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**Potential contribution of using voluntary agreements to manage
informal sector pollution in Zambia: the case of Lusaka's Soweto and
City markets**

by

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**Submitted in partial fulfilment of the requirements for the degree of
MSc Agric (Agricultural Economics)**

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Development
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DECLARATION OF ORIGINALITY

I hereby declare that the dissertation I submit for the degree of MSc Agricultural Economics at the University of Pretoria is my own work and that it has not been previously submitted by me for a degree at this or any other institution of higher learning.

Signature.....

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Date.....

Approved by:

Signature.....

Dr. E.D. Mungatana

Date.....

DEDICATION

This research thesis is humbly dedicated to God the Almighty for endowing me with the required knowledge and every necessary provision needed for the accomplishment of this work. If not for His Faithfulness and Mercy on me I would not have been able to achieve the slightest bit of this success.

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ABSTRACT

After several decades of rapid urbanisation, population growth and industrialisation, most developing countries have now become home to the rapidly increasing informal sector's polluting activities. With marked failures in their use of traditional Command and Control (CAC) legislation, limited technical and fiscal environmental protection resources coupled with weak environmental protection, complimentary judicial and legislative institutions, it has become necessary for these countries to look somewhere else for environment regulation policy. This study evaluates potential contributions of public-led voluntary agreements programs in the control of informal sector pollution in Lusaka's Soweto and City markets in Zambia.

The study employs Binary Logistic Models to establish factors critical to the successful implementation of environmental management voluntary agreements in the two markets. It also uses the Contingent Valuation Method (CVM) to assess and estimate traders' Willingness to pay (WTP) for proposed improvements to cleanliness in the markets. The

main empirical data for the study was collected by means of a questionnaire survey of 93 traders in the two markets and supplemented by semi-structured interviews.

The study finds that indeed voluntary agreements have a potential to control informal sector pollution in developing countries like Zambia. The study also finds that while the informal sector significantly contributes to urban pollution, they are hamstrung by lack of capacity to control their own pollution. The absence of adequate regulatory enforcement and appropriate incentives in terms of waste bins and cleaners in these markets seriously militate against the sector's limited efforts in implementing positive environmental management in these markets. The traders' mean willingness to pay (WTP) for the proposed improvement to cleanliness in the two market is K483,384 per trader per year while the total WTP of all the traders in the two markets is K1,208,460,000 or K1.2 billion per year. As a proportion of the traders' average annual income, the mean WTP amounts to 0.8%.

The study concludes that deliberate interventions with the aim of enhancing their capacity are necessary. In this regard specific recommendations have been made for policy intervention in specific key areas, namely; the provision of appropriate incentives in form of increasing the number of waste bins and cleaners in the markets together with supporting organisational structure and efficient services in terms of frequent removal of waste from the markets by the local authority; the expansion and strengthening of the physical presence of regulatory and enforcement agents in these markets and finally; the building of a shared understanding among the traders of the need for maintaining a clean and environmentally conducive market area through continued sensitisation programs in these markets

Key words: Voluntary agreements, Informal sector pollution control, Willingness to pay, Soweto, City, markets, Zambia.

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LIST OF ACRONYMS

CAC	Command and control
CBD	Central business district
CBEs	Community based enterprises
CSO	Central statistics office
CSR	Corporate social responsibility
CV	Contingent valuation
CVM	Contingency valuation method
DBZ	Development Bank of Zambia
EA	Environmental assessment
ECZ	Environmental Council of Zambia
EIS	Environmental impact statement
EPA	Environmental Protection Agency
EPB	Environmental project brief
EPPCA	Environmental Protection and Pollution Act
FNDP	First/Fourth National Development Plan
GRZ	Government of the Republic of Zambia
GTZ	Gesellschaft fur Technisch Zusammaarbet
IID	Independently and Identically Distributed
LCC	Lusaka City Council
MCTI	Ministry of Commerce, Trade and Industry
MDGs	Millennium development goals
MENR	Ministry of Environment and Natural Resources
MSW	Municipal solid waste
NCS	National conservation strategy
NEAP	National environmental action plan
NGOs	Non Governmental Organisations
NSWMS	National solid waste management strategy
POPs	Persistent organic pollutants
PPP	Polluter pays principle
PROPER	Program on Pollution control, Evaluating and Rating
SI	Statutory instrument
SID	Small industries development
SIDO	Small industries development organisation

SP	Stated preferences
VA	Voluntary approaches/agreements
VIS	Village industries services
WMD	Waste management division
WTP	Willingness to pay
ZCSMBA	Zambia Chamber of Small and Medium Business Associations
ZDA	Zambia Development Agency
ZMK	Zambian Kwacha – the local currency

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Environmental regulatory policy instruments are usually categorised under three common criteria; whether or not they dictate the polluter's abatement decision or just simply create some form of financial incentives to motivate abatement measures; whether they require the regulator to monitor and control emissions and; whether they involve government intervention through investment in abatement structure (Eskeland & Jimenez, 1992:146). Further, policy instruments under which abatement measures are dictated are called "Command and Control" (CAC) and policy instruments providing some form of financial incentives to motivate polluters to undertake abatement measures are called "Economic incentives" instruments. Policy instruments requiring government agencies to directly monitor and control emissions are referred to as "Direct" policy instruments while those that don't require monitoring are known as "Indirect" policy instruments (Blackman, 1999:2).

Added to the above taxonomy is a new class of "information-based policies" which has been receiving increasing attention (Blackman, 1999:2). This class covers policies which depend on the dissemination of information on polluters' environmental performance including the impacts of their polluting activities on health and the environment, to the public, as a way of influencing the public's reaction towards the polluters. Based on reactions or feedback from the public or stakeholders who include capital markets, consumers, non-governmental organisations and community groups, these firms are put under pressure and forced to cut down on their pollution and as a result improve on their environmental performance.

Connected to the above information-based policies, is one of the most striking environmental developments of the 1990s. Under the emerging "Voluntary Approaches" or "Voluntary Agreements" to pollution control, firms make commitments to improve their

environmental performance above and beyond the levels required by law (Lyon Maxwell & Lyon, 2001:1). For example, most firms that participated in the “33/50 program” for reducing toxic chemical emissions in the US are those that had been successful in reducing their emissions even before this program. They participated in the voluntary program in order to further improve their environmental performance so as to enjoy free publicity, raised sales and cut down on transaction and environmental compliance costs (Maxwell & Lyon, 2001:11). This over compliance is achieved after provision of incentives by regulators as opposed to mandates, in order for polluters to cut down on their pollution (Hanna, in Blackman, 2008:119). While direct regulation can be forced upon the polluters without their consent, voluntary agreements on the other hand require mutual acceptance of terms between the regulator and the polluters (Nyborg, 2000:125).

According to Blackman (2008:119); Marsiliani and Renstrom (2004:1), the common forms of voluntary agreements instruments in use today include; unilateral commitments made by firms; environmental negotiated agreements between the polluters and the regulator; public-led programmes (usually run by either the regulator or appointed third party) to which individual polluters are invited to participate in and; the public disclosure also known as informational based programs under which information on participants’ environmental performance is collected and disseminated to the public so as to influence their behaviours based on the pressure from the public.

This study evaluated the potential contributions of public-led voluntary agreements programs in the control of informal sector pollution in Lusaka’s Soweto and City markets. In particular, the study evaluated the potential contributions that specific voluntary agreements between the traders operating in the above markets and the Lusaka City Council as the regulator can make to the improvement of the *peri-urban* waste management system currently employed in the above two markets. The Soweto and City markets makes for an appropriate context for this study in that the size and composition of informal sector activities in the two markets is the largest in the country making it possible to select a representative sample for the study.

Another development in the effective use of environmental management policy instruments is the application of policy mix approaches in environmental regulation. According to Persson (2006:214), the growing awareness for the requirement to combine environmental regulation instruments in a policy mix arises in the light of the number of reasons. First are the potential benefits from policy mixes against limitations observed in single instrument approaches in general. Second, when considered from an instrument study point of view, it has been observed that 'mono-instrument' approaches are simply unattainable due to inevitable inter-linkages and complementarities of most instruments in reality. Third, Lehmann (2008:9) points out that a policy mix approach for example, becomes an alternative in cases where the implementations of single, first-best policy initiatives have higher transaction costs. This also applies in cases where it has become evident that there are high chances of polluters not likely to comply with a given policy or where marginal pollution damages are heterogeneous. In many African countries today, informal sectors have been growing rapidly during the last decades mainly due to population growth, rural-urban migration or both, accounting for over 50% of urban labour force (Ranis & Stewart, 1994:278). In Zambia for instance, only 11% of the total labour force is engaged in formal employment, leaving the 89% either unemployed or employed in the informal sector (World Bank, 2010:3).

Though usually characterised mainly as street vendors, the informal sector engage in a number of economic activities that are highly polluting. Considering their sheer number, their total polluting impact could be significant (Blackman, 1999:2). Perera and Amin (1996:10) however caution that generalizations of their environmental impacts may be misleading since in most developing countries, much of their activities are usually retail-oriented, creating minor pollution problems beyond common litter and congestions.

Some types of informal production methods have been found to be more pollution-intensive than formal sources, mainly due to their use of inputs inefficiently; they lack pollution abatement equipment and often have no access to sanitation facilities. In most cases, the polluters themselves usually have little or no knowledge of the consequences of their polluting activities on health or the environment. Informal sources are also seen

to be very competitive in that barriers to entry in their industry are seen to be low. As a result, the competition puts these firms under pressure to reduce costs by all means through their use of unclean production methods without considering the environmental impacts of their activities. Since they are usually located in the major poor residential areas, their generated pollution directly affects huge populations (Kent, 1999:9-11).

Eskeland and Jimenez (1992:154) on the other hand, note that in most developing countries, several factors including; institutional, political and financial hamstring environmental regulation. This is because technical and fiscal environmental protection resources are usually limited, while environmental protection and complimentary judicial and legislative institutions are weak. In addition, public sentiments usually favour economic development over environmental protection or advocacy. In their study conducted in Zambia, Siaminwe, Chinsembu and Syakalima (2005:1047) also attribute lack of suitable legal frameworks, economic instruments and appropriate institutional and organisational structures to poor environmental performance in the formal sector. They add that reliance on directive-based regulation could not suffice, instead a shift to the use of policy instruments that shift responsibility from government to the industry is proposed. In the same vein, Blackman and Harrington (2000:39) observe that conventional regulatory policies are impractical in developing countries, even when applied to big formal firms. This is because as earlier noted, most of these developing countries lack the capacity to detect, quantify emissions and accordingly impose necessary sanctions to polluting firms.

Finally, Kent (1999:11) concludes that if conventional regulatory instruments cannot be applied to formal firms in developing countries, then clearly they would not be suitable for the informal sector. Blackman and Harrington (2000:39) also add that controlling informal sector pollution is especially difficult even by developed countries' standards. This is because these firms are very difficult and costly to monitor as they are not only numerous and small, but are also dispersed over large areas. Further, they are also said to sustain a large proportion of the urban poor, and hence, may appear to both the public and regulators as an insignificant target to regulate compared to bigger firms.

Considering the above challenges, implementation of conventional regulatory policies on developing countries' informal sector is difficult if not impractical. Based on the above discussion, it seems reasonable for environmental policy to consider searching for other promising approaches for informal sector pollution management.

1.2 PROBLEM STATEMENT

Based on its 2004 Strategic Municipal Solid Waste Management Plan, the Lusaka City Council introduced two new waste management and pollution control systems – the *Conventional system* and the *Peri-urban system*, employed in both the residential and commercial areas. Under the *Conventional system*, the local authority established partnerships with private waste management companies. To facilitate this intervention, the city was divided into specific waste management districts (WMD), where waste collection is out-sourced to the private waste management companies through franchise contracts. A franchise contract provides a private waste collector with the sole right and obligation to collect and transport waste from all premises in a franchised waste management district. The waste collector awarded with a franchise contract is responsible for setting and collecting waste fees for the services provided, subject to the ceiling set by the local authority. Finally, the waste collector determines the type of waste receptacles (bags, bins or containers), for use subject to the approval of the local authority. Depending on the WMD, fees for low-density areas are higher than those in high-density areas.

On the other hand, under the *Peri-urban system* employed mainly in high density areas, waste collection is the responsibility of the Lusaka City Council. However, in order to provide an effective service, the local authority has partnered with local stakeholders called Community Based Enterprises (CBEs) or market committees in the case of markets. The partner CBE is responsible for the day-to-day management of the waste scheme in a given area. In these areas, which include the two markets in our study area, waste is collected through large and small containers placed in various locations

and picked up for emptying by the local authority periodically. The responsibilities of the CBEs or market committees in this case include; conducting community awareness and education programs on the waste collection services; at all times ensuring that their settlements are clean; all waste generators are part of the waste management scheme and; collecting waste collection levies which are also used to finance the operations of the CBEs. In both systems above, the local authority employs inspectors to monitor the systems. It also subsidise the waste generator's fees for the waste collection services and the private companies' fees towards the use of the local authority's main waste disposal area.

However, the above municipal solid waste management policy reforms which were meant to revolutionize informal sector pollution control have failed to achieve a higher standard of environmental management and cleanliness in the city. The failure of the reforms are largely due to the fact that franchise contractors under the conventional system still face a number of institutional and technical constraints such that, at the moment, they can only collect up to 22% of their total waste collection targets. On the other hand, the Lusaka City Council which operates the peri-urban waste management system has problems in enforcing its own By-laws due to lack of institutional capacity to do this and this has not helped improve compliance levels in the high density areas and markets where it is used. Therefore, implementation of conventional regulatory policy on the informal sector has also proved difficult in Zambia. This growing failure in the use of traditional command and control (CAC) measures in developing countries therefore suggests that informal sector pollution control policy requires novel and innovative approaches.

In a contribution to solutions for the problem of informal sector pollution control, Blackman (2008:119) begins by acknowledging that there have been few case studies on policy instruments meant to address informal sector pollution problems in developing countries. In the article *"Can Voluntary Environmental Regulation Work in Developing Countries? Lessons from Case studies (2008:119-141)*, Blackman concludes that though admittedly few in number, these case studies nevertheless suggest that

although voluntary environmental regulation may be seen as a relatively new and risky phenomenon in developing countries, it is by no means doomed to failure. This is because of its observed success in developed countries, which include reduced abatement and regulation enforcement costs and positive welfare effects on polluters.

Although the above Blackman findings and policy recommendations based on similar ideas find resonance in international practice, they despite their popularity around the world have limited empirical support in Africa. It is not clear for instance to what extent they can be applied in African developing countries. Put differently, there is lack of independent evidence to support or challenge their application in Africa. Specifically, under what conditions will voluntary regulation bring out positive outcomes, given the institutional and organisational challenges observed in most African countries like Zambia on the one hand, and the political, economic and social-cultural framework within which the informal sector operate on the other? The above questions present a knowledge gap. This study therefore sought to evaluate the potential contribution of public voluntary agreements programs in the control of informal sector pollution in Zambia. In particular, the study evaluated the potential contributions that specific voluntary agreements between the traders operating in the Lusaka's Soweto and City markets and the Lusaka City Council as the regulator, can make to the improvement of the *peri-urban* waste management system currently employed in the above two markets.

1.3 STUDY HYPOTHESIS

It is hypothesised that voluntary agreements on informal sector pollution control in developing countries could bring out positive results if factors outlined in empirical literature as critical to the successful of this policy instrument are put in place.

1.4 OBJECTIVES OF THE STUDY

In order to address the above problem statement and taking the peri-urban waste management system as a baseline, this study was guided by the following specific objectives;

- To identify voluntary measures that traders (as polluters) in the above markets would be willing to undertake to improve on the peri-urban solid waste management system above and beyond the current baseline.
- To establish appropriate incentives and institutional arrangements that the Lusaka City Council as a local authority and other stakeholders can implement to motivate the voluntary measures determined in the first objective above.
- To assess and estimate the market traders' willingness to pay for a proposed improvement in the cleanliness of the Soweto and City markets of Lusaka using the Contingent Valuation Method (CVM).

1.5 IMPORTANCE AND BENEFITS OF THE PROPOSED STUDY

From a theoretical and academic perspective, this study makes a contribution towards the debate on the potential contribution that public voluntary agreement programs can make to informal sector pollution control. At the empirical level it seeks to define local conditions under which voluntary agreements can be successfully implemented in the Zambian context.

Further, as far as it can be determined, this is the first study on public voluntary agreements programs on informal sector pollution control in Zambia that attempted to determine how the above proposed regulation can work. In particular, it sought to provide answers to the specific questions that lie at the interface of the informal sector and pollution control in Zambia. Answers to these questions would have profound implications not only on the future design and implementation of informal sector pollution control policy instruments, but will also enhance the informal sector polluter's economic growth and improve environmental management in Zambia. Like many other

African countries, the Zambian government has, with support from cooperating partners, been promoting environmental protection reforms, of which strengthening of local capacity to design, manage and implement sustainable environmental management programmes is the major plank (Siaminwe *et al.*, 2003:1038).

1.6 DEFINITION OF KEY TERMS

Below are the definitions of key terms used in this study;

Informal sector

For the empirical purposes of this study, enterprises with five or less workers including the owner-operator, and have no solid legal rights, lack access to credit, property rights, and have little capital, will be considered as belonging to the informal sector. They include but will not be limited to artisans, market vendors and professionals like auto mechanics. They supply different types of goods and services predominantly using manual labour and handmade tools.

Environmental policy mixes

Environmental policy instrument mixes will mean the application of a given combination of policy instruments, from pollution charges, subsidies and any other form of voluntary regulation approaches in the control of pollution (see section 3.3).

Voluntary Regulation or Voluntary Agreements

Voluntary Regulation shall refer to situations where incentives and not mandates for pollution control are provided to polluters in order for them to control their pollution. The four main forms of voluntary regulation instruments are;

- *Negotiated Environmental Agreements* which are created out of a dialogue between regulators and the industry, usually containing a specific targets to be attained and a time frame for reaching the specified targets, associated penalties for non compliance and subsidies to motivate abatement. (see section 3.2.1)

- *Public voluntary programs* (often administered by regulators or third parties) in which the participating firms have to agree to standards that are developed by public bodies such as local or national environmental agencies and commit to reducing their emissions in the process given specific incentives. (see section 3.2.2)
- *Unilateral commitments* by the industry include all business-led corporate environmental programs to reduce their own emissions without any pressure or coercions from the regulators. Implementation is normally done after consultations with state environmental agencies. (see section 3.2.3)
- *Public Disclosure (or Informational-based) programs* involve providing training to participating firms, collecting and disseminating information on participating firms' environmental performances including related health effects of their polluting activities and making this information public so as to attract public pressure that might force them to control their pollution. (see section 3.2.4)

Pollution Subsidies

Pollution Subsidies (or Green subsidies) will mean the provision of financial incentives or subsidies to firms who adopt environmentally friendly production processes by using environmentally clean input and producing environmentally clean outputs.

Pollution charges

Pollution charges on the other hand refer to levies applied on firms to compensate for the damages to the environment caused by their polluting activities.

Contingent valuation method (CVM)

Contingent valuation method is a survey approach designed to create the missing market for public goods by presenting consumers with a choice situation in which they have the opportunity to pay for or sell the public goods in question (Pearce and Ozdemiroglu *et al*, 2002).

Willingness to pay (WTP)

A way of revealing an individual's preference for a given environmental good or service, by placing a value on it. In a market place, WTP is made up of two components: the actual price and the excess of WTP over the price (Pearce and Ozdemiroglu *et al*, 2002).

A detailed treatment of definitions of the above terms will be addressed in the literature review that follows.

1.7 ORGANISATION OF THE THESIS

This thesis comprises six chapters. The rest of the thesis is organized as follows; Chapter one is an introduction to the study, while Chapter two is a descriptive account of the study area. The economic, demographic, environmental regulatory framework and the socioeconomic characteristics of the informal sector and their impact on pollution are presented. Chapter three reviews theoretical and empirical literature on the subject of voluntary regulation, applied to environmental management and informal sector pollution control. Chapter four addresses the research design together with all relevant methodological issues related to the study. Research results are presented and discussed in Chapter five, while the conclusion and policy implications of the study are presented in Chapter six which is the last chapter of the thesis.

CHAPTER 2: AN OVERVIEW OF ZAMBIA'S ENVIRONMENTAL MANAGEMENT REGULATORY FRAMEWORK AND POLLUTION CONTROL

2.1 INTRODUCTION

This chapter is a descriptive account of the environmental management empirical context in Zambia. It is arranged in eight sections as follows; Section 2.2 provides an overview of the Zambian Environmental regulatory framework. Section 2.3 presents the broad contexts within which the informal sector in Zambia and informal sector pollution control exists and are conceived Section 2.4 takes a look at the Lusaka City Council's solid waste management and pollution control system. Section 2.5 outlines the two formal waste management and pollution control strategies employed by the Lusaka City Council one of which is used in the Soweto and Lusaka City markets which are the two study areas. Section 2.6 highlights salient features of the Soweto and Lusaka City, the two markets from which the sample of the study was drawn. Concluding comments follow thereafter.

2.2 THE ZAMBIAN ENVIRONMENTAL MANAGEMENT REGULATORY FRAMEWORK

The environmental regulatory framework in Zambia follows a three tier system. The Ministry of Environment and Natural Resources provides for the overall broader policy framework within which all environmental and natural resource management related regulation falls. Based on this broader framework, the Environmental Council of Zambia, a statutory body created under the act of parliament as the regulator, drafts specific environmental management policy instruments for implementation by respective municipal or local authorities. In addition, there are other pieces of legislation that deal with environmental issues in general and pollution control in particular. The following section highlights some of these important pieces of legislation.

The pieces of legislation are the Local Government Act Cap 281, the Town and Country Planning Act Cap 283, the Markets Act Cap 290, Public health Act Cap 295 and the Environmental Protection and Pollution Control Act 204. It should be mentioned however, that these laws are not exhaustive as more other policy instruments contain specific provisions to deal with environment issues although the laws mentioned above are the key ones with regards to this study. The above laws are implemented by different government institutions while local authorities like the Lusaka City Council implement most of them through its provision of social services.

The Local government Act – Cap 281 is the principle law which provides for an integrated local administration system and also defines the functions of the local authorities. The statutory duties of the council/local authority are provided for in the second schedule of the Local Government Act and includes various aspects of the urban environment. One notable among them is that of establishment and maintenance of sanitary services for the removal and destruction of, or otherwise dealing with, all kinds of refuse and effluence, and compels the use of such services.

The Markets Act of Zambia – Cap 290 regulates the establishment and operation of markets in Zambia. Section 5 of the Act provides for the local authorities like the Lusaka City Council to make by-laws for markets within their jurisdiction. With regard to waste management and pollution control, the Lusaka City Council has made specific by-laws regarding the running of markets in the city. The Lusaka City Council Markets By-laws specifies requirements and rules for all markets within its boundaries. The by-laws in section 3 in particular, establish a position of a Market Master to be in charge of market operations at every market. Section 5 empowers the Market Master to collect charges including those to do with market cleaning as determined by the local authority. The by-laws further empowers the Market Master in relation to amongst others, waste management and pollution control matters, indicating (in section 6) that; “*...All persons using any market shall obey the reasonable direction of the Market Master for the purpose of preserving cleanliness and order in the market.*”

The Town and Country Planning Act – Cap 283 makes provision for the appointment of planning authorities and the establishment of a Town and Country Planning Tribunal. Important to our study is the fact that the Act provides for the protection of the environment from any form of development and business activities. The Public Health Act – Cap 295 provides for the prevention and suppression of diseases and general regulation of all matters connected with public health in Zambia. The Public Health Act deals with various aspects including Sanitation and Housing, Infectious disease control, drainage and building regulations. It also deals with the control of any accumulation or deposit of refuse, offal, manure or other matter whatsoever which is offensive or which is injurious or dangerous to health in general.

Finally, the Environmental Protection and Pollution Control (EPPCA) act- cap 204 is the main and important piece of legislature which provides for the protection of the environment and the control of pollution in Zambia. It also provides for the establishment of the Environmental Council of Zambia (ECZ) and prescribes the functions and powers of this council. The ECZ has a number of powers prescribed under this Act which have to do with the protection of the environment which in this case refers to land, water, air and other external influences and conditions which affect the development and life of all organisms including human beings. Pollution under the EPPCA means the presence in the environment of one or more contaminants in such quantities and for such duration and under such conditions as may cause discomfort to or endanger the health, safety and welfare of persons, or which may cause injury or damage to plant or animal life or property, or which may interfere unreasonably with the normal enjoyment of life or use of property or conduct of business. More specifically, ECZ has the mandate to establish pollution control and management standards for water, air, waste, chemicals, natural resources conservation, and land etcetera.

The EPPCA also premised on the Polluter Pays Principle (PPP) and is by and large – a command and control legislation with various licenses provided for and environmental inspectorate established to ensure compliance with the law. In particular, section 48 empowers the Environment Council of Zambia to give specific or general directions to

local authorities or district councils regarding their functions relating to pollution control in general and the collection and disposal of waste operations under the Local Government Act referred to above in particular. Under the EPPCA, there is provision for the Environmental Council of Zambia to develop legally binding regulations or secondary legislation. Among the regulations are Waste Management Regulations, Hazardous Waste Management Regulations and the Environment Impact Assessment Regulations.

2.3 THE ZAMBIAN INFORMAL SECTOR AND INFORMAL SECTOR POLLUTION CONTROL

The year 2008 saw more than half of the world's population living in the urban areas. Current projections estimate that this will rise to 70% by 2050, with most of the growth taking place in developing countries, principally in the regions of Africa, Asia and Latin America. The outcome of urbanization had been and continues to be a fundamental change in the socio-economic environment of human activities and life style (Fay & Opal, 2000; Kessides, 2006 cited in Ouma, 2010). Be it rural or urban, the informal economy comprises of small-scale enterprises which produce and distributes basic goods and services to unregulated and competitive markets that lie outside the regulating frameworks of either national or local government (Ouma, 2010:3).

The 2010 census results indicate that the Zambian urban population grew from 35% in 2000 to now 39% in 2010. Lusaka city, our area of study, has about 86% of its population residing in the urban area, being by far the most urbanized in the country and hosting the largest proportion of the informal sector (CSO, 2011). Predictions in the rise of unemployment are said to be severe for the youths, mainly school leavers from high and tertiary levels of education. These continue to find it increasingly difficult to find work of any kind and will have an impact on the growing urban informal sector (Todd & Shaw, 1980:410). As a result, the Zambian informal sector will continue to face great pressure to continue expanding, in order to accommodate this influx.

2.3.1 Empowering the informal sector and evolution of policy in Zambia

In 1979, the Zambian government unveiled its Third National Development Plan (TNDP) which was to guide policies regarding the problem of unemployment, in particular in the urban area. According to the TNDP, the problem of unemployment was to be overcome by an expansion in self-employment opportunities through a deliberate and ambitious government program (Todd & Shaw, 1980:411). Such was the enthusiasm for this new initiative that the absence of reliable information surrounding the nature and magnitude of the informal sector then was ignored. Under the TNDP, economic reforms encouraged indigenous entrepreneurs to establish small businesses and due to the unanticipated large size of the informal sector, unauthorised areas witnessed the major expansion, overshadowing licensing and the rigid enforcement of hygiene rules in the process (Todd & Shaw, 1980:425). The informal sector then was essentially composed of small-scale businesses established by self-employed persons, often operated with no employees receiving cash.

In 1981, the Zambian government realised the importance of the informal sector and its potential contribution to the country's economic development, resulting in the enacting of the Small Industries Development (SID) Act Cap 18, meant to promote the informal sector growth (GRZ, 2009). Later and in an effort to enhance the growing sector's contribution to the national economy, government created the Small Industries Development Organisation (SIDO) to guide the growth of the informal sector. In its Fourth National Development Plan (FNDP) of 1989, government provided for the infrastructure to improve the operations of the informal sector and expand their access to credit. In particular, priority was given to those entrepreneurs that had shown growth potential, so as to increase their productive capacities, income levels and employment (GRZ, 2009). Resources to support this growth of the informal sector were made available through SIDO, the Development Bank of Zambia (DBZ) and the Village Industries Services (VIS) - another institution created to enhance the growth of the informal sector, which became the primary source of informal sector support.

2.3.2 Recent initiatives

The Zambian government has developed a policy document – The Micro, Small and Medium Enterprises Development Policy under the Zambia Development Agency Act Cap 11 of 2006 (GRZ, 2009). In this document, the government has committed itself to supporting the growth of the informal sector in a number of areas salient among them being; promotion of capacity building in entrepreneurship development. Other areas include innovation and technological capacity growth, access to market opportunities and credit, provision of appropriate operating premises and infrastructure and a generally favourable local economic operating domain. In addition, to provide conditions where their interests are fully represented and cross-cutting issues such as HIV/AIDS and gender as they relate to them are addressed (GRZ, 2009). While attractive necessary policies and legal frameworks are in place, successful implementation is yet to be seen following institutional and financial limitations among other setbacks.

2.3.3 Characteristics of informal sector activities in Zambia

Moving in parallel to the urbanisation process pointed out above has been a proportionate increase in informal sector activities. The need for survival in an environment of rising unemployment in the formal sector continues to draw thousand in many cities to invade these cities' unplanned open-spaces, and road reserves being the most preferred (Ouma, 2010). This situation is not any different in Zambia.

Past analyses of private sector competitiveness in Zambia have been hampered by their focus on the larger formal sector enterprises, ignoring the informal sector which employs over 70% of the total labour force, 47% of which are females (GRZ, 2009). In spite of the policy developments referred to above, the realities on the ground show that little is known to date on the actual performance characteristics of these firms and the actual constraints under which they operate. This has in turn made it difficult for policy makers, business houses and donors to effectively design and implement policies,

services and/or programs that can help improve their operations in general and address the impacts of their activities on the environment in particular (World Bank, 2010:3).

Of the 88% Zambians employed in the informal sector, 62% are employed in informal agriculture while the remaining 26% are engaged in other informal services, broken down as follows; 21% are in retail or wholesale trade, 3% in manufacturing with the remaining 2% in food and beverages businesses (World Bank, 2010:3). The major activities of the urban informal sector in Lusaka include but are not limited to artisans, traders of second hand clothes from Europe, Asia and South Africa, locally known as 'Salaula', sales of foodstuffs (both cooked and uncooked, fresh and non-fresh, including the staple food - nshima) and various beverages. Others include sale of various wares and farm inputs, including radios, wrist watches, cosmetics, jewellery, seeds, fertiliser; all sorts of car spares and accessories ranging from used car tyres to car stereos and windscreens. These activities normally take place in market stalls, in their homes, in unauthorised open spaces and on the streets when traffic slows down (Muuka, 2001:53). Currently, the Zambian informal sector absorbs men and women, youths and now increasingly college and university graduates.

2.3.4 Causes of Informal sector pollution

Todd and Shaw (1980:425) report that the size of the informal sector in Zambia under its First National Development Plan was beyond the licensing and the basic service provision capacities of most urban municipal authorities following the expansion of unauthorised areas and the resulting congestion in these areas. These high rates of urban informal sector growth pose enormous challenges for urban management, making it difficult for authorities to provide necessary services like markets, waste management and sanitation adequately. This undoubtedly resulted in the proliferation of un-serviced and generally unhygienic trading areas and settlements differently referred to as slums, squatter, illegal or informal settlements with severe environmental degrading implications (Jonnes & Nelson, 1999).

Further, financial challenges which limit their ability to acquire abatement equipment and clean inputs are among the major causes of informal sector pollution. Blackman and Bannister (1998:3) explain that faced with a daunting array of obstacles including financing constraints, results in their seeming indifference to the adverse environmental and health effects of their repeated use of cheap inputs. Closely related to this, is the inefficient use of clean inputs, where available. Finally, the absence of effective regulatory pressure in Zambia coupled with undue political pressure on the operations of local authorities in deterring pollution caused by the informal sector has also contributed to the continued pollution intensive activities.

2.3.5 Informal sector pollution control review of general regulation in Zambia

Zambia, like many other developing countries have only policies and strategies targeting pollution caused by large firms in the industries, but hardly has any coherent strategy or legislation targeting the special need of the informal sector. Kent (1999) also observes that most environmental regulation policies in developing countries do not differentiate between small and large enterprises as regards to pollution control. Orwa (2007:1) adds that many laws and regulations applied to the informal sector in many developing countries remain out of step with current realities and are often hostile to the growth of the informal sector. In most cases these laws often appear to be punitive instead of being facilitative. Below is the evaluation of the suitability of various conventional pollution control policy instruments on the informal sector as it applies to the Zambia environment;

(i) Command and Control.

While command and control measures can succeed in limiting waste emission into the air, water and on land, the problem of these instruments is lack of enforcement as the Zambian government agencies do not have the resources or power to police all the industry. Further, the idea of enforcing government regulation on the informal sector

runs counter to the spirit of the movement to support the growth of small-scale enterprises in developing countries (Kent, 1991:49).

(ii) Economic Policies

Although economic policy instruments have increased in popularity in recent years because they present several advantages in economic efficiency, they are difficult to apply in Zambia for the same reasons that command and control instruments present. Since economic instruments cannot be successfully implemented without pre-existing appropriate standards and effective capacities in monitoring and enforcement, for this reason they too can not be considered to be appropriate for the control of informal sector pollution, which is by far the most difficult to monitor and regulate (Kent, 1991:50).

(iii) Direct government expenditure on pollution control

Although efficiency argument for public intervention to mitigate pollution problem is well established in the theoretical literature of Baumal and Oates (Eskeland & Jimenez, 1992:147), Kent argues that the problem with such schemes, however is that devising ways to motivate the small firms to pay for the operating cost of waste treatment facilities provided by government investment or even for them to use such facilities at all has been a challenge (Kent, 1991:50). This is particularly true in the Zambian situation.

(iv) Cleaner production methods

Since pollution is considered as an indication of inefficient production methods which lead to wastage of resources, economic losses, poor working conditions and environmental degradation, Frijns and Vliet (1999:975), note that cleaner production as pollution preventive measure can be a more attractive approach for the industry than treatment of end pipe measures that add on cost. However suffice to say that cleaner production measures pose even more implementation challenges than those explained above when applied to the informal sector in Zambia.

The advantages and disadvantages of voluntary measure regarding pollution control have already been addressed in the preceding chapter. In Zambia, like many developing countries, the prevailing strategy is command and control based on the 'Polluter Pays Principle', whose limitations on the informal sector have already been addressed above.

2.4 AN OVERVIEW OF LUSAKA CITY COUNCIL'S WASTE MANAGEMENT STRATEGY AND POLLUTION CONTROL

The population of Lusaka city estimated from the recent 2010 census stands at 1,742,979 with about 368,364 households (CSO, 2011). The city has a density of 42,408 persons per square kilometre and is still the most urbanized and most populated district in the country. Lusaka has a projected population growth rate of 3.5% per annum. The population distribution shows that 67% of the population is found in peri-urban areas which are mainly low income, unplanned and in some instances informal settlements. The high income, low density areas house only about 15% of the population, while the medium density areas account for 13% of the population. Presently, about 70% of Lusaka's 1.7 million population lives in unplanned and un-serviced settlements. Early efforts at providing some reasonable level of service through schemes such as site-and-service and squatter settlement upgrading proved costly, slow and aesthetically disruptive of the garden-city character of Lusaka (LCC & ECZ, 2006:7).

The provision of solid waste management and pollution control services is one of the statutory functions of the local authorities in Zambia. However, the city of Lusaka has for a number of years experienced inadequate service provision in the areas of solid waste management and pollution control mainly due to limited institutional and technical capacity of the local authority. The net result of this situation has been the uncontrolled dumping, burying and burning of waste, littering of streets and general environmental degradation of the city. Provision of solid waste management in the city, over the years, has been conducted by both the formal and informal sector. This dual system has

mainly evolved in the period of inertia of the local authority. The following section describes the baseline state of both the industrial and household waste management.

2.4.1 Private sector involvement

The failure by Lusaka City Council, to adequately provide waste management services gave rise particularly in 1992 onwards to private sector involvement. Following the 1991 general elections, the new government started to implement economic policies that sought to liberalize and commercialize different sectors. The new political dispensation posed new challenges to municipalities and one of which was the reduction in grants from central government (LCC, 2003:57). For the private sector, solid waste management was a new area for most of them and their entry into this market was mainly exploratory with little capital investments made (LCC, 2003:59). In the absence of any plan for service provision, the private sector adopted an open subscription system which implied that only residents and organizations that were able to pay received the service. One dimension of this system was that clients who were ready to pay for services were not concentrated in one area but spread throughout the city. This system was not cost effective for the private contractors. Due to some of the factors alluded to above the involvement of the private sector did not significantly increase the service levels of waste collection (LCC, 2003:59).

2.5 THE NEW SOLID WASTE MANAGEMENT AND POLLUTION CONTROL SYSTEM

The Lusaka city's new solid waste management and pollution control system described below was designed against the above background. The Lusaka City Council in designing the new system recognized its own inadequacies particularly in the area of revenue collection. Further, the City Council appreciated the role that the private sector can play particularly if well coordinated in achieving the goals of the Lusaka Waste Management Project. The Lusaka city, however, was fully aware of the need to maintain a balance between public and private sector involvement in order to ensure that even

poorer communities who cannot afford economic charges are serviced (LCC, 2003:59). The new solid waste management system has two components – a franchise system for mainly conventional housing areas which are low to medium density areas, and a community waste management system for peri-urban and high density areas. These are briefly discussed below.

2.5.1 The conventional or franchise contractors waste management and pollution control system

For the franchise system, the city was divided into 12 Waste Management Districts (WMD), which are considered as service areas. These Waste Management Districts are made up of a number of residential, commercial and in some cases industrial areas. Each WMD is to be serviced on a zoned monopoly basis, meaning that only one selected contractor will be allowed to service a WMD. The potential market in terms of client base is large enough to allow for the growth and expansion of the selected contractors over time. While the franchise system will be private sector driven, the Lusaka City Council will continue to have overall responsibility for solid waste management. Further the contractors are expected to meet collection targets in each WMD agreed upon at the time of tending. Finally, the contractor in each WMD is expected to market the service, collect waste from subscribed clients, and transport the waste to the designated dump site, bill and collect service charges from its clients. Additionally, the contractor is required to pay an annual franchise fee to the Lusaka City Council in addition to the fees for the use of the official waste disposal sites for the Council. However, the franchise contractors' have failed to achieve their given goals in that their total waste collection represents only 22% of the waste entering the formal waste management.

2.5.2 The peri-urban waste management and pollution control system

The waste management system in the peri-urban areas and some high density areas is divided into primary and secondary collection. Communal waste collection points

(including the two markets of the study – Soweto and City markets) have been established in these areas where 15m³ containers, which provide for single handling of waste, have been located (LCC, 2003:60). The community members or traders in markets are required in this system to use the services of an intermediary or committees in terms of primary collection and this includes either Market Waste Management Committees or Community Based Enterprises (CBEs). These intermediaries provide primary collection using different transportation methods including carts and wheelbarrows, tractor and trailer, ordinary trucks etcetera (LCC, 2003:22). The community members or market traders pay for this primary collection and a component for secondary collection. The CBEs or the market Waste Management Committees have the responsibility of organizing and paying for secondary collection which is provided by the Lusaka City Council through the WMU.

In the case of the two markets under consideration, their market waste management committees employ a few workers who sweep the markets, collect the waste and transport it to the communal 15m³ containers. In order to maintain the fees paid by residents of peri-urban areas and markets at an affordable rate, the subsidized fee structure for secondary collection only covers operational costs while capital costs are covered by LCC. Currently the City council charges these communities or markets a fee of K200,000 per collection, which is daily in case of the markets or as required with the other communities.

The overall conclusion is that while there is an environmental management regulatory framework in place, both at national and local levels, it has no impact on regulating informal sector pollution for the following reasons. At both national and local authority levels, there is generally lack of capacity to enforce regulation. At national level, there are insufficient budgetary allocations and skilled staff to enforce the Environmental Council of Zambia's yearly mandates. Further, environmental protection and complimentary judicial and legislative institutions are weak. At the local authority level and with regards to the Lusaka City Council's new waste management strategy, the franchise contractors' failures stems from the private sector's lack of capacity in general.

For instance, while the franchise contracts have more vehicles than the council's waste management unity, their performance is far below the council's. Secondly some of the franchise contractors' vehicles are small and inappropriate for the waste management. Additionally, due to problems in accessing financial capital to purchase the right equipment, most of them employ second hand or used trucks and compactors. As a result they have a high downtime to cater for repairs and refurbishment. Finally most of these contractors seem to be undertaking these contractual obligations as "business ventures" and not in the real sense of "environmental management", hence there may be need to first acquaint them with this objective. On the part of the peri-urban system, the Lusaka City Council's lack of institutional capacity has led to its failure to enforce its own By-laws and as a result, this has not helped improve waste management and compliance levels.

2.6 AN OVERVIEW OF SOWETO AND LUSAKA CITY MARKETS

This study was conducted at Soweto and City markets of Lusaka, Zambia. Soweto and City markets are located in the central business district (CBD) of the city Lusaka. While the actual population of traders in the two markets is difficult to determine as earlier explained in chapter two, the population of the two markets is estimated at around 25,000 with approximately 10,000 traders trading at Soweto market.

In the above two markets, Lusaka City Council employs the peri-urban solid waste management system described above. The traders in these markets are required by this system to use the services of Market Committees appointed by the traders themselves, for primary waste collection. These committees provide primary collection using hired cleaners who are also responsible for cleaning the respective markets. In turn, market traders contribute a daily levy of K1,500 for this primary collection and partly for secondary collection which is heavily subsidized by the Council. The City Council further provides monitoring and supervision of the operations of these market committees through respective Market Masters who are employees of the City Council but located in these markets. The market committees have the responsibility of

collecting daily waste collection levies from traders, employ cleaners and pay for the market's contribution towards secondary waste collection. Secondary collection is the collection of waste from the markets to the official dumping sites, which in this case is provided by the Lusaka City Council through its WMU. In addition to subsidizing the fees paid for waste management, the council is also responsible for monitoring the performances of these waste management market committees for compliance both in waste operations and financial accountability.

2.7 CONCLUDING SUMMARY

This chapter has presented a mostly descriptive account of the empirical context in Lusaka in which the study is grounded. Salient features of this context include the geography, political history, economic profile and the social demographics of the City of Lusaka. It is a context characterized by rapid growth in urban population and informal sector activities, inadequate sanitation and solid waste management system, coupled with a weak environmental management regulatory framework. Further, it has also addressed the waste management strategy employed by the Lusaka City Council including that used in the Soweto and Lusaka City markets, which are the two study areas.

Lusaka makes for an appropriate context for this study in another more specific and pragmatic sense in that the size of informal sector activities in Lusaka is the largest in the country making it possible to select a representative sample for the study. Further, physical security in these markets appears to be relatively better, making it easy to undertake onsite surveys.

CHAPTER 3: THEORETICAL AND EMPIRICAL LITERATURE ON ENVIRONMENTAL MANAGEMENT VOLUNTARY AGREEMENTS AND INFORMAL SECTOR POLLUTION CONTROL

3.1 INTRODUCTION

This Chapter has two major objectives. The first is to present a conceptual framework for the study using concepts from the theory of Voluntary Agreements approaches (VA) to environmental management and pollution control. The second objective is to review the current state of theoretical and empirical literature on voluntary agreements regulation and informal sector pollution control. The aim is to identify key knowledge gaps and consequently articulate the agenda to which this study will contribute.

The rest of this chapter is organised as follows; Key concepts in environmental voluntary agreements are introduced in section 3.2. Section 3.3 discusses the theoretical relevance of environmental policy-mix approaches in general. Drawing on the proceeding sections, section 3.4 develops a conceptual framework on voluntary agreements in environmental management regulation. Section 3.5 examines the seminal thinking of Allan Blackman whose ideas on voluntary agreements and informal sector pollution have had a profound effect on the debate on informal sector pollution control in developing countries. Section 3.6 reviews empirical evidence on the use of voluntary regulation on informal sector pollution control in developing countries. Section 3.7 summarises the knowledge gaps in this area, articulates the study agenda and within that, the specific contribution of this study. A concluding summary follows in the penultimate section.

3.2 KEY CONCEPTS IN VOLUNTARY AGREEMENTS REGULATION

The traditional approach to the control of industrial pollution is to establish laws which require firms in the industry to reduce their emissions. On the other hand, voluntary regulation works through the provision of incentives as opposed to mandates in order to control pollution (Hanna, in Blackman, 2008:119). While direct regulation can be forced upon the industry without its consent, a voluntary agreement on the other hand requires mutual acceptance of terms between the regulator and the industry or polluters (Nyborg, 2000: 125).

The four forms of voluntary agreements instruments include (i) unilateral commitments made by firms; (ii) environmental negotiated agreements between the regulator and the industry; (iii) public voluntary programmes to which individual industrial firms will be invited to participate in; and (iv) public disclosure programs which collect and disseminate information about participants' environmental performances (Blackman, 2008:119; Marsiliani, L. & Renstrom, T.I., 2004:1). These are briefly discussed below.

3.2.1 Negotiated agreements between the regulator and the industry

Maxwell & Lyon (2001:2) define negotiated agreements as situations in which the regulator and the industry as the main actors both actively participate in writing the environmental regulation agreements. The agreements would often include specific environmental performance targets to be achieved by the industry and a given deadline to be met by the polluting parties. In addition, a third party monitoring (other than the regulator) may be included, with sanctions for non-compliance and pollution abatement subsidies or incentives for the complying firms (Blackman, 2008:128). In other words, both the industry and the regulator negotiate the environmental performance targets to be achieved and agree on abatement measures to be undertaken including the resulting costs. The regulator then provides incentives for abatement in exchange for compliance from the industry and applies sanctions for non-compliance, thereby providing both “carrots and sticks” in the process. In the interest of transparency and effectiveness, a

third party monitoring may be included (Blackman, A., Lahiri, B., Pizer, W., Planter, M.R. & Pinina, C.M. 2010:182).

3.2.2 Public programs administered by the regulator or third party

These are voluntary programs initiated by the regulator and administered by either the regulator or a third party on behalf of the regulator that require participating firms to attain prescribed environmental emission performance targets or procedural standards developed by regulator (Blackman, 2008:123). The regulator or a third party will often not impose or introduce new stiff regulation, but has authority to present to the firms an agreement which calls for a higher level of pollution cuts. Firms that accept this offer will have the background pressure or threat of regulation removed, resulting in a reduction in both transaction and physical costs of compliance on the firm and reduced enforcement cost for the regulator (Segerson & Micel, in Maxwell & Lyon, 2001:9). In other words, the program is initiated by the regulator and firms are only invited to participate in and may not have a say on the prescribed performance standards to be achieved.

3.2.3 Unilateral commitments made by firms

All industry, business or corporate-led environmental protection initiatives fall under this category. These are programs that are initiated and managed by the industry without cohesion from the regulator (Maxwell & Lyon, 2001:1). While often developed by companies and trade associations, such programs will only be implemented after consultations with relevant government agencies while the whole initiative of implementing the programs remain with the industry.

However, Maxwell & Lyon (2001:7) note that industrial firms have over the years become increasingly able to anticipate and predict the outcome of expected future laws and regulatory perspectives. As a result, some industrial firms' strategists are now able

to prepare in advance for the next likely wave of regulation and attempt to initiate proactive measures to shape any future regulations, instead of waiting for laws to be imposed on them. In the process, these firms develop the ability to pre-empt future regulation altogether by the means of “self-regulation” with the necessary stringency to frustrate environmentalists and in the process head off any demand for regulation from government. This of course is due to the fact that it is not easy for outsiders to infer the motives in any particular corporate-led initiative.

3.2.4 Public disclosure (or information-based) initiatives

Under these programs, the regulator collects and disseminates information on the industrial firms’ environmental performance to the public who in turn are expected to apply external pressure to defaulting firms in order for them to take corrective measures (Blackman, Darley, Lyon & Wernstedt, 2010:787). Two types of public disclosure programs are common. The first is where polluters report their own plant emissions without rating their own environmental performance. These reports are then used by the regulator to rate these firms’ environmental performance. The other form of disclosure uses emission data collected by the regulator from the firms to rate these firms’ environmental emission performance and later disseminate the results to the public as in the first instance (Blackman, 2010:241). The above instrument is considered to be under voluntary measure due to the absence of direct regulatory pressure, i.e. polluters volunteer to cut down their pollution not as a result of pressure from regulators

3.3 POLICY MIX APPROACHES IN ENVIRONMENTAL REGULATION

Lehmann (2008:9) explains that two rationales for using policy mixes in environmental regulation are; first, a policy mix is perceived as a remedy to correct for multiple reinforcing failures of private structures, in form of pollution externalities or technological slipovers. Second, a policy mix approach becomes an alternative in cases where the implementations of the single, first-best policy initiatives have higher transaction costs

or in the case where it has become evident that polluters are unlikely to comply with the policy or where marginal pollution damages are heterogeneous.

3.3.1 Theoretical perspective of policy mix approaches

According to Gunningham and Sinclair (1999:50), the vivid failure and limitations of both market-based and the main government approaches to environmental regulation have now become more and more apparent compelling policy makers to opt for a much wide range of policy initiatives. Swanson (cited in Gunningham & Sinclair, 1999:50) observes that despite a suit of environmental policy interventions far and broader than the conventional regulation, which can arise from the use of a mix of policy instruments, there still remains a common tendency of treating these policy initiatives as alternatives to each other and not as potentially complementary measures which are capable of being employed in combinations. Taking the argument further, Dover (1995:149) illustrates the single approach problem by explaining that predictably, economists will often focus on economic instruments, while lawyers or government regulators dwell on direct regulation, the industrial firms dwell on self-regulation with the scientists sticking to research.

The need for policy mix approaches arises in the light of the potential benefits from them against limitations observed in the single instrument approach. For example while command and control approaches are observed to be highly dependable and predictable if properly enforced, they are said to be largely inflexible and inefficient (Gunningham & Grabosky (1998: 2). In contrast, economic or market-based instruments which are seen to be efficient are in most cases often not dependable. Informational-based strategies, self-regulation and voluntarism on the other hand are seen as non-coercive, un-intrusive and in most cases cost-effective, but present the challenge of low reliability if applied in isolation (Gunningham & Young, cited in Gunningham & Sinclair, 1999:50). In a nutshell, the conclusion is that a better strategy should harness the strength of each individual mechanism while at the same time compensating for the

weaknesses of others through the use of additional or complementary policy instruments tailored to deal with specific policy goals.

However, Gunningham and Sinclair (1999:70) also caution that not all combinations have positive effects. They add that policy mixes can either be complementary as in a case of targeted informational campaigns to supplement self regulating initiatives, while a counterproductive mix would for instance combine uniform pollution control across the industry with pollution tax, which in this case would undermine the efficiency of the latter. Lehman (2008:5) notes that in addition to addressing multiple failures of private governance structures, policy mix approaches are also instrumental in reducing higher transaction costs arising from regulation with a single instrument. Policy mix approaches are also seen to reduce uncertainties against the background of imperfect information which renders first-best policies ineffective (Jonstone, n.d:3).

3.3.2 The application of voluntary agreements to a policy mix approach

The application of voluntary agreements to a policy mix approach is based on the resulting broader benefits outlined earlier. Persson (2006:213) notes that in searching for more effective policy instruments, the desire to combine instruments like the traditional command and control regulation, taxes and charges, tradable permits, informational-based measures, voluntary agreements in policy - mixes appear to have intensified of late.

This growing awareness for the requirement to combine voluntary regulation instruments with other policy mixes arises for a number of reasons; First, together with the emergency of the new environmental policy instruments like voluntary agreements and informational measures, many governments today are committed to adoption of a comprehensive and unbiased alternative environmental policy instruments. Such instruments provides regulation in policy development processes, both at aggregate levels or at specific environmental policy need areas, like in our current case of informal sector pollution control (Persson, 2006:214).

The second and perhaps more technical reason is the desire to achieve positive and synergistic interaction effects between instruments given the argument that most environmental problems are often too complex to lend themselves to a single strategy approach (Persson, 2006:214). Thirdly, when considered from an instrument study point of view, it has been observed that ‘mono-instrument’ study approaches are simply unattainable given the inevitable inter-linkages and complementarities of most instruments in reality. Finally the inclusion of voluntary agreements in a policy mix have become attractive in today’s pollution control given their welfare effects and cost reduction in abatement and regulation (Nybog, 2000:126; Marsilian & Renstrom, 2004:4).

3.4 VOLUNTARY AGREEMENTS IN ENVIRONMENTAL MANAGEMENT

After several decades of rapid urbanisation, population growth and industrialisation, developing countries have now become home to the world’s major polluting activities. (Blackman, 2010:234). With marked failures in the use of traditional command and control (CAC) measures like mandatory emission limits, use of costly technologies, market incentives etcetera; it has become apparent that these regulations are riddled with gaps and inconsistencies. In addition and as earlier noted, state regulating agencies in developing countries lack adequate funding, expertise and personnel to execute their mandates. Further, the political will required for allocating the needed scarce resources to environmental protection and enforcement is often limited. Finally, the “costly and difficult-to-monitor” small informal sector firms have been rapidly increasing over the years (Blackman, 2010:234).

Faced with these challenges, most developing countries, often with funding and guidance from cooperating partners are now increasingly experimenting with alternative pollution control strategies. They do this by moving away from policies that depend on direct regulation to issue mandates, monitoring compliances and sanction violations. Instead, they are increasingly moving to the use of informal-non-regulatory pressures

for environmental quality improvement - including those applied by many communities, consumers and capital markets in order to prevent and reduce pollution.

Voluntary agreements are crucial and can act as ideal vehicles for enhancing Corporate Social Responsibility (CSR) by the formal and informal sector firms, as an exercise of responsibility and accountability for the economic, social and environmental impacts of their business decisions and behaviours ((Hamann, R., Woolman, S. & Sprange, C. 2008:2; GTZ, 2009:9).

The use of Voluntary agreements has revealed notable advantages outlined by different studies which are crucial to informal sector pollution control. Arimura, Hibiki & Katayama (2007:17) conclude that Voluntary agreements have positive long term impacts on environmental protection; they are more efficient than conventional CAC (Maxwell & Lyon, 1999:5); they are flexible and hence help to reduce enforcement and abatement costs (Amacher & Malik, 1996:234); they are known to result in over-compliance in industrialised countries (Cavalier, 2000:200); they promote effective communication between the industry and public agencies thereby ensuring successful implementation of public environmental programs (Prizzia, 2005:13); they are seen as the alternatives where enforcement even through courts of law is deemed a failure (Nybog, 2000:141); and finally they are said to have welfare improving effects critical to the informal sector development (Nybog, 2000:126; Marsilian & Renstrom, 2004:4).

3.5 CAN VOLUNTARY AGREEMENTS WORK IN DEVELOPING COUNTRIES?

The popular article of Allan Blackman, who has written widely on voluntary agreements and informal sector pollution control, is perhaps a fitting place to beginning a survey of empirical literature on environmental voluntary agreements in developing countries. The central message in Blackman's "Can Voluntary Agreements Work in Developing Countries?" paper is that the traditional command and control regulation has been performing poorly in most if not all developing countries. It is therefore imperative for policy makers in these countries to start experimenting with alternative measures

including voluntary regulation programs (Blackman, 2008:119). Blackman describes developing countries as being hamstrung by weak institutions that militate against the successful enforcement of conventional environmental regulatory tools, thereby requiring them to turn to voluntary approaches.

Although most voluntary agreements instruments applied in developed countries have similar features to those proposed in developing countries, Blackman observes that their policy objectives are usually different. Blackman (2008:120) notes that policy makers in developed countries use voluntary agreements to encourage industrial firms to over comply with ordinary regulation, while their counterparts in developing countries apply voluntary regulation to help control rampant non-compliance with mandatory regulation. Therefore, since voluntary regulation measures applied in developing countries are meant to induce compliance and not necessarily as an effort to motivate firms towards over compliance, the stakes for their success are higher.

3.5.1 Empirical literature on environmental regulation voluntary agreements in the informal sector pollution control

Despite worldwide growing popularity of voluntary regulation having stimulated an increase in research on the subject, Blackman (2010:138), notes that only a handful studies have focussed on the developing countries. The following section will review the thread of the empirical literature relating to application of voluntary regulation on pollution control in developing countries. Attention is dedicated to three forms of voluntary regulation reported in case studies reviewed in this study. These are public programs, negotiated agreements and public disclosure or information-based program.

Blackman and Bannister (1998:1-23), in their study of pollution control in the informal sector on Mexico's Ciudad Juarez brick makers' project based on a case study of 300 informal brick kilns, drew the four lessons from the case study. First, they observe that private-sector-led voluntary initiatives may be more effective than public sector voluntary initiatives. However they emphasise that such initiatives can only succeed

with strong public sector support. Second, they propose that necessary conditions for effective use of voluntary agreements in environmental management on the informal sector include enlisting the cooperation of local organisations, relying upon peer monitoring, and offsetting compliance costs. Third, pollution control strategies that provide the greatest environmental benefits on the formal sector may be less appropriate than low-cost intermediated strategies. And finally, they conclude that in most developing countries, market-based environmental initiatives on the informal sector are bound to be fragile.

In evaluating the effects of public pressure and clean technology on the informal sector pollution control using an econometric analysis of the adoption of a propane by traditional Mexican brick makers, Blackman and Bannister (1998:1-22), used both a probit and an OLS models. They regressed adoption and then variable costs associated with the new technology as dependent variables on a number of socio-economical variables to show that it is possible to successively promote the adoption of clean technology by intensely competitive informal firms even when the new technology significantly raises variable costs. Second, they find that community pressure applied by competing firms and private-sector local organisations can generate incentives for adoption.

A small body of literature on case studies conducted in Mexico by Blackman came to the following conclusions; Firstly, voluntary regulation is not likely to work in countries where both regulatory and non-regulatory pressures for improved environmental performance are weak or lacking (Blackman, 1999:18; Blackman & Bannister, 1998:15). Secondly voluntary programs are not likely to bring positive results if they do not include quantified baselines and targets, monitoring and program enforcement mechanisms, transparency, incentives for compliance and penalties for non compliance. Thirdly, national programs are seen as more likely to perform effectively than local ones since national programs are said to tap in a broader and deeper set of regulatory and non-regulatory pressures. Further, these programs are run by national environmental authorities, who often wield a much more credible threat of mandatory enforcement than

local regulators. In addition, another case study also revealed that publishing information on pollution and abatement options to both firms and the public at large can help boost the effectiveness of such voluntary initiatives in general (Blackman,2010:137).

3.6 VOLUNTARY AGREEMENTS AND INFORMAL SECTOR POLLUTION CONTROL.

As noted above, policy makers in developing countries are faced with a number of barriers in the enforcement of mandatory regulation such as weak institutions, limited political will and incomplete legal foundations (Eskeland & Jimenez, 1992:154). The proponents of voluntary regulation argue that voluntary initiatives side-step the above limitations in that, by definition, voluntary regulation does not rely on mandatory measures to encourage firms to reduce their pollution. Instead, they contend that it relies on two other important incentives. The first one is that by publishing these firms' polluting activities, voluntary regulation can increase pressure applied on them by consumers, capital markets, community groups and non-governmental organisations for the polluting firms to take corrective measures (Blackman, 2008:120). For example, firms participating in a given negotiated voluntary program could in principle, receive positive publicity which could increase their sales, enhance their access to financial capital and deflect criticisms from environmental advocates. The second incentive is that voluntary measures often subsidises investment in abatement. The subsidy can either be in form of grants, low interest loans or informational as in the case of free provision of seminars to complying firms by regulators.

Notwithstanding the above arguments, there are at least four arguments advanced by those opposed to voluntary regulation, to doubt the effectiveness of voluntary regulation instruments in developing countries;

(i) Weak regulatory pressure

According to Hanna; Lyon and Maxwell (cited in Blackman, 2010:120), a 'background threat' of mandatory regulation is seen as an important motivation causing firms to take part and even comply with voluntary measures. In more formal terms, these findings imply that voluntary regulation initiatives are unlikely to bring positive results in countries exhibiting weak mandatory regulation.

(ii) Weak non-regulatory pressure

Fry; Wermeyer and Mulugetta (cited in Blackman, 2010:121) observed that pressure from capital markets, consumers, non-governmental organisations and community groups are important non-regulatory factors which reputedly encourage firms to take part in and comply with voluntary regulation. They conclude that these pressures are relatively anaemic in developing countries.

(iii) Preponderance of Small-scale firms

This refers to the fact that small-scale firms exist in larger numbers in developing countries than in developed countries, a situation which might be problematic to the use of voluntary regulation in pollution control (Blackman, 2006 cited in Blackman 2010:122). They argue that small informal firms are taken to be less susceptible to most of the regulatory and non-regulatory pressures. These pressures create incentives to motivate compliance with voluntary initiatives, which include those generated by capital markets and green consumers.

3.7 KNOWLEDGE GAPS

Overall, a survey of the thin literature above reveals gaps in empirical evidence on the success of voluntary agreements in developing countries in general and African countries in particular. The major problem identified is lack of basic information regarding evidence of voluntary regulation programs in African countries. This gap is

significant for two important reasons; the first is that voluntary regulation plays a particularly important role in developing countries. Whereas voluntary regulation in developed countries is used to spur over compliance with mandatory regulation, regulators in developing countries use it to stem rampant non-compliance resulting from among other factors; weak environmental management institutions, limited political will and lack of strict enforcement (Blackman, 2008:119). Secondly findings from the literature from developed countries may not directly apply to developing countries where voluntary initiatives are implemented in a different socio-political context and as just noted above, for a different cause.

Therefore despite the above few known cases of successes of voluntary agreements in environmental regulation, there are no known studies that show empirical evidence of their application on African informal sector firms. Thus there is a basic knowledge gap regarding the contribution of voluntary agreements to informal sector pollution control in Africa. The fact that there are few studies on voluntary agreements in developing countries reduces the generalisation of their findings, applicability to different contexts and as a consequence, limits their potential predictability.

3.8 CONCLUDING SUMMARY

The purpose of this section has been to provide the conceptual framework for the research problem identified above, as well as to review the theoretical and empirical literature relevant to the problem. Review of the theoretical and empirical literature on voluntary regulation in developing countries has demonstrated that there are significant gaps in the knowledge of the subject matter when applied to African informal sectors. The overall conclusion therefore is that while there has been increasing interest in policy prescription in the area of informal sector pollution control and regulation, there has been inadequate follow through in the performance of these policies in developing countries in general and Africa in particular. Thus the potential contribution of emerging policy instruments like public voluntary agreements programs to informal sector pollution control in Africa has not been sufficiently articulated in policy and practice.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 INTRODUCTION

This Chapter presents the methodological approach to the study. The Chapter comprises eight sections. The study area and sampling methods are discussed in sections 4.2 and 4.3 respectively. This is followed with the discussion on survey instrument development in section 4.4. Survey implementation is discussed in section 4.5 and an overview of data analysis is given in section 4.6. The Logit empirical study models are presented in section 4.7. The last section summarises the discussion in the Chapter.

4.2 STUDY AREA

This study was conducted at Soweto and City markets of Lusaka, Zambia. The Lusaka City market which is an ultra modern market was built in 1997 as a social service provision by the City Council. This was the first ever modern market in the city's CBD, whose previous markets were mainly makeshift structures, seen by many as a sore sight to the beauty of the garden city of Lusaka. In addition, this was also an effort meant to decongest the major streets of Lusaka that absorbed most of the traders in the CBD. According to market management, Lusaka City market has the official capacity of 4,025 traders though currently occupied by over 15,000 traders.

On the other hand, Soweto market, which existed long before the construction of the ultra modern Lusaka City market, is predominantly made up of makeshift structures on one side and an open trading area on another. This market has continued to expand on the side of the open area which lies under high voltage electricity pylons in order to accommodate the growing influx of marketers that could not be taken up by the newly built City market. This market is characterized by narrow circulation paths, basic infrastructural facilities or services with poorly constructed stalls which lack aesthetic appeal. The stalls themselves are made up of fixed temporal structures made of wood,

mud/concrete bricks, scrap corrugated iron sheets and black or transparent polythene paper in some cases. Given the nature of this market's infrastructure, it is almost impossible to estimate its actual capacity. However it is safer to state that at the moment, both markets are full beyond capacity resulting in the influx of traders at the edges of the two markets, including along water drainages, under dangerous high voltage electricity pylons which are located near Soweto market and along the main streets of Lusaka CBD. It is estimate that at least 10000 traders operate in and around the Soweto market.

4.3 SAMPLING

The study used a combination of purposive and referendum sampling methods to come up with the sample of traders that were interviewed. The selection of Soweto and City markets was purposively done because the two markets are the largest in Zambia in terms of informal sector trading activities. The sampling frame of the study comprised traders from both the Soweto and City markets. The composition of the traders in the two markets is such more than half of the traders trade outside market structures due to limited space inside the markets as such, are not captured on the official roll of traders in these markets. During informal interviews and pre-testing of questionnaires, most traders did not want to co-operate i.e. the study experienced a high rejection rate. Most traders were either too busy going about doing their business or were simply not willing to speak out on the pollution problems they faced for fear that the information they would provide could be used against them. This was despite being assured by the researcher that the whole exercise was academic, i.e. showing them the letter from the University and the local Council. Further, the study was conducted just before the country's general election and most of the traders had lost interest in the then ruling government and its council and did not wish to participate in the study because nothing reasonable in their views could arise from any recommendations of the study. Arising from the fore-going, randomisation of the sample could not be done and due to time and resource constraints, it was decided that a referendum be conducted by interviewing as many as could co-operate in each stratum. The various strata in terms of business type

from which the sample came are shown in Table 4.1 below. Based on this strategy, a total of 93 traders were interviewed. Of this sample, 47 were from Soweto market while 46 came from City market. Fifty two percent were females and 48 percent males. Regarding age groups, 5 were under 20 years, 48 were between 20 and 30 years, 29 were between 31 and 40 years while only 11 were above 40 years.

Table 4.1 Occupation of traders

Traders' occupation in the market	Soweto market	City market	Total
Clothing, jewellery and cosmetics business	16	3	19
Automotive, electrical, electronic and hardware business	12	0	12
Food products and processing business	7	9	16
General household wares and groceries business	5	2	7
Chemistry/Agrochemicals	2	0	2
Wood and metal fabricator	2	2	4
Bottle stores and bars	2	3	5
Saloon/hairdresser/barbershop	1	4	5
Agricultural inputs, equipment and accessories	1	7	8
Mechanical, electrical or electronic technician	0	1	1
Minibus Driver	0	2	2
Newspaper vendor	0	3	3
Air time vendor	0	3	3
Cell phone Dealer	0	3	3
Tailoring business	0	4	4
Total	47	46	93

Source: Author's own construct

With regards to education levels, 7 had no formal education, 15 attended primary and 58 had secondary education while only 13 has college or university education. On the period they traded in the markets, 59 traded for less than 5 years, 18 for between 5 and 10 years, 4 for between 10 and 15 years and 12 for above 15 years.

4.4 SURVEY INSTRUMENT AND DEVELOPMENT

Before developing the survey questionnaire, considerable time was spent consulting with the supervisor to ensure that the questionnaire was correctly developed. A pre-test was conducted where 10 traders, 5 from each market were interviewed. Informal interviews were also conducted with officials from the Environmental Council of Zambia, Lusaka City Council, market managers and their market master from the two markets. This was used to understand the general existing situation regarding the nature and levels of informal sector pollution in the study area and the current environmental regulatory framework in order to develop a relevant survey instrument. The purpose of the pre-test was to ensure that the questionnaire was logically sound and that questions including those eliciting the traders' WTP were clearly understood. In addition, it was used to obtain the lowest, average and upper bid prices for the traders' WTP. Perhaps more crucial was to determine the length of the interview. This was particularly important in that traders were busy attending to customers such that the interviews were interrupted several times in order for them to attend to customers. During the pre-test, interviews took between 15 to 25 minutes. The questionnaire was revised accordingly based on the findings of the pre-test.

The questionnaire was partitioned into 5 sections as follows; section 1 contained questions on socio-economic characteristics of the traders while section 2 asked on forms and intensity of pollution in the markets. Section 3 inquired on the causes of pollution while section 4 asked for voluntary measures that traders were willing to undertake to improve cleanliness in the market. This section further sought to find out what the local authority could do to motivate the traders to undertake their voluntary measures. Finally section 5 was on contingent valuation of proposed improvements in the levels of cleanliness in the markets. Here, under the iterative bidding technique, traders were asked whether they would be willing to pay the given amounts for improvement in the cleanliness of the markets, starting with the lowest bid of K500 followed by K1750 and the highest amount being K5000 until a maximum amount was recorded. Before being asked to state their bids, the traders were first shown a picture

of the current “deteriorated market cleanliness” condition followed by one showing a proposed future “improved market cleanliness” condition. They were then asked how much they were willing to pay for the improvement in cleanliness from the current dirty state shown in the first picture to a proposed higher standard of cleanliness shown in the second picture. This visual assistance helped the traders to understand the questions that followed.

4.5 SURVEY IMPLEMENTATION

In-person interviews were conducted in the two markets based on the referendum framework. On average the interviews took 15 – 20 minutes per interview. Interviews were alternated between Soweto and City markets each day to prevent traders from sharing information. In some cases questions from the questionnaires were repeated where necessary until traders indicated that they understood them. At the end of each day of data collection, questionnaires were reviewed for errors of recordings and consistency. Thereafter, the survey questionnaires were supplemented by semi-structured interviews with officials from the Ministry of Environment and Natural Resources (MENR), the Environmental Council of Zambia (ECZ), the Ministry of Commerce, Trade and Industry (MCTI), the Zambia Chamber of Small and Medium Business Associations (ZCSMBA), Lusaka City Council (LCC) - Waste Management Division (WMD) and management and key informants from the two markets. These were meant to provide information on the current baseline and associated limitations upon which policy recommendations can be based. The primary data collected was transcribed onto SPSS spread sheets from which summary statistics were obtained for the purpose of verifying that there were no possible outliers that would affect the results.

Given the way the survey instrument was designed, pre-tested and implemented, there is a high likelihood that traders understood the questions and answered them truthfully. Further following the use of referendum sampling strategy to make up for randomised

sampling, which could not be undertaken due to higher rejection rates¹, this strategy significantly minimised sampling errors, thus making it possible for inferences to be made from the results of the study.

4.6 DATA ANALYSIS

Two samples, one from each market, were analysed comparatively with a view of, firstly identifying any differences between the samples and determining the extent to which such differences were statistically significant. This was achieved by the use of chi-square test for categorical data and student *t* test of equality of means for continuous data. Data used to address the first objective was collected using sections three and four of the questionnaire which dealt with the nature, intensity and causes of pollution in the markets and how the traders volunteered to reduce this pollution above and beyond the baseline. The second objective was addressed using data collected in section four of the questionnaire regarding what the traders thought the local authority needed to do in order to motivate them to undertake their proposed voluntary measures. The third objective was addressed using data collected in section five of the questionnaire which elicited traders WTP using iterative bidding technique of contingency valuation method.

Finally, using the data collected in section four of the questionnaire containing proposed measures of what traders' felt the local authority should undertake to motivate their voluntary measures, together with traders' socio-economic characteristics in section one of the questionnaire, a logit regression was run. The logit models were used to assess the possibility of implementing voluntary agreements policy in the two markets. The proposed motivating measures together with traders' socio-economic characteristics were taken as independent variables, while the "success" or "failure" of implementing the policy, being a binary outcome was the dependent variable in the logit model while some of the voluntary measures were taken as dependent variables in the logit models.

¹ Most of the traders selected for interviews during the questionnaire pre-testing refused to be interviewed either because they were too busy or feared that the information they provide may be used against them.

Traders' WTP bids collected using section five of the questionnaire, were used to obtain the traders' average and total WTP. The mean, standard deviation as well as the range (minimum and maximum) of values for the variable used in the estimation of the above models are shown in Table 4.2 below.

Table 4.2 : Summary statistics for variables investigated in the empirical models

Variable	Mean	Standard deviation	Minimum	Maximum
Sex of respondent				
Age category of respondent	2.49	0.77	1	4
Education level category of respondent	2.83	0.76	1	4
Marital status of respondent				
Market name				
Period of trading in the market	1.67	1.05	1	4
Minimum number of bins needed	6.27	3.13	1	15
Minimum number of cleaners needed	18.43	14.01	1	40
Frequency of garbage collection	3.69	0.47	3	4
Distance from location of waste bins	3.98	0.15	3	4
Maximum Willingness To Pay (ZMK)	1830.65	1232.02	500	5000
Average daily income (ZMK)	23575.27	15920.14	5000	100000

Source: Author's own construct; (1 USD = ZMK 4900.00)

4.7 EMPIRICAL STUDY MODELS

Logit models were used in the analyses of the covariates to determine the probability of implementing voluntary policy. Stata software version 11 was used to run these models.

4.7.1 THE LOGIT MODEL

To enhance the policy relevance of this study with regards to the potential contribution of public voluntary agreements programs, a multinomial probability logistic model was used. The logit model was chosen for its simplicity in the presentation of binary response variables and their interpretation.

4.7.1.1 *Model specification for voluntary agreements data*

Factors influencing the successful implementation of public voluntary agreements regulation on informal sector pollution control were the types of incentives or motivation offered to polluters in the two markets by the regulator together with socio-economic variables. These are the proposed minimum number of waste bins and cleaners allocated to the markets, the frequency of emptying waste bins from the markets and distance between the locations of waste bins and traders. Socio-economic variables include sex of respondent, age of respondent, Education level of traders, marital status of traders, market name, period of trading in the market, maximum WTP bids and traders' average daily income. The dependent variable which is a binary variable, represent either "successful implementation of voluntary agreements" or "not". This is explained in the Linear Probability Model below;

$$P_i = E(Y = 1 / X_i) = \beta_1 + \beta_2 X_i \quad (4.7.1.1)$$

In equation (4.7.1.1) above, X_i is the type of incentive offered. If $Y=1$ it means voluntary agreement regulation implementation is possible while when $Y=0$ means failure in implementation. Further, in the Logit model below the probability of implementing voluntary agreements is given by

$$P_i = E(Y = 1 / X_i) = \frac{1}{1 + \text{Exp}[-(\beta_1 + \beta_2 X_i)]} = \frac{1}{1 + \text{Exp}(-Z)} \quad (4.7.1.2)$$

Where $Z_i = \beta_1 + \beta_2 X_i$

Equation (4.7.1.2) is known as the Cumulative Logistic Distribution Function in which the value of Z_i ranges from $-\infty$ to $+\infty$; while the probability P_i ranges between 0 and 1. In addition P_i is non-linearly related to Z_i . This therefore satisfies two conditions required for a probability model. The probability of the successful implementation of voluntary agreement regulation is given by;

$$P_i = \frac{1}{1 + \text{Exp}(-Z)}$$

While the probability of not implementing voluntary regulation successfully is given by;

$$(1 - P_i) = \frac{1}{1 + \text{Exp}(Z)}$$

Therefore we can write;

$$\frac{P_i}{1 - P_i} = \frac{1 + \text{Exp}(Z_i)}{1 + \text{Exp}(-Z_i)} \quad (4.7.1.3)$$

Where $\frac{P_i}{1 - P_i}$ is the odds ratio that is the ratio of the probability of successful implementation of voluntary agreement regulation to the probability of not implementing it. Taking the log of equation 4.7.1.3 we get;

$$L_i = \ln\left[\frac{P_i}{1 - P_i}\right] = Z_i = \beta_1 + \beta_2 X_i + \mu_i \quad (4.7.1.4)$$

In equation 4.7.1.4 above, X_i represents the type of incentive that influences successful implementation of the instrument. μ_i is the error term while L_i is the log of odds ratio which is also called the logit.

4.7.1.2 Estimating the Logit Model

The above model employs the method of maximum likelihood, which is generally a large sample method hence the estimated standard errors are asymptotic. The partial slope coefficient β_2 measures the change in L_i for a unit change in X_i that is, it tells us how the log of odds in favour of implementing the regulation changes, as we increase the incentives for the adoption of the public programs.

4.8 CONCLUDING SUMMARY

The aim of this Chapter had been to discuss the broad methodological approach adopted for this study. In pursuit of this objective, the section started off with defining the study area, followed by a discussion of the enquiry strategy and broad research design. This provided a backdrop against which the rest of the methodological issues regarding how the proposed methodological approach and specific areas like data collection, data analysis, and study model were implemented in practice.

CHAPTER 5: RESULTS AND DISCUSSION

5.1 INTRODUCTION

This chapter presents the empirical findings and discussion on the study and is arranged in five sections as follows: Section 5.2 presents the results and discussion on objective 1 while section 5.3 present the results and discussion on objective 2. Results and discussion on objective 3 are presented in section 5.4. Data was analysed comparatively between the two markets, within the context of the conceptual framework developed after critically reviewing literature and theories on voluntary agreements and informal sector pollution control presented in chapter three.

5.2 POTENTIAL VOLUNTARY MEASURES TO BE UNDERTAKEN BY TRADERS TO IMPROVE MARKET CLEANLINESS

Traders in both markets observed that solid waste is the highest form of pollution followed by air pollution while water pollution is almost insignificant. The major causes of solid waste pollution were reported to be wastes from food products and food processing activities while air pollution is caused mainly by decomposing accumulated food and food processing waste followed by burning of plastics and general litter. Finally, water pollution was attributed to mainly blockage of drainages by plastic and general litter resulting in pools of stagnant contaminated water.

The first objective of the study was to identify what voluntary measures traders would be willing to undertake in order to attain a higher level of cleanliness in the markets. The responses regarding what individual traders would be willing to voluntarily undertake to implement a higher standard of cleanliness in their markets above and beyond the

requirements of the law² are shown in Table 5.1 below as follows; The potential voluntary measures to be undertaken by traders are recorded in column I. Columns II and III report the number (and percentages) of traders in the Soweto and City markets respectively who volunteered to undertake the measures specified in column I. In column IV, the chi-square approach is used to test for independence of responses between the two markets.

Table 5.1: Potential voluntary measures to be undertaken by individual traders

Potential voluntary measures offered to be undertaken by individual traders	Soweto market (%)	City market (%)	χ^2 Test (p-value)
Sweep or clean my trading place regularly	39 (83%)	35 (76%)	0.8643 (0.3530)
Hire people to clean my trading premises	5 (11%)	1 (2%)	2.5841 (0.1080)
Clean my trading area at least twice a day	0 (0%)	8 (17%)	9.3365 (0.0020)
Throw all litter in the right places	3 (6%)	0 (0%)	2.9063 (0.0880)
Contribute money towards all other market cleaning efforts	1 (2%)	2 (4%)	0.4148 (0.5200)
Provide my own waste bin	0 (0%)	3 (7%)	3.3067 (0.0690)
Volunteer to clean contaminated market areas	1 (2%)	0 (0%)	0.9477 (0.3300)

Source: Author's own construct

Information in Table 5.1 shows that there seem to be two groups of responses to the above question, one for voluntary measures that will have a positive impact on cleanliness of an individual trader's premises and another for voluntary measures that will have a positive impact on everybody else's premises or on the total market. Further, the potential voluntary measures offered by the traders in both markets show characteristics of public goods in nature. The study findings have also revealed that the

² Currently traders are required to make a daily contribution of K1500 towards the cleaning of their trading premises and the rest of the markets. The contributions are then used by the Market committees to employ market cleaners and pay for the rest of the cleaning services in the markets.

response “Throw all litter in the right places” which should have received more attention was only chosen by very few traders due to the fact that the term “right places” was vague and not appealing compared to the other measures. This should not imply that the traders do not consider throwing litter in the right places as an important measure because the position is in fact confirmed in table 5.6 below. As far as potential voluntary measures are concerned, there is basically no difference between traders in the two markets implying that they can be lumped together to facilitate data analysis. As a follow up, traders were also asked if they could separate plastic waste from non-plastic waste before putting it in waste bins, as another voluntary measure of further improving environmental management in the markets. Their responses are shown in Table 5.2 below indicating that nearly all traders were willing to separate plastic waste from non-plastic waste. Further the information in table 5.2 below show that there are no significant differences in the responses between the two markets.

Table 5.2: Traders’ willingness to separate plastic from non-plastics waste

Response	Soweto market (%)	City market (%)
Yes	46 (98%)	46 (100%)
No	1 (2%)	0 (0%)

Source: Author’s own construct

A range of reasons advanced for their willingness to separate plastic waste from non-plastic waste are also highlighted in Table 5.3 below. There are significant differences in the number of traders indicating “improves cleanliness in the market” between the two markets. The possible explanations for this difference could be the fact that there are more and visible accumulations of plastic waste, burning of plastic waste and blocked drainages caused by plastic waste in the make-shift Soweto market whose negative effects on the traders are more prominent compared to the City market. As far as reasons advanced for their willingness to separate plastic from non-plastic waste are

concerned, there is basically no difference between traders in the two markets implying that they can also be pooled together to facilitate data analysis

Table 5.3: Reasons for willingness to separate plastic from non-plastic waste

Reasons	Soweto market (%)	City market (%)	χ^2 Test (p-value)
Reduces blockage of drainages	10 (21%)	15 (46%)	0.7935 (0.3730)
Improves cleanliness in the market	16 (34%)	8 (17%)	2.9353 (0.0870)
Reduces plastic littering	11 (23%)	9 (8.7%)	0.0099 (0.9210)
Improves hygiene	6 (13%)	5 (20%)	0.0430 (0.8360)
Makes it easy for waste collection	3 (6%)	5 (20%)	0.6981 (0.4030)
It is a good idea	3 (6%)	5 (20%)	0.6981 (0.4030)
Plastics can be recycled	2 (4%)	4 (9%)	0.8581 (0.3540)
Prevents air pollution as from burning of plastics	1 (4%)	1 (2%)	0.0021 (0.9630)

Source: Author's own construct

Similarly, traders were also asked if they could separate food waste from non-food waste and their responses are shown in Table 5.4 below. Various reasons for their willingness to separate food waste from non-food waste are shown in Table 5.5. In Table 5.4 below there are no significant differences in the responses regarding the traders' willingness to separate food waste from non-food waste between the two markets.

Table 5.4: Traders' willingness to separate food waste from non-food waste

Response	Soweto market (%)	City market (%)
Yes	45 (96%)	46 (100%)
No	2 (4%)	0 (0%)

Source: Author's own construct

Further analysis of information in Table 5.5 below shows that there are no significant differences in the responses regarding their reasons for willingness to separate food waste from non-food waste in the two markets again implying that the traders can be pooled together to facilitate data analysis. This question had multiple responses and the indicated percentages were arrived at as a percentage of the total responses in each market out of the total number of traders in that market. There were no rankings or options from which traders chose. This applies also to the responses from tables 5.6 to 5.10.

Table 5.5: Reasons for willingness to separate food waste from non-food waste

Reasons	Soweto market (%)	City market (%)	χ^2 Test (p-value)
This prevents bad smell since food waste rots easily	21 (45%)	23 (50%)	0.0870 (0.7680)
This will improve cleanliness in the market	10 (21%)	10 (22%)	0.0265 (0.8710)
This will improve hygiene in the market	7 (15%)	11 (24%)	1.4470 (0.2290)
Makes it easy for waste collection	3 (6%)	7 (15%)	2.0958 (0.1480)
Reduces food waste in the market	3 (6%)	4 (9%)	0.2324 (0.6300)
This is a good idea	2 (4%)	4 (9%)	0.8581 (0.3540)
Reduces flies which carry germs	1 (2%)	3 (7%)	1.1854 (0.2760)
Prevents rodents around the market area	1 (2%)	0 (0%)	0.9477 (0.3300)
Reduces blockages of drainages	0 (0%)	1 (2%)	0.9477 (0.3300)

Source: Author's own construct

Statistical information depicted in the tables above clearly indicate that some potential forms of voluntary measures in terms of cleaning and maintaining a higher level of environmental management in the markets are feasible. Further, these potential voluntary measures offered by the traders in both markets show characteristics of public goods in nature - where benefits accrue to individual traders and where benefits accrue

to all traders or the whole market. In view of the above, policy should support these measures that are public goods in nature which are rarely supported by the private sector. The results from the chi-square tests also show that traders in both markets share similar views regarding the potential voluntary measures they could undertake to improve cleanliness in the markets above and beyond the current baseline. This means policy recommendations for one market may well be equally applied to the other, implying homogeneity in the sample characteristic. Implementation of these voluntary measures is however subject to availability and the provision of appropriate incentives to motivate the traders, the subject of the second objective that follows below. The above results and discussion under section 5.2 has thus addressed objective 1.

5.3 APPROPRIATE INCENTIVES AND INSTITUTIONAL ARRANGEMENTS BY THE COUNCIL TO MOTIVATE TRADERS' POTENTIAL VOLUNTARY MEASURES

The second objective of this study deals with the incentives or assistance which the Lusaka City Council as the local authority and regulator or other stakeholders concerned with issues of environmental management can offer to motivate individual trader's voluntary efforts. In Table 5.6, 94 percent of traders from Soweto and 85% from City markets indicated the need for the City Council or other stake to provide extra waste bins to help the implement their voluntary measures.

There is however no significant differences in the response regarding the proposed assistance that the City Council should provide to enhance individual traders' voluntary efforts. In table 5.6, all the proposed steps to be undertaken by the City Council will motivate voluntary measures affecting all traders or the entire market as well as at the individual level. This observation makes intuitive sense in that, even if markets had fewer cleaners as the case is now, a mere increment in the number of waste bins could significantly increase the levels of cleanliness in the markets. This is because traders could still clean their own trading premises but at the moment desperately need waste bins.

Table 5.6: Proposed assistance by the Council to individual voluntary efforts

Motivating measures from the Council	Soweto market (%)	City market (%)	χ^2 Test (p-value)
Council to provide extra waste bins	44 (94%)	39 (85%)	2.0958 (0.1480)
Council to provide extra cleaners	2 (4%)	4 (9%)	0.1488 (0.7000)
The council to provide brooms, shovels, wheelbarrows and gloves	4 (8%)	2 (4%)	0.5820 (0.4460)
The council to sensitize traders on the need for a clean market	2 (4%)	0 (0%)	1.9162 (0.1660)
Council to empty waste bins regularly	1 (2%)	1 (2%)	0.0021 (0.9630)
Council to provide inspectors to monitor compliance	0 (0%)	1 (2%)	1.0783 (0.2990)
Council to work hand in hand with us traders	0 (0%)	1 (2%)	1.0783 (0.2990)
I don't know	1 (2%)	0 (0%)	0.9477 (0.3300)

Source: Author's own construct

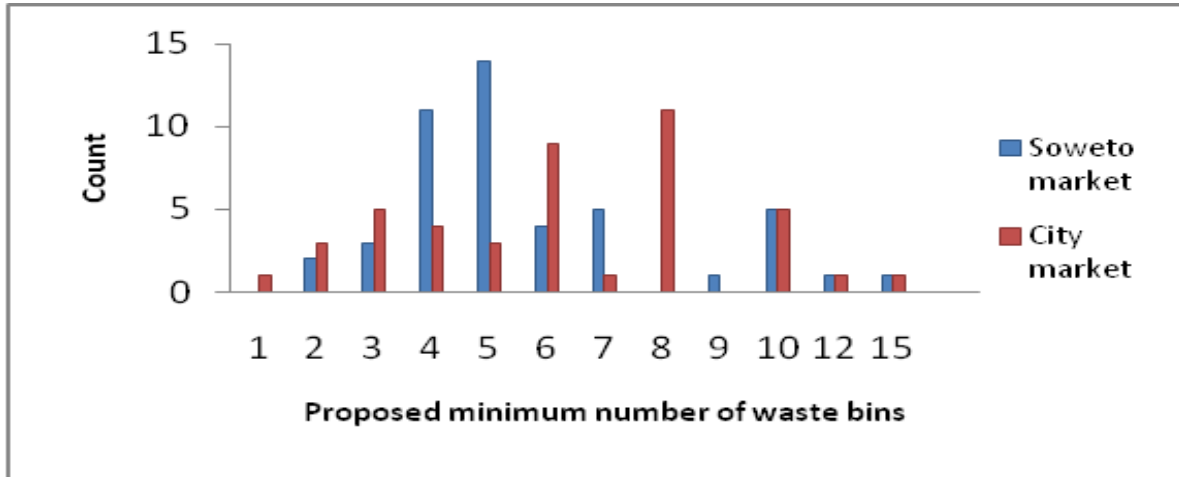
As a follow up, traders were also asked to indicate in their opinion, the minimum number of waste bins considered adequate to meet the current cleaning needs of each section in their respective markets which could also enhance their proposed voluntary efforts. The traders' responses are shown in Figure 5.1 below.

Similarly, the traders were also asked to indicate the minimum number of workers they considered adequate to meet the cleaning needs of each section in their respective markets and their responses are show in Figure 5.2. The results in Figure 5.1 show that the 16 % of all traders in the two markets reported that the minimum number of waste bins that can meet the current cleaning needs of each of the section³ in the markets is 5. This figure is against the background of some sections of the markets not having any waste bin. This is particularly the case in the Soweto market. A student t-test for the equality of means in of the figures in Figure 5.1 shows that there are no significant

³ Market sections refer to demarcations made in the markets based on the category of goods or services being provided by the traders. Sections are well defined in the modern City market while in the case of the open and make-shift Soweto these demarcations are not strictly followed.

differences between the means of the minimum number of waste bins demanded in each section of a market between the two markets ($t_{9,1,0,005} = -1.511; \rho = 0.134$).

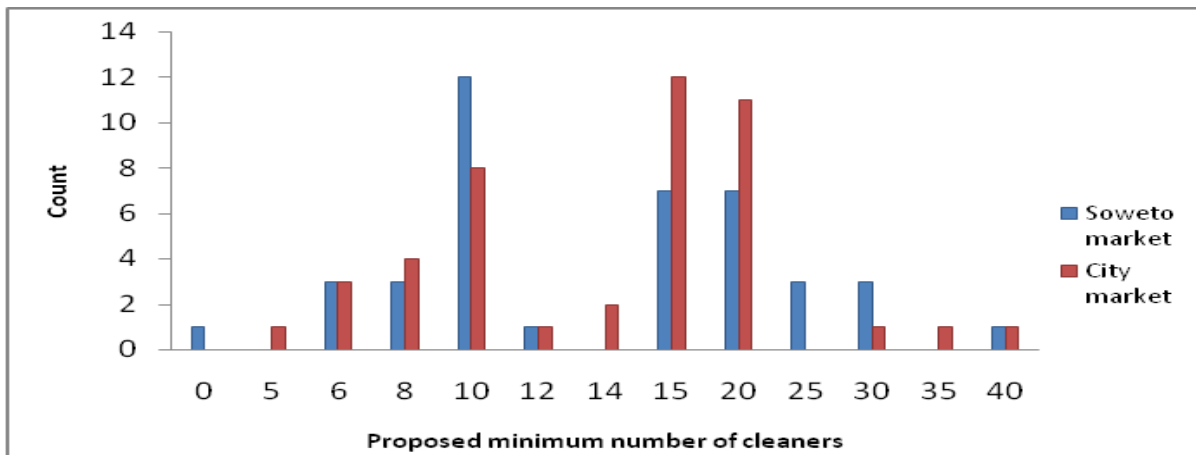
Figure 5.1: Proposed minimum number of waste bins needed in the markets



Source: Author's own construct

On the other hand, the results shown in Figure 5.2 below indicate that the 19.8% of the total traders in both markets reported that a minimum of 10 workers could adequately clean each section of their markets. This is against some sections of the markets currently not having a singer worker, despite the fact that these traders pay for the daily cleaning service.

Figure 5.2: Proposed minimum number of cleaners needed in the markets



Source: Author's own construct

Similarly, a student t-test for the equality of means on information in Figure 5.2 above shows that there are no significant differences in the means of the minimum number of cleaners to meet the cleaning needs of each section of a market between the two markets ($t_{91,0.005} = 1.457; \rho = 0.149$). The distribution of responses in Figure 5.1 above and Figure 5.2 above appear to be similar.

Further, the study also sought to find out from the traders what they thought the Lusaka City Council needed to do in order to assist the highest solid waste polluters, air polluters and water polluters minimize their different kinds of pollution. The results are shown in Tables 5.7 to 5.9 below.

Table 5.7: Proposed assistance by the Council to highest solid waste polluters

Proposed measures for the Council to assist solid waste polluters	Soweto market (%)	City market (%)	χ^2 Test (p-value)
Provide traders with waste bins	37 (79%)	42 (91%)	2.5913 (0.1070)
Provide workers to clean the market daily	5 (11%)	19 (41%)	9.1736 (0.0020)
Provide inspectors to monitor defaulters	6 (13%)	2 (4%)	1.9170 (0.1660)
Empty refuse from the market regularly	4 (9%)	2 (4%)	0.5820 (0.4460)
Allocate a place for heaping waste	3 (6%)	0 (0%)	2.9063 (0.0880)
Sensitize traders to stop littering any how	2 (4%)	0 (0%)	1.9162 (0.1660)
Strengthen the capacity of market committees to prevent pollution	1 (2%)	0 (0%)	0.9477 (0.3300)
Improve their service provision by appraising their own performance	1 (2%)	0 (0%)	0.9477 (0.3300)

Source: Author's own construct

Regarding assistance the City Council should give to the highest solid waste polluters (Table 5.7), 64 percent of the total responses in the two markets reported the need for extra waste bins while 19 percent reported that the council should provide enough cleaners to each of these markets. There are significant differences between the two

markets regarding the response “provide workers to clean the market daily”. The possible explanation for this difference could be the fact that traders in the City market are used to having more cleaners who are responsible for their relatively cleaner environment when compared to the Soweto market, hence feel the need for more cleaners in the market. The general conclusion in table 5.7 above is that in both markets, the need for waste bins and cleaners seem to be prominent. In addition the need for the local authority to provide inspectors or enforcement agents to enforce cleanliness in the market also comes out in the above table.

Table 5.8: Proposed assistance by the Council to highest air polluters

Proposed measures for the Council to assist air polluters	Soweto market (%)	City market (%)	χ^2 Test (p-value)
To provide enough bins in the market	35 (74%)	31 (67%)	0.7828 (0.3670)
To provide enough cleaners in the market	7 (15%)	21 (46%)	8.5165 (0.0040)
To remove waste from the market frequently	11 (23%)	8 (17%)	0.3773 (0.5390)
Provide inspectors to monitor compliance in the market	7 (15%)	4 (7%)	0.7222 (0.3950)
Sensitize all traders on the dangers of pollution	3 (6%)	2 (4%)	0.1488 (0.7000)
Disinfect all contaminated sites in the market	2 (4%)	2 (4%)	0.0044 (0.9470)

Source: Author's own construct

Further analysis of the information in Table 5.8 shows that there are significant differences regarding the response “to provide enough cleaners in the market” between the two markets. The possible explanation for this is the same as that provided under Table 5.7 above. However, in addition to the issue of the need for inspectors raised in table 5.7 earlier, the traders have also pointed to need of increasing the frequency of collecting garbage from the markets, a service provided by the Lusaka City Council.

With regards to the highest water polluters (Table 5.9), there are significant differences regarding the response “provide more cleaners to clean the market” between the two

markets. As already noted above, traders in the more organised modern City market having the benefits of a few more cleaners who are responsible for their relatively clean environment have indicated a higher need for more cleaners in the market. The same trend is reflected in table 5.9 below.

Table 5.9: Proposed assistance by the Council to highest water polluters

Proposed measures for the Council to assist water polluters	Soweto market (%)	City market (%)	χ^2 Test (p-value)
To provide enough bins in the market	36 (77%)	36 (78%)	0.3321 (0.5640)
Provide more cleaners to cleaners the market	2 (4%)	15 (33%)	13.2266 (0.0000)
Provide inspectors to monitor compliance of cleanliness in the market	9 (19%)	7 (15%)	0.9172 (0.3380)
Increase on the frequency of waste collection from the market	4 (9%)	5 (11%)	0.2050 (0.6510)
To disinfect all sites contaminated by waste accumulation	1 (2%)	1 (2%)	0.0021 (0.9630)
Sensitize traders to stop littering	1 (2%)	0 (0%)	0.9477 (0.3300)
Consult traders on how best to clean the market	1 (2%)	0 (0%)	0.9477 (0.3300)

Source: Author's own construct

From the above Tables, it is clear that a deliberate increase on the current number of the waste bins and cleaners could improve cleanliness in these markets. The descriptive statistics above suggest that the increase in the number of waste bins in both markets is likely to impact more on the level of cleanliness in the market than in the case of increasing the number of cleaners.

In further determining which action (incentive) would bring or motivate the highest improvement in market cleanliness, traders were asked to rate three specific actions. These were; "increasing the number of waste bins in the markets"; "increasing the number of cleaners in the market" and "increasing the frequency of emptying waste bins from the market by the City Council". The traders' responses are reflected in Table 5.10 below. The results show that the highest improvement in market cleanliness will arise

from increasing the number of waste bins, while the least improvement comes from increasing the frequency of emptying waste bins from the markets. The table shows that there are no significant differences in the traders' responses between the two markets in general.

Table 5.10: Potential levels of improvement in the cleanliness of the markets caused by various proposed actions to be undertaken by the Council

Action resulting in highest improvement in market cleanliness	Soweto market (%)	City market (%)	χ^2 Test (p-value)
Increasing the current number of waste bins in the market	36 (77%)	37 (80%)	0.7529 (0.6860)
Increasing the current number of cleaners in the market.	7 (15%)	5 (11%)	4.0548 (0.1320)
Increasing the frequency of emptying waste bins in the market	4 (9%)	4 (9%)	3.4458 (0.1790)

Source: Author's own construct

In conclusion, there are no significant differences in the responses between the two markets, implying, as noted above that there seems to be homogeneity in the traders' views regarding the subject of study in the two markets. The above incentives or factors⁴ are hypothesized to be predictors or have significant influence on the implementation of voluntary measures in the cleaning of the markets and maintaining of a good environmental management around the markets in general.

It is clear from the preceding chapters and the results of this study discussed above that the informal sector in general is responsible for generating a considerable amount of pollution of various forms in many cities. This study has revealed that although the informal sector traders are willing to take remedial measures to minimize their pollution, they are hamstrung by their lack of capacity or necessary tools to take such remedial actions. This therefore implies that given appropriate support in specific key areas, the

⁴ These are factors referred to by the traders as measures that the City Council or other stakeholders should undertake in order to motivate their voluntary measures. The prominent two factors are; increasing the number of waste bins and cleaners in the markets.

informal sector can contribute significantly towards the reduction on the pollution they create.

These findings agree with empirical literature. In a study conducted in Kenya, Frijns and Vliet (1999:967) also conclude that the informal sector in many developing countries significantly contributes to urban environmental pollution but that they have little opportunity to control their pollution. They add that constrained in minimizing their pollution by various attitudinal, organization, technical and economic barriers, the informal sector need support, such as technical, or financial incentives from policy and non-governmental organizations concerned with environmental management. This implies that with the necessary assistance and motivation from the regulators and other stakeholder, they could minimize their pollution. The above findings will have to be verified by the use of an econometric analysis that follows below. Based on the above motivating factors, logit models were used to predict the successful implementation of potential environmental management voluntary measures proposed by traders above in the two markets.

In addition to appropriate motivating factors stated above, other factors critical to the implementation of voluntary measures are regulatory and non regulatory pressures on the traders (polluters). Regulatory pressure in form of monitoring and enforcement of market cleaning regulations by the authorities in the two markets under study was clearly anaemic due to the problem of inadequate staffing faced by the local authority. Traders felt that increased presence of enforcement agents in the markets could compel traders to be responsible. This finding has empirical support in literature as reported by Hanna; Maxwell & Lyon (cited in Blackman, 2010:120). Hanna *et al.* contend that a 'background threat' of mandatory regulation is seen as an important motivation causing firms to take part and even comply with voluntary measures.

From the results on the assistance sought from the City Council in form of inspectors to enable the traders minimize the three types of pollution in the markets, 8 percent of the traders felt that the presence of inspectors would help towards controlling solid waste pollution, while 11.9 percent of traders felt that the presence of inspectors in the

markets could help control air pollution. Another 15.8 percent reported the need for inspectors to help in the control water pollution. This variable was however not significant in the regressions analysis.

In addition, the traders added that if the City Council had supplied inspectors in the market, they could be assisting them by bringing to their attention all defaulters. Therefore, the closest feasible form of regulatory pressure in the two markets may be *the peer monitoring* from among the traders themselves, who could report defaulters to enforcement authorities. Blackman (1999:13) also noted that peer monitoring are common strategies for enhancing enforceability among the informal sector polluters. In particular peer monitoring has been observed to be effective when carried out by a local organization, such as a market committee in the case of this study. Other studies conducted on voluntary agreements support this finding. For instance, Blackman and Barnnister (1998:18) in a study on the adoption of clean production methods observed that early adopters to cleaner production methods felt disadvantaged and frustrated by the failure of their fellow producers to do so. Therefore they had an incentive to ensure that, at very least, neighbours and fellow union members switched to cleaner methods as well. In the same study, Blackman and Barnnister (1998:15) report that a peer monitoring mechanism in abating highly polluting emission from Ciudad Juarez, Mexico's informal brick kilns had positive results. Under this mechanism, citizens were encouraged to report to the local authority's office complaints about brick kilns emissions. The local authority's office would then dispatch an enforcement team which routinely jailed violators for twenty-four to thirty-six hours and sometimes finned them as well. Therefore without physical presence of enforcement agents in the markets voluntary measure may not work.

Non-regulatory pressure, which refers to lobbying and boycotts of traders' products, services or markets due to their poor environment record by consumers, the capital markets, non-governmental organizations and community groups, was not directly observed in this study. However, all the traders agreed that a dirty market environment would negatively impact on their businesses in that such an environment could lead customers to shun their markets. Negative media reporting from the Zambian local

media on the two markets' poor environmental performance have been seen to have a significant influence on the need for traders to make efforts towards cleaning their markets. From this study, consumers' complaints and local negative media reports highlighting pollution in these markets especially in the rain seasons could be used as a proxy for non-regulatory community pressure.

The other factor directly affecting the success of voluntary measures is that of imposing sanctions for non-compliance and the effectiveness of such sanctions. The study found that while most traders felt that it was necessary to impose sanctions on defaulting traders with regards to pollution in the market, they contended that the feasibility of applying such sanctions in the absence of effective physical monitoring is impractical.

5.3.1 Logistic models analysis

This regression analysis estimates the probabilities that the trends depicted in the descriptive statistics above regarding the possible implementation of potential voluntary measures stated above can occur. The hypothesis is that as the Lusaka City Council increases the proposed incentives, there are higher chances of traders adopting environmental management voluntary measures specified above, that is, clean their own trading areas, separating plastic/food waste from non-plastic/food waste etcetera.

ML estimates of the Logit analysis output generated in STATA for the adoption of potential voluntary measures by the traders in the market are shown in Table 5.11 below. Given the homogeneity on traders' views regarding the environmental management problem they are experiencing and their perceived solutions to the problem observed above, data from the two markets was pooled in the analysis of logit regressions that follow. The dependent variable which is 'adoption of voluntary agreement' was defined using the two main motivating factors that traders felt the city council must put in place to assist them implement voluntary measures. These are increasing on the number of 'waste bins' and 'cleaners' in the markets, defined as follows; Based on figures 5.1 and 5.2, whose modes are 5 and 10 respectively, number

of waste bins ≥ 5 and number of cleaners ≥ 10 represent '1' implying success in adoption of voluntary measures and '0' otherwise. The logit regression results in table 5.11 below show that at 95% confidence interval, only the variables waste bins and cleaners are significant and positive explanatory variables for the successful implementation of potential voluntary measures in the two markets.

Table 5.11: ML estimates of a Logit analysis for adoption of voluntary measures (Dependent variable: Adoption of voluntary measures)

Variable	Parameter	ML estimates (standard error)
Intercept	β_0	-6.3541 (7.7670)
Sex	β_1	-0.89178 (0.6295)
Age	β_2	0.6377 (0.6215)
Education levels	β_3	-0.0131 (0.4433)
Marital status	β_4	0.5753 (0.7097)
Distance between trader and location of waste bins	β_5	0.8195 (1.636)
Frequency of emptying waste bins by the Council	β_6	-0.5369 (0.6661)
Period of trading in the market	β_7	-0.1849 (0.4114)
Number of waste bins provide in the market	β_8	0.5166 ^{***} (0.1492)
Number of cleaners provided in the market	β_9	0.0569 ^{**} (0.0268)
Trader's average income	β_{10}	0.0000 (0.0001)

***statistically significant at 1%, **statistically significant at 5%

In other words, the regression output shows that successful implementation of voluntary measures represent an increasing relationship with the number of waste bins and cleaners provided in the markets. These estimates make intuitive sense in that a positive relationship between the number of waste bins or cleaners and the adoption of

voluntary measure confirms the earlier predictions in the descriptive statistics noted above. This positive coefficient on the number of bins is therefore in line with expectations. Similarly, a positive relationship between the number of cleaners and adoption of voluntary measures also confirms our earlier prediction under descriptive statistics. Both regressors have a significant impact on the adoption of voluntary measure by traders in the market, as the LR statistic of 43.51 with a p value of 0.0000 depicts a robust model.

The negative sign on the variable sex means more women are willing to undertake a voluntary measure, which is expected since there are more women than men in the two markets. While the sign on the variable educational level was expected to be positive, the negative sign can still be explained in the sense that due to the misuse and corruption associated the use of traders' monetary contributions towards market cleaning by market officials, the educated and enlightened traders would be reluctant to engage in voluntary measures in protest. Similarly though the sign for the variable period of trading in the market was expected to be positive, the negative sign can also be explained in the sense that the traders are now tired of the misuse of their resources hence won't bother to engage in voluntary measures to clean the markets. As for the negative sign on the variable frequent emptying of waste bins, the possible explanation is that the more frequently the bins are emptied, the more cleaner the markets will be and the less the need for traders to engage in voluntary measures.

In addition to the above logit regression, the prominent voluntary measure of "clean or sweep my own trading premises" was regressed using a logit model, as a dependent variable on incentives or motivating measures that the City Council or other stake holder in environmental should provide in order to enhance voluntary measure by the traders. The ML estimates output is shown in Table 5.12 below. The ML estimate in table 5.12 show that at 95% confidence interval only the variable "the City Council to provide extra waste bins" is significant, though the model is not as robust as in the logit regression. However the sign on the coefficient for the variable to provide extra cleaners is negative.

From the above regression analyses, the variables regarding the need for extra waste bins and cleaners in the markets are significant in first regression (Table 5.11) while in the second (Table 5.12) regression only the variable waste bins is significant.

Table 5.12 ML estimates of “clean or sweep my own place” on proposed motivating measure

Variable	Parameter	ML estimates (standard error)
Constant	β_0	-0.1937 (0.9703)
Council to provide extra waste bins	β_1	0.6497* (0.0027)
Council to provide extra cleaners	β_2	-1.2093 (0.9149)
The council to sensitize traders on the need for a clean market	β_3	-0.0264 (1.8995)

**statistically significant at 10%*

The conceptual framework presented in Chapter three above argued that Voluntary Agreements in environmental management will need the following attributes if they are to be implemented successfully:

- well defined and attainable performance targets
- clearly specified deadlines within which to achieve the performance targets
- a third party monitoring (other than the regulator)
- sanctions for non compliance and subsidies or incentives for the complying firms

The conceptual framework suggests that the ability of environmental regulatory authorities to provide well defined and attainable performance targets, clearly specified deadlines within which to achieve the performance targets and monitoring of implementation in the achievements is critical. This is because these abilities are a necessary condition for successful implementation of voluntary agreements as a policy instrument for pollution control. This provides increased opportunities for both polluters

and regulators to not only assess the feasibility of achieving such targets but also to assess their own capacity with regards to implementation.

With regards to defining performance targets and deadlines for achieving them, the two Market Masters who represent the local authority in the above markets observed that defining performance targets and deadlines in the absence of prerequisites like adequate number of waste bins and cleaners is difficult. However, based on their past experiences with traders, they pointed out that traders have always shown willingness to abide by the other feasible market requirements presented to them, therefore they conclude that they would equally abide by any other feasible performance targets and deadlines required of them if appropriate prerequisites are put in place. Further given the availability of resources, the City Council can easily define performance targets and deadlines for achieving them, as has been the case in the past.

The picture regarding the issue of monitoring implementation of cleanliness in the markets by the regulator or through a third party is a lot clearer. The absence of physical enforcement agents in the markets has been partly blamed for the indiscriminate disposal of waste and general litter around the market area. As a result, even the little efforts by some traders to apply peer pressure on their careless counterparts have not yielded significant results in the absence of regulatory pressure. For instance, 15 percent of the traders reported that the local authority should provide inspectors to prevent the throwing of garbage in the drainages. Other traders however were of the opinion that with adequate waste bins and cleaners in the market, the need for external monitoring could not arise. They argued that monitoring could even be done by their own market committees and complimented by peer monitoring. The possibility of third part monitoring was also seen by the Market masters to be helpful if the local authority could afford such services, especially if sought from the private sector.

At the core of successful implementation of voluntary agreements as outlined in the theoretical framework, is the provision of appropriate incentives to induce compliance and application of sanctions to defaulters. As noted above the need for appropriate

incentives as motivation for successful implementation of voluntary agreements cannot be overemphasised. In order to determine the incentives that respondent needed, they were first asked to specify which voluntary measures they were willing to undertake as individuals in order to implement a higher standard of cleanliness in the market despite the fact that they contributed a daily levy of K1, 500 towards the cleaning of the market. Seventy four percent of the traders reported that they would clean their trading premises daily while 8 percent reported that they would clean their trading premise at least twice daily. Another 2 percent reported their willingness to find some time off their business schedule to go round the markets and sensitise their fellow traders on the need for a clean market, while a further 1 percent volunteered to clean contaminated areas in the market, a clear evidence of over compliance.

When prompted to give their suggestions on how best the Lusaka City Council could assist them implement these voluntary measures, 83 percent of the traders felt that the local authority should assist them with extra waste bins in the markets. This is a crucial factor and implies that even if the council did not employ enough workers in the markets the mere presence of adequate waste bins would greatly improve market cleanliness. In a similar fashion, 6 percent reported the need for extra cleaners in the market while 2 percent pointed out that the council should increase the frequency of emptying the few waste bins in the markets. A further 1 percent noted the need for inspectors to enforce cleanliness in the markets. With regards to sanctions to be applied to defaulters, most traders welcomed sanctions as a last resort and suggested that expulsion from the market was a better sanction compared to payment of fines.

The study results earlier predicted by the descriptive statistics and confirmed by the logit regression analysis have shown a great deal of influence exhibited by the increase of the number of waste bins on the success of the proposed policy instrument and slightly less influence by increasing on the number of cleaners in the markets. This means that these factors which are considered to be incentives, are critical and directly affect the success of implementing the proposed policy, therefore, need to be addressed. Thus, there is need for the local authority to either provide these requirements or facilitate the

participation of other stake holders in environmental management having the capacity to provide them.

The discussion above has attempted to build a picture of the potential contribution that voluntary agreements can make to informal sector pollution control in general in Zambia and the improvement to the current peri-urban waste management system employed in the study areas in particular. As a follow up to the traders' potential voluntary measures identified in objective 1 above, this section has pointed out in outline the incentives potentially expected to motivate above voluntary measures and spur compliance in environmental management in the markets. The above discussions have thus addressed the first and the second objectives of the study.

5.4 ESTIMATION OF TRADERS' WILLINGNESS TO PAY FOR IMPROVED CLEANLINESS IN THE MARKETS

Although the study was on potential contributions of voluntary measures to informal sector pollution control, it also employed contingent valuation method (CVM), to play a subsidiary role of testing some correlation between traders' voluntary measures and their willingness to pay for proposed improvements to market cleanliness. The statistical results together with the discussions above indicate that traders in the two markets understand the environmental management problems they are facing and would strongly support efforts to address the problem. As a result they all indicated their willingness to pay extra money for the proposed improved to the cleanliness in the two markets.

5.4.1 Traders willingness to pay for improvement in the market cleanliness

All the 93 traders in the sample population from the two markets reported a positive WTP based on the proposed improvement to the market cleanliness based on the hypothetical scenario that was presented to them. This is an average WTP generated using STATA from all the traders' individual WTP figures. Results for the traders' WTP for the proposed improvement in the cleaning of the two markets are summarized in

Table 5.13 below. A student t-test for equality of means show that there are no significant differences in the means of traders' WTP amounts between the two markets ($t_{91,0.005} = -0.636; \rho = 0.526$). The daily average WTP per trader is K1831.00 with a standard deviation of K232.00

As a result, the average WTP per respondent per year for the improvement in market cleanliness in the two markets is K483,384.00 This average WTP accounts for approximately 0.8 percent of the traders estimated average annual income of K6,223,800.00 per respondent. The aggregate WTP for traders in both markets calculated by multiplying the average WTP (K483,384.00) per respondent per year by the total number of traders in the two markets (25,000 traders as provided by market management in 2011) is K1,208,460,000.00 or K1.2 billion.

Table 5.13: Willingness to pay for improved cleanliness in the markets

Willingness to pay (ZMK)	Soweto market (%)	City market (%)	Totals (%)
≤500	15 (16.1%)	12 (12.9%)	27 (29%)
501-1750	5 (5.4%)	4 (4.3%)	9 (9.7%)
1751-4999	23 (24.7%)	25 (26.9%)	48 (51.6%)
≥5000	4 (4.3%)	5 (5.4%)	9 (9.7%)

Source: Author's own construct

This is the traders' valuation of the annual benefits from the proposed improvement to the cleanliness in the Soweto and City markets of Lusaka. Correlation tests failed to show any relationship between traders' voluntary measures and their WTP. In order to determine commensurate cost estimates of the proposed project that can enable the interpretation of the WTP value, the two markets are divided, based on the trading activities, into 4 sections as shown in Table 5.14 below, with each section allocated the proposed minimum of 5 waste bins each. These are 5m³ communal waste bins which

are considered by the City Council to be large enough to be shared between the two markets, given that the markets are situated next to each other.

Table 5.14: Market sections and allocation of waste bins

Description of market section demarcations	Waste bins
Fresh and dry foods, restaurants and bottle stores/taverns	5
Groceries, clothing, jewellery, cosmetics, agro input/chemicals and tailoring shops/stalls	5
General hardware, automotive, electrical, electronic and Agricultural implements, accessories	5
Bus station area, newspaper, talk time and other vendors	5

Source: Author's own construct

Currently, the markets under the peri-urban waste management system are only expected to meet the City Council's operational costs of secondary waste collection – this is the collection of waste bins from the market for onward emptying at the City Council's official waste dump site. This subsidised service is currently provided at a cost of K200,000.00 for servicing one waste bin per day. The total cost of servicing the 20 waste bins per day translates to K1,460,000,000.00 or K1.6 billion per year (20 x K200,000.00 x 365 days). This is higher than the aggregate WTP value of K1,208,460,000.00 or K1.2 billion calculated above, implying that the project cannot be sustained from the resources raised from the traders alone but would require 20 percent of external financial support. The proposed 20 waste bins for the two markets are however justified to spur higher cleaning standards given the current situation where there are only 3 waste bins servicing the two markets (2 in the City market and 1 in the Soweto market).

While the CVM aimed at evaluating total value of proposed improved to market cleanliness or environmental quality improvement, most of the traders, however, appeared to be only familiar with health effects and loss of business associated with poor market environmental management record. This is because the health impact and loss of business seem to be the easiest to be identified with. For this reason, the willingness to pay expressed by the traders is mostly for reducing negative health

impacts and improving on the poor environment management record that could result in their loss of business caused by the pollution in the markets.

In the study, the main factor that may cause bias in the results regarding traders' WTP lies in some traders' incomplete or incorrect perception of the total value of the environment, as well as the total benefits from environmental quality improvement as noted above. Therefore the reported low responses to the higher bids of WTP questions could mainly be due to the traders' failure to appreciate the total value of proposed improved environmental quality. As a result many traders may have undervalued their true WTP when being asked to sacrifice some of their resources to protect the environment. Finally, it was difficult to compare the result of this study with any previous studies since there is no evidence of such previous studies in Zambia.

The third objective of this study aimed at applying CVM to assess the correlation relationship between traders' voluntary measures and their WTP. The mean willingness to pay for the proposed improvement in cleanliness was K1831 per respondent per day, and the total WTP of all the traders is K1.2 billion per year. The mean WTP accounts for 0.8 percent of the reported average annual income. The total WTP of the traders in the ultra modern City market is higher than for the traders in the make-shift Soweto market. The traders' positive WTP illustrate their preference for better environmental quality in general. Although the use of the CVM was meant to show some correlation between traders' voluntary measures and their WTP, correlation test failed to show any relationship.

Since the use of CVM in the valuation of environmental goods and services in Zambia is rare, making reference to previous studies impractical, logical and reliable results of future studies can only be obtained through proper questionnaire design and survey implementation. Moreover, more studies are needed to get comparable data and better practice of CVM in Zambia. Although there is still considerable uncertainty regarding calculating accurate benefits of environmental improvement in general, CVM has been found to be a useful and flexible tool for policy makers in decision making. In

conclusion, for better results, each particular CVM study should be designed according to the prevailing local situation, so that successful valuation practice and reliable estimates of values of environmental goods and services could be obtained.

5.5 CONCLUDING REMARKS

This chapter presented empirical findings and discussion of the study. The findings of the study show that there is a potential for implementing voluntary measures in the control of informal sector pollution in Zambia. The homogeneity in the traders' views from the two markets regarding the problem of pollution and the proposed voluntary measures to resolve the problem imply that policy recommendation for one market will have similar effects on the other. Further, the potential voluntary measures offered by the traders in both markets show characteristics of public goods, which are not usually supported by the private sector. It is also clear that traders in the two markets significantly value quality improvement in the environmental management of their markets, as show by their positive willingness to pay for improvement in environmental quality.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

The principal aim of this research was as a case study, to investigate the extent to which public programs as a form of voluntary agreements for environmental management could be used for the control of informal sector pollution in Zambia. In particular, it aimed at establishing the potential contribution that voluntary agreements could make to informal sector pollution control in Lusaka's Soweto and City markets', as an example of such markets in Zambia. Within that broader aim, the study hoped to, using logistic regression models to establish appropriate institutional arrangements in the existing regulatory framework that may be better placed to support the implementation of voluntary measures and therefore contribute to knowledge and informs policy in this increasingly important area. While the context is Lusaka in Zambia, the study is of wider application to other African countries which are currently grappling with the intertwined problems of informal sector growth and informal sector pollution control. This Chapter presents the conclusion and recommendations from the analysis and discussions of the empirical data presented in the preceding sections, as well as qualitative information obtained from the unstructured interviews.

6.2 CONCLUSION OF THE STUDY

The study was based on the hypothesis that environmental management voluntary agreements as a policy instrument for informal sector pollution control could have positive outcomes in developing countries if appropriate motivating measures are put in place. Information from the data analysis shows that the traders in the two markets would like to engage in voluntary measures that are beneficial to them as individual traders as well as the market as a whole. The reasons advanced for the traders' willingness to engage in voluntary measures are of a "public goods" nature in character.

Similarly, the incentives that the traders in the two markets are demanding from the Lusaka City Council to facilitate their involvement in voluntary measures are basically of “public goods” character.

Based on the information above, this study concludes that voluntary agreements could indeed significantly contribute to Zambia’s informal sector pollution control. The study however finds that, while voluntary agreements can contribute significantly to pollution control in the two markets of the study in Lusaka, there is at present limited potential for their success with regards to implementation due to lack of appropriate institutional arrangements and incentives to support such implementation. Some of these incentives include the provision of adequate number of waste bins and cleaners in the markets. The physical absence of regulatory enforcement agents in these markets could seriously militate against implementation of this policy instrument.

With regards to the assessment and estimation of traders’ willingness to pay for the proposed improvement in the cleanliness of the Soweto and City markets using the Contingent Valuation Method (CVM), the results report an average positive WTP of K1831 per day. This represents 0.8 percent of respondent’s average daily income and translates into an aggregate WTP in the two markets of K1.2 billion per year. Since all traders indicated that they were privately willing to adopt voluntary environmental agreements, it was not possible to test whether a statistical relationship exists between willingness to pay and willingness to adopt voluntary environmental agreements.

6.3 RECOMMENDATIONS AND POLICY IMPLICATIONS

Overall the study concludes that there is a good potential for implementing Voluntary Agreements to Zambia’s informal sector pollution control after putting in place necessary institutional arrangements specified above. This is consistent with the results of our descriptive statistics followed logit regression models which have both indicated potential success of implementation of the policy instrument, subject to the presence of

appropriate institutional arrangements outlined earlier. In this regard, specific proposals are made for policy interventions in four key policy areas as follows;

- The Lusaka City Council and other stake holders (NGOs, individuals, business houses and other institutions who support and contribute to efforts towards environmental management) should adequately provide appropriate incentives to the traders in the two markets in form of increasing the number of waste bins and cleaners in the markets.
- The Lusaka City Council and other stake holders should ensure that supporting organisational structures and services like frequent removal of waste bins from the markets by the local authority should be effectively co-ordinated.
- The Lusaka City Council and other stake holders should at all time ensure the expansion of physical presence of regulatory enforcement agents in these markets to monitor compliance and impose sanctions for non-compliance.
- The Lusaka City Council and other stake holders should continue to build a shared understanding of the need for maintaining a clean and environmentally conducive market area through continued sensitization programs.
- Traders from both markets to implement voluntary measure they offered to undertake to reduce pollution in the markets.
- Buyers to uphold good hygiene by avoiding littering anyhow in and around the marketer areas.

The study however argues that these policy recommendations create the necessary conditions to support other existing regulatory policy framework on informal sector pollution control in Zambia. It is further acknowledged that mere implementation of voluntary agreements measures will by itself not necessarily combat the problem of informal sector pollution control in total. As pointed out in the conceptual framework, the best overall results are expected when voluntary agreements are implemented to compliment other policy instruments in a policy mix approach. This means that more attention should be placed on developing strategies that will effectively integrate voluntary agreements into the existing environmental regulatory framework.

6.4 LIMITATIONS OF THE STUDY AND AREAS FOR FURTHER RESEARCH

The main weakness of this study is one which is inherent to the case study approach and relates to the generalisation of these findings to other markets, cities or even countries. While there are no reasons to suggest that the findings of this study are not representative of the Zambian experience in Lusaka, caution needs to be exercised when considering other cities in Zambia or even other countries. Further, the logit models appear to be underspecified as most of the dependent variables had limited variability. As regards to the estimation of the WTP, the drawback lies in the fact that responses from the traders are based on a hypothetical situation rather than actual behavior and therefore, the accuracy of the estimations are a function of effective questionnaire design. Further, the absence of CVM studies in Zambia means that respondents are not familiar with correct valuation of environmental goods resulting in incomplete and incorrect perception of the values of the environment, as well as the benefits from environmental quality improvement. This means traders may have expressed lower estimations than actual values regarding the total benefits of improved market cleanliness. In particular the calculated WTP in this study is low at 0.8 percent of their average annual income hence more studies are needed to get comparable data and better practice of CVM in Zambia. Finally, since this was not meant to be a fully fledged CVM study, the reported WTP and related CVM results should be interpreted with caution.

The above weaknesses and the conceptual framework suggest areas for further research. Firstly there is need to extend this study either by way of a large scale survey with a larger sample randomly selected than that used in this study or replicating it in a different social-cultural and economic environment. Second, Lusaka city has the largest and representative informal sector population, and is within the Lusaka City Council which has the advantage of having relatively more resources in material and staff, being in the capital city of Zambia. While this may have its practical advantages, it may be the case that a minimum resources threshold is required for successful implementation of

voluntary agreements, of the sort envisaged in the conceptual framework for successful implementation of voluntary measures in poor African countries.

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APPENDIX 'A' SURVEY INSTRUMENT

IMPROVEMENTS TO THE WASTE MANAGEMENT SYSTEM IN LUSAKA'S SOWETO AND CITY CENTRE MARKETS

Questionnaire No:

Name of Enumerator:

Date of Interview:

1. BACKGROUND INFORMATION

Basic Respondent Information	Coding
1.1 Name of Market	1=Soweto, 2=City Centre
1.2 Sex of respondent	1= Female 2=Male
1.3 Age group of respondent	1= Under 20 years, 2= 20 – 30 years, 3= 31 - 40, 4= Over 40 years
1.4 Highest level of formal education attained	1= None, 2= Primary, 3= Secondary, 4= College/University
1.5 Marital Status of respondent	1= Married, 2=Single

1.6 In the table below kindly tick against the categories that best describes the occupation you spend most of your time on in this market?

1= Food products/food processing business dealer.	
2= General household wares/ groceries dealer.	
3= Automotive/electrical/electronic/hardware dealer.	
4= Mechanic/electrical or electronic technician.	
5= Wood/metal fabricator.	

6= Clothing/jewellery/cosmetics business dealer.	
7= Bottle store.	
8= Other (specify).	

1.7 Using the table below kindly indicate how long you been trading (transacting business) in this market.

1= 5 years and below	
2= Between 5 and 10 years.	
3= Between 10 and 15 years.	
4= 15 years and above.	

2. CLEANLINESS AND SANITATION IN THIS MARKET

Interviewer: The purpose of this section is to obtain your views on the level of cleanliness and sanitation services provided by the City Council in this market. Further you will be required to indicate the kinds of liquid, solid or airborne wastes that you find unpleasant in this market.

2.1. Do you think it is important to maintain a clean, healthy environment in this market?

- i. Yes
- ii. No (Go to Q 2.2)

2.2. If your answer in Q 2.1 above is NO, kindly provide some further clarification.

2.3. Are you satisfied with the current levels of cleanliness in this market?

- i. Yes
- ii. No (Go to Q 2.4)

2.4. If your answer in Q 2.3 above is NO, kindly provide some further clarification.

2.5. Rate the seriousness of the following forms of waste and garbage problems in this market area on a scale of 1 – 3, where 1 stands for “a very serious problem” and 3 indicates that it is indeed a problem but it does not bother you.

Form of waste	1	2	3
<i>Indiscriminate disposal and accumulation of solid wastes or garbage around the market grounds.</i>			
<i>Bad smells of decomposing waste or smoke from burning material in the air.</i>			
<i>Dirty and smelling water in drainages or ponds around the market.</i>			

3. ACTIVITIES GENERATING POLLUTION

Interviewer: This section requires you to identify the materials contributing to solid, liquid and atmospheric forms of waste in this market. You will also be required to identify the business activities that in your view are responsible for the different types of accumulation of waste in this market. In each case, you will rate them on a scale of 1-3, where 1 indicates a very high intensity of waste accumulation, 2 indicates a moderate

intensity of waste accumulation and 3 indicates a level of waste accumulation that does not apparently bother you. Further the section also seeks to know what in your view those people causing the highest pollution (waste accumulation) can do to minimize their pollution and what the Lusaka City Council can do to help them achieve this.

3.1. Rate the levels of waste accumulation (pollution) caused by the following solid forms of wastes (land pollution). In each case, you are required to select only one option.

Activities causing solid waste accumulation	1	2	3
<i>Food products and food processing wastes</i>			
<i>Plastic products, papers and general litter</i>			
<i>Automotive, electrical, electronic repairs waste</i>			
<i>Wood and metal fabrication wastes</i>			

3.2. What measures in your view can the people causing the highest waste accumulation (pollution) in Q3.1 above undertake to minimise this problem.

3.3 How best do you think the City Council can help them achieve this?

3.4 Rate the levels of air (atmospheric) pollution caused by the following forms of activities below. In each case, you are required to select only one option.

Activities causing air pollution	1	2	3
<i>Decomposing food products and food processing wastes</i>			
<i>Burning Plastic products and used tyres</i>			

<i>Burning Wood and, papers and general litter</i>			
<i>Burning Automotive, electrical, electronic repairs waste</i>			

3.5 What measures in your view can the people causing the highest air (atmospheric) pollution in Q3.4 above do to minimise this problem.

3.6 What in your view can the City Council do to help them achieve this?

3.7. Rate the levels of water pollution caused by the following forms of activities below. In each case, you are required to select only one option.

Activities causing water pollution	1	2	3
<i>Food products and processing wastes</i>			
<i>Plastic products, papers and general litter</i>			
<i>Automotive, electrical, electronic repairs, Wood and metal fabrication waste</i>			
<i>Chemicals from textiles, dye stuff and other processing wastes</i>			

3.8 What measures in your view can the people causing the highest water pollution in Q3.7 above do to minimise this problem.

3.9 What in your view should the City Council do to help them achieve this?

4. VOLUNTARY MEASURES TO IMPROVE ENVIRONMENTAL MANAGEMENT IN THE MARKET

Interviewer: You will recall that you earlier indicated that you were generally not satisfied with the level of cleanliness in the market. Even if you were happy with the current levels of cleanliness in the market, there is always room for improvement. It is on this basis that this section now seeks to know what in your view you and the Lusaka City Council can do to implement higher standards of cleanliness. This is because, for better environmental management in the market to result, the City Council has a role to play, and you too as an individual also have a very important role to play. Therefore, am interested in establishing what you as an individual is willing to do in order to improve the environmental management in this market beyond the minimum cleanliness required by the Lusaka City Council.

4.1. How many waste collection bins do you see around this market?

_____ (please indicate the number here)

4.2. In your view, do you think this number of waste bins is adequate to meet the cleaning needs of this market?

- i. Yes
- ii. No (Go to Q 4.3)
- iii. Not sure

4.3. If your answer in Q 4.2 above is NO, kindly give reasons for your answer in the space provided below, if possible indicate the what number of waste bins would in your view be adequate?

4.4. How far are the waste bins from where you are operating?

- i. Very near
- ii. Near
- iii. Far
- iv. Very far

4.5. From your own observations, how often are the waste bins collected for emptying by the Council?

- v. Before they are filled up
- vi. At the time they are filled up
- vii. Long after they are filled up and are overflowing with waste
- viii. I don't know

4.6. How many cleaners do you normally see cleaning this market? _____

4.7. In your view, do you think this number of cleaners is enough to meet the cleaning needs of this market?

- i. Yes
- ii. No (Go to Q 4.8)
- iii. Not sure

4.8. If your answer in Q 4.7 above is NO, what in your view should the minimum number of cleaners that can meet the cleaning needs of your market area be? Kindly provide the reasons for your answer in the space provided below

4.9. According to your preference, rate which action to be taken by the council below would lead to the highest improvement to the current waste management system in your market area on a scale of 1 – 3, where 1 stands for the action leading to the highest improvement and 3 indicates the action leading to the least improvement.

Actions to be undertaken	1	2	3
<i>Increasing the current number of waste bins located in your market area</i>			
<i>Increasing the frequency of collecting waste bins for emptying from your market area</i>			
<i>Increasing the current number of cleaners in your market area</i>			

4.10. What measures are you as an individual willing to undertake in order to implement a higher standard of cleanliness in this market?

4.11 How in your view can the City Council help you implement this?

4.12 If separate waste bins were provided, would you be willing to separate plastic waste from non plastic before you throw them into the waste bins as a way of improving environmental management in your market area?

- i. Yes (Go to Q4.13)
- ii. No (Go to Q4.14)
- iii. Not sure

4.13. If your answer in Q 4.12 above is YES kindly give your reasons in the space provided below?

4.14. If your answer in Q 4.12 above is NO, what in your view should the council do in order for you to be willing to separate plastic wastes from non plastic waste before you throw them into the bins as a way of improving environmental management in your market area?

4.15. If separate waste bins were provided in the market, would you be willing to separate waste from food (organic) from non food waste before you throw them into the waste bins as a way of improving environmental management in your market area?

- i. Yes (Go to Q4.16)
- ii. No (Go to Q4.17)
- iii. Not sure

4.16. If your answer in Q 4.15 above is YES kindly give your reasons in the space provided below?

4.17. If your answer in Q 4.15 above is NO, what in your view should the council do in order for you to be willing to separate wastes from food (organic) and non food waste before you throw them into the bins as a way of improving environmental management in your market area?

5. VALUATION OF ENVIRONMENTAL QUALITY IMPROVEMENTS IN THE MARKET

Interviewer: In this section you are required to state how much, in your view, it is worth for you to achieve a higher level of environmental quality in your market as explained below. Please see the described environmental qualities on the corresponding pictures. When you have understood them, answer the questions that follow. The current level of cleanliness in this market is not good for the benefit of both customers and you the traders. For example, the high accumulation of garbage around the market area, as shown in picture 1 below, coupled with bad smells from decomposing waste and contaminated water is not a suitable environment to both customers and traders.

Picture 1: High accumulation of garbage in the market



5.1 Are you aware that the current situation around the market area is as described above? YES/NO

Interviewer: Under such dirty market conditions, there are several health hazards to both customers and traders. For example, flies from decomposing waste or contaminated water could transmit germs from these areas to foodstuffs sold in the market, where consumption of such food could result in out breaks of diseases like cholera.

5.2 Do you agree that the dirty market environment can lead to out breaks of diseases such as cholera or do you want me to explain further on the relationship between a dirty environment and disease out breaks? I AGREE/ I DO NOT AGREE

Interviewer: Further, such high accumulation of garbage could block water drainages resulting in flooding of some market areas. In addition to health hazards and bad smell, such flooding of some market areas could make access to the market itself very difficult if not all together impossible, in the process causing most if not all customers to shun the market. When customers shun the market, this will translate in loss of business on your part as a trader.

5.3 Do you agree with the above assessment or you need further clarification? I AGREE/ I DO NOT AGREE

Interviewer: The situation described above and shown in picture 1 could be improved to a better level of cleanliness now shown in picture 2 below. Under picture 2, there is *no* accumulation of garbage and bad smell, *no* health hazards and *no* customer shuns the market. However, in order for the situation to improve from what you see in picture 1 to what is observed in picture 2, a number of things have to be done. For instance, the council will need to purchase and allocate more waste bins to this market, as well as increase on the frequency of emptying of waste bins. In addition, your market committee will also need to employ extra cleaners to clean the market. This will inevitably require more funds for both the council and your market committee to attain the level of cleanliness shown in picture 2. As a result, you as a trader may be required to increase on the current daily waste collection levy of ZMK1, 500.00 you are paying. You are

guaranteed that once this “extra” money is collected, it would definitely go towards improving the quality of the environment from picture 1 to picture 2 without doubt.

Picture 2: No accumulation of garbage and bad smell in the market



5.4 Does this explanation make sense to you or should I explain further? YES/NO

Interviewer: I would now like to ask you a few questions on the idea of increasing your current daily waste collection levy that could lead to the level of cleanliness shown in picture 2 above.

5.5 Would you be willing to pay ZMK 500 above what you are already paying as your daily waste collection levy if the level of cleanliness in the market improved from the level shown in picture 1 to that in picture 2 above? YES/NO

If YES, continue to Q NO 5.6, if NO, please explain below why you would not be willing

5.6 Would you be willing to pay ZMK 1,750 above what you are already paying, as your daily waste collection levy if the level of cleanliness in the market improved from the level shown in picture 1 to that in picture 2 above? YES/NO

If YES, continue to Q NO 5.7, if NO, please explain below why you would not be willing

5.7 Would you be willing to pay ZMK 5,000 above what you are already paying, as your daily waste collection levy if the level of cleanliness in the market improved from the level shown in picture 1 to that in picture 2 above? YES/NO

If YES, continue to Q NO 5.8, if NO, please explain below why you would not be willing

5.8 What is the maximum amount of money you would be willing to pay towards your daily waste collection levy if the level of cleanliness in the market improved from the level shown in picture 1 to that shown in picture 2 above? ZMK _____

Thank You