – even those linked to a social enterprise. It was the larger case organizations that had the strategic vision and considered how the various waste livelihood models fitted into their product portfolio and mission. However, those entrepreneurs that were demonstrating higher skills such as the hyacinth furniture and eggshell art were slightly more active or strategic in seeking out new markets and linking to other businesses. Those using very low order skills such as making baskets, selling second hand clothing and picking wastes were typically marginalized – cut off from social networks and business support agencies, demonstrating little variation in how they operated their business and mimicking much of what went on elsewhere in similar subsistence businesses. Our work suggests that linking such entrepreneurs to networks and sources of additional resources is crucial in moving them from crowded ‘red ocean’ market spaces with marginal rates of return to new ‘blue ocean’ strategic opportunities of either new product combinations or new customer bases unreachable by others. Such additional resources might be providing access to new knowledge, skills or micro-credit.

Sometimes our examples ‘fiddle’ with various product concepts (e.g. furniture and art) using trial and error until it is sellable (after Ciborra, 1996; Salimath and Jones, 2011); this is indicative of trying to exploit new ‘blue ocean’ spaces. This suggests that perhaps the types of product concept that have emerged in the relatively well developed ‘green’ artisan markets of the West utilizing waste materials may offer ideas that can be copied by entrepreneurs in developing countries. The challenge is accessing this knowledge and product templates for the resources

available. This is where the role of boundary spanner organizations such as Ecofinder and other NGOs are again crucial in providing access to a new market, or training on how to produce these products to those who may lack literacy and may be marginalized.

Social Capital and Networks

Linna (2013) stresses the importance of social dimensions of entrepreneurship and social capital in resource poor contexts providing access to knowledge, capital, markets, skills, talent and experiences. In a study of natural resource use in Tanzania through a lens of institutional bricolage, Cleaver (2002, p. 15) suggests that social relations are 'more central than simply context or assets'. The importance of partnerships as mechanisms to address resources scarcities and lack of capabilities is not a new idea (Linna, 2013), but within our cases knowledge transfer, or indeed co-creation (London and Hart, 2010), is typically across locally embedded development agents such as Ecofinder or within informal social networks such as the communities in which our informal economy entrepreneurs were embedded. Thus the social enterprises typically leveraged their networks to gain new ideas, funding and the skills needed to train their informal economy producers – as in the case of the ecosan toilets where they trained an initial group using donor funding.

Cleaver (2002) discusses the idea of overlapping identities within developing country institutional environments creating 'complex norms and networks'. Such complexity can be seen in some of our larger case examples, for instance Ecofinder, where they address the needs of multiple groups, juggle numerous projects, manage relationships with a wide range of funders and wear 'many hats'. Such complex identities are important as a way to leverage social capital to innovate and adapt – as a form of bricolage – but also difficult to manage and indeed to institutionalize more formally. In part this links to emerging discussions on hybrid organizations, which often juggle differing social and environmental missions alongside a commercial requirement to stay solvent and increase trading activity towards self-sufficiency (Holt and Littlewood, 2015).

Linked to the idea of identity is the authority that different groups and organizations have within these more informal communities, with some 'bricoleurs' having more influence or position within socially constructed networks (Cleaver, 2002). In some of our examples the main social capital lies with the initiating social enterprise/NGO. For instance it was Ecofinder and the FFRC that accessed markets and leveraged their own social capital to initiate these waste livelihood programmes – they then reached out to participants. Whereas Benson's father had the idea to use the hyacinth and then reached out to the lakeside community of women to supply the materials, leveraging his social capital, which stems from the age of his business, his role as an elder and potentially wider kinship ties as part of multiple identities.

Those individuals more isolated in their communities tend to mimic others utilizing community based tacit knowledge – for instance, where to buy second hand clothing and at what price to sell it. Very few additional skills or knowledge are needed, with financial capital a major constraint in capturing additional value. Patience and Gloria seemed more passive – making their products in a family home and not actively seeking out new markets, waiting for groups such as Ecofinder or the church to support them. Ecofinder recruited Gloria after seeing her selling baskets in the local marketplace. In Patience's case a key member of the church group leading the income generation training activities programme went to Ecofinder to showcase the products that their disabled entrepreneurs make.

Within our cases we might also consider the idea of bootstrapping as a form of securing resources at minimal or no cost (Salimath and Jones, 2011). Ecofinder Kenya provided such initial funds for the construction of ecosan demonstration facilities – essentially micro-credit to participant entrepreneurs – but they also provided access to skills and knowledge shared in the community. Part of what Ecofinder does is to learn about successful models elsewhere and share them amongst its networks – and it is this altruistic 'sharing' that might be considered as part of a joint utilization of resources (knowledge) sharing assets with other groups (Winborg and Landström, 2001). We might also consider networks of social enterprises sharing ideas about livelihood models as a form of 'familiar collective bricolage' (Duymedjian and Rüling, 2010) giving access to their 'repertoire' building on networks of trust and reciprocity.

Innovation/Improvisation

Who is the bricolage agent? Is it the individuals or the organization that is helping them? In the Ecofinder case we see both examples. We suggest that they are practicing institutional and network bricolage to create new markets,

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link producers with these markets and identify opportunities to create new products or services that bridge institutional voids, thus addressing environmental problems and supporting community members to generate a sustainable income. Individual entrepreneurs who have the skill and/or creativity are recognizing opportunities to use waste materials such as eggshells and water hyacinth to create new products. They do demonstrate elements of entrepreneurial bricolage. The source of the innovation/improvisation is often from a third party, whose process or products are then mimicked by our micro-entrepreneurs (the hats and baskets made from waste plastic or foil) or franchised (waste paper jewellery). The importance of the source of the innovation or improvisation is a theme little explored in extant studies. Our work suggests that linking boundary spanning organizations with informal economy entrepreneurs to transfer innovative ideas, and also provide the skills training to deliver them, might be a powerful enterprise development tool.

Duymedjian and Ruling (2010) also suggest that bricolage is reliant on knowledge developed over time and as such cannot be imitated by another person. Yet in our case examples we see elements of what might be considered social franchising (Tracey and Jarvis, 2007). Patience's knowledge of using waste paper to make beaded necklaces and curtains was developed via a training programme through a local church group, who trained a range of disabled entrepreneurs. The church group then acted as the bridge to the marketplace provided by Ecofinder.

In the case of the hyacinth furniture and eggshell art we see evidence of active 'fiddling' (Ciborra, 1996) and trial and error until the materials can be utilized. Even Patience experiments with different combinations of waste paper to make more interesting patterns in her beads. The artists at FRRC also experiment to make different products and designs from their recycled plastics.

Bricolage and Waste Livelihoods

We suggest that bricolage occurs in multiple contexts. We see evidence of entrepreneurial bricolage and network bricolage in both the social enterprises and some of the individual entrepreneurs. This entrepreneurial bricolage is less evident in those where their waste livelihood idea was franchised – whereby the entrepreneur was trained in the design and execution of the product production processes by a third party (often a charitable project or NGO). Selection of participants to take part in this training may also be initiated by this third party. Thus passivity within some waste livelihoods is in contrast to the experimentation and innovation of some of the other informal economy entrepreneurs using waste, such as the hyacinth furniture makers.

We also suggest that social bricolage is evidenced, lending strength to the idea that it should be explored as a distinct form of bricolage (after Di Domenico *et al.*, 2010). We would extend this further, suggesting that formal and informal institutions also significantly influence bricolage activities at an organizational and individual level. Given suggestions that social entrepreneurship in Africa differs from that in the developed world (Rivera-Santos *et al.*, 2015) we also need to consider if social bricolage is equally varied. Thus we need to recognize the influence of socially embedded informal institutions and consider differences across and within different developing world contexts.

Elements of innovation and improvisation exist across the examples we present, but the nature of this and the bricoleur agent varies depending on the resources needed, especially the level of skill, as well as the nature of the waste livelihood model. Thus in Table 2 we segment the different waste livelihood models observed in terms of extent of creativity or experimentation alongside the extent of training needed beyond 'raw talent'.

	Skill:	Lower – little training or highly imitative	Higher – needs prior experience or training beyond just 'talent'
Extent of innovation or creativity or experimentation	Lower	waste picking of water hyacinth, plastic, collection of flips flops, selling clothes/shoes*	production of foil/plastic baskets and hats, paper bead jewellery
	Higher	eggshell art, wire Christmas decorations/jewellery	water hyacinth furniture manufacture*

Table 2. Segmenting our waste livelihoods on the basis of innovation and skill

*Needs higher capital.

In Table 3 we propose how different bricolage dimensions may play out in different waste livelihood categories – collectors, retailers and transformers – using three illustrative examples. However, these groupings are not mutually exclusive; for instance, an individual may be both a retailer and a transformer.

Conclusions

In the absence of formal employment opportunities in low income and resource-constrained environments, waste materials have significant potential for livelihood creation and income generation. The three different examples profiled in Table 3 suggest that differing waste livelihood models will have different rates of return, or profitability, and differing input requirements of capital, skills and knowledge. Thus some waste livelihood models are likely to only provide subsistence level returns and thus act as a stepping stone to only marginally higher levels of income, whereas other models may lead to wide ranging poverty impacts that provide significant uplift and empowerment opportunities. Thus which waste livelihood model is promoted to the poor is a pertinent consideration and one worthy of detailed future consideration.

Our findings suggest that the role of boundary spanning NGOs and social enterprises is critical in generating access to new markets and capturing greater value. Such organizations offer opportunities for informal economy entrepreneurs not only to reach new customers but also to learn new skills that allow them to place their products in less contested market spaces. Such organizations can also act as the customer for informal entrepreneurs using waste materials, providing a minimum guaranteed cash flow and helping income smoothing.

Our work also illustrates how social capital and networks vary across groups and how this can impact the types of waste livelihood model that are accessible. Boundary spanning organizations leverage this capital to gain access to resources that they can filter down to informal economy entrepreneurs. Initiatives to help connect marginalized entrepreneurs to networks, resources and training are clearly important. Our work suggests that where we have ‘passive’ entrepreneurs such as Patience they will need to be actively recruited into training opportunities, as opposed to those likely to voluntarily engage such as Benson.

Our discussion also supports the overwhelming significance of the trade in second hand items and waste picking as an income model for those without any specialized skills or knowledge beyond that of community resources. These are crowded market spaces into which anyone looking for an income opportunity may enter. Thus moving people ‘on’ to new higher value livelihood models is an important development tool, and can only happen if these

	Improvisation	Innovation/unique	Making do	Fiddling/recombining resources/ experimenting
<i>Collectors</i> , e.g. waste picking of litter from streets	Likely low given highly imitative nature of product.	Very low barriers to entry and easily mimicked.	Key aspects as they make do with what they can find –access is perhaps the barrier. No capital required.	Little experimentation other than looking for unusual sources.
<i>Retailers</i> , e.g. selling second hand clothes	Fairly minor and consists mostly of improvising market access.	Very low barriers to entry regarding skills. Capital is the key constraint.	Will require capital for the stock and access. Fixed process likely with low returns.	Most recombining consists of different mixtures of types of item.
<i>Transformers</i> , e.g. furniture from waste hyacinth	Likely high – improvising solutions to problems and creating new product ideas.	Unique or rare in local environment – few mimicked examples.	High element of ‘making do’ but will also need skills and capital.	High level of experimentation to make the materials useable.

Table 3. Exploring bricolage concepts with three waste models

Waste Livelihoods

entrepreneurs can be given access to additional resources – such as training or indeed capital.

The concept of bricolage provides a useful framework for exploring waste livelihoods in these varied contexts. Bricolage also introduces ideas of improvisation and innovation that require further exploration – in particular around where the innovation arises, and how this can be encouraged. Experimentation can be a risky strategy for an informal economy entrepreneur. Thus bringing in ideas that work elsewhere through an intermediary who can absorb that risk can be a viable strategy for development within marginalized producer and retailer groups.

We acknowledge the limitations of this study. Our work is exploratory, our case selection is purposive given challenges of access in such locations and we will not have captured the total diversity of waste models that may occur in such environments. Nevertheless, our work does offer conceptual and practical insights that speak to emerging narratives on informal economy entrepreneurship, social/hybrid enterprise, bricolage and waste livelihoods. Therefore, further research should also consider the nature of a wider range of waste livelihoods across the continuum from collectors to retailers and transformers, and in differing institutional contexts, quantifying how different waste streams are being operationalized for income generation and impacts on poverty. Further study is also needed of the bricolage agents and the role they play in creating waste livelihoods.

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