Price realization for electronic waste (e-waste) in Accra, Ghana

by

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ABSTRACT

The price realization literature suggests that a price is made through a process of actualization that is different from that theorized by neoclassical economics in supposed universal laws such as demand and supply. Empirical research demonstrating processes of price realization have focused on standardized (e.g., cotton) and financial (e.g., stocks, bonds) commodities. This begs the question: how are prices realized when the commodity traded is something other than a standard commodity? That is, when the commodity traded, such as electronic waste (e-waste), lacks a system of standardization practices that contribute to something like a 'world price' (e.g., there is no 'world price' for discarded computer monitors). Following the practices of trading e-waste in Accra, Ghana, the thesis answers this question. It documents how prices are realized when e-waste is the commodity traded. In doing so, this thesis draws three key lessons for the price realization literature. First, it demonstrates that in the processes of price realization for e-waste goods are qualified as both wholes and in pieces simultaneously, and this questions the assumption of qualifying goods as wholes evident in the extant literature. Second, the findings from this thesis raises questions about the notion of price realization itself by flagging practices of exchange for e-waste such as bartering, gleaning and leasing. Although discussed in other disciplines, the price realization literature has not looked at price making within the exchange relations of bartering, gleaning and leasing. Thus, in flagging these practices, the thesis points the price realization literature to other economics activities that lead to non-monetary realization of price. Finally, the price realization literature tells us that the processes of price realization are performed as

relations of power in themselves. With the example of realizing prices for e-waste, the current thesis contributes to this theorization by demonstrating different modalities of power relations in play in verifiable instances of price realization.

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LIST OF ABBREVIATIONS

Alcotexa- Alexandria Cotton Exporters Association

AMA- Accra Metropolitan Assembly

ASDA- Agbogbloshie Scrap Dealers Association

BAN- Basel Action Network

CAD- Canadian Dollar

CBD- Central Business District

COHRE- Centre on Housing Rights and Evictions

COMEX- Commodity Division of New York Mercantile Exchange

CRT- Cathode Ray Tube

DVD- Digital Video Disc

EEE- Electrical and Electronic Equipment

ENGO- Environmental Non-Governmental Organization

EPA- Environmental Protection Agency

GCC- Global Commodity Chain

GD- Good Middling

GDP- Gross Domestic Product

GNA- Ghana News Agency

GO- Good Ordinary

GSS- Ghana Statistical Service

GVC-Global Value Chain

ICAC- International Cotton Advisory Committee

ICEHR- Interdisciplinary Committee on Ethics and Human Research

ICT- Information and Communication Technology

ICT4AD- Information and Communication Technology for Accelerated Development

ILO- International Labour Organization

IME- Izmir Mercantile Exchange

KLERP- Korle Lagoon Ecological Restoration Project

LCA- Liverpool Cotton Association Ltd

LME- London Metal Exchange

Mt- Metric ton

NL- Newfoundland and Labrador

NYBOT- New York Board of Trade

OLPC- One Laptop Per Child

PC- Personal Computer

PWB- Printed Wiring Board

R2- Responsibly Recycling

SLM- Strict Low Middling

TV- Television

UNEP- United Nations Environmental Program

USDA- United States Department of Agriculture

WCT- Weighline Calibration Tool

CHAPTER ONE

PRICE REALIZATION AND THE TRADE OF ELECTRONIC WASTE (E-WASTE)

This chapter presents what this thesis is about. To do so, here is what to expect: First, I unpack key ideas central to the overarching research question of the thesis: the performativity thesis (Callon, 1998, 2007, 2010) in price realization (Caliskan, 2007, 2009, 2010) and e-waste and practices (Lepawsky & Mather, 2011; McNabb, 2013; Gabrys, 2011). Next, I present the methodology I used to answer the research question. The final part of the chapter outlines the organization of the whole thesis.

When species meet: performativity thesis, price realization and e-waste studies

This thesis engages two fields of inquiry, namely the literatures on price realization and e-waste studies. The price realization literature is the brainchild of Michel Callon's (1998, 2007, 2010) performativity thesis of economics; the idea that economics "performs, shapes and formats the economy, rather than observing how it functions" (Callon, 1998, p. 2). What Callon means by economics as performative is that instead of economics describing an external reality out there in the world (e.g., price), it practically enacts that reality. In other words, economics produces effects and intervenes in the world it describes.

Although the performativity thesis of Callon is described as the "most challenging recent contribution to economic sociology" (MacKenzie & Millo, 2003, p. 107), it is important to underscore that the concept of performativity had been in existence before its re-appropriation by Callon. The language philosopher J. L. Austin (1962) introduced the

concept when he claimed that some utterances are performative–meaning that they do more that just represent or describe reality. The utterances generate the realities they describe. For instance, when a priest says 'I pronounce you man and wife' to a couple, he is not just describing a situation, but he brings into effect an act by which the attribution 'married couple' is produced. Apart from language, Judith Butler's (1990, 1993) theorizing of gender also mobilized and developed the concept of performativity. Like Austin, Butler also sees performativity as having to do with the "reiterative and citational practices by which discourse produces the effects that it names" (Butler, 1993, p. 2). Consequently, her argument that gender is performative follows that gender is brought into being by the doings of citational practices.[1]

While the concept of performativity dates back to Austin and Butler, Callon's appropriation can be distinguished from them. This is because, for Callon, the performativity of economics is also mediated through material entities and not utterances or discourse alone as emphasized by Butler and Austin. For instance, let us consider an economic theory like the futures pricing used to price commodities at a future date. For this theory to perform the actual price of a commodity at a future date, it requires more than an economist talking about the theory to traders who use it. A market report is mobilized to enable the theory to travel and perform the future price of the commodity (Mitchell, 2008a). The market report is a material artifact without which the theory of futures pricing cannot bring into being its object: the future price of a commodity. It can

1 Elsewhere, she uses the term discursive, saying that performativity is "the discursive mode by which ontological effects are installed" (Butler, 1996, p. 112).

therefore be said that the market report partly generates the condition through which an economic theory–futures pricing–describes and also produces its object, a future price. This emphasis on the material dimension of performativity distinguishes Callon from both Austin and Butler.[2]

Placing practical attention on the material dimensions of performativity, Muniesa, Millo and Callon (2007, p. 2) coined the term "market devices" to refer to all the "material and discursive assemblages that intervene in the construction of markets" and through which the economy is performed. What this idea of market devices means is that material apparatuses and discursive arrangements together accomplish acts that have effects on markets. The implications of material apparatuses as performative market devices have been well demonstrated in the growing literature on economic performativity. For instance, Cochoy (2004, 2007, 2008) evidences that supermarket shelves and trolleys or carts are not just tools in a supermarket setting. Instead, these materials are market devices because they intervene in the choices people make in the supermarket environment. Beunza and Stark's (2004) study of calculative practices[3] in investment banking also provides an example of the implications of a market device in the design of trading rooms. Buenza and Stark show that the trading rooms for banking institutions are not just spaces where banking takes place. Instead, the physical arrangements of the rooms are done in ways that seek to inform the trading strategies that

2 Butler (2004, p. 198) admits that her performativity theory does not pay enough attention to materiality. She writes: "… I confess, however that I am not a very good materialist. Every time I write about the body, the writing ends up being about language".

3 Broadly, calculative practices have to do with the ways in which the qualities of goods are established and valued (see Callon & Muniesa, 2005).

go into valuing the stocks traded in the bank. For instance, the desk-based spatial configuration of the trading rooms Beunza and Stark observed promote communication but more importantly they are designed in ways that enhanced distributed cognition across the different teams valuing the various financial securities traded by the bank. In one trading room, each desk corresponds to different operational arbitraging strategies. There are desks for merger arbitrage, index arbitrage, convertible bond arbitrage and customer sales arbitrage. Although each desk in the room has a different operational strategy, the interaction between them is a key strategy that the arbitrageurs use to realize the value of stocks. For example, when a customer sale arbitrageur is on the phone with a customer, the sound of his or her voice provides other arbitrageurs in the room a sense of the level of anxiety of customers from which they read the sentiment of the market. This means that through the design of the trading room, the bank integrates different modalities of calculation in ways that has an effect or intervene in the valuing of stocks. In this regard, the design of a trading room is a market device.

Like Beunza and Stark (2004), Knorr-Cetina and Bruegger's (2002) study of foreign exchange trading speak to another way in which space can produce an effect as a market device in financial markets. However, unlike the case of arbitrage banking (which Buenza and Stark studied), foreign exchange trading takes place between traders who are distant from each other geographically, but execute trading decisions through computer interfaces. The computer screens may therefore be considered as displays for a market with dispersed traders. However, as Knorr-Cetina and Bruegger (2002) demonstrate, the computer screens do not display an existing and independent market. The screens are

generative of that market for, without them, traders cannot constitute a market of foreign exchange trading and observe it at the same time. The computer screens are therefore market devices. From shopping trolleys or carts to spatialities of rooms and screens, a wide range of apparatuses including analytical tools, pricing formulas, trading protocols, stock tickers, scorecards, surveying kits, and assaying instruments have been empirically demonstrated to operate as market devices (see the edited collection on market devices by Callon et al., 2007; also Gregson, Watkins and Calestani, 2013).

That these apparatuses have been shown to be market devices is useful for two reasons, which I expand on in Chapter Two. First, theoretically and as the studies cited above show market devices enable us to open the repertoire of actions deployed in efforts to perform, shape and format the economy. As Callon and Muniesa (2005, p. 1245) put it, the notion of market devices "emphasizes the diversity of possible forms of market organization". Second, demonstrating interventions by market devices show the agencies these devices offer various market actors, how the actors mobilize the devices in their calculations and the outcomes of those calculations (Callon et al., 2007; Callon & Muniesa, 2005; Kjellberg & Helgesson, 2007). The notion therefore allows for analyzing issues of justice and equity in markets. That is, by looking at what market devices do, we are able to make empirically observable and theoretically analyzable the fact that certain agents are exempted or prevented from calculations altogether while others accrue the most effective tools of calculation to themselves (Callon & Muniesa, 2005).

This thesis is interested in Callon's performativity thesis and the role of market devices and how these devices relate to the idea of price realization (Caliskan, 2007,

2009, 2010; Muniesa, 2007; Beunza, Hardie & MacKenzie, 2006; MacKenzie, 2006; Velthuis, 2005). Inspired by Callon's thesis, Caliskan examines how the actual price[4] of a commodity is made in a market when economics is practically performing the economy. The actual price of a commodity, he suggests, is made through a process of realization that is different from that theorized by neoclassical economics in supposed universal laws such as demand and supply. In the process of realization, a price is made to appear real so that it can be effectively conceived as real in relation to a commodity and eventually converted into actual money, which is the actual price of that commodity (Caliskan, 2010, p. 23). This process of realization in which a price is made occurs within the everyday practices of trading a commodity. Here is a hypothetical illustration of a price in a process of realization. I ground this hypothetical situation in cotton exchange, which is the empirical context of Caliskan's study.[5] Assume a male trader (trader A) in St. John's, Newfoundland and Labrador, Canada, is interested in buying 1000 Mt (metric ton) of cotton. Trader A consults another male trader (trader B) in a cotton trading house, XL Ltd. in Memphis, Tennessee, USA. To arrive at a moment where money is exchanged as the actual price of the 1000 Mt of cotton, first the two traders will locate in the language of cotton exchange what 1000 Mt of cotton means. This involves specifying what cotton is according to established measurable standards such as Strict Low Middling (SLM), Good Middling (GD), Good Ordinary (GO) etc.

4 The actual price of a commodity is the contractual price given and received to buy or sell a commodity.

5 I have decided to use cotton trade here (rather than e-waste trade) to illustrate the idea of price realization for several reasons. First, to introduce the reader to the idea as demonstrated by Caliskan (2010). Second, by introducing the idea using cotton trade, I aim to make clear the exchange relations of cotton and how different these are with respect to those of e-waste which is the focus of this study.

After successfully determining what 1000 MT of cotton means in a standardized framework, the second practice will be to clarify the kind of price to realize. In cotton markets, prices proliferate in different forms and appearances: world price, future price, market price, actual price. Consequently, to realize a price for the 1000 MT of cotton, the two traders have to establish clearly the kind of price for which the cotton will be exchanged. Trader B will ask A what type of price he is after; a quote or a firm offer. A quote price is the world price of cotton while a firm price in this exchange is a range of prices trader B is willing to negotiate in order to sell his 1000 Mt of SLM cotton. In this scenario, assume A requests a firm price to which B provides a price representing the range he is willing to negotiate; not below 60.5 cents per pound (c/lb). Trader A, like most cotton trader will have read market reports (a key market device for cotton traders) and knows that the world price of cotton is 62.5clb. In a bid to buy at the lowest price, A will negotiate further, calling for a price of 58.5c/lb. But B reminds A that the world price[6] is 62.5clb, so there is no way he is going to sell his cotton at 58.5c/lb. The two traders know that the world price of cotton is not the actual price of the 1000 Mt in question, yet, in order to realize an actual price against which they can successfully exchange the 1000 Mt, the world price of 62.5clb is a tool of engagement that they can both mobilize to facilitate the transaction. Should A accept the offer of 58.5c/lb, then the exchange relation will continue with another practice for the price to be converted to actual money.

6 The world price of cotton represents offering prices on the international raw cotton market. It is the average of the cheapest five quotation prices from internationally traded principal cotton (see Caliskan, 2010, p. 47; Cotlook.com). A private company, Cotlook Inc. produces this price by averaging prices of individual exchanges and publishing it in a market report.

This practice involves determining when, where and how the cotton should be exchanged between them. Thus, trader A might ask B the mode and date of delivery of the 1000 Mt of SLM cotton. Here, there are different possibilities. A might want the cotton bales to be processed and shipped immediately. In this case, the transaction is a spot exchange and A will quote the actual price realized for a spot exchange with or without insurance and freight cost included. Another possibility could be that A wants to buy the cotton bales at a future date, say 21st August 2014. With both options, further practices are required. For shipment to proceed, the exchange relation discussed thus far will have to be backed by a sale contract. The contract will initiate other actors and their practices into the transaction. Some of the actors include freight forwarders who will oversee the shipment; bankers, who will provide the line of credit for trader A and act as intermediaries to ensure that B receives payment if he ships the cotton. State institutions such as the United States Department of Agriculture (USDA) are also called upon to supervise and ensure that the cotton B is shipping to A corresponds to the grade of 1000 Mt of SLM stated on the sale contract. The above practices might seem mundane, however they constitute practices within which trader A will pay money and B receive that money as the actual monetary worth of 1000 Mt of SLM cotton. Consider again the other scenario where A wants to buy the cotton at a future date. Here, in addition to mobilizing the world price as a tool of engagement, the traders will consult another market report produced by the New York Board of Trade (NYBOT) for futures trading, noting the futures contract[7] for a bale of cotton on 21st August (or the nearest available

7 A futures contract is the commitment to buy or sell a commodity at a set price on a future date. Note that

contract to 21st August). From the futures contract, B will make an offer to A regarding how much the 100 bales of cotton cost when delivered on 21st August. He might say something like 'basis 5.16 points on', which means that A will pay 5.16 cents more than the future market price of cotton on 21st August.

In the above hypothetical situation, we can see two things. First, through different exchange practices, the actual price of the 1000 Mt of SLM is conceived as real in different times and spaces until it is made real in actual monetary exchange between traders A and B. This is what is meant by making the actual price of a commodity in a process of realization (Caliskan, 2007, p. 240). To that end, a price in a process of realization is very much like what Annemarie Mol (2002) shows as *enactment* of a body with the disease atherosclerosis in medical practices for both concepts gesture to the practical context-ing (Asdal & Ingunn, 2012) within which entities (either prices or atherosclerosis) come into being or attain realness. Second, various market devices (e.g., market reports, perceptions and formulary designs or future pricing) and regulatory bodies (e.g., USDA, banks, Liverpool Cotton Association Ltd. [LCA][8]) intervene in the processes of price realization. In short, realizing the actual price of a commodity is the result of a wide range of arrangements or configurations and market devices under the influence of various actors.

This idea that a price is made in a process of realization is of great theoretical importance because it revives a longstanding debate in economic theory. The debate about

as a standardized exchange, it is not the commodity itself that is traded with a futures contract, but the right to exchange the commodity at a future date.

8 The arbitral authority in world cotton trade who will adjudicate any dispute arising from the 1000 Mt of SLM exchanged between traders A and B.

what prices are and how they emerge in economic relations. Neoclassical economists have long argued that demand and supply determine prices (Marshall, 1982; Cournot, 1897; Smith, 1776). However, scholars in diverse disciplines have developed a critique over the idea that on their own demand and supply work in a self adjusting system to determine prices. For instance, sociological and anthropological approaches have contributed to a better understanding of prices by suggesting that we look at the cultural and social frameworks within which prices emerge (Mauss, [1925] 1954; Granovetter, 1985; Appadurai, 1986; Fligstein, 2001). Some economic sociologists contend that because demand and supply are shaped, that is, 'embedded' in the organization of societies, social relations provide important insights on prices (Granovetter & Swedberg, 1992; Fligstein, 2001; Bourdieu, 2005; Beckert, 2011). Economic anthropologists have also emphasized social and cultural frameworks as explanations for how prices emerge (Gudeman, 2001; Davis, 1992; Ortiz, 2005). Marxist labour theory of value also points to the conditions within which labour is created to produce commodities as important in understanding prices and subsequently profit (Marx, [1898] 1969). Furthermore, interdisciplinary interests converging around global commodity and value chains (GCC/GVC) argue that the governance relations between commodity or value chains provides insights into how prices are determined (Johns, 2006; Dedrick, Kraemer & Linden, 2010).

Contrary to universal laws of demand and supply determining prices, the idea of price realization sees a price actualized through an array of practices and interventions by market devices including perceptions and representations of demand and supply. For

instance, the market report of Cotlook Ltd.[9] which publishes the world price of cotton also contains figures of demand and supply as compiled and released by the USDA. In the daily trading practices, demand and supply figures inform traders' decisions for they mobilize these figures in the processes of price realization. When traders mobilize demand and supply figures, demand and supply are not determining prices on their own. Instead, they become one of the tools that can be manipulated through perceptions, regulatory bodies, market reports at various stages in processes of price realization (Caliskan, 2010, p. 90). That the so called market forces of demand and supply are mediated means that they do not set prices on their own. Instead, these market forces are influential in the making of prices when, through specific mediation, they are mobilized as tools by agents to intervene and shape the outcomes of actualizing prices.

Empirical research demonstrating the processes of price realization and the market devices that intervene in the processes have focussed on standardized commodities (e.g., cotton), financial commodities (e.g., stocks, bonds) (see MacKenzie, Muniesa & Siu, 2007; Caliskan 2007, 2009, 2010; Callon, 2007; Beunza & Stark, 2004) and mass retail (Cochoy, 2004, 2007). Here, 'standardized' means that the commodity traded is graded according to quality specifications instituted and maintained by market making organizations (e.g., Cotlook Ltd., the USDA, the LCA, and the International Cotton Advisory Committee [ICAC]) that contribute to setting a 'world price' quoted on an international exchange (e.g., NYBOT, Reinhart cotton market report, Cotton outlook by Cotlook). For instance, as indicated in the hypothetical trade situation between traders A

9 Cotlook Ltd. is a private company that produces and publishes the world price of cotton.

and B, standardization of the object of exchange (cotton) through the intervention of organizations like the USDA is a key practice informing the processes within which the price of 1000 Mt of SLM is realized.

That the existing empirical research have demonstrated processes of price realization for standardized commodities begs the question: how are prices realized when the commodity exchanged is something other than a standard commodity? That is, when the commodity traded, such as e-waste, lacks a system of standardization practices that contribute to something like a 'world price' (e.g., there is no 'world price' for discarded laptops or computer monitors). E-waste does not have any specified quality.[10] Neither is there a world price in relations of its exchange. *How then are actual prices realized when e-waste is the commodity traded?* This is the overarching question I explore in this thesis. Before proceeding to the specific research questions, I offer some clarification about what I mean by e-waste.

Familiar narratives of or about e-waste include it being the fastest growing waste stream in the world, with an estimated 20-50 million tonnes generated per year (UNEP, 2005). As the fastest growing waste stream, e-waste is also often framed as an effect of the thoughtless disposal acts of consumers and the 'made to break' approach prevalent in the electronic manufacturing industry (Slade, 2007; Grossman, 2006; Packard, 1960). Furthermore, because some electronic equipment contain toxic substances such as cadmium, lead and brominated flame retardants, e-waste is also considered a hazardous waste stream that poses risks to the environment and human health (Wang, Han, Yang,

10 Indeed, it will become clear that e-waste itself is something that cannot be defined in definitive terms.

Chen, Lui & Ke, 2011; Caravanos, Clarke, Fuller & Lambertson, 2011; Caravanos, Clarke, Osei & Amoyaw-Osei, 2013). Partly because of the above risks, another popular narrative about e-waste concerns issues of management or governance. Here, the discussions mostly centre around the notion of 'toxic colonialism' which depicts developing countries as remaining in subordinate positions with regard to e-waste dumping, and as a result experiencing environmental injustice as a new kind of colonialism (Greenpeace, 2008; BAN, 2002, 2005; Pellow, 2007).

As a result of the above framings, e-waste has become synonymous with different definitions centring on the idea of a problem.[11] It is very common to hear researchers say: 'I study the e-waste problem or the X problem of e-waste'. In this thesis, I do not invoke any of these connotations when I use the term e-waste. Indeed, I do not study a self-evident thing called e-waste or the e-waste problem. Although I use the term e-waste, in the context of this thesis, e-waste is a placeholder for electronics that are being discarded in practices. What I mean by this is that, rather than being a thing with essential qualities as waste, e-waste is an effect of *how* electronics are discarded. Mobilizing Mol's (2002) concept of enactment, I will unpack in more detail what I mean by e-waste as a placeholder in Chapter Two. The point here is that combining this conceptualization of e-waste with the idea that prices are made in a process of realization, I follow the practices of discarding electronics in practices of exchange in order to examine how prices are realized for a non-standardized commodity. In this regard, my overarching research

11 This is the case in both the academic and cooperate literatures (e.g., News media, ENGO and EPA publications).

question of *how are actual prices realized when e-waste is the commodity traded?* is subdivided into two sub-questions:

- Within what practices are e-waste discarded and exchanged?
- How are prices realized in this process when e-waste, a non-standardized commodity, is that which is traded?

With these questions, this thesis investigates the practices enabling the realization of prices for e-waste in Accra, Ghana. As I will show in the following chapters, examining the realization of prices for e-waste reveals four novel insights for the emerging price realization literature. First, unlike the well-documented instances of price realization for standardized commodities, the processes of price realization for e-waste that I studied show that goods or commodities for which prices are realized can be qualified as both whole and in part. The price realization literature suggests that qualification of goods–the processes of temporarily articulating the qualities of a good so that a monetary compensation (its price) can be attached to it–is an integral part of the processes of realizing prices. This is because it is in the work of qualification that we see various market devices intervening in the processes of price realization. In the extant literature, discussions have shown the qualifications of goods as whole objects. For instance, the qualification of cotton or food produce in a supermarket takes place while the goods are still intact as whole objects. However, as I will show in this thesis, for prices of e-waste to be realized, at times the goods are qualified as wholes and in parts or pieces simultaneously. For instance, in the practices of qualifying a television (hereafter, I

use TV) or computer monitor for its price to be realized, traders engage in practices that take into account both their wholeness and the potential value of their material parts (see Figure 1.1[12]). As whole units, the TV and monitor could potentially fetch a higher price than their material value (e.g., on the electronics reuse or refurbish market). So, when these goods are qualified in exchange practices, there is a qualification and referencing of many prices simultaneously for the same things: prices for the TV and monitor as whole electronic products sellable on the reuse, repair, and refurbishment markets and the prices for the various materials the TV and monitor are comprised of (e.g., plastics, various metals, and glass). This simultaneous qualification as wholes and in parts, I argue, add to the price realization literature in a useful way because it questions the assumption of wholeness as presented in the qualification of goods for which prices are realized.

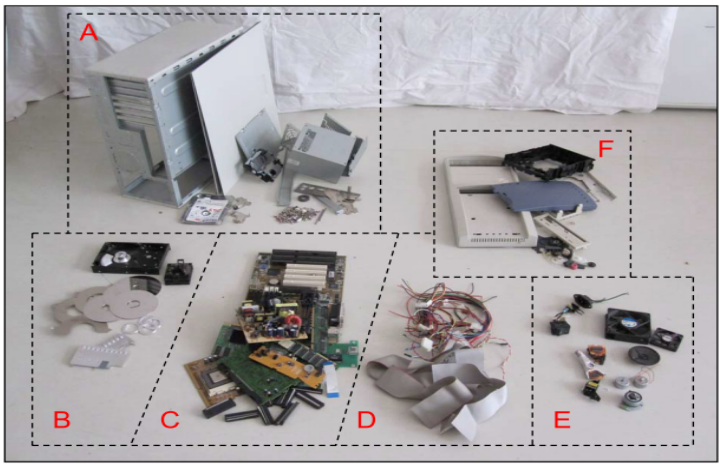

Figure 1.1: Material fractions from a PC tower when manually disassembled (Credit: Prakash & Manhart, 2010).

12 E-waste is a multiple material. Consider the material fractions from a PC tower when manually dissembled (as shown in Figure 1.1). There are fractions of steel (e.g., cases, screws, structural elements); aluminum (e.g., heat sink, structural component of drives, hard disks); high grade precious metals (e.g., Printed Wiring Board [PWBs]); copper cables and fractions (e.g., motors, drive readers, speakers) and plastics (e.g., cases, structural elements).

Second, in the processes of price realization for e-waste, as in other commodities studied in the price realization literature, a wide range of market devices intervene. The processes of price realization examined in this thesis bring to light market devices such as storage spaces, human beings, body language, weighing scales and others. Thus, the case of price realization for e-waste adds to the growing number of works that show the role of market devices in mediating calculative practices (Beunza & Stark, 2004; Callon & Muniesa, 2005; Caliskan, 2007, 2009, 2010; Cochoy, 2007). Demonstrating the interventions in the processes of price realization for e-waste by the specific market devices, I take discussions on market devices in the price realization literature a step further. This is because, as I will show, while the role of certain devices in standardized commodity market have been well documented (e.g., analysts, regulators and institutions like the USDA, market reports), in the case of e-waste trade, such devices are not likely to work. As demonstrated earlier, in the practices of cotton exchange for instance, market reports are key market devices. In the processes of price realization for e-waste, I find that although market reports exist (e.g., the London Metal Exchange [LME] and the metal trading division of the New York Mercantile Exchange [COMEX] publishes a set of reference prices for various metals traded on the exchanges), they are impractical when it comes to intervening in the practices that realize prices in street trading of e-waste in places like Accra, Ghana.

Insights from this thesis also matter to the price realization literature in a third way, in that I question whether price realization occurs only when monetary compensation is involved. Considering that the price realization literature has focussed

mainly on price realization involving monetary instruments, and has not talked about non-monetary exchanges, this thesis flags such a neglect. I will show that, within the series of practices that realize prices in monetary terms, there are instances of exchanges such as bartering and gleaning where monetary instruments are absent. Here, although I acknowledge that the implication of barter and gleaning for the price realization literature will require more work specifically on barter and gleaning practices, I flag such moments to argue that further research should focus on what the processes of price realization mean in non-monetary exchange practices.

Finally, the price realization literature tells us that processes of price realization are performed "as a relations of struggle or power" (Caliskan, 2010, p. 189). That is, the very processes through which prices are realized embody concerted efforts of market actors as they relatively position themselves in various practices and use diverse market devices to determine who has a voice in how and at what price a commodity is bought and sold. However, the processes of price realization as a relation of power are not given, they are also enacted in practices. Thus, just as a price is realized through particular practices, so too is the field of power or struggle a price realization moment may embody. This means that the specific practices making price realization a power relation might be actually observed and thus explained (cf. Allen, 2003). The thesis builds on the price realization literature by showing different modalities of struggle or power relations in play in verifiable instances of price realization.

Methodology: following the practices of price realization

Recall that the overarching research question I explore in this thesis is how prices are realized when e-waste is the commodity traded. Also, recall the realization process within which a price is made real happens in the practices of trading commodities. In this regard, in order to understand how prices are realized, one needs to follow the practices of trading commodities. Taking cues from my research questions (Elliott, 1999)[13], I followed practices of discarding e-waste through exchange relations in Accra, Ghana. I chose Accra, Ghana for the following reasons. First, like most primate cities in Africa, Accra, is the commercial, administrative and political hub of Ghana, contributing between 20-30% of the national Gross Domestic Product (GDP) and housing about 30% of the urban population (Ghana Statistical Service [GSS], 2008). The city is therefore rapidly urbanizing. In the face of rapid urbanization, electrical and electronic equipment (EEE) have become pervasive in many spheres of life. For instance, mobile and fixed phone teledensity increased from 5 phones/100 people in 2004 to 49 phones/100 in 2008 (Oteng-Ababio, 2012). The use of computers has also expanded through the governments' Information and Communication Technology for Accelerated Development policy (ICT4AD)[14] which makes computers accessible and affordable to the citizenry using initiatives such as One Laptop Per Child (OLPC)[15] and free import duties on secondhand

13 Here, I draw from Elliott (1999, p. 240) who suggested an approach to research methods where a guiding principle is the appropriateness of a method in relation to the research questions the researcher seeks to answer. The message is simple: "the question shall determine the method".

14 This policy is key to Ghana's development as its main aim is to transform Ghana into "a high income economy and society that is predominantly information-rich and knowledge based" (Ghana ICT4AD, 2003, p. 14). A key focus area to achieving this is increasing the infrastructural base of ICT.

15 The OLPC project is owned by a non-profit organization. The organization, in consultation with development partners and governments, distributes free laptops to school children to help improve learning and access to knowledge. Ghana is one country in Africa currently benefiting from the project.

computers (Grant & Oteng-Ababio, 2012). As Ghanaians consume more EEE, they also discard these devices. Indeed, estimates suggest that developing countries, like Ghana, will be the largest contributors to the global pool of discards from electronics (e.g., Personal Computers) by 2016-2018 (Yu, Williams, Ju, & Yang, 2010). In Ghana, most users of EEE rid themselves of their equipment through some form of exchange making Accra an important site for exploring questions about price realization for e-waste.

The second reason for choosing Accra, Ghana is that the city has been spotlighted in a number of scholarly publications, activist reports, and media exposés as an e-waste 'hotspot' (Oteng-Ababio, 2010; Caravanos et al., 2011, 2013; Amoyaw-Osei, Agyekum, Pwamang, Muller, Fasko, & Schleup, 2011; Greenpeace, 2008; New York Times, 2010; Frontline/world, 2009). Finally, Accra was chosen as the study site because that is where I am from. I speak several of the languages relevant in the city and to the traders whose practices of price realization I followed for three months from June 2012 to August 2012. This combination of reasons was the rationale for choosing Accra, Ghana as the site for exploring price realization for e-waste.

Figure 1.2: Map of Africa showing the locations of Ghana and Accra. Map courtesy of Charlie Conway, Dept. of Geography, Memorial University.

For three months, I followed practices of discarding e-waste through exchange in Accra, Ghana. I started from the streets, where I found itinerant waste traders roaming in the city with trucks and buying and selling e-waste from households, offices, warehouses, secondhand shop complexes and scrap markets (see Figure 1.3). I literally followed these

itinerant waste traders, working with them, as they bought e-waste. From the households, offices, and other sites the materials itinerant traders bought were moved to scrap markets and foundries (mainly the Agbogbloshie scrap market and Tema industrial area), and I followed some of these movements and placings too. In this fieldwork, I found that the electronics being discarded were transformed through practices such as dismantling, repairing, remanufacturing, and smelting. While the materials were being transformed, they were also traded and, in the process, their prices continuously realized although not endlessly.

Figure 1.3: Two itinerant waste traders moving a truck in the streets of Accra.

How exactly did I do this 'following'? I participated in the activities of traders who buy and sell e-waste. I worked with them on their trading routes, helped them push and load items they bought on to their trucks and alongside made observations, engaged in conversations, and photo-documented the practices of trading e-waste and realizing its price. Practically, I took my notebook, pen, camera, voice recorder and started walking in the streets of Accra with the aim of looking for itinerant traders who roam in search of e-

waste to buy and sell. Using oral consent, I asked for and received consent to participate in the trading activities of these itinerant traders when I met them.[16] In the first two weeks preceding the three months period, I approached traders and explained my purpose: to participate in their trading practices in order to understand how the price of the electronics they buy and sell is made. Some of the traders were willing to allow me to participate; others declined. By the third week before the three-month period, I made contact with twenty itinerant traders, with consent to follow them while they engaged in buying and selling e-waste.

In the first week of the three-month fieldwork period, I worked with the first trader beginning the process of my participation, observation and questioning around practices of trading e-waste and realizing its price. I usually phoned traders two or three days in advance and inquired about the possibility of working with them on a particular day. When we reached an agreement on a date, a venue was also arranged, which in most cases happened to be the Agbogbloshie scrap market or it immediate environs because most of the traders begin their working day at the scrap market where they rent the truck for transporting the items they buy. Also, most of the itinerant traders are members of the Agbogbloshie Scrap Dealers Association (ASDA), a self-generated association for the traders at the scrap market.[17] I would meet the traders early in the morning between 5:00 and 6:00 a.m. at designated locations inside or around the scrap market. From there, we

16 Prior to any of my fieldwork activities, the Interdisciplinary Committee on Ethics and Human Research (ICEHR) at Memorial University reviewed and approved my research proposal and oral consent procedure.

17 It is estimated that half the membership of this association engages in e-waste related trade either as itinerant collectors, scrap dealers or middlemen trading between collectors and scrap dealers (Prakash & Manhart, 2010).

walked to neighbourhoods, offices, curbsides, secondhand shop complexes and warehouses in the city, buying and selling e-waste. Roaming in and around the neighbourhoods and curbside went on until about late afternoon.

We then would make a return journey to the Agbogbloshie scrap market between 1:00 and 3:00 p.m. At the scrap market, the itinerant traders resell the items they bought after or before processing them. Processing practices include dismantling, burning insulations from copper wires or cables. The component parts (e.g., Printed Wiring Board [PWB], Digital Video Disc [DVD] compartment) and materials (e.g., copper, aluminum) from the dismantled electronics are then resold to electronic repair or refurbishing shops and metal scrap merchants at the Agbogbloshie scrap market. Prices continue to be realized for e-waste at the Agbogbloshie scrap yard amidst this variety of processing practices. I therefore spent time at the scrap market, observing the practices of repair and refurbishing shops as well as that of the scrap merchants with the aim of investigating how e-waste continues to be moved along (Gregson, Metcalfe & Crewe, 2007)[18] and its

18 By moved along, I am mobilizing Gregson et al.'s (2007) concept of 'moving things along'. What Gregson et al. mean by moving things along is that when people discard consumer objects (such as electronics), they are not necessarily wasting these objects in terms of throwing them into the bin. Instead, they route the objects through diverse conduits including gifting, donating to charity shops, handing down to friends and family, and placing them at the curbside. These conduits, they argues, do not only save the objects from wastage but literally move them along in practices. In their research, they wanted to know what people do when they rid themselves of consumer objects. Their work was set against the backdrop that contemporary European societies are throwaway societies, where people just carelessly waste things (Packard, 1960). Documenting what people do when they discard consumer objects, they demonstrate that people do not just throw things away as suggested by the idea of a throwaway society. Instead, people use conduits such as gifting, donating to charity shops, handing down to friends and family or placing on the curbside to rid themselves of consumer objects. These practices divert most consumer objects (as high as 71%) from the waste stream (and refuse dump) and move them along. From their ethnographic research, only 29% of consumer discards went through the bin, evidence that does not support a throwaway society. By 'moving e-waste along' I gesture to further rounds of exchange through which prices continue to be realized for e-waste well after moments of ridding at the household level (though not endlessly).

prices realized.

In following all these practices (those of itinerant e-waste traders, repair and refreshing shops, and scrap merchants at the Agbogbloshie scrap market), I wrote notes about my observations of price transactions, had conversations with traders after transactions, took photographs of the practices as they happened and sometimes video or, and audio recorded interactions. The following of itinerant e-waste traders usually lasted for 11 hours by the time I parted ways with the traders at the scrap market because they work between 5:00 a.m. and 5:00 p.m. With the repair or refurbishing shops and scrap merchants or dealers[19], I made observations and conducted interviews at their shops or tents at the scrap market from 9:00 a.m. to 5:00 p.m. for a month. Combining the travels with itinerant traders each way (from the scrap market to households and back to the scrap market), processing practices (e.g., burning, dismantling) and reselling activities within the scrap market itself, the total daily distance travelled averages 50 kilometers. While roaming the city we do not follow direct routes since that would cut out opportunities to trade more materials.

The participant observation, conversations and interviews with traders were mostly done in 'Pidgin English'.[20] As a result of Ghana's colonial past, English is its

19 At the Agbogbloshie scrap market, traders use dealers and merchants interchangeably. I will do same in this thesis too.

20 Like other languages linguists categorize as 'pidgin', Pidgin English is a form of English language developed in the 15th century during Afro-European contact in West Africa. It was developed to enable the Europeans trade with the the African population living in this part of the continent. As such, its use is mainly within the West African coastal areas of Sierra Leone, Ghana, Nigeria and Cameroon where the Europeans first made contact. It is sometimes referred to as 'Broken English', suggestive of attempts to bring the English language to the level of people who might not be able to speak or understand. For instance, if I want to ask: will you go to the house? Putting it 'pidginly', it becomes: you go go house? (see 'Ghanaian Pidgin English' by Magnus Huber, 1999).

official language. However, because English is mostly taught in school, some people without formal education cannot speak English well or at all. In such situations, indigenous languages (also called Ghanaian languages) are the language of communication. About nine (Akan, Ewe, Dagomba, Dangme, Dagaree, Ga, Nzema, Kasem and Gonja) of (45 to 80) indigenous languages are government sponsored-languages, which are spoken widely on radio and television programs and are the alternatives for people who can not speak English.[21] However, there are spatialities in the use of these indigenous languages. Akan, Ewe, Ga and Nzema are dominant in the southern part of the country while the rest are dominant in the North. Born and raised in the southern part of Ghana, I speak English because it was the language of instruction throughout my schooling. Apart from English, I also speak some of the dominant indigenous languages of the south–Akan and Ga. Most of the e-waste traders I worked with are migrants from the Northern part of Ghana. As such, they speak the indigenous languages dominant in the North–Dagomba, Dagaree, Kasem and Gonja. Also, because the northern part of the country has the highest illiteracy rate, most of the traders had little or no formal education and cannot speak English at all. It was due to the lack of a common language (English or a mutual indigenous Ghanaian language) between the traders and I that Pidgin English emerged as an alternative language for our interactions. In view of communicating in Pidgin English, some direct quotations and excerpts from field notes I will refer to in Chapters Three and Four convey the nature of Pidgin English.

21 Although Ghana is highly multilingual, there is no consensus on the actual number of languages spoken. Bodomo, Anderson and Dzahene-Quarshie (2009), however, put the number of languages spoken between 45 and 80. The lack of consensus, they contend is because of disagreement over what constitutes a language and a dialect.

For clarity purposes, I have chosen not to quote verbatim from the field notes, but slightly translate them while still maintaining the richer sense of the language used. We did not, however, always communicate in Pidgin English. In fact, when two or more itinerant traders met or transacted among themselves, they spoke Dagomba–one of the dominant languages in the north. I will discuss instances of this in Chapters Three and Four. In such situations, there were language barriers to my participation. I therefore taped conversations and later translated them (verbatim transcription) with the help of a translator. Some traders disapproved of my taping of conversations. I therefore focussed more on gestures, bodily practices and who was speaking rather than what was being said in situations when I could not understand the language spoken.

Furthermore, my own gender practices, nationality and the very design of the research (following practices of trading e-waste) were also key points of negotiation in the unfolding of my participation in the activities of e-waste traders. E-waste trading is a male dominated activity.[22] It is therefore unusual for a woman to be involved in this work. Consequently, as a woman, I was confronted with justifying to the traders and people who wondered and asked about my participation in e-waste trading. For instance, some householders whom the itinerant traders bought e-waste from would normally ask: "why is a beautiful woman walking all day in the sun with these boys"? My senior brother who is a banker and claims to know "a lot about prices" asked me: "what kind of price research requires walking daily with these boys". In Chapter Four, I will flag situations

22 Most of the traders that I worked with were males. Studies by Grant and Oteng-Ababio (2012), Rockson, Kemausuor, Seassey, and Yanful (2013), and Amankwaa (2013) have underscored that the e-waste trade in Ghana is male dominated (90% males).

where gender mattered in the actual practices of price realization. However, with regard to being a woman and engaging in predominantly men's work, householders often mistook me for a visitor whose entry into their houses coincided with the itinerant traders. When I entered houses and shops with the traders, some householders asked: "Madam, are you looking for someone"? I dealt with these questions by rehearsing to both the traders and householders that I wanted to understand how a price for e-waste is made real (conceived as real in relation to a good and subsequently converted into actual money) in practices of exchange. And that, in order to do so, I had to follow the practices of exchanging e-waste itself. And, which also meant that I was following e-waste traders as they buy and sell e-waste. The above explanation better facilitated my relationship with the traders as some of them told me how my approach to research is very different from "other researchers (mainly foreign ENGOs and journalists) who only want to "take photos of us burning copper wires at the Agbogbloshie scrap market". I did not, however, withhold from the traders that I was schooling outside Ghana (and in that sense, might be considered a foreign researcher). Indeed, the ethics approval and oral consent forms I showed them when seeking consent had Memorial University written on it, and I made it clear that I am schooling in Canada. Eventually, my affiliations to Canada (holding a study permit) also became an important facilitator of the relationship between the traders and myself. While we walked buying and selling e-waste in the streets, some traders asked questions about my experience living outside Ghana.[23] I therefore shared stories

23 For some of the traders, it was more than just curiosity because they asked me to help them travel outside Ghana. Others also assumed that, because I lived outside the country, I could help them financially with their business.

with them about my life in Canada.

In addition to participating in the activities of e-waste traders during the three-month period of fieldwork, I engaged in another field of participation: student-supervisor encounters. On a weekly basis, I held Skype meetings (weekly check-ins) with my supervisor who was based in Memorial University, St. John's, Canada. When Internet connections did not cooperate for Skyping, emailing summaries of events became handy. These check-ins were another 'participation field' for me as my supervisor often helped me think through certain practices I recount, informing further rounds of conversations and observations with the traders about the practices within which the price of e-waste is realized.

Following the daily participation of practices of trading e-waste to weekly check-ins, the three months of fieldwork ended. Memories of forty-five traders, over a thousand photographs, many pages of field and analytical memos or notes, transcribed notes and taped recordings; I headed to Memorial University, St. John's. From home (Accra, Ghana) to home (Memorial University, St. John's, Canada)! A boundary and edge (Lepawsky & Mather, 2011) making in my personal, academic life and other relationships. At Memorial, I confronted another trajectory culminating in the production of this thesis: working through the practices of price realization observed in such a way that I can produce a thesis document. Here is what I did and I continue to do now while writing these very words: first, I gathered all the forms of data I collected (e.g., observational notes, analytical notes and memos, photos and videos, interview

transcripts). Next, I worked through all the interview notes, price transactions and conversational data by generating codes according to practices or doings suggested in the data (e.g., if a computer monitor was coming apart in the actions of people engaged in the trade, I coded the practice as dismantling. If a trader was hefting a computer monitor while negotiating with a householder about prices, I coded the practice 'estimating potential value of monitor', 'use of the body in estimation', 'body language'). Subsequently, I went through all the data again, this time around using the already generated codes to identify if and to what extent a practice is embodied differently in all the data collected (e.g., observational notes, analytical notes and memos, photos and videos, interview transcripts). That is, for practices of dismantling, I use these questions to further code the data:

How are the practices of dismantling suggested in the observational notes?

How might these practices also be suggested in the conversational scripts and how might they be compared with data in the observational notes?

How might the practices of dismantling be suggested in the photos and how is the data in these different from that in others (e.g., observational notes or conversational scripts)?

How do the analytical memos (written while following the practices) suggest practices of dismantling then and how are these providing different information from the data sources above?

When finished with this exercise, I related individual practices (dismantling) as

performed in the different forms of data (observational notes, photos and videos and interview transcripts) to my research questions: how are prices realized when e-waste is the commodity traded? (e.g., in realizing prices for e-waste, at times the good is dismantled. In dismantling the good, visual practices [visual inspection] are used in estimating the value of component parts and materials for which prices are realized). This way of working with research data is inspired by interests in the performativity or enactments of research methods (Mol, 2002; Law, 2004, 2012). According to Law (2004, p. 143), "method does not report on something that is already there. Instead, in one way or another, it makes things more or less different".[24] In line with this idea that methods do things, I chose to foreground and present the practices I observed through the different forms of data I collected and how they might do things differently.

This mode of presenting and ordering the different forms of data will be evident in Chapters Three and Four where I detail price realizations for e-waste. There, I demonstrate how prices are realized for e-waste by recounting one day out of the ninety days of fieldwork. In that day, there are eight moments of price realization. I will unpack each of those moments and highlight how prices realized for e-waste in those moments relate to but also develop the price realization literature. In each moment of price

24 Mol (2002, p.160) captures this in a different way when she writes about her writing that "texts are active. And they do so much more". Working with the active-ness of texts, she enacts the the message in her book (the body multiple) by or through juxtaposing two texts, which she calls upper text and subtext. The upper texts speak directly to the practices she observed, the practice of a body with atheroscleroses mainly in modes of stories, pictures and sketches. The subtext on the other hand, describes her own research practices, for she discuss ways of relating to the literature–who to cite (and not), when and how to make or support her claim and to what extent her knowledge claims can travel. The subtext, therefore, may parallel, contrast or at times interfere with the practices she observed and recount. That is how texts can make a difference.

realization, I will mobilize the different data forms relevant to explaining what is happening in those moments. Recounting one out of ninety days of fieldwork, I am not in anyway generalizing that day as representative of what happened in the ninety days of fieldwork. Instead, by focussing on a day, what I hope to achieve is foreground the specificities of the practices as 'exemplary situations' to explain the processes of prices realization for e-waste.[25]

Ordering of chapters

Having outlined my research questions, outlined the methods used in answering them and summarized the thesis contributions to the price realization literature in this chapter, I will in this concluding part of Chapter One present the organization of the whole thesis. Four additional chapters follow in this manner: Chapter Two offers a review of the relevant literature. There, I will review the relevant literature on price realization and e-waste with the aim of unpacking an analytical framework to guide subsequent discussions. The literature reviewed will revolve around two key ideas. First, that e-waste is enacted in practices of exchange and secondly, prices for it are made in a process of realization. Taken together, the key task in Chapter Two is outlining a very simple framework, summarized as: e-waste is enacted in the practicalities of exchange and its prices realized in the process.

Chapters Three and Four are the substantive chapters of the thesis. There, I

25 Here, I take inspiration from Mol (2008, p. 33) in mobilizing the specificity of stories as "exemplary situations". Exemplary situations are specific instances or events that a researcher can work with experimentally to convey his or her message. Using specific instances as exemplary situations, what is at stake is not a generalization of a specificity. Instead, it offers ways to work through a specific moment in order to understand better. Following Mol, my intention here with the eight moments of price realization is to open up the practices that enable prices to be realized for e-waste.

examine the processes of price realization when e-waste is the commodity traded. A premise to both chapters is an account of a day in which I followed two itinerant traders as they bought and sold e-waste at households and curbsides in the city of Accra and the Agbogbloshie scrap market. There are eight moments of price realization in the course of the day. I will flag three of the moments of price realization in Chapter Three and the remaining five in Chapter Four. The first three moments occurred at households and curbsides while the remaining ones occurred at the Agbogbloshie scrap market and its environs. Discussing what happens in each moment for a price to be realized for e-waste, I will show how the processes of price realization for e-waste yield important insights that relate to and also build on the price realization literature.

Chapter Five concludes the thesis by summarizing and connecting the insights in the eight moments of price realization. In doing so, the chapter repositions insights from the processes of price realization for e-waste within the existing price realization and e-waste literature. Potential future research directions are also highlighted in this chapter.

CHAPTER TWO

ANALYTICAL FRAMEWORK: E-WASTE AND PRICE REALIZATION IN PRACTICES

The previous chapter outlined what this thesis is about: the question of how prices are realized when e-waste is the commodity traded. In particular, the chapter demonstrated what it means for prices to be made in a process of realization. Furthermore, discarding of e-waste through some form of exchange in Accra, Ghana was introduced as the empirical context for examining price realization for e-waste. In this chapter, I present my analytical framework by further unpacking the literature on e-waste and price realization. The framework I present can be summarized as follows: e-waste is enacted in the practicalities of exchange and prices for it are realized in the process.

The chapter is organized into two main sections: The first section discusses the theoretical bases of the idea of enacting e-waste. The second reviews the existing literature on price realization. Following the discussions in both sections, I develop three analytical contentions that will guide my analysis in Chapters Three and Four. The analytical contentions are: first, to examine the everyday practices of discarding e-waste through exchanges. Second, to analyze the material apparatuses (market devices) through which those practices are negotiated. Finally, to examine the bringing of prices into being (realization) through those practices.

Enacting e-waste in the practicalities of exchange

Waste is "intrinsically, profoundly a matter of materiality" (Gregson & Crang, 2010, p. 1026). Gregson and Crang, recalling older discussions in waste studies (e. g.,

Douglas, 1966; Thompson, 1979; Hetherington, 2004) made the above claim echoing that waste is matter, but matter that is situational and relational. If the matter of waste is situational and relational, waste ceases to be a thing in its own right (an intrinsic character of an object or material). Instead, waste becomes an effect of *how* objects or materials are practiced. Meaning, what people do when they waste. Put differently, what do people do when they rid themselves of stuff? This question suggests the action of making waste, that is, wast*ing*. The emphasis on action leads to my use of enactment (Mol, 2002)[26] as an analytical concept for following practices of discarding e-waste through exchanges.

Recent work on e-waste that informs my use of enactment to follow the action of price realization for e-waste includes that by Lepawsky and Mather (2011).[27] Researching the geographies of e-waste, Lepawsky and Mather followed electronics disposed in Canada to Dhaka, Bangladesh. In Dhaka, they continued to follow these electronics thinking that because the dominant e-waste storyline claims that those electronics are axiomatically waste they might end up in dumpsites. However, and to their surprise, they ended up not at dumpsites but at production sites where these electronics were being transformed and re-circulated. Amidst the transformations of electronics at the production sites, these researchers could hardly recognize e-waste (something they seem to have known so well). A question thus emerges: how does a researcher continue to follow e-waste when what he or she presumes as e-waste cannot be recognized anymore? Confronting this question, they suggest a different approach for studying the geographies

26 Here, using enactment in Mol's sense of the word, I am gesturing to her argument that rather than being self evident things, objects are enacted in practices.

27 See also Lepawsky and Billah (2011).

of e-waste. They argue that instead of constituting e-waste as a knowable or identifiable thing ahead of inquiry, researchers should follow the practices within which electronic things are discarded and rendered waste (or not) in practice. At the sites of production where they ended up, people were doing things with electronics and in the process transforming them. They were dismantling, smelting, repairing, and refurbishing. These doings are actions, which constitute practices. That is, the practices are what people do when they discard electronics and move them along. In this light, Lepawsky and Mather redirect attention of e-waste research from a question of *what it is* to *how it is practiced*. Thus, how is e-waste done in practices? In Chapters Three and Four, I take a similar position, showing how e-waste is done and in what practices (what people do when they discard electronics) as it is discarded by original users and moved along while being bought, sold and its prices realized.

McNabb (2013) has elaborated on the insights of Lepawsky and Mather (2011) by demonstrating what is at stake if one follows the action of making e-waste. He shows that if practices are the entry to e-waste, then we open the possibility that e-waste "is more than one, but less than many" (McNabb, 2013, p. 7[28]). Following the practices of discarding electronics at Memorial University of Newfoundland, McNabb shows that e-waste is enacted as protecting data security risks as much as if not more than for environmental justice or with respect to occupational health dangers. In the discarding practices at the university, e-waste is practiced as materials to do with different sets of

28 Here, McNabb is drawing on Mol (2002, p. 55) who argues that if practices are the entry point into realities, objects are enacted in the multiple–"more than one but less than many".

problems other than that claimed in the dominant e-waste storyline (e.g., environmental pollution, health risks and toxic colonialism[29]). In this light, McNabb, demonstrates that when attention is directed to practices bringing e-wastes into being, different realities of e-waste are enacted into being. The concept of enacting e-waste therefore provides a useful way to engage the familiar narratives of or about e-waste. Like McNabb, in following the practices of enacting e-waste through exchange and realizing its price, it becomes evident that there is more to the story than toxic colonialism occurring in an African country and that Accra, Ghana is more than an e-waste hotspot. In Chapters Three and Four, it will become clear through the eight moments of price realization for e-waste that, it is not prices of toxic garbage (although toxins are part of the story I tell) that are realized as e-waste is traded. The practices of exchange within which prices are realized for e-waste relate to people's everyday lived experiences and livelihoods.

Finally, in her book *Digital Rubbish: A Natural History of Electronics*, Jennifer Gabrys (2011), presents another angle to the idea of enacting e-waste. One thing that the dominant literature on e-waste does is that it limits discussions on e-waste to post manufacturing, making its possible enactments something problematic after users rid themselves of their electronics (Lepawsky, 2012). Following practices of wasting, Gabrys questions the narrative of e-waste being a problem that happens after manufacturing. Her research suggests that electronics are practiced as pollution and health risk in their

29 By toxic colonialism, I am gesturing to the popular e-waste narrative that portrays developing countries as remaining in subordinate positions with regard to e-waste dumping, and as a result experiencing environmental injustice as a new kind of colonialism (Greenpeace, 2008; BAN, 2002, 2005; Pellow, 2007).

manufacturing. For instance, she documents groundwater pollution and occupational health risks in Silicon Valley–a primary manufacturing site for the microelectronics industry until offshoring moved much of it abroad. In the dominant e-waste literature, when e-waste is framed as a problem of pollution and health risk, post manufacturing practices and developing countries are mostly referenced. However, following the actual practices of wasting, and showing that electronics are practiced as pollution and health risk even when they are produced and in developed countries, Gabrys un-brackets geographies of practicing e-waste. That is, she opens up and makes present other ways of enacting e-waste such as manufacturing discards in the production of electronics and toxic accumulation in the bodies of assembly line workers in developed countries.[30]

Making prices in a process of realization

Recall, the questions I am exploring in this thesis are framed within the performativity program of Callon, specifically, the emerging literature on price realization. Also, recall the price realization literature argues that prices are actualized in practices rather than set by supposed universal laws such as demand and supply. By asking how prices are realized when e-waste is the commodity traded, I follow Caliskan's (2009, p. 240) claim that price realization is "a more accurate way to make sense of prices in global trade". Consequently, in what follows, I demonstrate why I use the idea of price realization as an analytical concept. Furthermore, I unpack in detail how the idea of price realization guides my analysis in the next two chapters in specific moments of realizing

30 In Chapter Four, I use one moment of price realization to flag an instance that un-brackets the idea of colonialism with regard to e-waste. There, I suggest that colonial encounters through e-waste happen in different ways than what has been suggested in the e-waste literature.

prices for e-waste.

Well known in market economies, but a defining feature of neoclassical economic theory is the claim that demand and supply determine prices (Marshall, 1982; Cournot, 1897; Smith, 1776). However, as noted in Chapter One, scholars in diverse disciplines have critiqued the idea that on their own demand and supply work in a self adjusting system to determine prices. For instance, sociological and anthropological approaches have contributed to a better understanding of prices by suggesting that we look at the cultural and social frameworks within which prices emerge (Mauss, [1925] 1954; Granovetter, 1985; Appadurai, 1986; Fligstein, 2001). Marxist labour theory of value also points to the conditions within which labour is created to produce commodities as important in understanding prices and subsequently profit (Marx, [1898] 1969). Again, interests converging around global value, commodity, and production chains emphasize spatial relations of power[31] with regard to commodity production, consumption and circulation as providing insights into how prices for commodities are determined (Gereffi & Korzeniewicz, 1994; Coe, Dicken & Hess, 2008; Hughes & Reimer, 2004; Johns, 2006; Dedrick, Kraemer & Linden, 2010).

A new strand of interdisciplinary approach to prices has emerged in what is called 'price realization' (Caliskan, 2007, 2009, 2010; Muniesa, 2007; Beunza, Hardie & MacKenzie, 2006; MacKenzie, 2006; Velthuis, 2005). According to this body of work, prices are made in a process of realization that is different from that theorized by

31 Spatial relation of power encompasses the governance structure that drives economic chains which are embedded in different locations.

neoclassical economics in supposed universal laws such as demand and supply. Key to the idea of price realization is Michael Callon's (1998, p.2, 2007, 2010) performativity thesis of economics, which claims that economics "performs, shapes and formats the economy, rather than observing how it functions". What Callon means by economics as performative is that instead of economics describing an external reality out there in the world (e.g., price), it practically enacts that reality. Consequently, his performativity thesis proposes a particular approach to the economy: how the economy is enacted. In other words, the relevant question that the performativity thesis of economics raises is how the economy is actualized. Asking this question, the performativity thesis points researchers to the economic theories, models, instruments and practices that act upon the economy while being used to observe its workings (Santos & Rodrigues, 2009). Drawing on Callon's approach, the idea that prices are made in a process of realization emphasize the practices of exchange and apparatuses within which the price of a commodity is actualized. The current thesis employs the idea that prices are made in a processes of realization to examine how prices for e-waste are made. It does so for a variety of reasons.

First, the idea of price realization offers ways to engage with a wide range of 'modes of valuation'[32] (Helgesson & Muniesa, 2013). Key to the processes of price realization is the *ways* in which the monetary value of a commodity is established and tied to the qualification of a commodity or a good in order to realize its actual price (Callon, Meadel, & Rabeharisoa, 2002; Callon & Muniesa, 2005; Helgesson & Muniesa,

32 Another way of understanding this is Heuts and Mol's (2013) idea of 'registers of valuation'.

2013). Modes of valuation therefore have to do with practices that temporarily articulate the qualities of commodities or goods so that the monetary compensations for their exchange (prices) can be realized. For example, as demonstrated in Chapter One, diverse practices ranging from standardizations by USDA to mobilization of market reports happen in order to realize the actual price of the 1000Mt of SLM cotton. The study of Beunza and Stark (2004) discussed earlier also evidence the arrangements of desks in a trading room as contributing to the valuation of stocks. In this regard, price realization opens up the repertoire of possible actions and practices deployed in efforts to make the price of a commodity. It does so by evidencing the qualification of goods (Callon & Muniesa, 2005). There are three aspects to the qualification process. First, the diverse conditions or arrangements under which the work of qualification occurs. Second, the market devices through which the work of qualification is materialized. The third aspect has to do with the actors that conceive of and at times certify the implementations of the conditions and devices.

In the eight moments of price realization for e-waste that I discuss in Chapters Three and Four, I demonstrate different qualification practices and the involvement of particular market devices. Specifically, I show how those devices relate to but also build on the existing literature on price realization. For instances, the price realization literature tells us that the human body is an important market device in processes of price realization in a supermarket setting (Cochoy, 2004, 2007), financial markets (Beunza & Stark, 2004; Ho, 2009) and global cotton trade (Caliskan, 2007, 2010). The body as a market device is a theme in all eight moments of price realization that I demonstrate in

Chapters Three and Four. However, in certain instances, the work of bodies as a market device in the processes of price realization for e-waste operate in a different way than what has been suggested in the extant literature.

The idea of price realization is useful in a second way in that it shows the existence of a multiplicity of prices in markets at any given point in time and their effects in the processes of realizing an actual price. Because price realization occurs in an iterative and recursive process, we can see the interventions of *other* prices in the realization of actual prices. Consider the case of the future price of 1000Mt of cotton SLM demonstrated in Chapter One. Future price, like other global prices, (e.g., world price, option price) is not the actual prices paid for the bales of cotton in an actual exchange between a buyer and seller. It is a price produced by the NYBOT to enable traders navigate the world market when realizing actual prices. As the hypothetical example demonstrates, trader B and A consult the NYBOT futures price when realizing the actual price for the 1000Mt of SLM cotton on 21st August. Through this consultation, the future price instantiated in the NYBOT market report enables traders to realize actual prices. Caliskan (2010) proposes the notion of prosthetic prices to refer to *other* prices used as inputs to realize actual prices. Like a prosthetic arm or crutch aiding a disabled person, the idea of prosthetic price gestures to prices that aid traders to navigate the terrain of realizing actual prices. He identifies three distinctive prosthetic prices: world price, rehearsal price and associate price. I explain each price in turn.

When exchanging cotton, traders reference and use the world price to guide their trading decisions. The world price represents offering prices on the international raw

cotton market. A private company, Cotlook Ltd. produces this price and publishes it in a market report. Cotlook produces the world price by averaging the cheapest five quotation prices from internationally traded principal cotton (Caliskan 2010, p. 47; cotlook.com). If cotton traders on the ground therefore consult the world price in their trading decision and that price informs the actual price they realize, then the actual price is relating to something (the world price) that they–the actual prices–help to create in the first place. In this way, prices are realized in an iterative and recursive relationship between the published world price, and actual prices paid. Those actual prices that come to be the cheapest five quotation prices averaged by Cotlook Ltd. by definition represent a plurality (five individual prices that are averaged) that subsequently informs new rounds of actual price making (of which there will be many variations from the world price published by Cotlook Ltd.). Thus, rather than there being a singular price, price is multiple; and one of its iterations, world price, acts as a prosthetic price to aid the realization of actual prices paid for an actual commodity (e.g., bales of cotton).

Caliskan (2010) evidences rehearsal price in a regional cotton market like the Izmir Mercantile Exchange (IME) in Turkey. Here, a sequence of four different prices emerge as traders encounter each other during pit trading; post pit trading; closing price committee meeting and permanent working group meeting. Different prices are produced at each stage. However, pit price is the first to emerge in the course of a trading day. Only 10 percent of cotton is traded against this price. Indeed, the purpose of the pit price is not to directly exchange cotton. Instead, pit price is produced to be used as a reference in the next encounter between traders. Thus, traders who trade post-pit reference pit price as a

justification for the actual prices they are realizing. Similarly, a closing price, which is the market price of Turkish cotton, reference pit and post-pit prices. Thus, each price is a rehearsal into the next iteration of price realization.

The last prosthetic price, the associate price, unfolds in Egyptian cotton trade where there is no mercantile exchange, yet traders produce their own prosthetic price in the form of an associate price (Caliskan, 2010). In Egypt, a private association; Alexandria Cotton Exporters Association (Alcotexa) gives approval to all cotton export and trade. This association meets every Sunday to establish a minimum price of Egyptian cotton for a week. Egyptian traders then have to consult the minimum price when trading their cotton because they cannot realize an actual price below the minimum price. Here too, the minimum price works as a prosthetic price used to derive actual prices. In the two chapters that follow, I take a similar position with the processes of price realization for e-waste showing the various prosthetic prices in play and their implications in each moment of price realization.

Finally, and related to the above we can see another way that the idea of price realization is a useful analytical concept for exploring how prices for e-waste are made. This has to do with the modalities of power enacted in the processes of price realization. The three prosthetic prices illustrated above clearly shows that actual prices are calculated from other prices rather than simply supposed universal laws of supply and demand. As shown in the three prosthetic prices, assuming X is a world price, price rehearsal or associate and Y the actual price of cotton on a particular day, price X is used as an input to derive price Y. Because price X is used in calculating Y, Caliskan evidences that actors

with interest in price Y manipulate price X to further their interest. In this way, the iterative relationship between prosthetic prices and actual prices in a process of price realization is performed "as a relation of struggle or power in itself" (Caliskan, 2010, p. 189). That is, the very processes through which prices are realized embody the concerted efforts of market actors as they relatively position themselves in various practices and use various market devices to determine who has a voice in how and at what price a commodity is bought and sold. However, the processes of price realization as a relation of power is not given, it is also enacted in practices. Thus, just as each actual price is realized through particular practices, so too is the field of power or struggle a moment of price realization may embody. This means that the specific practices making price realization a power relation might be actually observed and thus explained (cf. Allen, 2003[33]). Discussing the processes of price realization in Chapters Three and Four, I detail modalities of struggle or power in play when prices are realized for e-waste.

To conclude, this chapter has presented my analytical framework by introducing existing literature on e-wast*ing* (enacting e-waste in practices) and price realization. Specifically, I have elaborated three analytical contentions guiding my analysis in Chapters Three and Four. The analytical contentions are: first, examine the everyday practices of discarding e-waste through exchanges. Second, analyze the apparatuses (market devices) through which those practices are negotiated. Finally, examine the

33 Power is a highly debated concept in the social sciences. In this thesis, I approach power in a very particular way, one that I draw from the economic geographer John Allen (2003) and also reflects in the work of Caliskan (2010). For Allen, power is not a thing that is there and thus can be stored in certain organizations, people or roles. Power exists only as an outcome or effect of practices. Consequently, in discussing the processes of price realization as relations of power in Chapters Three and Four, I point to specific practices and their relations and how power is produced as an outcome of those relations.

bringing of prices (in their plurality) into being (realization) in those practices. I now transition to the substantive chapters of the thesis where I recount eight moments when prices are realized for e-waste in Accra, Ghana.

CHAPTER THREE

PRICE REALIZATION AT THE FOOT OF HOUSEHOLDS AND CURBSIDES

This chapter and the next focus on the processes of price realization. I answer the question: how are prices realized when e-waste is the commodity traded. My analysis is grounded in exemplary situations from a day on which I followed two itinerant traders as they bought and sold e-waste in Accra. Taking moments from that day, I highlight eight moments of price realization. Three moments occurred at the foot of households and curbsides in the city. The remaining five moments happened at the Agbogbloshie scrap market and its environs. In the current chapter, I focus on the first three moments of price realization. I then transition into the last five moments in Chapter Four. In what follows, I first, recount the sequence of events in the day as experienced during my fieldwork. In recounting, I flag the first three moments of price realization. Subsequently, I unpack each moment examining the processes of price realization for e-waste while positioning my findings more broadly within the price realization literature.

Price realization on the move: somewhere on the streets of Accra

July 14, 2012, 5:15 a.m, Accra, Ghana's capital city wakes up to another day of commercial activities. This day is one among the ninety days I spent following practices of trading e-waste in Accra, Ghana. It is a sunny morning, I stand along the Graphic Road, a major street from the city's central business district (CBD). People walk briskly, and it seems I am the only immobile person around. From where I stand, I see itinerant e-waste traders coming from the Agbogbloshie settlement[34]*(see Figure 3.1), mostly in*

34 The Agbogbloshie settlement is a slum community home to many itinerant e-waste traders. The

groups of twos, moving their carts or trucks[35] as shown in Figure 1.3 (see Chapter One). The traders are headed to the residential areas, offices and secondhand electronics shop complexes in the city to trade (buy and sell) discarded electronics. On this day, I head out with two of the itinerant traders; Sonny and Dallas[36] (hereafter referred to as S&D) to participate in their trading activities in order to understand the processes of price realization for e-waste.

settlement is located at the edge of the Agbogbloshie scrap market, a famous site where e-waste processing takes place. The shanty wooden structures of the settlement houses about 80,000 people. Considered as an illegal settlement by the government, Agbogbloshie is mainly populated by migrants from Northern Ghana.

35 A pushcart is known as a 'truck' in Ghana. In the rest of the chapter, I use trucks and pushcarts interchangeably. Most itinerant traders rent the trucks on a daily basis at a rate of 2 cedis (CAD $1.1) from entrepreneurs at the Agbogbloshie scrap market close to the Agbogbloshie community where most of the traders live. The trucks differ in design, but they are mostly assembled from 'used' car axles, wooden boards and old car tires. Their sizes are normally small enough to enable traders to manoeuvre their way through neighbourhood streets in poor conditions and areas without well demarcated street paths.

36 These names are pseudonyms.

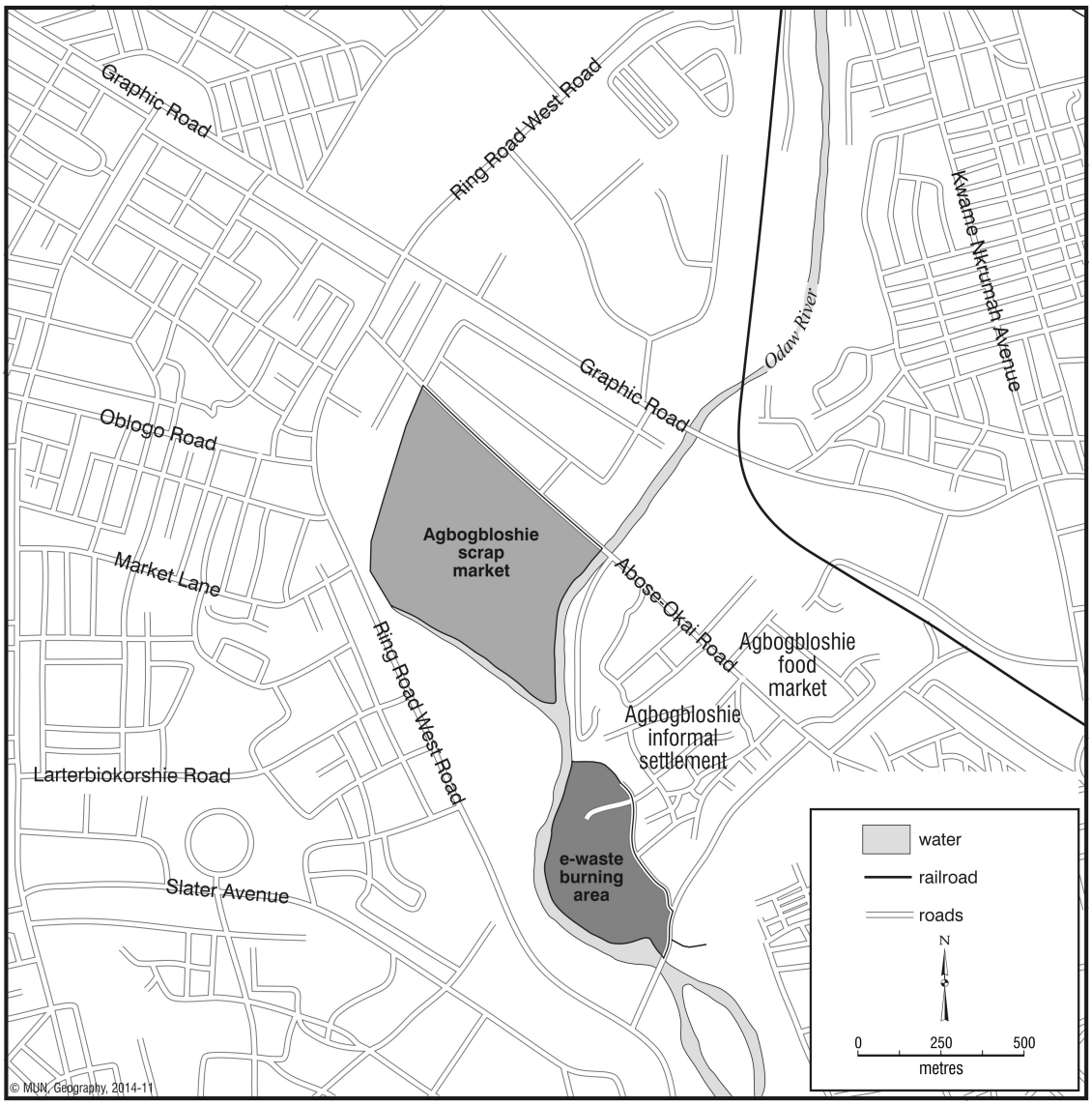

Figure 3.1: Map of the Agbogbloshie area showing the scrap market, informal settlement and food market. Map courtesy of Charlie Conway, Dept. of Geography, Memorial University.

While standing on the bridge and waiting, I mobilize the method of counting schedules (Fife, 2005) to do a headcount of traders churning through the streets per minute, identifying them via the trucks they push. Amused by the numbers (dozens per minute), I wonder if I could pick out S&D in the crowd since I already met them during

the consent seeking process. I hear a shout: "Madam, madam!"[37] *I turn, and it is the two young men whose trading practices I followed on July 14, 2012, and will continue to follow in this chapter.*

On the trading route with S&D, we walk for about 9 hours of the day moving in-between residential neighbourhoods, secondhand electronic shop clusters and industrial complexes. Like most itinerant traders, S&D do not plan their routes in advance although they have a rough idea of moving eastward or westward through the city. Mostly, they rely on calls from potential customers to direct their path. With no planned route, I just follow their lead. It takes about two hours to move across the commercial zones surrounding the CBD into the residential areas where most of their trading occur. While in residential communities, S&D are called into houses: "Abochie, Abochie, come here."[38]

During one such call, Dallas enters a house, parking the truck by the side of the road. Sonny and I follow. The customer who called them wonders, "If she [I] is looking for someone". Sonny answers: "she is with us". My presence sparks a conversation[39]*, diverting attention from why the two traders are called into the house. Eventually, attention shifts to the task at hand: moving e-waste along in a practice where the household sells their surplus electronics to itinerant traders. On the floor at the*

37 This hail was in the Akan language.

38 Abochie is a name normally used for migrant workers with origins from northern Ghana who are working in the south. In most cases, the name is restricted to workers in jobs such as watchmen (security guards), and itinerant waste trading.

39 In Chapter One, I noted that it is unusual for women to be involved in itinerant e-waste trade. Hence being a woman and following S&D, people whom they traded with inquired about my presence. This was one instance. When I walked with S&D into the house, the assumption was that I was looking for someone, and perhaps it is coincidental that I walked in at the same time as S&D. When S&D explained that I was with them, the householder did not believe them. I intervened and explained that I am doing research. This research means that I follow S&D and observe what they do while trading e-waste.

householders corridor sit a desktop computer (tower and monitor), a TV and stereo system (see Figure 3.2). At the household, these items are being moved into a rubbish category since they no longer occupy spaces on shelves in living rooms and desks but pushed into corridors (Thompson, 1979; Appadurai, 1986; Gregson et al., 2007; Lucas, 2002).[40] *The woman selling the items asks: "how much for these"? Speaking Dagomba, S&D deliberate for about two minutes. It takes an additional 10 minutes to actualize a price of 15 cedis (CAD $7.9*[41]*) against which the items are traded. Money changes hands and property rights to the items handed to S&D as they carry the items onto their truck.*

Figure 3.2: Dallas inspects the inside of the TV through a panel at the back.

We continue walking. Hundred meters away from the house where the first items were bought, another itinerant trader riding a bicycle (see Figure 3.4) approaches S&D. This itinerant trader expresses his intention to buy the printed wiring board (PWB) in the

40 From the dust accumulation on the items, I could tell that the items have been placed in the open corridors for a while. This illustrates the interim placings or graduations–(e.g., at the back of a wardrobe, under the bed, the attic or corridor)–associated with how people rid themselves of surplus materials.

41 The average exchange rate during the three month period of fieldwork (June - August) was 1.91 cedis per CAD. I use this cedis-CAD exchange rate throughout the thesis.

computer tower from S&D. Immediately, negotiation begins from which another price of 9 cedis (CAD $ 4.7) is realized, this time, not for the whole computer monitor but a part of it–its PWB. Realizing this price, the computer tower comes apart as it is partially dismantled (see Figure 3.3). Again, money changes hands and S&D relinquish property rights on the PWD in the tower.

Figure 3.3: The computer tower comes apart in this moment.

Figure 3.4: An exchange situation between a bicycle and truck trader.

Always in motion, we continue walking making stops to buy more items (some non-electronic items)[42] *and eat lunch at 1:00 p.m. After lunch, S&D are called into an electronic repair and refurbishing shop (see Figure 3.5). While we stand at the curbside in front of the repair shop, the owner comes out of his shop. He begins to survey the items on the truck of S&D, lifting and turning them. He claims to have "an eye to spot repairable items and functional contents". He selects a microwave, but only wants to trade its glass plate and magnetron. Dallas disassembles the microwave separating the glass plate and magnetron from the rest. On the floor where the magnetron and glass plate from the microwave sit, the shop owner places coated copper wires or cables contained in a sack. He wants to exchange the coated copper wires for the magnetron and glass plate. Once again, negotiations ensue resulting in S&D bartering the microwave glass plate and magnetron for coated copper wires. This is not a monetary transaction, how then is a price realized in this moment? I address this below.*

Figure 3.5: The electronic repair shop where the barter transaction took place.

42 Because my interest is in prices for e-waste, here, I limit my narration to incidences when electronics were the object of exchange. I, however, observed and recorded price realization for non-electronic items.

Price realization for e-waste: qualification practices, market devices and enactment of power relations

In the above narrative of my itinerary with S&D are three moments of price realization. Moment one occurred at the foot of the household with a woman. Moment two, at the curbside with another itinerant trader. And, moment three at a repair shop. In what follows I take each moment as exemplary situations to illustrate the processes of price realization for e-waste. Using the analytical contentions outlined in Chapter Two to guide my discussion, I describe the diverse qualification practices, the market devices, prosthetic prices and enactment of relations of power at work in the processes realizing actual prices for e-waste. In my discussions, I specifically use the processes of price realization observed with regard to e-waste to recast the price realization literature that has mainly drawn evidence from standardized commodities.

Moment of price realization 1

According to Amankwaa (2013), household and road side trading of e-waste (also called door-to-door) constitute about 95% of the material entry into the e-waste economy in Accra. Occurring at the foot of a household, the first moment of price realization flagged above exemplifies one way itinerant e-waste traders encounter the people with whom they trade with. It is therefore indicative of the conduits through which households rid themselves of their surplus electronics. For some householders I encountered, selling surplus electronic to itinerant e-waste traders means making some money. Hence, they build stocks in anticipation for when they might see an itinerant e-waste trader passing by their neighbourhoods. The woman who called S&D into her house had built stocks

consisting of a desktop computer (the tower and monitor), a CRT TV and a stereo system. Having sat in the corridors of her house for weeks, she was happy to recirculate them via the system of monetary exchange. It took about about 10 minutes to realize an actual price against which the exchange of the items was executed. The following is an extract of recorded practices I observed:

Sonny and Dallas (S&D**)**: How much for these items?

Woman (W): Bring 40 cedis (CAD $ 21)

S&D: These for 40 cedis?

W: How much will you pay?

S&D: These things! These things, they are condemned. Dallas hefts the items one after the other. He also inspects them by looking inside the TV through a panel at the back as shown in Figure 3.2. He then says: "There is not much inside here. Most of them are plastics. Just a small amount of copper from the cables and TV yoke. The same (small amount) of aluminum from the heat sink. See! This is not 40 cedis items. We will pay 15 cedis (CAD $7.9)".

W: Making a sweeping move with both hands over the items to emphasize their spatial coverage on the floor, the woman asks: 15 cedis for all these?

S&D: Yes. 15 cedis is more than enough. There is too much plastic in here.

W: Ok. Bring money.

In the 10 minutes space of time, several key things happened. First, the woman made a price offer of 40 cedis, which both she and S&D referenced subsequently (e.g.

Woman–“Bring 40 cedis”, Dallas–“These for 40 cedis?”, “This is not 40 cedis items. We will pay 15 cedis”). Second, Dallas hefts the TV and monitor, a gesture to determine their weight. He also inspects the inside of the TV through a panel at the back as captured in Figure 3.2. Third, the woman waves her hands over the goods as they sit on the floor; an action pointing to the space that the goods occupy and for which she wonders why they are worth only 15 cedis. In this sequence of events, an actual price of 15 cedis is realized. This realization reiterates for us a key insight of the price realization literature: a good must be qualified in the processes of price realization. Notice that for this to happen S&D and the woman mobilize different registers or modes of valuation practice. The negotiations around the 40 cedis price offer for instance points to rhetorical practices. When the woman waves her hand over the goods, she is mobilizing gestural practices to value the goods. Again, Dallas also engages in gestural practices when he hefts the TV and monitor to signal their weight. There is also a visual practice with regard to Dallas’s inspection of the TV’s inside through a panel at the back. Clearly the practices in play point to the diverse registers or modes of valuations mobilized to qualify goods. Exactly how do these practices qualify the goods?

Consider the gestural practice of hefting the TV and monitor. This practice offers S&D a rough estimate of the potential metal value inside them if, at a future point they sell the goods for their material value (copper, aluminum or plastics). But, they may not if they are able to sell them as a working TV and, or monitor or even working parts like the TV main board, monitor, or printed wiring board (PWB) respectively. Hence, the visual

inspection of looking into the TV and monitor enable them to ascertain if all the parts are intact. Similarly, take the practice of the woman waving her hands over the goods. Although doing so does not offer estimates of material value or parts, should they be sold in the future, it gestures to the space that the goods occupy on the floor as a quality to consider when realizing it price. The question "all these for 15 cedis" accompanied by a waving hands is meant to suggest to S&D that although the goods might be condemned as S&D put it, they are worth more than 15 cedis considering the vast space they occupy on the floor. Also, with the visual inspection of the TV through the panel, S&D are mobilizing another approximation of the potential material value of the TV or monitor, which downplays the woman's practice of gesturing to space. The practice of looking inside guards against being tricked by a householder filling a TV case with sand or other 'fill' in the hopes of obtaining a higher price.[43] In all these ways of qualifying the goods, we see that although the practices mobilized by both S&D and the women are common, S&D use at least one more repertoire of practices (the visual), which the woman does not. For S&D, mobilizing more repertoires of practice (compared to the people they trade with) is one way to qualify goods in their favour and thus realize a price to their advantage. The following extract drawn from my conversation with Dallas after the transaction, illustrates the thinking very well:

> The people who sell to us want high price. They say, see these items give me this amount for it. But, we do not just see and pay. You have to be sure what you are paying for. For us, that is what matters in doing business. We make sure we know what it is that we are buying. Pushing the truck and walking is hard walk,

43 This is a common practice in scrap trade. There are instances where huge containers with loads of scraps have been found to have only scraps at the front and the rest of the container filled with sand and stones.

> but to be successful in this business you need to learn to know the goods when you are buying so that you pay a good price. I can not just say it is a TV or monitor. I have to find a way to determine the weight, look into it and be sure all parts are intact. Sometimes, I do other stuffs. For instance, in addition to looking inside and hefting, I will use a magnet to verify if certain metals are what they are portrayed to be.

The point S&D make is that the benefit of imagining several ways of qualifying goods lies in realizing a 'good' price. In that sense, mobilizing additional repertoires of practices to qualify goods equip them to realize a price in their favour compared to the people they trade with, in this case the woman. It therefore appears clearly that in the number and effectiveness of practices aimed at qualifying a good is the enactment of power. Thus, in the qualification of the goods are efforts by both S&D and the woman to relatively position themselves in determining whose 'voice' matters more in making real the actual price of the goods. This first moment of price realization therefore shows that for a verifiable instance of price realization there is a relation of struggle or power enacted (Caliskan, 2010).

The qualification of goods in this first moment of price realization enables us to catch four important differences in price realization between standardized commodities (e.g., cotton) and a non-standardized one such as e-waste. First, as a non-standard commodity, e-waste is simultaneously or, one might say, 'virtually' qualified as both whole and in pieces. As whole units, the TV and monitor could potentially fetch a higher price than their material value (i.e., on the electronics reuse or refurbish market). So when S&D are qualifying the goods, they are referencing many prices simultaneously for the same things: prices for the TV and monitor as whole electronic products saleable on the

reuse, repair, and refurbishment markets while at the same time the prices for the various materials the TV and monitor are comprised of (e.g., plastics, various metals, and glass). In the well documented instances of qualification discussed in the price realization literature–cotton (Caliskan, 2010), stocks or bonds (Beunza & Stark, 2004), consumer retail goods (Cochoy, 2007)–goods are qualified as wholes. The case of qualifying e-waste in this first moment of price realization however shows that goods can be qualified as wholes and in pieces. In this regard, the case of qualifying a non-standardized good like e-wastes adds to the price realization literature in useful ways because it questions an assumption of 'wholeness' evident in other cases where standardized goods are the focus. The point here is: the processes of price realization for e-waste enable us to recognize that goods can be qualified as whole and in parts or pieces.

Second, the qualification work here matters in a second way when we look at the market devices through which they are articulated. Consider how both S&D and the woman's body are involved in the gestural and visual practices qualifying the goods. The price realization literature tells us that the body is important in practices that realize prices. For instance, before and during pit trading in the IME (Caliskan, 2007, 2010), traders watch each others' body for gestures that may suggest strength, weakness, self-confidence, insecurity or alarm. The traders then read these gestures as indexes of what the price might be and thus position themselves strategically when pit trading starts and pit price is in realization. At the start of pit trading, walking too fast to take a seat in the pit may signal an emergency or panic which other traders may interpret as urgency to buy

or sell more cotton and thus affect the price that will be realized.[44] In this way, the body is performed in the practices of price realization as a market device. Beunza et al. (2006) also show that bodily practices are crucial in arbitrage trading. For instances, in the trading pits and floors of the Chicago Stock Exchange, traders mobilize bodily practices like body positioning in the pit, height of the body, loud voice and even noise from shoes to detect and exploit opportunities in price movements. Similarly, when looking closely at the way the body of both S&D and the woman are involved in the gestural and visual practices qualifying the goods, we can see the body working as a market device because it is through bodily practices that various modes of qualifying the goods are articulated. Take away these bodily practices and the organization of price realization breaks down.

However, here, the body works in quite different ways than that in trading pits and floors. For instance, using his body, Dallas is genuinely hefting the goods to try and get a sense of what is in there. In that sense, the heft is a measure of the weight. But, note that this hefting can also be body language (in the way body language is used in the pit), in that, the goods could be quite heavy, but Dallas could play with the weight by lifting the TV easily to suggest to the householder that, well there is not much in here. The body is therefore used here as a market device in two ways: first, body language to communicate a gesture and second, a measure of the weight of the goods. The body as a market device is a theme in almost all the moments of price realizations I observed. More importantly, I show in subsequent moments how the body is mobilized in different ways when

44 This is one way demand and supply are located by market agents. Through bodily performances, traders perceive and process the 'market forces' of demand and supply. In this regard, the making of demand and supply is not independent of traders everyday bodily performances in the pit.

qualifying goods. For instances, while S&D (as well as the woman) use their bodies as a market devices in this first transaction, later on in the ongoing moments where prices are realized again for the same goods, for instance at the Agbogbloshie scrap market, no one will accept the use of the body as a market device to estimate weight. As will be demonstrated, when S&D gets to Agbogbloshie and are reselling the goods they bought to a scrap merchant, rather than hefting the goods to indicate weight, an Avery weighing scale will be used for that purpose. In this regard, the way the body is used as a market device here will not be accepted in later scenarios when prices are realized again for the goods.

Considering institutional actors that conceive, certify and monitor qualification practices and their associated market devices with regard to this first moment of price realization for e-waste offer a third difference between price realization for a standardized (cotton) and non-standardized good like e-waste. Unlike standardized commodities like a bale of cotton, here, there is no institution such as the USDA, to send a sample of a good to so as to verify its quality. However, accounts of such third party institutions (including analyst, regulators, arbitrators) intervening in the qualification of goods dominates in the price realization literature. Note that in qualifying the goods, S&D do not plug in the TV or, and monitor to test if they work, even though they may and thus possibly fetch a price in the reuse market that could exceed their material value. Neither does the woman do same, which will perhaps qualify the goods in her favour since if the TV or, and monitor is shown to be working, then perhaps their weights or material values will not be as

important in qualifying them. More crucially, both S&D and the woman do not take the TV to a third party organization like the USDA to standardize the goods or the LCA Ltd to arbitrate their different qualifications. In fact, it seems to be practically impossible even if there were such equivalent institution in door-to-door e-waste trade. This is because, just imagine how long it could take (hours) to qualify the goods and realize a price. Will an agent from the institution follow S&D on their trading routes? Or will S&D carry the items to where the institution is based to be qualified? Let us say there is an institution like USDA in Accra, where S&D can send the TV or computer monitor as a whole unit to be standardized. The householder is not going to stand on her doorstep for hours waiting for a TV to get standardized before a price is realized. The absence of third party institutions in the case of street e-waste trade illustrates that, even if we can conceive of the role of certain institutions in the qualification of goods, some of those institutions might at best be laughable propositions in certain instances of price realization (e.g., door-to-door e-waste trading).

Finally, the rhetorical practices in the iterative processes realizing the actual price of 15 cedis offer an instance of a prosthetic price at work. Notice that the woman made an initial price offer of 40 cedis. This 40 cedis is subsequently referenced by S&D and the woman as they engage in their rhetorical practices (e.g. Woman–"Bring 40 cedis", Dallas–"These for 40 cedis"?, "This is not 40 cedis items. We will pay 15 cedis"). At the foot of households, most itinerant traders ask householders "how much for these"? The tactic is that the householder selling the item gives a price he or she wants to sell first and

then the itinerant traders beat down that price to the lowest possible. Inquiring why this is the case, another itinerant trader, Ibrahim explains:

> The people who sell to us do not know how and even how much we are going resell these items. The items may be working, or it may just be scraps. We cannot tell at that instance. So, we look at the items and do our own calculations, but we will not tell you a price. You are the one selling, tell us how much you think we should buy them, and we will find all the reason why we cannot buy at that price.

Through rhetorical practices, the price offer of 40 cedis becomes useful because it is either referenced to support or work against the other modes or registers of qualifying the goods. For instance, saying "there is nothing inside", and hence "this is not 40 cedis items", Dallas is mobilizing the 40 cedis price while hefting and conducting a visual inspection of the goods. Similarly, by waving her hands and commenting "all these for 15 cedis", the woman is also supporting her gesture to the space occupied by the goods. In essence, referencing the 40 cedis suggests a prosthetic price in play, for one of the things the price of 40 cedis does is enable both S&D and the woman to navigate and direct other ways of qualifying the goods. Particularly, as a prosthetic price, the 40 cedis is put to use in this transaction in a similar way to Caliskan's (2010) rehearsal price observed in cotton trade at the IME. Thus, as can be seen from the transaction, the 40 cedis price is a reference price rehearsed into the realization of the actual price of 15 cedis. Overall, this moment reiterates Caliskan's claim that in moments of exchange when a buyer and seller encounter each other to realize actual prices, there is more than one price in play.

Moment of price realization 2

In this second moment of price realization, another itinerant trader approached S&D at a curbside minutes after we got out from the household. Unlike S&D (and about 80% of itinerant traders who use trucks), this trader uses a bicycle for his collection activities (see Figure 3.4). The use of bicycle is a new development in street trading of e-waste in Accra. The reason for this development has to do with changes in regulations with regard to truck use in the city. Although most street traders (e.g., porters, mobile street vendors, stationary and mobile food vendors) in Accra use trucks for their activities, recently the use of trucks for e-waste trading has been singled out as creating difficulties for mobilities in certain areas in the city. Consequently, the city authorities (Accra Metropolitan Assembly [AMA]) have banned traders from plying certain streets with their trucks. The assembly issued this directive:

> The Council of the Accra Metropolitan Assembly (AMA) would on September 15, this year (then 2011), ban truck pushers, as well as scrap dealers, on certain streets of Accra under its jurisdiction…. These truck pushers pose a danger to motorist, as well as create inconveniences for pedestrians. (Modern Ghana, 2011).

As a result of the directive, e-waste traders cannot ply more than twenty-three principal streets in the city. The assembly has mounted signposts and selectively positioned street guards along the selected streets to ensure that the traders adhere to the ban. The street guards (colloquially called AMA police) punish offenders by seizing their trucks to their warehouse. Offenders have to pay a fine in order to retrieve their truck and its content within a time period or they risk being arraigned before court. This directive

can be read as a classic example of hostility by city officials or stigmatization towards waste traders (who use trucks) (Medina, 2007; Mitchell, 2008b). It also raises questions about the control of access and use of common goods[45] like roads. More importantly, the ban has resulted in some itinerant traders using motorbikes and bicycles to access and buy e-waste from streets where the trucks are banned. Thus, a corollary to the ban is that itinerant e-waste trade has been somewhat partitioned: truck traders plying un-banned streets and bicycle or motorbike trader plying banned streets. A bicycle trader, Issa, explains his transition from using a truck to bicycle as an attempt to work around the AMA ban. He says:

> You see. The AMA people think they are smart. They do not want us to do our business. Preventing us from using the streets we buy more items from, their plan is to kill our business.The other day, when I use to push a truck, I was going to Teshie-Nungua. Then the AMA police seized my truck around the Labadi area. How can I go to Teshie without using the Labadi road? Do they want me to fly? Some of us have found another way. I now use a bicycle. And with a bicycle I buy stuff, ride to Agbogbloshie to resell and come back again. It is suitable for me. I like it better.

Two other bicycle traders, Baba and Muntala, complicate this account. To them, although using bicycles has enabled easy access to streets that truck traders cannot ply and eased their movement in the city (in terms speed to households and back to Agbogbloshie), the bicycle presents its own challenges. Muntala who moved from truck to bicycle e-waste trading as a result of frustration with AMA police points this challenge:

> The bicycle is good. I do not walk all day like I used to. But, you know what? The bicycle does not tell people that we are interested in buying scraps. So you can

45 Here, the roads are common goods in the sense that people have common access to them and they are also provided for by the state with 'public' funding. In Chapter Four, I present another way that commons play out in e-waste trade.

> ride the bicycle the whole day and go where you want, and you will not get any items to buy.

Baba also recounts his challenge with the bicycle: “with this bicycle, when you get a lot of items to buy, where do put it? How do you carry them to Agbogbloshie?”

Bicycles and motorbikes are common means of transportation in the city. As such, compared to trucks which have been used for e-waste trading for quite a while, the bicycle does not communicate the interest of e-waste traders (buyer of e-waste). Moreover, the bicycle does not offer much space for carrying the items to the Agbogbloshie scrap market where the goods are resold. Due to the above challenges associated with bicycles, some bicycle traders alternate between plying banned streets and re-buying goods from truck traders confined to un-banned streets. They do so by closely following and targeting truck traders, buying their items and quickly returning to Agbogbloshie to resell it. It is in such a scenario that a bicycle trader approach S&D buying the PWB from the computer tower they bought from the woman. This encounter presents us with a second moment of price realization where the goods are re qualified again for its price to be realized. Here is what happened between S&D and the bicycle trader: S&D stopped when the bicycle trader approaches their truck. The bicycle trader then started to inspect the items on the truck, moving from one side of the truck to the other. He points to the computer tower and ask S&D if they would open or dismantle the tower because he is interested in buying the printed wiring board (PWB). S&D obliged to do so but put out a caution; “If we dismantle the computer tower, you will buy it.” “Ok”, says the bicycle trader. With a screwdriver, Sonny had the tower lying down, opened with

its parts in view (see figure 3.3).

S&D: Let us talk about the price before we further unscrew the PWB

Bicycle Trader (BT): I said I will buy. What is your problem!..... How much for the PWB?

S&D: 10 cedis (CAD $5.2)

BT: 10 cedis for the whole thing or the PWB?

S&D: Is it not the PWB you want to buy? I (Dallas) said it is 10 cedis.

BT: 10 cedis is too high, and you know it. What am I buying? I do not even know, and I cannot tell, neither can you. I have to go to Agbogbloshie and test it first.

S&D: In a harsh tone, Dallas fumes "my friend do you think we had the opportunity to open the tower and see inside before we bought it, or did we select the parts we wanted. You know we do not need this plastic casing, yet we paid for everything. 10 cedis, that is it, take or leave" We also know the way to Agbogbloshie..... and will eventually get there."

BT: Let me give you 8 cedis (CAD $ 4.2).

S&D: No. 9 cedis (CAD $4.7). You know you will get a higher price when you go to Agbogbloshie now.

This encounter between S&D and the bicycle trader presents another moment of price realization where the goods are qualified again. Qualification of goods is therefore an ongoing process done and redone as goods circulate (Callon et al. 2002, p. 199). Like

the first moment of price realization, the parties of exchange here mobilize different registers or modes of qualification practices to realize the price of 9 cedis. Let us consider what is going on here. Whereas using visual inspection, S&D tried to mitigate their risk by poking into the back of the TV and monitor in the first transaction, here the bicycle trader has the opportunity to fully view the computer tower before buying. But, notice again that the bicycle trader has to deal with certain risks too. He accepts S&D's condition that he buys the PWB should they open the monitor. The reason the bicycle trader accepts this condition is that, whether the PWB is working or not is unimportant. At the Agbogbloshie scrap market where the bicycle trader will resell the PWB, there is only a minimal price difference should it be bought as either working or non-working. What matters is the size of the PWB. The bigger the size of the board, the higher the amount of precious metals (e.g., gold, silver, palladium and copper)[46] to be recovered and thus a higher price when resold at Agbogbloshie. At the Agbogbloshie scrap market, it is likely for prices to be realized within the same range for either a working or non working PWB. Indeed, in the course of my observations at some computer repair and refurbishing facilities at the scrap yard, some bicycle traders who return to Agbogbloshie to sell computer parts refuse to sell PWBs which are working to a repair facility to be reused because they can realize a price within the same range (and even higher) if they sell the PWBs for their scrap value.

We see here that although visual inspection is used in moment of price realization

46 Although this is generally the case, actual amount of precious metal content in a PWB varies with age, origin and manufacturer (Zhang, Lui, Xie Zeng & Li, 2012).

one and two, their exact operations are modified to suit specific kinds of risks. What this shows is that in qualifying goods like e-waste, different qualities of the goods come into play at different moments of price realization. As we can see, in this moment the computer tower actually comes apart in the process of price realization. Also, although the same register of qualification–visual inspection–is used in the two moments, it is operated differently in each moment. Thus, here we see that a trader might not necessarily have to mobilize more repertoires of modes of valuation to mitigate his or her risk. Instead, by modifying the same register he shares with the other party of exchange, he can realize a price in his favour. Yet, another instance of the processes of price realization being enacted as a relations of power or struggle through the qualification of goods.

Furthermore, in this moment (price realization two), we do not see the body in play as a market device the way it was in the first moment. Clearly, the transaction could not take place in the absence of the body, but the body is not used as a device to either estimate weight in ways that influences the realization of the actual price of 9 cedis. However, although body might not be an important market device, there is another device in play here: a bicycle. Consider that, both S&D and the bicycle trader reference the Agbogbloshie scrap market in their qualifications. Being the hub of e-waste trade in Accra, most of the e-waste traded in Accra gets amalgamated and dis-amalgamated at the Agbogbloshie scrap market (Chapter Four sheds more light on these processes). Thus, although itinerant e-waste traders like S&D roam the streets buying e-waste from householders and along the way encounter other traders (like this bicycle trader) who will

re-buy the goods, in most cases the goods will eventually be resold at the Agbogbloshie scrap market. For this reason, traders make reference to prices that might be realized at Agbogbloshie for a good (which will be qualified under different conditions and practices) when they are engaged in encounters elsewhere in the city. In this regard, yet to-be realized prices at Agbogbloshie become something like reference prices elsewhere in the city.

We see S&D and the bicycle trader refer to reference prices as they compare the price in realization at the current moment to what might be realized at Agbogbloshie. However, this reference price, a price that might be realized at Agbogbloshie is not the same for S&D and the bicycle trader. It is here that we see the bicycle working as a market device. The bicycle enables the bicycle trader to cover distances more rapidly, and as a consequence be able to realize prices for the PWB within a different range than will be available to S&D at Agbogbloshie later in the day. Prices vary at Agbogbloshie throughout the day. This is partly because the volume of trade is very low in the early hours of the day when most itinerant traders head into the city to search for goods. In chapter four we see that in the late afternoon and evening, when itinerant traders make a return journey to Agbogbloshie a different regime of price range takes effect. That supply fluctuates in the course of the day does not mean that on their own demand and supply plays a magical role in making prices. As we will see the level of supply itself is mediated by the traders in order to have an effect on the processes of price realization. The shift in price ranges result from a situation in which itinerant traders do not have storage space

for their goods and hence cannot accumulate surplus goods at the end of the working day. As such, itinerant traders sell their goods to scrap merchants at a lower price range during the late hours of the working day.

Furthermore, working as a market device, a bicycle renders distance and time key factors in this moment of price realization. Knowing this, S&D consider where they are in the city and the time of day when trading with bicycle traders. For instance, they consider if it is a 15 minute walk from where the transaction is taking place so they can walk back to Agbogbloshie and perhaps realize a price within a higher range than they will do later in the day. They also take in account the time of day the transaction is taking place. Is it the first trade in the morning when they are guaranteed to get more goods as they move through the city and thus will realize a price at a lower range for the PWB in anticipation for more goods? These are possible calculations, which although S&D did not explicitly state, I observed do play out in moments of price realization between bicycle traders and truck itinerant traders. My observation that most of the re-buying of goods between bicycle and truck traders takes place within the early hours of the day when truck traders are still at the fringes of neighbourhoods corroborate the fact that these considerations did play out in this moment of price realization.

Also, in this moment of price realization, the reference prices or the price yet to-be realized at Agbogbloshie at a later time in the day (should the goods be sold there), present an interesting contrast to the world and associate prices in cotton trade. Both the world and associate prices are not the actual prices of cotton. A private company produces

the world price and publishes it in a market report. Although through a different practice, a trade association, Alcotexa produces the associate price and publishes it in Alcotexa Cotton Gazette (another version of a market report). Thus, functionally, both the world price and associate price mobilize the market device of market reports and institutions or a trade association to intervene in the processes of price realization. The reference price here, however, is not made by a private company or an association. Although the S&D and the bicycle trader are members of the ASDA, the association does not have a say in prices realized for e-waste either at the scrap yard or anywhere else in the city. However, the London Metal Exchange (LME) and metal trading division of the New York Mercantile Exchange (COMEX) publish a variety of prices for various metal traded through market reports. But, when S&D and the bicycle trader refer to yet to-be realized prices at Agbogbloshie (reference price), they are not referring directly to LME or COMEX prices. Indeed, during my fieldwork, itinerant traders hardly talked about LME or COMEX prices. The scrap merchants at Agbogbloshie who eventually buy from itinerant trader however do consult LME or COMEX prices. It can therefore be assumed that the reference price might partly be a function of LME or COMEX prices although not directly.

In cotton trade, Caliskan (2010) shows that market reports and trade associations play a crucial role in the processes of price realization through the making and articulation of prosthetic prices. That in e-waste trade, the reference price exists as a prosthetic price without being materialized through a market report and trade association

shows that pricing prosthetics does not always depend on such devices. Instead, prosthetics prices can emerge and operate independently of market reports and trade associations. Thus, as I have shown, although LME or COMEX produce market reports where they publish prices for various metals, and there is a trade association of e-waste workers at Agbogbloshie, these apparatuses do not have anything to do (directly) with the reference prices produced.

Moment of price realization 3

Following S&D's trajectory through the city, the third moment of price realization happened at the doorsteps of an electronic repair and refurbishing shop. We had almost walked passed this shop about 10 meters away when the owner called S&D. Upon arriving at the shop and parking the truck at the curb, I was confused when the shop owner approached the truck of S&D and began conducting a visual inspection on their goods. It is at this point that the shop owner commented about having "the eye to spot repairable items and functional contents". During the inspection, the shop owner opened the door of a microwave that S&D had bought earlier. While this inspection went on, S&D stood quietly by their truck. In my confused state, I asked Sonny what was going on. Dallas replied that the owner of the shop is a regular customer who sells goods to them. After inspecting the goods, the shop owner entered his shop and returned with coated copper wires. He tells S&D, "here, have these coated copper wires, and I will take the glass plate and the magnetron of the microwave". Quickly, Sonny open the sack containing the coated copper wire and looks into it. He shakes the sack to move the

content at the bottom to the top, saying: “these copper wires are not enough for the plate and the magnetron”. The following is the rest of what happened:

Shop owner: What do you mean by they are is not enough? I am only taking the glass plate and magnetron. How much are these two items for which the coated copper wires are not enough?

S&D: Do you want to buy them? If so, tell us and we will give you a price.

Shop owner: The issue is not if I am buying or not. You know how we do business. I offer you something in return for parts that I need for my work. This is not the first time I am doing this, and you know. We have done business in the past.

S&D: Ok. How much will you sell the coated copper wires?

Shop owner: I am not selling them. I keep them to exchange for other items I need.

S&D: Look at this coated copper wires. It appears a lot, but should we burn the coatings off at Agbogbloshie, the actual copper will be just a small amount, selling for less than 10 cedis (CAD $5.2). The magnetron you want also has copper. Pure copper. No coating, nothing. Please add more wires. This is not enough.

Shop owner: That is not true. I do business with a lot of itinerant e-waste traders, and I know most of them will be happy with what I am offering. I need these items.

What happened in this third moment of price realization presents a key insight to the price realization literature. As can be clearly seen from what transpired between S&D and the shop owner, there was a direct exchange of goods without the medium of money,

meaning, the transaction was a barter exchange. So far, I have discussed the processes of price realization for e-waste where a monetary instrument was the medium of exchange. However, here, we see the absence of money. That money is absent in this moment begs important questions that the price realization literature has not considered yet. Some of the questions include: does price realization occur only when monetary compensation is involved in the exchange? What is a price when barter is the practice in play in a relation of exchange? Is the idea that prices are made in a process of realization not applicable to other forms of non-monetary exchanges like barter? Is there anything about barter transactions which implies that they are less subject to the processes of price realization? Do the processes of price realization take a different form than the case of monetary exchange? It is the light which a barter exchange[47] throws on these questions which makes this third moment of price realization contribute an important insight to the price realization literature.

Barter exchange is something that we do not see much of in the price realization literature. Price is in most of the studies always realized in monetary ways. Indeed, until I encountered this moment in my fieldwork, I had conceived of price realizations which involve qualifying goods while tying them to monetary value. This conception was partly the result of examples of price realizations that I had read in the literature. In a two article series where Caliskan and Callon (2009, 2010) explain processes of economization[48] of

47 This appears as an important insight specifically for the price realization literature given that the literature has not looked at barter. However, there is a huge literature on barter exchange in anthropology (see Humphrey & Hugh-Jones, 1992) and the diverse economies project (Gibson-Graham, 2006).

48 Economization has to do with examining how the economy is performed (in Callonian sense of the performativity thesis).

which price realization is presented as one, the authors signal monetary compensation as a necessary feature of price realization. They conceptualize processes of economization as involving how "markets organize the conception, production and circulation of goods, as well as the voluntary transfer of some sorts of property rights attached to them". They continue, "these transfers involve a monetary compensation which seals the goods' attachment to their new owners" (2010, p. 3). This view means that fundamental in the processes of price realization are the ways in which money is tied to the qualification of a good to enable its exchange.[49] What happens when the qualification of a good is not tied to money, but another good? In what follows, I look at what transpired between S&D and the shop owner. Specifically I think through the moment in search of answers to the above questions that a barter exchange raises.

When we look at the transaction between S&D and the shop owner, we see that there are practices seeking to articulate the qualities of the goods being exchanged. In other words, we see goods being qualified, making the process of qualification apply to barter just as much as to money mediated exchanges. For instance, we see the use of a visual register by the shop owner when he claims to "spots repairable items and functional contents" on the truck of S&D. Also, S&D mobilize a visual register with regard to estimating the actual copper likely to be retrieved from the copper cables. What is peculiar about the qualification work done here is that the good is not tied to money. Instead, the qualification of one good is dependent and tied to that of another. That is, the

49 Perhaps the high legitimacy of money in the contemporary economy could be an explanation for limiting the discussion of price realization in the literature to money mediated exchanges.

qualification of the glass plate and magnetron is tied to that of the copper cables. Consider, S&D's comparison of the amount of copper to be retrieved from the cables with that from the magnetron. This means that in barter exchange, the work of qualification takes on a different form, which is articulating the qualities but also quantities of two goods so that they can be compared with each other. Furthermore, like the work of qualification in the other two moments of price realization, here too we see the bodies (of S&D and the shop owner) mobilized in qualifying goods. Thus, in barter exchanges too there are market devices in play, one of which is the body.

Closely related to the qualification of the qualities and quantities of the goods in this barter exchange is the establishment of non-equivalence (the right quantity of copper wire against the plate and magnetron). To illustrate why this is so, we need to consider under what conditions S&D accept to engage in a barter exchange. S&D may accept to engage in a barter exchange at particular moments for a variety of reasons including storage constraints. If their truck is too full to accommodate heavy goods, they may barter heavy goods for those of smaller size (e.g., a refrigerator for a computer tower). Another reason which may occasion barter has to do with the type of goods. On their itinerary, S&D are in a constant struggle to collect and disperse goods at the same time. Achieving a fine balance between these two tasks usually means that at the end of their journey through the city, they accumulate a minimum amount of stock (goods) on their truck but of the highest value relevant for where they will be, which is the Agbogbloshie scrap market. As we will see in the next Chapter, copper is a good of the highest value in e-

waste trade at the Agbogbloshie scrap market. Consequently, should S&D be offered goods whose material content is high in copper, they will agree to barter other non copper goods on their truck. In the current exchange situation, the shop owner offers copper cables in exchange for a microwave glass and magnetron. S&D know that the microwave is not working; hence when they get to Agbogbloshie, they might dismantle it and sell for material value. In the absence of a glass buyer at the Agbogbloshie scrap market, bartering the glass plate for copper cable is a better option. However, the copper cables come with a cost, which is the time that they have to spend processing the copper cables into a form that scrap merchants will accept to buy. As we will see in Chapter Four, processing copper cables involves burning their insulation in risky conditions. Therefore for S&D, qualifying goods in a bartering situation also means establishing that the goods to be exchanged are not of equivalent value so that the cost and time of processing is accounted for in the monetary price to be realized elsewhere (e.g., at Agbogbloshie).

As to what happened in this moment, I can tell that what the price realization literature refers to as qualifying goods also occurs in a barter situation. Also, market devices intervene in barter transactions. Consequently, the processes of price realization can also help us understand aspects of a barter transaction. However, playing out what the full implications of barter are for the price realization literature will require more work specifically on barter. My intention here is not to fully exhaust the questions that barter raise, but flag this moment of barter to open a space where we can push the limits of the price realization literature since we do not see much of non-monetary exchange (e.g.,

barter) in the literature. In this regard, I think there is promise in examining more deeply the implication of barter for the price realization literature. In the earlier cited two-series article, Caliskan and Callon (2010) propose that research on the processes of price realization shift towards exchange situations such as that for 'living beings' (e.g., cells, genes, human organs). Considering that their list is by no means exhaustive, I add barter exchange. Thus, here, I propose that there might be room for the price realization literature to offer a richer understanding of processes of price realization if it considers the processes of price realization in both monetary and non-monetary ways (e.g., barter and commons. The instance of commons is discussed in Chapter Four).

With reference to the three moments of price realization for e-waste as exemplary situations, this chapter shows that price realization for e-waste contributes important insights to the price realization literature. First, it demonstrates an instance of qualifying goods that are different from what exist in the price realization literature. That is, simultaneously qualifying goods as whole and in parts. Second, the processes of price realization examined in this chapter bring to light different ways that the body is mobilized as a market device in qualifying goods for their prices to be realized. Thirdly, it shows different modalities of power relations in play in verifiable instances of price realization Last, it demonstrates an instance of a barter transaction of e-waste and hints such a moment is useful for testing and extending the idea of price realization as pertains to non-monetary exchanges. In the next chapter, I continue to develop these themes further. Specifically, I adopt similar analytical tactics to unpack the next five moments of

price realization as S&D move across the city to the Agbogbloshie scrap market and it environs.

CHAPTER FOUR

PRICE REALIZATION IN AND AROUND THE AGBOGBLOSHIE SCRAP MARKET

In the previous chapter, I mentioned that my analysis of the processes of price realization for e-waste is grounded in exemplary situations from a day on which I followed two itinerant traders as they bought and sold e-waste in Accra. Chapter Three examined the first three moments of price realization that occurred at the foot of households and curbsides in the city on that day. This chapter addresses the remaining five moments. Like Chapter Three, I continue to recount the sequence of events in the day, taking off from the fourth moment. After the account, I proceed to examine in detail the processes of price realization for e-waste. Here too, I connect what happens when prices are being realized for e-waste to discussion within the price realization literature.

At the Agbogbloshie scrap market and its environs

It is 2:30 p.m., the truck of S&D is almost full of electronic and non-electronic discards. After the previous transaction, they informed me that it is time to head back to Agbogbloshie. As we head in the direction to the CBD, I see other itinerant traders too heading in the same direction. Heading to Agbogbloshie at this time is normal practice. This movement is not dissimilar from that which occurs in the morning when itinerant e-waste traders move into the city. However, heading back to Agbogbloshie, we must walk faster than we did in the morning when heading to the neighbourhoods. This is because, first, there is still more work to be done with the goods on their truck before reselling (e.g., dismantling, material segregation, weighing, burning insulations from copper wires

or cables and refrigerator coils[50]). Second, with all the truck itinerant traders moving to Agbogbloshie at the same, it becomes difficult to find buyers. At times, some itinerant traders have to wait in queues just to have a scrap merchant weigh or even have a look at their goods. Finally, recall that itinerant traders rent the trucks they use for their collection at the scrap yard. The trucks have to be returned to the owners, who usually close their business around 6:00 p.m. If for any reason a trader misses this closing time, he would have to deal with finding a safe place to keep the truck till the next day and also pay a fine. Paying a fine is not so much of a problem for the traders. The biggest challenge is safe keeping of the truck.

Most itinerant e-waste traders live at the Agbogbloshie settlement beside the scrap market (see Figure 3.1[51]). They make up part of the approximately 80,000 people living at the settlement and sharing the 31.3 hectares space (People's Dialogue, 2010). Property relations about the Agbogbloshie scrap market and settlement are very ambiguous. Currently, the government is against the settlers with threats of eviction (Centre on Housing Rights and Evictions [COHRE], 2004).[52] According to Grant (2006),

50 Burning coated copper wire or cables at the banks of the Odwa river has drawn much attention to the Agbogbloshie scrap market as a notorious e-waste site in Africa. Toxicology studies at the site indicate that open burning of copper wires and dismantling of electronics releases toxic substances like heavy metals (lead, mercury,) and chemical compounds (brominated flame retardants). These emissions have negative health and environmental consequences for the traders at the yard, the nearby food market and the entire city (see Greenpeace, 2008; Caravanos et al., 2011, 2013).

51 Figure 3. 1 is in chapter three, page 48.

52 Since 2002, the local government authority (AMA) has constantly issued threats of evicting the settlers. The eviction is to make way for environmental restoration of the Korle lagoon that drains the area (Korla Lagoon Ecological Restoration Project [KLERP]). Furthermore, as a result of inadequate infrastructure, fire outbreaks are very rampant at the settlement. Anytime fires occur residents will start rebuilding the next morning. The local authorities also use these fires as moments to continue their threats.

the ambiguity of the current land politics at Agbogbloshie dates back to three political time frames: first, a period when the land claims of traditional rulers (local chiefs of the Ga traditional area) clashed with colonial plans (1914-1960); a second period where government (after independence) acquired the land over traditional claims (1961-1990); third, the contemporary period where the government's claims are in conflict with settlers (1991-present). As a result of the current conflict, the settlers do not have titles to the land. With the residents having no title to the land, the settlement is a mix of self-built wooden kiosks and shacks with little government provided infrastructural facilities like roads, water and electricity. S&D live with eight other people in one of the kiosks at the settlement. With such a limited space, they cannot afford to keep any surplus goods from their collections, not to talk of safely keeping a truck. That they have to return the trucks in time and do not have the capacity to keep surplus goods overnight makes trading activities at Agbogbloshie very important.

*While **e**ntering Agbogbloshie with S&D, about 400 meters away from the scrap market itself, scrap merchants had lined up along the Graphic and Abose-Okia Road leading to the scrap market (see Figure 3.1). According to S&D, the line-ups are "barrier posts" mounted temporarily at a particular moment in the day, usually between 2:00-5:00 p.m. when itinerant traders are returning to the scrap market. Mounting a post can simply mean positioning a wheel barrow along the road or placing a sack on the floor to signal interest to buy scraps. The purpose of the barrier posts according to one scrap merchant is "to intercept the best deals". However, at a different moment, while interviewing another scrap merchant, I got to know that mounting a barrier post is a key*

practice informing price realization. This is because some of the boys (also called barrier boys) mounting the barrier posts and intercepting goods trade on behalf of scrap merchants located inside the scrap market itself. Furthermore, there is constant communication between price offers at the barrier posts and the scrap market through phone conversations. For instance, I witnessed incidents where barrier boys stationed at their post called their 'masters' at the scrap market and inquired how comparable a price they are offering at the post is to that likely to be realized should the itinerant trader insist on selling at the scrap market instead of the barrier post. When S&D got to the barrier posts, one of the barrier boys approached their truck. He wanted to buy all the aluminum on the truck. S&D therefore assembled all the aluminium content of the items they had bought (from electronic and non-electronic items). This encounter presents a fourth moment of realizing price for e-waste which I will unpack subsequently.

We arrived at the Agbogbloshie scrap market at around 4:30 p.m., and went to the cluster of small workshops located at its west end (see again Figure 3.1). Among these workshops are those specializing in electronics repair, remanufacturing and specialized parts trading (e.g., PWB or motherboard traders) (see Figure 4.1). S&D visit two of these shops, inviting the owners to come have a look at the goods they have brought for them. There too, another round of processing occurs. The computer tower (without PWB) is further stripped of its steel casing and DVD compartment as the repair shop owner claims those are the only parts he is willing to buy in order to assemble a desktop tower. At this moment too, a price is realized.

Figure 4.1: A shop that buys computer parts from itinerant traders to repair and refurbish new computers.

Still walking within the Agbogbloshie scrap market and feeling very exhausted, S&D inform me that until all their items are sold, they cannot head home. Why? I ask. Sharing a two square meter space with eight other people in a kiosk at the Agbogbloshie settlement, they cannot afford to store overnight any items from their collection activities. Thus, a successful day for them is not when they have a lot of items from their collection, but when they are able to resell all those items. Currently, we still have some items yet to be sold. We therefore head to the edge of the scrap market. There, the CRT monitor they bought in the first moment of price realization comes apart. Using a screwdriver, Sonny removes the screws holding the monitor casing together. He sits on the plastic head casing and with a small knife, Dallas cuts off the monitors power cable and all the cables around the tubes and the main circuit board. He then puts the cables in a sack containing other cables from their barter exchange earlier in the day (They engage in similar processing for the TV). Dallas, kindly tells me: "Madam, we are going to burn. There will

be a lot of smoke so go and stand at the other side". While I was receiving the above instructions, Dallas makes a fire to burn the insulations off the wires to retrieve copper. At the burning site, there are 'burning specialists' who may be hired to burn cables for a fee of 1 cedi (0.52$ CAD) irrespective of size. When one of the specialists offer his service to Sonny, he declines claiming "these boys are thieves; they will steal some of your copper into their pockets under your nose, and you will not even see". Standing at the opposite side of the burning site, I watch fumes rise to the sky as they are directed by the winds (see Figure 4.2). In about 15 minutes, S&D approach me with the copper scraps retrieved after burning the insulations. In a form ready to be sold to copper scrap merchants, we join a line up of traders waiting to weigh and sell their scrap copper to a scrap merchant. On an Avery weighing scale, Sonny places the sack containing the copper. Another transaction, making price for e-waste, now scrap copper (see Figure 4.3).

Figure 4.2: A trader burning copper wires or cables at the Agbogbloshie scrap market (Credit: Josh Lepawsky, 2011).

Figure 4.3: A trader weighing copper scrap on an Avery scale at the Agbogbloshie scrap market.

Heading to a *scrap merchant to sell the copper, S&D left behind some remainders from dismantling the CRT monitor and TV. One of the remainders is the CRT monitor casing which Sonny initially used as a seat while Dallas was burning the copper cables. At the time, when Sonny got up from the monitor case, two young women run to grab the casing. Since the beginning of my research, I have not come across monitor casings being sold on their own at the scrap market. This is because plastic buyers at the scrap market do not buy plastics from electronics. Seeing the young women grab the plastic casing, I wondered what happens to the casing. Keeping this question in mind, I later followed one of the women who picked the monitor casings at the burning site. Carrying about four casings which she picked from the burning site, the young woman was heading to the Agbogbloshie food market adjacent the scrap yard. I followed her to the food market. At*

the food market, I observed that the monitor casings are supports for food displayed at stall fronts (see Figure 4.4). From a distance, I watched the young woman negotiate and sell the four monitor casings to market women. I then approached the young woman who sold the monitor casings, asking about the transaction. Having seen me with S&D at the burning site, she did not answer any of my questions for the fear that I might reveal information about the transaction to S&D. On another occasion (two weeks later), I meet the young woman again, and this time she allowed me to observe a transaction where she sold a monitor casing to a food seller. I got to know that this young woman, like others who grab monitor casings at the scrap market are head porters at the food market. They transit between the food market and the scrap market picking monitor casings left behind by e-waste traders and later sell them to market women at the food market.

Figure 4.4: Monitor casings used as food display inside the Agbogbloshie food market.

Returning from my detour to the food market, I observe another transaction involving trading monitor casings. Along the Abose-Okai road connecting the food and

scrap markets, monitor casings are traded through other practices. Here, street beggars trade the casings to be used as seats (see Figure 4.5). Like the young women, beggars who beg for money on a daily basis along the road[53]*, pick the monitor casings at the edge of the scrap market. These beggars accumulate about 4 to 5 monitor casings which they rent or lease to other visiting beggars who come to the Agbogbloshie vicinity to beg for money. The renting of casings usually happens during 'market days' at the food market when the inflow of people are high, and the beggars are guaranteed of money. One such transaction between two beggars is the eighth moment of price realization for the day.*

Figure 4.5: Beggars renting monitor casings as seats along the road at Agbogbloshie.

Moment of price realization 4

In the account above, S&D prompt me at 2:30 p.m. that it is time we head back to the Agbogbloshie scrap market. This was not a coincidence, but the regular pattern they and other traders follow. After roaming the city of Accra in search of e-waste to buy, and

53 I use roadside or along the road instead of curbside here because this activity happens on the road. There are no clearly demarcated curbsides on both sides of the road.

selling some of those items en-route (e.g., bicycle traders), itinerant e-waste traders transport their goods to the scrap market for processing and further trading. As a processing site for e-waste, the Agbogbloshie scrap market is both an assembling and disassembling site. For instance, when e-waste is processed through dismantling, the equipments are disassembled at the site. However, should the disassembled parts be resold, they might once again become reassembled with other materials at the site (e.g., scraps from cars, cooking utensils). The disassembling and reassembling activities involve a variety of actors including scrap merchants. Scrap merchants buy e-waste from itinerant traders which they sort, classify and build stocks and later sell to local foundries in the city and or export (Grant & Oteng-Ababio, 2012). Although most of the activities of the scrap merchants happen inside the market itself, increasingly the street sidewalks leading to the scrap market have become temporary scrap markets springing up at a certain time of the day. Among the scrap merchants, the setting up of posts is known as a barrier post. While the system of the barrier post is still emerging, it is interesting to see how it plays out in the processes of realizing prices for e-waste. To do so, let us consider S&D's transaction at the post, which is our fourth moment of price realization. Upon the request of S&D, I observed this transaction from a distance. Consequently, my retelling of what happened in the moment is based on my distant observation and subsequent elicitation from S&D after the transaction.

Two barrier boys congregate around the truck of S&D. They move around the truck touching almost all the items on it. After inspecting the items, the barrier boys talk to

S&D. Somewhere in the conversation, one of the barrier boys steps aside and makes a phone call (I could not hear what was said). The phone call was very brief. The other boy was still talking with S&D. From the body language of S&D, I can tell they are in haste. Dallas even moves the truck signalling that we should continue walking. The four congregate again and this time the transaction is finalized as S&D begin to dismantle and sort the items on their truck separating aluminum materials from the rest.

I (researcher): I thought you resell your goods to scrap merchants at Agbogbloshie?

S&D: Yes. We do. Now Agbogbloshie begins from here. These boys are from Agbogbloshie. They work for the same scrap dealers we will sell to if we go to Agbogbloshie.

I: OK. I see. So, does it mean that you get the same price when you sell at the barrier post and at Agbogbloshie?

S&D: No. It does not work that way. You see. When we get to Agbogbloshie, the same scrap dealers will tell us that we have to weigh our goods on a scale before we get a price. That is very different from what happened here. We did not use a scale here.

I: OK. I see. So, is it possible that if you had to sell the goods at Agbogbloshie, you would have gotten a different price than what you just had? Which of the prices will be favourable to you, here or Agbogbloshie?

S&D: Yes. We will get different prices. Maybe we will get better price at Agbogbloshie. But wait. We do not have all the time to chase after a better price. We have to sell

everything today. By the way, what we sold is aluminum. It is just 1.50 cedis (0.8 $ CAD) per kilogram at Agbogbloshie

What calculative modalities are in play in this fourth moment of price realization? S&D's concern about making sure that all their goods are resold echo anxieties running throughout the study with regards to time and space. For instance, in this transaction, S&D acknowledge that it is likely they will realize a higher price for their goods if they sold it at Agbogbloshie instead of the barrier post. The question then is, why did they choose to negotiate with the barrier boys rather than go to Agbogbloshie and resell there? As mentioned earlier, S&D are in a constant struggle to collect and disperse goods. This is because they do not have anywhere to store the goods they collect during the day. This lack of storage space has a knock-on effect in that; it is that much of a struggle for S&D to accumulate surplus materials (unsold products). Confronted with this struggle, S&D aim to strike a fine balance between constantly collecting and dispersing goods, but still have a minimum amount of the highest value stock on their truck by the time they reach the Agbogbloshie scrap yard. Copper scrap is a material of the highest value at the scrap market (see Table 1). Consequently, selling other materials of lower value (e.g., aluminum) compared to copper is a strategy they mobilize to work around time and ensure that they do not accumulate surplus materials. Or, if they should accumulate surplus it is a material of higher value but of a smaller size such as copper.

Table 1: Prices for various metals when weighed at the Agbogbloshie scrap market.

Metal	Average prices[54] per kilogram for scrap metals at Agbogbloshie
Aluminum	1.50 cedis (0.8$ CAD)
Steel	1.50 cedis (0.8$ CAD)
Copper	7.50 cedis (3.9$ CAD)
Iron	0.50 cedis (0.3$ CAD)

In this moment, the lack of storage space matters in the processes of price realization in that, as shown above, even though a higher price could be realized for the aluminum at Agbogbloshie, it compels S&D to opt for a lower price instead at the barrier post. In this way, the lack of space works as an absent presence (Hetherington, 2004). That is, space is something that is not there, but in not being there, it has presence or tangible consequences, which is negative for the price S&D realized. Here, we see a moment where waste studies and the price realization literature come together. Absent presence is a central theme in the work of Hetherington (2004) on disposal. Hetherington raises important issues about the role of absence in disposal practices. He suggests that the absence of something, in his case the disposal of material waste does not mean that waste is completely eliminated, rather the semiotic presence of that which is disposed persists and generates certain effects. Similarly, thinking with the notion of absence presence, that S&D do not have storage space for their surplus goods, and thus, realizing a lower price means that the absence of space has an effect on the processes of realizing

54 These prices were recorded during the time of my research between June and August 2012. The recordings represent the average over the three-month period. Also, the average exchange rate of 1.91 cedis per CAD applies here.

price for e-waste.

Another factor in play in this moment is the configuration of the barrier post in relation to activities at Agbogbloshie. Scrap merchants located at the scrap market usually work with young boys. In most cases, the boys are paid a daily wage for their services, which include among other things standing-by in front of tents of scrap dealers and calling itinerant traders to come sell their items, loading items into stockpiles, running errands for the dealers etc and supervising weighing etc. It is these boys who are now posted to mount barrier posts to intercept the goods of itinerant traders. This system of barrier posts emerged in a situation where between scrap merchants A and B whose tents are just few meters away from each, A observes that B sent his boys to meet and buy goods from itinerant traders before they get to the scrap market. As a result, B gets the best and clean copper, while A gets the crappy copper. To out compete B, A also sends some of his boys to work as barrier boys and intercept better goods. Increasingly, more and more scrap merchants join A and B in the practice of mounting barrier posts. While scrap merchants claim the post helps them get better goods, they acknowledge that it has also increased their cost of production. This is because not only are they paying barrier boys to intercept goods, but also depending on how far the post is mounted from the scrap market they incur additional costs of transportation. For instance, in order to transporting the goods intercepted at the barrier post to the scrap market, scrap dealers have had to purchase standby wheelbarrows. Furthermore, there is an interesting idea about space in that with competition in the mounting of barrier posts along the streets, the posts are

becoming increasingly further away from the Agbogbloshie scrap market to the point where some of them are becoming co-terminal with the reach of itinerant traders. With this co-terminal comes a distance decay function, which scrap dealers have to consider in optimally placing barrier boys.

The practice of mounting barrier posts and placing barrier boys in order to get better goods reveal a key insight for the price realization literature. That is, it points to how a human being can be mobilized as a market device by others. Here, the barrier boys are the market devices for scrap merchants, for by positioning them at the post, the boys make a difference to and contribute in particular ways to the price that is realized for e-waste. As S&D mentioned, the prices realized at the barrier post are different from that likely to be realized at the scrap market. I have already pointed out how various senses of the body play out as market devices in the processes of price realization. However, here, what we observe is that the whole human is utilized as a market device by another human (scrap merchants) to intervene in the processes of price realization. The barrier boys therefore become something like the 'trading robots' Beunza and Stark (2003) describe in their work on arbitrage trading. Trading robots are systems of connections, algorithms and computer hardware that receive market data and send trading orders according to theoretical principles that statistical arbitrageurs put into them. The robots are programmed to execute trading decisions on behalf of arbitrageurs. For instance, by looking at the historic average price of stocks, a robot can be programmed to make a decision to buy or sell a stock at a particular point in time. In this way, akin to the market

devices of robots that monitor price mechanisms and trade on behalf of arbitrage bankers, here, scrap merchants at Agbogbloshie mobilize barrier boys as market devices to intervene in the processes of price realization. Also, although the robots execute trading decision on their own, they are constantly monitored by human traders (statistical arbitrageurs), who intervene should the market situation be different from that for which the robots were programmed. Similarly, the barrier boys seek the approval of scrap merchants on what to buy and at what price.

That barrier boys are mobilized as market devices by scrap merchants to intervene in the processes of price realization suggest an instance of exploiting labour for profit (Marx, 1867)[55]. However as I show, there is more than labor exploitation in play here. Let us look at the relations between barrier boys and scrap merchants a little closer. The first point to notice is that there is more than exploiting labour power in play in the profit the scrap merchant is likely to make from the price realized for the items traded. As already noted, depending on how far a barrier post is mounted from the scrap market, scrap merchants will incur additional costs of production on transportation. Also, I pointed to another factor of space in that with competition in the mounting of barrier post along the

55 Here, I am referring to labor exploitation in Marxist terms. According to Marx's labour theory of value, the labour power used to create a commodity is its ultimate source of value. He accounts for labour power in terms of the socially necessary labour time consumed in making a commodity. For Marx, because commodities are products of human labour, the amount of labour embodied in a commodity can be objectively measured as its exchange value. The monetary expression of the exchange value of a commodity in Marxian terms is its price. Thus, within Marxian labour theory of value, price cannot be explained without recourse to the concept of value, specifically how it is created from human labour and results in profit. Profit from any commodity is ultimately derived from exploiting the labour power used to create it. Marx claims workers are exploited because they are paid less than the value they produce with their labour. For instance, exploitation happens when workers work for eight hours but are only paid wages for the value of four hours of labour, the amount needed for labour to reproduce itself (and be able to return to work the next day). In this sense, exploitation of labour power for profit can explain the profit that scrap merchants make from using barrier boys as market devices.

streets, the posts are becoming increasingly further away from the Agbogbloshie scrap market to the point where some of them are co-terminal with the reach of itinerant traders. With this comes a distance decay function, which scrap merchants have to consider in order to achieve optimal placements of barrier boys, intercept the best deals from itinerant traders and subsequently realize a price that will result in a higher profit. The case of barrier boys as market devices therefore suggests that it takes more than just exploiting the socially necessary labour time to derive profit. And that profit may also be explained by the enactment of power relations as played out between specific arrangements of people (scrap merchants, itinerant e-waste traders [S&D], and barrier boys) and things (spaces, capital).

Moment of price realization 5

Having shown that S&D cannot accumulate surplus goods due to lack of storage space, they had at most two hours to resell all their goods when we arrived at Agbogbloshie. Within the two hour window, one of the things they did was go into repair and refurbishing shops inside the scrap yard and invite shop owners to come out of their shops and inspect goods they have on their trucks. In one of the repair and refurbishing shops, while still sitting in his shop and only peeping to look at the goods, a shop owner bought the computer tower casing and DVD compartment. Recall, that this computer tower has already been stripped of its PWB in the second moment of price realization (discussed in Chapter Three). The rest of the tower was therefore likely to be sold in parts since even if it was working, in the absence of the PWB, S&D will not be able to

determine functionality. Thus, here again we see a moment of price realization for e-waste involving stuff coming further apart. I glean insights into the processes of price realization through the following observations that happened at the shop:

Sonny, tries to persuade the shop owner to buy the whole tower as it is. The shop owner declines, saying that he prefers to buy the individual parts of computers. This is because buying parts, he will not be forced to buy any item for which he cannot easily find a buyer or reuse in reassembling a working PC. Sonny takes out his screw driver and unscrews the tower, separating the casing and the DVD compartment on one side and the rest on the other. With the tower casing, the shop owner visually inspects it, turning the casings on all of its sides to be sure of no breakages. He points a scratch on one side to S&D. With the DVD compartment however, he employs a different practice. Inside the shop, the shop owner has a framework of a working PC computer, made by assembling all parts of a computer tower, monitor and other peripherals (e.g., keyboard) arranged together on the floor (Figure 4.6). What happened is that when traders like S&D bring a computer part to be sold, the shop owner replaces that part in the framework to establish if it is functional. By functional, not only should the power button of the item be on, but it should be able to be operated fully with the other component. For the DVD compartment, it should play music or video if a DVD is slotted into it. This is one method used when qualifying the parts of a computer. Among the traders, it is called 'testing method'. Another is 'not testing method'. With the not testing method, the goods, in this case the DVD will not be tested for functionality. Instead, it will be visually inspected. S&D opted

for the testing method in their transaction.

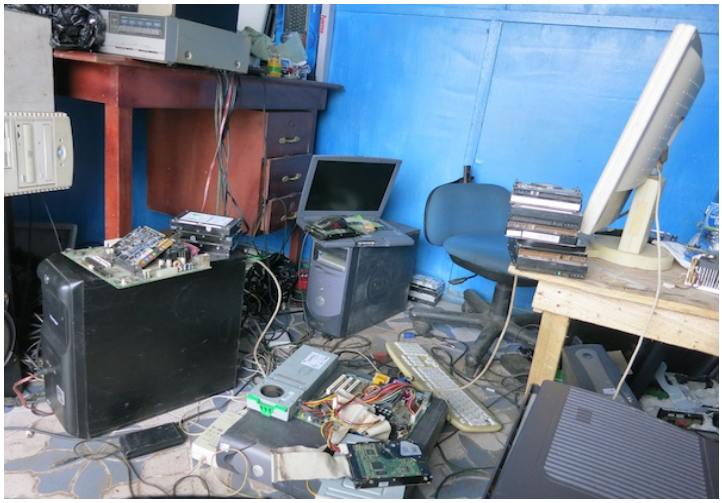

Figure 4.6: PC framework used for testing at a computer repair, refurbishing and reassembling shop.

There is some form of wagering in the choice of the testing versus not testing method. For instance, if an item is tested and is found to be functional the price realized is twice more than if the item is not tested. However if the item is tested and it is not functional and has to be sold for scrap value or to be repaired the price is twice less. So, here are three possible scenarios for how the DVD might be sold:

1. tested and functional= 4 cedis (2.1$ CAD) price realized
2. tested and non-functional= 0.50 (0.3$ CAD) cedis price realized
3. Not tested=2 cedis (1.05$ CAD) price realized.

With such a situation, traders like S&D wager in their choice of how to sell an item since they do not know if the item will be functional or not and for which a choice of testing over not testing or vice versa might realize a price within a higher range.

The above method of qualifying goods by testing for their functionality is a fairly sophisticated method in the R2 (Responsible Recycling) standard, the leading certification program in the electronic recycling industry.[56] Since 2008, certification programs have been introduced into the electronic recycling industry to ensure that practices within the industry adhere to standards for data privacy, environmental control and employee health and safety. Currently, there are two major certification programs: R2 and e-stewards. Although working with different principles, the certifications programs mainly operate through independent third-party auditors who accredit electronics recyclers should they demonstrate that their practices meet specific standards that safely recycle and manage electronics. For instance, within the R2 standard, certified recyclers have to comply to "effective testing methods" (R2, 2008, p. 8), which means that prior to the sale of either a unit of electronic equipment or part, recyclers should confirm functionality and label the items accordingly (Guideline 6, Reusable Equipment and Components). According to the updated guidelines (R2 2013), the testing methods are of three types. First, test for full functions where the equipment is labelled as ready for reuse (6[c][1]). Second, test for key functions where the component parts of an equipment are tested for their ability to power up when turned on (here, to power up does not mean the item has to be functional, the key function of power is what is being tested for). This second testing method is labelled ready for resale (6[c][2]). In the third test, the items are

56 With the aim of ensuring recycling practices that protect the environment, human health and safety, the US EPA in 2008 engaged stakeholders (ENGOs like BAN and Electronic TakeBack Coalition, trade associations, electronic importers and exporters and electronic manufacturers) in the electronics industry to establish a recycling certification program that will establish, uphold and monitor standards within the industry. This initiative lead to the R2 guidelines or practices (R2 Solutions, 2008) an independently audited certification program. The e-stewards standards (2009) is another certification program.

established to be non-functional, but they are evaluated for repair or refurbishing. Here, the item is labelled ready for repair (6[c][3]).

In many ways, the qualification of the DVD in this moment of price realization is similar to that employed in the R2 certification program. Specifically, the first testing method of full function where the equipment is established as ready for immediate reuse. At the repair shop, in other to realize a price for the DVD compartment using the testing for functionality method, the shop owner has to establish that the DVD does not just power up. Full functionality in terms of being able to be used immediately with the PC setup is what counts. Two key differences, however, exist between the R2 testing and Agbogbloshie shop testing. First, the testing practices in R2 aim partly to ensure the equipments are accurately characterized and labelled especially for export purposes so that they are not subjected to requirements that apply to 'waste' (R2 update 2014). At Agbogbloshie, however, the testing has to do with temporarily qualifying goods so that their prices can be realized. Second, R2 testing involves a third party organization (an independent auditor), while at Agbogbloshie such third party involvement is absent. In the absence of a third party organization to supervise and make accountable the testing practices, shop owners at Agbogbloshie who administer and supervise the testing of equipments attain a position whereby they are able to solely qualify a good, mainly to their advantage and have more say in the price that is eventually realized. In this moment, S&D accept the result of the testing process as told by the shop owner: the DVD is not functional. S&D know that this diagnosis might be false. However, the only way to check

the veracity of a shop owner's testing is to go through another testing, which means visiting three or four other shops. To do so requires time, which S&D do not have. That S&D have a limited say compared to the shop owner in qualifying the DVD by testing provides further evidence of an instance of practicing the processes of price realization as a relation of struggle or power. Furthermore, even though third party institutions are key in shaping processes of price realization at various stages, in trading of e-waste the absence of such third party organization to monitor the testing method provides room for enacting unequal power relationships. Thus, here again, there is a case of an absent presence. That is, the absence of a third party institution has an effect because it provides an opportunity to arrange the relations of exchange in ways that enable the enactment of unequal power relations. Note then that, this enactment of unequal power relations between S&D and the shop owner is not enabled by free floating power, but specific arrangements of people and things.

Moment of price realization 6

The sixth moment relates to realizing prices for scrap copper at the scrap market. As mentioned earlier, of all the materials retrieved from e-waste, copper is of the highest value. Of the metals traded at the scrap market, it commands the highest price value. Transactions involving trading therefore copper tend to be very heightened. The intense interest when trading copper is reflected in a comment by Ali, a scrap merchant:

> Some of the copper is not well burnt. Yesterday we lost almost 50 cedis (26.2$ CAD) here. When I added the sales in my book, we had bought about 60 kilos of copper. But, when I weighed the copper at the end of the day, it was only 52

> kilos. Where is the 8 kilos? I will only buy the copper that is good for me. If you lose 2 kilos of copper, you lose 10 cedis (5.2$ CAD) but if it is aluminum, you lose only 3 cedis (1.6$ CAD). I prefer buying aluminum and leaving copper alone. I do not want any trouble with copper today.

Another scrap merchant, Danladi voices a different concern with trading scrap copper :

> You have to be very careful when buying copper. The boys (referring to itinerant traders) are very smart. Sometimes they spray aluminum and zinc to make it look like copper and weigh it for copper price.

The above concerns about copper relate in many ways to how its price is realized. The following is what ensued when S&D approach a scrap merchant to sell their copper retrieved from the wires.

There were two scales at the tent of the scrap merchant. The three boys who work for the scrap merchant walked towards the scale when it was time for S&D to weigh their copper. Dallas placed the sack containing the copper on the Avery 5 Weighline Calibration Tool (WCT) scale (Figure 4.3). Immediately, all eyes–those of S&D, the 3 boys working for the scrap merchant and the scrap merchants–shift to reading the scale. They all stood in front of the scale, directly facing the readings. Different readings were offered: Sonny mentions 9 kilos, the scrap merchant and his boys on the other hand claim 8 kilos. To resolve the different readings. Sonny lifts the sack of copper from the scale, waits for a while and places it again for a fresh reading. After this second reading, they all come to the conclusion that the reading is more than 8 kilos but not up to 9 kilos. Consequently 8.5 kilos was agreed on as the reading. After the scale reading, one of the boys removed the copper from the sack and placed it on a wooden board. The other two boys joined him in sorting out the copper. The process of sorting involves spreading the

copper in such a way that any impurities such as sand or oil which might be adding to the recorded weight is removed (Figure 4.7). The process also helps to detect when aluminum or zinc is painted to look like copper. After the sorting was done, the 'purified copper' was placed aside leaving behind a substantial amount of sand on the board.

Scrap merchant: See. The copper is not well burnt. Look at all these impurities. I will deduct 2 kilos form the reading. I will pay for 6 kilos?

S&D: Deducting 2 kilos is too much.

Scrap merchant: No. 6 kilos. Take the money.

Figure 4.7: Traders sorting copper on a wooden board at the Agbogbloshie scrap market.

In this moment of price realization, a number of key things happen. First, a weighing scale is used to determine the weight of the copper. Second and after determining the weight, the copper is further sorted on a wooden board to remove impurities. Third, using visual inspection, the scrap merchant guesstimates the impurities

and subtracts it from the weight recorded on the scale. In this sequence of events, a price of 45 cedis (23.6$ CAD) is realized for 6 kilograms of copper. In this moment, we see two market devices in play in qualifying the copper. First, a weighing scale. Scales provide weight information, which is a key method for pricing in the material recovery industry. Measuring scales are also market devices in the sense that they enable traders keep track of, and monitor the amount of materials they accumulate over time. With regard to estimating value, weighing scales are often tampered with by those who control them. In this regard, although an important market devices, their use is imbued with unequal relationships in favour of those who control it. The second market device is a wooden board used to sort the copper and remove impurities. Although the scale is an important market device, it is as crucial for scrap merchants at Agbogbloshie to have a scale as it is to have a board on which they can sort and purify copper. This is because as Dallas puts its "unless it is fresh copper (copper retrieved without burning), no one buys burnt copper at Agbogbloshie without sorting" them on a board. Thus, the board is a necessary part of qualifying copper and thus the process of realizing its price. The purification of copper using a wooden board links very well with a particular kind of market device called assay device (Gregson et al., 2013). According to Gregson et al., in the ship breaking industry where goods are of a complex nature, assay devices are important in performing work that has to do with determining not only the content but also quality of metals. For instance, when breaking ships, surveys might be used to characterize, map and estimate the material worth of a ship. But, that will not be enough. In order to accurately value the materials, instrument and laboratory based testing are

required to test the quality of particular metals. Assay devices are therefore market devices used to determine the quality of metals. Since assay devices are those market devices that help determine the quality of metals, the wooden board can be considered as an assay market device because it helps separate bad copper from good copper. Understanding the board as a market device that does work of assaying, therefore point to the nuances that price realization for non-standardized commodities like e-waste (and Gregson et al.'s case of ship breaking) bring to the existing price realization literature.

At the Agbogbloshie scrap market, it is well known among both the scrap merchants and their customers that weighing scales are tampered with.[57] One scrap merchant told me, "if you want a scale which is not tampered, then bring your own scale when you want to sell". Itinerant traders like S&D do not complain about such tampering, for if they do, they cannot fulfill the option of providing their own scales. In this moment, S&D take the readings from the scale as it is. We therefore see uneven power relations enacted here through the scale and the scrap dealer's ability to control that scale. The enactment of power through the use of the scale re-iterates for us an insight that access to and control over certain market devices empower some actors whiles disempowering others (Callon & Muniesa, 2005; Caliskan, 2010). Consider that in addition to using a scale to weigh the copper, the scrap merchant sorts the copper to remove impurities. He then 'guesstimates' the weight of impurities and deducts it from the scale reading. Here,

57 During my research, an itinerant trader experimented with me to see if indeed the scales have been falsified. We visited three scrap merchants located at different places in Agbogbloshie and weighed scrap copper. Three different readings were recorded for the same quantity of copper. Each scale gave us differing readings of between 1 and 1.5 kilos.

there is room for the scrap merchant to over or under estimate the amount of impurities, which the itinerant trader might disagree with as S&D did. That scrap merchants can over or underestimate the amount of impurities points to them being able to enact a higher degree of power in transactions. Also, these scrap merchants control the scale in the sense of deciding whether the scale will be used in each phase of qualifying the copper. They could weigh the copper after sorting, but choose not to do so. However, to say that scrap merchants exercise a higher degree of power does not mean that S&D cannot enact any power. S&D have other options if they disagree with a reading and deduction. One possible action is to request the scrap merchants to weigh (rather than guesstimate) the impurities and deduct that from the scale reading. Scrap merchants never agree to such a request. Another possibility is that, having already removed all the impurities from their copper; S&D can go to another scrap dealer with cleaner copper. But, they know that doing so would will require time and will not be in their favour since the weight of the copper will be reduced again when taking through the same sorting process. What S&D end up with is a choice to trade on the difference between the accuracy of the scale and the visual estimate that the scrap merchant is making. In this encounter, after the scrap merchant deducted 2 kilos from original reading on the scale, S&D acknowledge that even though the deduction was not fair, they cannot take their copper to other traders. They described the risk of doing so in the following manner:

> He (referring to the scrap merchant) asks if we agree that he deducts 2 kilos from the reading. Does it even matter if we disagree? He knows we disagree. But, we cannot take our copper to another trader. See, he has already sorted the copper out and removed all this (pointing to the impurities on the board). Our copper was

> 9 kilos. If we take it to another trader, he will weigh it, and read 8 kilos, then sort and deduct again. Unless, it is fresh copper (copper retrieved without burning), no one buys burnt copper at Agbogbloshie without sorting. At the end, we will end up with about 5 kilos.

The point here is that in qualifying the copper there are different dimensions of power relations in play: a scrap merchant's control over the scale in terms of tampering, the potential for the scrap merchant to over estimate the level of impurities in the copper and his decision not to use the scale in each phase of qualifying the copper. Also, there is a risk S&D will face should they decide to go to another scrap merchant because they disagree with a guesstimate. Another power relation in play has to do with the use of S&D's limited time to sort out impurities. Again further evidence of an empirically verifiable instance of the processes of price realization as a relation of power or struggle.

Furthermore, with the enactment of unequal power relations, the scale as a market device in this transaction relates to the way in which post-colonial encounters about e-wastes materialize in a different way than that captured in the dominant e-waste literature (which typically frames e-waste in terms of toxic colonialism). The scale used in weighing the copper was made by the then W&T Avery Ltd.; a company based in Birmingham, UK, the colonial ruler of Ghana. Producing its first weigh-bridge in 1876 (although the roots of the W&T Avery company extends back to the year 1731), the Avery brand is not only a pioneer, but currently one of the largest manufacturer of weighing technologies in the world (Avery Weigh Tronix, 2014). While I did not inquire into the provenance of this particular Avery scale in use at the Agbogbloshie scrap

market, the particular model of Avery scale dates backs to a period when such scales were mostly used to weigh cocoa for export in Ghana.[58] The development of cocoa export is very much linked with Ghana's colonial encounter. Historical records suggest that there were European cocoa plantations in Ghana as early as 1890 (Anti-Slavery international, 2004). It is therefore not surprising that Avery scales were manufactured in the UK, the colonial ruler of Ghana. Originally used for weighing cocoa, the adjustments of the Avery scales by cocoa purchasing clerks to cheat farmers, and its associated effects of farmers smuggling cocoa to neighbouring Ivory Coast, has resulted in the cocoa industry gradually moving to electronic and sealed weighing scales (Ghana News Agency [GNA], 2012). As a result of this, the Avery weighing scales are being pushed into other industries such as weighing scraps from e-waste. That Avery manufactured the scale used in the weighing of copper in this moment of price realization relates not only a pragmatic market device in use now, but the banality of post-colonial encounters.

To the extent that the e-waste literature has talked about colonialism, it has been around the notion of toxic colonialism (Greenpeace, 2008; BAN, 2002, 2005; Pellow, 2007). With toxic colonialism, places like Agbogbloshie remain in subordinate positions with regard to e-waste because it is claimed that e-waste is dumped on the population. And as a result of the dumping, the population experiences environmental injustice as a new kind of colonialism. Bracketing the merits and demerits of the debate about toxic colonialism, I contend that there is a whole gamut of ways in which colonialism may be

58 Cocoa is the main agricultural export of Ghana. The country is the second largest producer of cocoa in the world after Ivory Coast (World Cocoa Foundation, 2012).

relevant in e-waste trade. Here, taking the use of the Avery scale as an example, postcolonial encounters happens not in a historical past but in an immediate way. At this very moment when e-waste is weighed on the Avery scale, we confront a pragmatic tool that is in use now, but only got there because of colonial encounters. Thus, in this very moment of price realization we see imperial banality with its associated uneven power relations being enacted.

That colonial encounters are enacted through the use of a weighing scale is another reason why materialities intervening in the processes of price realization should not be seen as mere mundane objects but market devices that have important consequences. The banality of colonial encounters that the use of a market device like the scale brings into being can be seen as what John Law (2012) calls collateral realities. For Law (2012, p. 156), collateral realities are "realities that get done incidentally, and along the way… They are realities that get done for the most part unintentionally". Here then, the colonial encounter that the use of the scale enacts can be seen as a collateral reality. The reason is that although the scale is a pragmatic tool in use now to qualify goods and realize a price (thus a market device), its use is enacting other realities, one of which is a colonial encounter through e-waste trade. There is a point to be made here about the usefulness of the notion of market devices. That is, apart from enabling analyzing the diversity of possible forms of market organization and their political dimensions (what has been so far demonstrated in the price realization literature), the notion is also potentially useful for throwing light on the collateral realities that are enacted through

market devices. One area for future research will be to examine what collateral realities are enacted when market devices are intervening in the processes of price realization.

Moment of price realization 7

In the seventh moment of price realization, a price is realized for the computer monitor casings at the adjacent food market. The sequence in this price realization begins with S&D leaving a monitor casing behind after their burning and two young women running to snatch it. S&D were aware that the young women were taking the monitor casings, but they decided not intervene. That they did not intervene is likely a consequence of two reasons. First, because it was between the hours of 4:00 and 5:00 p. m. in the day. And at this time of day, rapid work is essential. Recall that, because they do not have anywhere to store surplus materials, dispersing rather than accumulating goods attain more priority. Second, and more importantly, their main aim at that moment was to sell the copper they retrieved (recall copper commands the highest value at Agbogbloshie). The difference between getting the copper burnt and sold, and the price that they might be able to realize for the monitor casing was not worth the effort of chasing after the women. Third, even if they chased after the women and got the monitor casing, in order to realize a price, they would have to transit from the scrap market to the food market. When I followed the women who took the monitor casing, I found them selling the casings to food sellers at the Agbogbloshie food market. At the food market monitor casings are displays for food on sale as shown in Figure 4.4. I recall this seventh moment not to account for what happened when price was realized for the monitor casing

at the food market. Instead, I flag the moment to speak to the shifting contours in property relations of goods whose prices continues to be realized in different practices and how that add useful insights to the price realization literature.

Following S&D up until this moment, all the goods in play were realized for a price or at least bartered for another. S&D bought, sold and bartered all the goods they accumulated and dispersed throughout the day. There were some discards, for instance, the sand and oil from sorting copper on the board in moment six. As far as I followed, those discards entered the category of rubbish (Thompson, 1979). However, the monitor casing, which the young woman grabbed from the burning site were not bought or bartered. At best, the casing can be considered as a remainder that S&D left behind for various reasons, and which the young woman gleaned and later realize a price for. Thus, a key difference between the previous six moments of price realization and this seventh moment is the activity of gleaning (Varda, 2000). Here, I suggest gleaning because the young woman took what S&D no longer wanted or at least for some reason no longer pursued realizing a price for.

It is important to note that although S&D left the monitor casing as a reminder, the young women were able to glean partly because of the property relations at Agbogbloshie. In her film, *Les glaneurs et la glaneuse* (The Gleaners and I), where she documents all sort of gleaning activities[59], Varda (2000) raises questions around the property relations with regard to gleaning in contemporary times. For instances, she

59 These include agricultural gleaning where people glean for discarded potatoes as food and art, aesthetic gleaning involving finding special art pieces (e.g paintings), and Varda's own activity of gleaning film as autobiography.

wonders if it is legal for citizens to protest against supermarket shop owners who pour bleach on discarded food so that the food can not be reclaimed by gleaners. With the kind of ambiguous property relations in play about the land on which the Agbogbloshie scrap market sits, one can claim the entire land (or at least the section where copper is burnt) exist as a kind of common. It is the operation of the land as a common that enable the women to glean remainders from S&D and later realize a price for it. In this sense, with the women gleaning for the remainders of S&D's activities, what is happening at Agbogbloshie is what Ruth Lane (2011) calls 'waste commons'.

In her study of practices of scavenging bulky rubbish in Melbourne, Lane coined the term waste commons to refer to the ways in which people understand and operate the property relations around the materials resident place at curbsides for municipal collection. Between the period when an item is placed at the curb and picked by municipal authorities, people practice the items as common properties. That is, individuals (one could call them scavengers or gleaners) claim what other residents give up and place at the curb for municipal authorities. Within the window of time that the item remains at the curb, a waste common is in play since scavengers and passers-by can lay claim to the item. According to Lane (2011, p. 404) "the perspective of both the householders and professional scavengers shows that hard rubbish collections functions as an informal waste commons linked with social institutions and norms around gifting and gleaning". More importantly, Lane argues that the operation of hard rubbish collection as a waste common is something we should celebrate since it offers an example

not only of gifting and gleaning but also diverts more items from landfills, and thus leads to recycling a wide range of materials. Waste commons therefore comes across in her work as something which is inherently good and for which she argues more attention should be paid to as a strategy for achieving a resource recovery waste regime.

How are we to make sense of the commons in play at Agbogbloshie? Are waste commons inherently good as Lane would have us believe? Consider the conditions under which the waste commons that enables women to glean for reminders operates. First, the gleaning here occurs in conditions of significant risks to health, safety, and environmental contamination. It is well documented that working conditions at the Agbogbloshie scrap market pose a lot of risks. Among other things, current research has demonstrated high concentrations of lead levels in the soil, ambient air, and bloodstream of workers (Greenpeace, 2008; Caravanos, 2011, 2013). It is possible that food sold at the site, which the workers consume into their bodies could be contaminated from the toxins released into the environment from burning activities. Consider again issues of gender and age in play in the Agbogbloshie waste common. Itinerant traders like S&D are usually younger (between the ages of 15-29 years) compared with the scrap merchants they trade with (mostly 30 years and above) (see also Amankwaa, 2013; Prakash & Manhart, 2010). Also, the people who glean for the monitor casings are mostly young girls, some below the country's minimum legal working age of 16 years (International Labour Organization [ILO], 2006). Recall that the young women who glean for monitor casings at the scrap market work as head porters at the food market. According to Oberhauser and Yeboah's

(2011) survey of head porters in markets in Accra, including the Agbogbloshie food market, some of the girls are as young as 11 years. Thus, in the midst of Agbogbloshie's waste common, issues of child labour too are in play.

There are two points to be made here. First, that between buying the monitor, dismantling it and reselling the components, some parts enter the rubbish category, but others too are exchanged within practices such as gleaning which are outside of strict private property or capitalist relations. Like the case of barter flagged in Chapter Three, here again the price realization literature could benefit from examining how moments such as gleaning occurring in-between series of actual price realizations affect the processes of price realization. Second, I use this moment to point to a waste common in play differently than what is suggested by Lane (2011). Thus as I have shown, the gleaning at Agbogbloshie operates outside of strict private property relations or capitalist relations making it a waste common. However, that gleaning takes places in property relations of a common also questions if a waste common is necessarily good. In this sense, I use the moment to raise questions of how to balance a celebration of waste commons with the fact that in the case at Agbogbloshie, a waste common takes place in risky living and working conditions.

Moment of price realization 8

I noted that Agbogbloshie exists as a kind of common, at least the area where copper is burnt and where the monitor casings are left behind as reminders of processing e-waste. As a common, head porters are not the only group of people who partake in

gleaning. Another group of people who glean e-waste are beggars located at roadsides around the Agbogbloshie area. The gleaning and subsequent trading of monitor casings by beggars is the focus in this eighth moment of price realization. From the account provided earlier, roadside beggars at and around the Agbogbloshie area glean for monitor casings which they rent to other beggars. In most cases, the monitor casings are leased for their capacity to provide seats for begging. Within this practice of leasing the monitor casings are two groups of beggars: those for whom Agbogbloshie is a regular territory and those who visit during the market days when there is an influx of people to the area. The Agbogbloshie food market is one of Accra's biggest foodstuff markets. Due to its central location which makes it accessible to people in various parts of the city, the market and it environs receive large volumes of people daily. Beggars looking to position themselves at vantage points find areas around the market very attractive. Those beggars who have claims to various spaces along the roads (for these groups Agbogbloshie is a permanent spot) therefore glean for the monitor casings which they place along the roadsides and lease to visiting beggars for a fee (a situation captured in Figure 4.5). Here, although I did not have close interactions and further questioning with the people involved in leasing the monitor casings, I think the moment illustrates some useful insights worth bringing into conversation with the price realization literature.

The first point has to do with the qualification of the casing. Throughout the moments of price realization from the first to sixth, prices have been realized for the goods either in parts or as wholes because of their electronic-ness. Indeed I have assumed

and called the goods electronic 'waste'-*ing*. Here, the monitor casings were rented as seats. Consequently, I could have plausibly stopped my study of price realization for e-waste at this moment for the thing that I was following was no longer e-waste. Clearly one can argue that the monitor casings were formally working electronics. But here what they were leased for and for which a price is realized had nothing to do with the electronic-ness of the good. Instead, the monitor casing is something to make a very difficult day in the scorching sun a little bit easier for beggars.

Second, to the extent that the realization of price in this moment occurred in the form of a lease is important. A lease means price realized in the form of rent. But, the price realization literature has not devoted empirical attention to leasing and rental price.[60] Hence, I would argue here that, while there is insufficient evidence to fully draw conclusions about the implications of leasing, in part because I did not have the privilege of following up on the transaction, this moment is useful to the extent that it pushes the boundaries and edges (Lepawsky & Mather, 2011[61]) of what the price realization literature offers. And it does so in the sense that, the price realization literature has not talked specifically about rent. For instance, the literature has nothing to say about the fact

60 Here again, I am referring to the price realization literature not dealing specifically with rental prices. Rent is extensively discussed in Marxian rent theory and the literature on urban economics (See Park, 2014 for an overview of both literatures).

61 I use boundaries and edges in Lepawsky and Mather's (2011) sense of the terms. For Lepawsky and Mather, boundaries and edges are useful methodological tools because boundaries implies crossings and edges adjacencies with the possibility of crossings. By boundaries, I am referring to moments when the processes within which price are realized cross over into other processes that have nothing to do with price realization and thus the idea of price realization can not usefully help explains what happens. Edges on the other hand, denotes a situations of sliding adjacency from one moment or practice to the other.

that in realizing price as rent in this situation, there is no rental contract signed to stipulate what happens if a visiting beggar refuses to return the monitor casings at the end of the day. That rental price has not be discussed in the price realization literature could mean that, perhaps, there is a limit to what the price realization literature is useful for in following the processes of price for a commodity like e-waste, which is leased for a rent in its capacity as a seat.

Third, the property relation under which a rental price was realized for the monitor casing is also insightful for the price realization literature. Note that in this transaction are a particular group of beggars for whom Agbogbloshie is a regular territory, and those for whom it is not. Thus, it is important to ask how those for whom Agbogbloshie is a regular territory defend it or maintain access to it so that they can be able to realize rental prices for the monitor casings. Also, how do the beggars for whom Agbogbloshie is not a regular territory negotiate to gain access? And, how do these negotiations of space relates to the creation of market stales in both the scrap and food markets? These are obviously important questions, which are beyond the purview of my research. Nevertheless this moment points to how far the price realization literature took me. The price realization literature could deal with these moments of leasing and rental price. That the literature has not done this so far can be seen as one of its limits. Furthermore, if I wanted to cross the boundary and deal with the moment robustly, I would have to entertain questions like control of space, ethics and injustice in play, and whether control over spaces of renting are maintained by violence.

This chapter explored the processes of price realization for e-waste at the Agbogbloshie scrap market and its environs. I used five additional moments when prices were realized for e-waste to follow up and develop further the themes of qualification practices, market devices and relations of power in play in the processes of price realization. Specifically, I reflected on how the processes of price realization give rise to an account of price realization that differs in some ways but also build on and push the limits of the price realization literature. In all, it becomes evident that making the price of e-waste is far from a straightforward play out of demand and supply. As the eight moments show, the processes of price realization for e-waste is a kind of patchwork of different qualification practices occurring in different spaces where diverse market devices intervene and unequal power relations are enacted. I talk more about the interconnectedness of the different moments of price realization as a kind of patchwork in the concluding chapter.

CHAPTER FIVE

CONCLUSION

This thesis is an attempt to engage Callon's performativity thesis and the role of market devices and how these devices relate to the idea of price realization (Caliskan 2007, 2009, 2010; Muniesa, 2007; Beunza et al., 2006; MacKenzie, 2006; Velthuis, 2005). More particularly, I want to understand how prices are realized for a commodity that is not so standardized because prior research on price realization has focussed mainly on the processes of price realization for standardized commodities. The thesis therefore asks the question: how are prices realized when e-waste is the commodity traded? Employing a methodology of following the everyday practices of exchanging a commodity (processes through which prices are made), I examine the processes of price realization for e-waste. More specifically, I use eight moments when prices are realized for e-waste as exemplary situations to demonstrate the processes of price realization for a non-standardized commodity. In this concluding chapter, I highlight the conceptual and theoretical advances that price realization for e-waste makes to the existing price realization literature. First, I reflect on the processes of price realization for e-waste as a patchwork of different modes of valuations where diverse market devices intervene, and unequal power relations are enacted as e-waste is moved along in practices. Next, I pull together the key contributions of the thesis in building on the price realization and e-waste literature as well as the broader waste studies literature. Finally, I consider the potential future research directions that the findings from the thesis speak to.

Moving e-waste along in practices: patchworks of processes of price realization

Mobilizing eight moments of exchange when prices are realized for e-waste, I illustrate diverse modes of qualifying goods, market devices, enactments of power relations and prosthetic prices in play in processes of making prices. What becomes clear from the eight moments is that there are different ways in which the processes of price realization are articulated or enacted in particular moments. Depending on how practices are organized, and their relations arranged, different processes of price realization are articulated. For instance, in almost all the eight moments of price realization it becomes evident that the body is used as a market device in the qualification of goods. However, exactly how the body is mobilized as a market device differs in each moment. For instance, in the first moment of price realization in Chapter Three, we observe bodily practices (in gesture or visual) of S&D and the woman householder in qualifying the goods while realizing its price. Specifically, I point to how those practices use the body as a market device to intervene in particular ways in the price realized. There, I was able to show that bodily practices such as hefting the TV and monitor to determine their weights and communicate those weights through body language; looking into the inside of the TV through a panel at the back; and waving hands to suggest spatial coverage of the items on the floor are essential parts of the practices through which prices are realized. Take away these bodily practices and price realization will fail. Also, in the fourth moment, we see a different mobilization of the body as a market device in barrier boys and their relation to itinerant traders like S&D and scrap merchants at the Agbogbloshie scrap market. Here, others mobilize whole human beings as market devices. By positioning barrier boys at

specific posts, the boys make a difference to and contribute in particular ways to the prices realized for e-waste (e.g., lower prices for S&D, higher cost of production but better goods at lower price range for scrap merchants). Again, take away these specific bodily practices and the organization of price realization breaks down.

Later on in the ongoing moments of price realization where prices were realized again for the same goods, for instance at the Agbogbloshie scrap market (moment six), on its own, the body is not accepted as a device to determine the weight of copper. Instead, in the sequence of practices realizing a price for copper, an Avery weighing scale is used to determine the weight. It was only after the scale has determined the weight that the body (through a visual register) is used to guesstimate the amount of impurities in the copper (what scrap merchants call 'bad copper') and then subtracted from the weight recorded on the scale. Looking at the play out of the body as a market device, the processes of realizing prices for e-waste in practices may be viewed as a kind of patchwork. By patchwork I mean that instead of a single way of qualifying goods in processes of price realization and a market device intervening in a particular way, there are varied ways of qualifying goods and the effects of a market device (e.g., the body) also varies as goods are moved along in different practices of exchange.

The patchwork character of processes of price realization for e-waste can also be seen through the enactments of power relations in the processes. In the eight moments of price realization, there are different modalities of power being enacted. Here, power as observed is not free floating; instead, it entails specific arrangements of people and things (market devices) in the moments of price realization. For example, in the first moment of

price realization, by using the body as a market device in different ways, S&D mobilize additional repertoires of practices to qualify the goods and realize a price in their favour compared to the householder. Thus, as a verifiable instance of the processes of price realization being a relation of power (Caliskan, 2007, 2010), we see in the work of the body as a market an enactment of power relations. In the fourth moment of price realization, the use of barrier boys to intervene in the processes of price realization also shows a different modality of enacting power or relations of struggle. Here too, the enactment of power relations plays out through specific arrangements of people (scrap merchants, itinerant e-waste traders [S&D], and barrier boys) and things. These include the optimal placement of barrier posts, lack of storage spaces hindering the accumulation of surplus goods, and additional cost of production for scrap merchants. Furthermore, in moment five, the relation of power is enacted through a repair and refurbishing shop owner's control over the testing process and the absence of a third party organization to certify the testing process as well as adjudicate any competing claims that arises from the testing result. Finally, moment six presents another dimension of power relations in the scrap merchants control over the scale in terms of tampering, the potential for them to over guesstimate the impurities in the copper and decide if the scale is used in each phase of qualifying copper. Also, there is power enacted in wasting S&D's time in sorting the copper and the fact that going to another scrap merchant would not be in their favour should they disagree with the current scrap merchant's guesstimate. In all these instances, it becomes evident that power is not something that is there; instead, there are many practices and relations of exchange that may produce different power relations. And that

the practices and relations change depending on the specific arrangements of people and things. That power relations are enacted in this fluid and dynamic way provides further evidence for thinking through and understanding the processes of price realization for e-waste as a kind of patchwork.

This patchwork character of the processes of price realization for e-waste that my research suggests is in line with the existing price realization literature in seeking to engage with a wide range and the shifting ways in which calculative practices and devices make prices in commodity exchange. Previous research demonstrates that the processes of price realization even for a single commodity such as cotton and tomato are not stable (Caliskan, 2007, 2010; Heuts & Mol, 2013). For instance, Caliskan (2010, p. 190) captures the patchwork character of the processes of price realization when he argues "prices are realized contested, made and unmade on a dynamic platform of trade". Thus, the processes of price realization are constantly negotiated in practices. It is in understanding these constant negotiations in the processes of price realization that I suggest thinking about the price realization as a kind of patchwork. More importantly, capturing the processes of price realization for e-waste as a kind of patchwork, my research nuances specific instances that occur as prices are realized for a commodity that is continuously (again, not endlessly) moved along in different practices of exchange (e.g., money mediated exchange, bartering, gleaning, leasing).

Contributions to the literature: price realization, e-waste studies and waste studies

Examining the processes of price realization for e-waste, this thesis draws novel insights for the price realization literature. It also makes important contributions to e-

waste studies and the broader waste studies literature. Furthermore, it brings forth interesting conversations between ideas in the price realization and e-waste literatures. In what follows I highlight these insights in five points. I also draw on the insights to flag potential future research directions.

First, this research advances analytically and empirically the idea of qualifying goods within the price realization literature. The price realization literature suggests that the qualification of goods is an important practice in the processes of realizing prices. This is because it is in the work of qualification that we observe the effects of various market devices in the iterative process of price realization. Goods are qualified as whole objects in the well documented instances of good qualification discussed in the price realization literature (e.g., cotton [Caliskan, 2010]; stocks or bonds [Beunza & Stark, 2004]; consumer retail goods [Cochoy, 2007]). Thus, implicit in the idea of good qualifications and the empirical examples in the literature is the assumption that goods are always qualified as wholes. However, this thesis shows that there are alternatives to goods as whole objects being qualified and a price being realized for them as wholes. As demonstrated in Chapter Three, in the practices of qualifying a TV or computer monitor for its price to be realized, parties involved in the exchange engage in practices that consider both the wholeness and potential value of the material parts or pieces of the TV and monitor. The thesis therefore provide evidence that goods can be qualified as both wholes and in parts or pieces. In this regard, the focus on the processes of price realization for e-waste adds to the price realization literature in a useful way by questioning the assumption of wholeness as presented in the qualification of goods for

which prices are realized. In effect, what my research suggests is that it would be fruitful for studies of price realization to examine how 'wholeness' and separability or 'partness' do or do not enter into practices of qualifying goods and to what effect(s).

Second, the findings from the thesis push the limits (boundaries and edges) of the price realization literature in interesting ways. Grounded in empirical situations, the thesis flags particular practices such as bartering, gleaning and leasing (rental prices) that happen in a series of price realizations for e-waste and which the extant price realization literature is yet to pay attention to. The third moment of price realization in Chapter Three provides evidence that, within a series of price realizations for e-waste, goods are bartered. However, the extant price realization literature has not talked about instances of non-monetary exchanges such as barter and how it plays out in moments of price realization where monetary instruments are not used. Flagging this moment of barter, the thesis shows that the price realization literature could benefit from expanded notions of price realization itself, since there are many instances–even whole gamuts of economic activity (e.g., Gibson-Graham, 2006)–that lead to non-monetary realizations of price (e.g., barter). Thus, one of the key points that emerge from my research is the need to raise new questions about price realization. Questions that may include: what is a price when barter is the practice in play in a relation of exchange? Is the idea that prices are made in a process of realization not applicable to other forms of non-monetary exchanges like barter? Is there anything about barter transactions, which suggests that they might be less subject to the processes of price realization? Do the processes of price realization in situations like barter take a different form than the case of monetary exchange? The barter

exchange observed in this study, for instance, shows that even in the absence of monetary instruments, goods are qualified in practices of exchange in ways claimed by the price realization literature (registers of qualification, market devices, enactments of power relations). Thus, whether in situations of monetary or barter exchanges, goods are qualified in practices. It is important to note that there are still important questions that the instance of barter I observed could not answer. Consequently, I argue that fully appreciating the implication of barter for the price realization literature will require further research.

Chapter Four illustrates gleaning as another practice that happens within a series of moments of price realization and which raises additional questions for the price realization literature. How are we to understand the effects of gleaning on price realization considering the fact that the property relations with regard to gleaned goods (for which prices may later be realized) are not always clear cut? Using the examples of barter and gleaning, the thesis pushes the limit of the price realization literature. More importantly, it marks potentially useful areas for future research that can build on and expand the literature. These areas for future research include exploring the ways in which the processes of price realization instantiate themselves within bartering and gleaning exchange situations and how different or not those instantiations are compared to monetary price realizations.

Another key practice that emerges in this thesis and which pushes the limit of the price realization literature has to do with leasing of goods and the associated rental prices. The eighth moment of price realization demonstrates a situation in which beggars lease

monitor casings as seats. There, prices are realized in the form of rent. Although I did not have sufficient evidence to draw conclusions from the practice of leasing e-waste, one implication of this practice is, I think, in shedding light on the fact that rental price has not been discussed in the price realization literature. However, saying the price realization literature has not looked at rental price is not to say that it cannot deal with leasing and rental prices. Perhaps, that it has not done so is a limit to what the price realization literature is useful for in following the processes of price realization for a commodity like e-waste. For instance, in the moment of leasing and realizing rental prices, I show that there are a particular group of beggars for whom Agbogbloshie is a regular territory, and those for whom it is not. Thus, in the conditions and practices of leasing, one might want to ask how those for whom Agbogbloshie is a regular territory defend their space or maintain access to it so that they can be able to realize rental prices for the monitor casings they lease. Also, how do the traders for whom Agbogbloshie is not a regular territory negotiate to gain access? How do these negotiations of space relates to the creation of market stales in both the scrap and food markets? These questions, I argue, while obviously important are beyond the purview of my research. However, if I wanted to deal with the moment robustly and follow up on leasing transactions at Agbogbloshie, I would have had to entertain different kinds of questions like control of space, ethics and injustice in play, and whether control over spaces of renting are maintained by violence. To this end, I argue that this moment of leasing and rental price which the thesis sheds light on is relevant for the price realization literature insofar as it calls for entertaining different questions and research directions that cross the boundaries and edges of the

existing literature (Lepawsky & Mather, 2011).

The third contribution of this thesis is that it writes and opens a space for conversations between the price realization and waste studies literature. Exploring questions about the processes of price realization, I refer to Hetherington's (2004) idea of absent presence in disposal practices to understand and address some of the practices that happen in the processes of price realization for e-waste. The notion of absent presence I show is particularly relevant because it enables me to explain the effect certain absences have in the processes of price realization. For instances, in the moment of price realization four where prices are realized at the barrier post near Agbogbloshie, the absence of storage spaces for itinerant traders have an effect on the calculative modalities in play in how and which prices S&D are able to realize for their goods. That is, storage space, as something that S&D do not have access to matters in that, in not having access to space, space has presence or tangible consequences as an absence, which I show is negative for the price they realized. Again, in the moment of price realization five, in the testing processes of qualifying goods for their price to be realized, there is an absence of a third party organization that will verify the testing result and adjudicate competing claims that may arise about the result. In the absence of a third party organization to supervise and make accountable the testing practices, shop owners at Agbogbloshie who administer and supervise the testing of the equipment are able to solely qualify a good, mainly to their advantage and have more say in the price that is eventually realized. Absent presence here, therefore, helps explain the arrangements that enact unequal power relations. Crucially then, that I called on the notion of absent presence in waste studies to

understand certain practices in the processes of price realization for e-waste points to the potential for useful discussions between the price realization literature and waste studies.

Fourthly, by demonstrating a different way that colonialism is in play in e-waste trade, this thesis draws an important lesson from asking questions of price realization. To the extent that the e-waste literature has talked about colonialism at all, it has been around the notion of toxic colonialism (Greenpeace, 2008; BAN, 2002, 2005; Pellow, 2007). With toxic colonialism, places like Agbogbloshie remain in subordinate positions with regard to e-waste trade because it is claimed that e-waste is dumped on marginal populations, thus causing environmental injustice. Bracketing the merits and demerits of the debate about toxic colonialism, this thesis provides evidence that there are other alternative ways in which colonialism is relevant in e-waste trade. Through the use of an Avery scale (a tool that only came to Ghana because of colonial encounters), I show colonial encounters occurring through the use of a pragmatic tool. Specifically, I show that colonialism continues to be relevant in banal ways in everyday practices of trading e-waste and not only in toxic dumping. One implication of this alternative enactment of colonialism in e-waste trade is that it alludes to claims by the emerging body of work that is rethinking popular narratives of and about e-waste (Lepawsky & Mather, 2011; McNabb, 2013; MacBride, 2011; Gabrys, 2011; Lepawsky, 2012, 2014).

Finally, the findings from this thesis make a key contribution to the broader waste studies literature by questioning the idea of waste commons as a necessarily good policy direction. Lane (2011) advocates for waste commons as a strategy for achieving a resource recovery waste regime. In her work, she shows that allowing and encouraging a

commons through curbside bulk waste exchanges promotes practices of gifting and gleaning while at the same time diverting more items from landfills, as well as promoting the recycling of a wide range of materials. The thesis shows that the ambiguous property relations in play about the land on which the Agbogbloshie scrap market sits allows for some form of waste commons to operate. The commons then enable young women and beggars to glean for the remainders of itinerant traders and realize prices for these items. However, the conditions in which waste commons are in play at a place like Agbogbloshie questions celebrating commons as an inherently 'good' strategy to promote. For example, as a waste common, others (young girls working as head porters and roadside beggars) are able to glean for the reminders of itinerant traders at the Agbogbloshie scrap market and make a living from it. At the same time, the conditions at Agbogbloshie that enable this gleaning to occur (and thus a waste common to operate) poses serious health hazards and supports highly problematic practices. The question that the waste commons at Agbogbloshie begs is: how do we balance the positive aspects of waste commons with the fact that it may occur in situations that pose significant health risks to those that partake in the commons? How do we reconcile issues of gender (e.g., poor young girls working as head porters) and age (child labour, older scrap merchants buying from younger itinerant traders) that thrive with and in the commons? In pointing out a concrete case of waste commons in play in a very particular way, this thesis adds usefully to the broader waste studies literature by not foreclosing a waste common as automatically being a good strategy for waste management in similar ways that recycling has been presented in the literature and policy circles as inherently positive (see

Ackerman, 1997; MacBride, 2011; McNabb, 2013). Here too, there is potential for further research to document the peculiarities of waste commons in play in different places and under different conditions in order to develop richer policy directions around commons.

Overall, my research shows that there are important lessons to learn from examining the processes of price realization for non-standardized commodities such as e-waste. Up until now, much of the interest in processes of price realization has been within studies of financial markets and standardized commodities. Focussing on the processes of price realization for e-waste, my research not only extends the idea of price realization to study a non-standardized commodity, it raises questions about the notions of price realization itself which if further explored could push the price realization literature in interesting directions.

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