NATIONAL TECHNOLOGY BUSINESS CENTER

ALUMINUM PROJECT REPORT

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ABBREVIATIONS

CSO - CENTRAL STATISTICS OFFICE

ECZ - ENVIROMENTAL COUNCIL OF ZAMBIA

IDDS - INTERNATIONAL DEVELOPMENT AND DESIGN SUMMIT

MDG - MILLENIUM DEVELOPMENT GOALS

OECD - ORGANISATION FOR ECONOMIC CO-OPERATIONS AND DEVELOPMENT

UNDP - UNITED NATIONS DEVELOPMENT PROGRAMME

EXECUTIVE SUMMARY

This report is based on an assessment study aimed at determining the unexploited capabilities and opportunities in the recycle aluminum value chain. The study assessed the business opportunities that can be exploited in the aluminum value chain. The study findings revealed that there are four business opportunities in the aluminum industry. These opportunities are; (1) Collection of aluminum scraps metal, (2) Sorting and cleaning, (3) Refining and processing and (4) Marketing.

The study further revealed that the youths who participated in the study were willing to venture into the business of aluminum recycling. The majority 30.4% of the youths were those willing to work at the processing stage. About 21.4% were willing to work at the sorting and cleaning stage.

The collection stage was also outlined as one of the most important stage in the process of recycling aluminum because in most compounds there is the ongoing business of buying scrap metals. About 26.8% of the youths were willing to venture into the business of collecting aluminum scrap metal for sell. Further the study findings indicated that about 21.4% of the youths consulted were interested in the marketing stage of the aluminum products

Finally, the study sought to establish the challenges that were associated with the aluminum recycling process. The major challenge was lack of financial support for the casters to purchase the raw materials, transport their goods to the selling places and funds to buy the casting energy (charcoal) which most of those interviewed indicated that charcoal was costly for the casting process. Markets for recycled aluminum products are not exploited and the sector lacks the improved technology for casting.

CHAPTER ONE

1.0 INTRODUCTION

Aluminum recycling is a process practiced globally as an intervention to deal with the high waste produced from manufacturing industries and domestic use of aluminum based products. This has led to both developed and developing countries to put in place aluminum recycling policies that will allow the waste of aluminum to be reused or processed into other useful products.

While the aluminum industry's interest in Sub-Saharan Africa is growing tremendously, the sector's contributions to Africa's economic and human development to date remain unexploited. In developing countries recycling aluminum has brought about innovations that process the aluminum into other usable products like pots and earth boxes giving people an opportunity to generate income to the available market and also the raw material which is collected from scrap metal from waste is being reduced.

In the case of Zambia, the opportunities in the aluminum sector are not fully exploited in the sense that the products produced in the recycling process are of a limited range and technologies accompanying this process are conventional and not necessarily modern. Aluminum casting as a sector is not fully established in Zambia, it is predominately practiced in a highly density areas mostly as family business. The indigenous knowledge supporting this industry is generally passed on from generation to generation and hence it is a tradition in specific locations to produce specific products. Capacity building in the aluminum sector if improved would allow exploitation of the sector giving room for increased income generation and potentially export opportunities. Improved aluminum recycling would also present business opportunities for the casters to expand their probable markets allowing the sector to

attract more would be practioners namely the youth found in local communities in the high density areas which have greatly been affected by high unemployment levels. .

Although the challenges faced currently in the aluminum value chain are numerous ranging from limited space of operation, limited access to the market, limited financial and business literacy, perhaps the most critical is inability for the casters to have access to more efficient and safe technological options to increase their productivity and reduce on the poor quality production of recycled aluminum into quality reusable products. The casters also lack information on the value chain making them unaware of the vast opportunities available for them to exploit as well as benefit more from the sector.

1.1 PROBLEM STATEMENT

There is a large quantity of waste produced in the country due to the increase of the population in Zambia. Importation of second hand vehicles and electrical components has also increased resulting in large quantities of scrap metal being accumulated. Industries concerned with the processing of scrap metal in Zambia are very limited due to lack of infrastructure and innovative technology to curb the scrap metal situation. This has resulted in the opportunities in the sector being lost and challenges not being addressed. The effect of this is increased scrap metal waste in high density areas which now act as act as dumping sites for various manufacturing industries Very few individuals are now collecting this scrap metal and processing it into reusable products.

It can therefore be concluded that the aluminum sector is still not fully exploited and operates in undefined markets within its value chain; the product range is limited and cannot be improved because in the technology in use is inefficient and still highly traditional Business opportunities are vast within the sector but due to limited information on the industry they are

not being exploited, hence this study is aimed at enhancing the opportunities present in the aluminum sector.

1.2 OBJECTIVES AND AIM

1.2.1AIM

- The aim of this study is to determine the unexploited capabilities and opportunities in the recycle aluminum value chain.

1.2.2 SPECIFIC OBJECTIVES

Specific objectives of the research study will be:

- To profile competitive products that can be made from aluminum recycling
- To determine the conditions under which the casters would be willing to adopt improved casting technology
- To determine the business opportunities present in the aluminum recycle value chain

CHAPTER TWO

2.1 BACKGROUD ANALYSIS

In a monolithic society as Zambia, arts and crafts play an important social, economic, as well as utilitarian role which can help in the developmental needs of the nation. The aluminum industry can be one of the major commercial ventures in Zambia if it is given proper attention by the various actors in enterprise development.

2.1.1 Youth unemployment

Zambia has one of the fastest growing populations in sub-Saharan Africa. The growth rate reached 2.8 percent per annum during 2000-2010, up from 2.4 per-cents during 1990-2000. This has not been accompanied by the requisite social and economic development planning and investment, in effect weakening the link between economic growth and poverty reduction. A rapidly growing population puts pressure on public expenditure, thereby straining vital public services, particularly education and health. Matching population growth with appropriate planning is fundamental to raising the low quality of Zambia's human capital and to speed up poverty reduction (Millennium Development Goals Number 1; United Nations Development Programme)**.** Therefore, this study is expected to address the unexploited employment and enterprise development opportunities for the casters in the aluminum sector.

2.1.2 Poverty

Majority of Zambians have continued to live in poverty in most high density areas due to rapid growth in population. However, the government of Zambia has set up a number of policies to alleviate the scourge but the poverty levels are still high whilst these policies are being implemented. The 2010 Population and Housing census show that poverty levels have

remained high despite recording a decline between 2006 and 2010. The proportion of the population falling below the poverty line reduced from 62.8 percent in 2006 to 60.5 percent in 2010. The percentage of the extremely poor marginally declined from 42.7 percent to 42.3 percent (CSO, 2010).

Therefore, improving aluminum sector by introducing new technology can help to address poverty levels in the country. For example the International Development and Design Summit (IDDS) which took place in Lusaka in 2013 considered the aluminum recycling for as an accelerator of economic development at community levels with specific focus on high density areas. This necessitated the development of a new improved aluminum recycling technology. The technology aimed at enhancing efficiency and effectiveness in aluminum recycling process. This has accelerated the process of production and improves the quality of aluminum products such as pots. Therefore, it will enable casters to produce and sell many pots and many other products made from recycled aluminum which will generate income for their living. This will enhance sustainable development and poverty reduction in the long run.

2.1.3 Waste Management

Generally the current waste management situation leaves much to be desired. Waste generated from all the sectors of the economy is currently not well managed. Disposal sites in almost districts are either not there or they are poorly managed. Taking the Lusaka situation as a reference point, less than 14 % of the waste generated in the urban centers finds its way to the disposal sites. The following waste streams include domestic, commercial, industrial and hazardous wastes. Currently, there is no available data on radioactive, agricultural and chemical wastes. In addition, there is generally inadequate data for other waste streams especially for areas outside Lusaka and the Copper belt. (Source; Environmental council of Zambia; National solid waste management strategy, 2004).

A waste management system should ideally consist of environmentally acceptable waste Management practices that are aimed at minimizing waste generation from both domestic and Industrial activities. Further, the system must provide for the protection of human health and the environment. All stakeholders shall follow the waste management hierarchy system an ideal waste management system, which involves minimization/reduction, re-use and recycling, pre-treatment/treatment and disposal of waste in an environmentally sound manner. (Source; Environmental council of Zambia; National solid waste management strategy, 2004) .

The Lusaka city council is the major player in the collection of waste in the city. With the waste problem reaching an all time low, the Lusaka City Council embarked on a new course of action, leaving waste collection in the hands of private contractors who discovered there was money in waste. Small community-based companies such as clean fast are now trying to fill that void, paying people a small fee to go around with wheelbarrows and pushcarts, gathering garbage and transporting it to a central place. From there the city's Waste Management Unit comes to collect it, and pays the company for each full container.

2.1.4 Challenges in Aluminum Sector

Aluminum industry costs have actually increased more rapidly for low-cost aluminum producers. The largest cost drivers for the international aluminum industry are energy and alumina. Energy costs represent 28% of aluminum smelting costs and 30% of the cost of producing alumina, therefore, on a combined basis, Citigroup suggested energy accounts for 40% of the cost of aluminum production. Between 2004 and 2006 the average cost of smelting aluminum increase by 9% while production increased by 15%, according to the analysts' estimates.

However, these were partially offset by lower labor costs (-9%). Emerging nations are believed to account for the majority of power generation and aluminum growth. “The primary energy mix is expected to come from coal and gas, which is very sensitive to rising fuel costs,” Citigroup forecast. “Long-term power generation of 2% is expected to lag aluminum demand of greater than 4%. However, in the short-term excess power capacity in China is likely to keep a cap on power prices and facilitate further capacity additions.”(Author: Dorothy Kosich; the Zambian chronicle)

In case of Zambia, the aluminum casters uses charcoal to melt aluminum scrap metals, this poses a challenge to the sector as most of the casters cannot afford to buy charcoal in large quantities. A 90-kilogram sack of charcoal (malasha) costs between K110 and K120 while a 50-kilogram bag of charcoal costs between K70 and K75 in most compounds in Lusaka (www.jctr.org.com).

Another occurring challenge the producers do face is the problem of financial support and the sector has got no defined value chain. Financially the casters are unable to buy the used aluminum materials or the used engines from the mechanics. Sometimes the raw materials (aluminum scraps) for the production becomes scarce in the market and as a result the producer have to look for an alternative as they sometimes travel to several places mostly long distance journey to purchase the aluminum waste (scraps) which attracts extra cost due to the transportation charges thus leading to an increase in both the production cost and prices of the pot.

In summary, the problems faced by the industry are technical, operational, organizational and financial in nature. It is concluded that improved policies and proper management of technology can drastically solve these problems.

2.2 RESEARCH HYPOTHESIS

The ideal scenario in the aluminum sector is that the building capacity in the aluminum sector once improved and this will enhance the exploitation of business opportunities for the aluminum caster in Zambia. These opportunities will bring about an increase in job creation, increased exportation of recycled aluminum products in turn increasing revenue, this study is aimed at profiling these unexploited opportunities in this sector and the value chain as well.

2.3 RESEARCH QUESTIONS

The report will be concentrated finding out:

1. What are the challenges in the Aluminum recycling business
2. What opportunities are currently being exploited in the aluminum value chain
3. Where are the gaps in exploiting opportunities in the aluminum value chain
4. Under what conditions are you willing to adopt the new technology

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 POPULATION DESCRIPTION

The sample of this study comprised of unemployed youths from high density areas in Lusaka. Lusaka is the main capital city of Zambia and currently the population stands at 2,191, 225 at provincial level according to the Central Statistics office report of 2010. The urban area of Lusaka mainly comprises of youths who are seeking employment.

3.2 SAMPLIG SIZE AND SAMPLING PROCEDURE

The study targeted 100 youths from five high density compounds namely Bauleni Chawama, Linda, Kanyama and Chazanga. A total of 73 Youths collectively were used for the focus group discussion in the named areas. Questionnaires were administered to a total of 14 aluminum casters and simple random sampling was used to select the aluminum casters in Chazanga compound where the practice is normally done.

3.3 SECONDARY DATA

The report made use of publications and information available on the internet provided from the national technology business center's resource center. The information collected from targeted formal organizations which were used to validate the information provided for the research. The secondary data that was collected was used to determine the business opportunities that are currently available in the aluminum sector in Zambia. The information used gave a picture on the challenges that are in the aluminum sector as well as what measures have/are being taken to address the challenges.

3.4 PRIMARY DATA

Primary data collected for this report was done through interviews conducted to the local residents in the targeted high density areas, observations also where done by physically visiting the targeted sites to observe aluminum casters activities and impacts faced in the aluminum casting sector. Questionnaires used were comprised of open ended and closed questions to obtain the required data for the project, these where distributed to some of the casters who are residents of one of the sample areas. The information collected from this method gave a proper understanding on the major challenges faced in the aluminum value chain as well as gives information on what solutions have been made currently. The primary research also gave a proper picture on the business opportunities that are present in the aluminum value chain currently. The primary research was also focused on the innovations in this sector that are improving aluminum casting process and whether the casters were aware of these updates.

3.5 ETHICAL CONSIDERATION

The research participants were briefed about aims and objectives of the study before the primary data collection process and their participation was to be voluntary. The report ensured the privacy of the participants by not collecting their personal information. The questionnaires did not contain any degrading, discriminating or any other unacceptable language that could be offensive to any members of the sample group.

3.6 RESEARCH LIMITATIONS

The areas that were selected for this report are namely Chazanga, Bauleni, Kalingalinga, Linda and Kanyama. The research assistants faced some hostility from one of the areas which was Chazanga were some hostility was encountered from the casters whom were under the

impression that they were there to acquire the trade which they practiced and use it to their benefit, shown lack of empathy from them. Having more than one high density area in Lusaka

3.7 RESEARCH OUTCOMES

The assessments made from the repot will enable the National technology business center to have an overview of the aluminum sector and advise the necessary stakeholders in this sector to exploit it even further. It will further address the scrap metal waste situation that is on the increase in Lusaka and also create the business opportunities for the interested youths.

3.8 CHARACTISTICS OF THE SAMPLE

Majority of the youths who were interviewed during this research were unemployed as a result the report will issue its statements as in how the responses from the youths were being given out. The youths sampled from this report were uneducated or drop outs therefore information expressed in this report come from their personal experiences and willingness to improve their standard of living.

CHAPTER FOUR

4.0 RESEARCH FINDINGS

4.1: BACKGROUND DATA

This section will discuss the background characteristics of the respondents.

Table 4.1: percentage distribution of demographic characteristics of the respondents

	Characteristics	**Percentage**
Gender	Male Female **Total**	64.3 35.7 **100**
Age group	15– 19 20 – 24 25 – 29 30 – 34 Above 35 **Total**	35.7 14.3 28.6 7.1 14.3 **100**
Marital status	Single Married Divorced **Total**	21.4 57.1 21.4 **100**
Employment status	Employed Self employment Unemployment **Total**	7.1 7.1 85.8 **100**
Education level	Primary Secondary Tertiary No education **Total**	42.9 28.6 14.3 14.3 **100**

Table 4.1 provides a summary of some of the respondents' demographic and socio-economic characteristics which included; sex, age, marital status, educational level and employment status.

The findings in Table 4.1 revealed that majority 64.3% of the respondents were males, while 35.7% were females; thus, there was fairly equal distribution of Gender among the respondents. Further, the results indicate that the majority 35.7% of the respondents were aged between 15-19 years while the minority 7.1% were between 30-34 years. The results in Table 4.1 further revealed that 28.6% of the respondents were between 25-29 years, those in the age groups 24-25 and above 35 years were represented by 14.3% each. Generally most of the respondents were married represented by 57.1%, divorced 21.4% and single 21.4%, while 85.8% were unemployment, 7.1% self employed and those employed were represented by 7.1%.

In terms of education, most of the respondents had attained primary level 42.9%, secondary 28.6% and 14.3% had attained tertiary level. Furthermore, Table 4.1 revealed that 14.3 % were those who had no education at all.

4.2 COMPETITIVENESS OF RECYCLED ALUMINIUM PRODUCTS

This section discusses the competitiveness of recycled aluminum products.

Table 4. 2: percentage distribution of products produced from recycled aluminium

Products	**Percent**
Pots	50
Pots and spoons	14.3
Pots and pans	21.4
Pots, pans and earthing box	14.3
Total	100

The study findings on the products that are being produced from recycled aluminium are presented in Table 4.2. It was evident from the findings that the pots are the most produced products by the casters as shown by 7 (50%) of the respondents, whereas 3 (21.4%) revealed that they were producing pots and pans. There was the equal distribution for those respondents who were making spoons and earthing boxes represented by 2% each.

Table 4.3: percentage distribution of other products that can be produced from recycled aluminium by the casters

Products	**Percent**
Pans	14.3
Spoons	14.3
Pressing Irons	14.3
Earthing box	42.9
Coffin handles	14.3
Total	100

The study established the other aluminium recycled products that can be produced (See Table 4.3). From the findings, it was revealed that the majority (42.9%) of the respondents reported that if they are given an opportunity to make other products they can make earthing boxes. Those who were willing to make spoons, pressing iron, coffin handles and pans were represented by 14.3 %.

Figure 4.1: percentage distribution of the respondents' view over the competitiveness of the aluminium recycled products

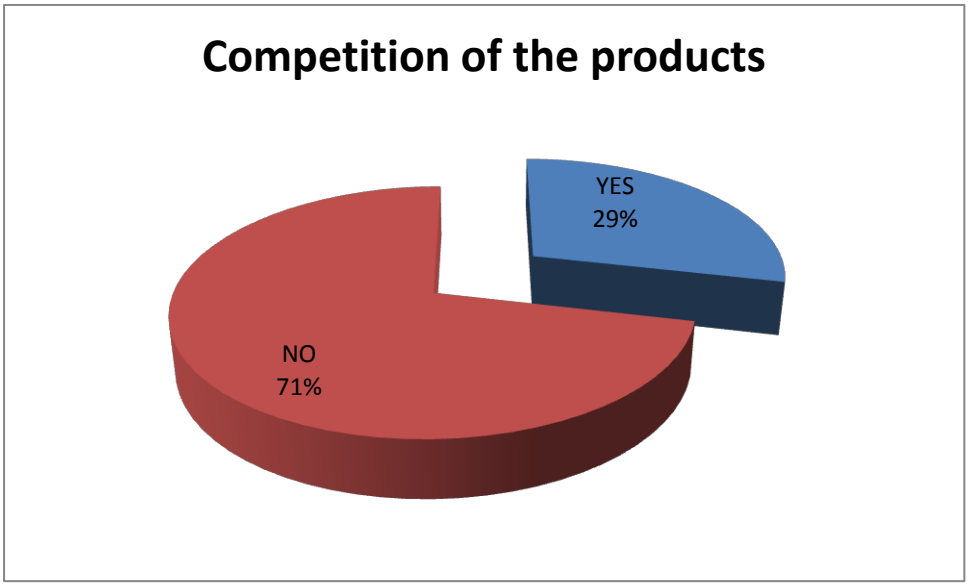
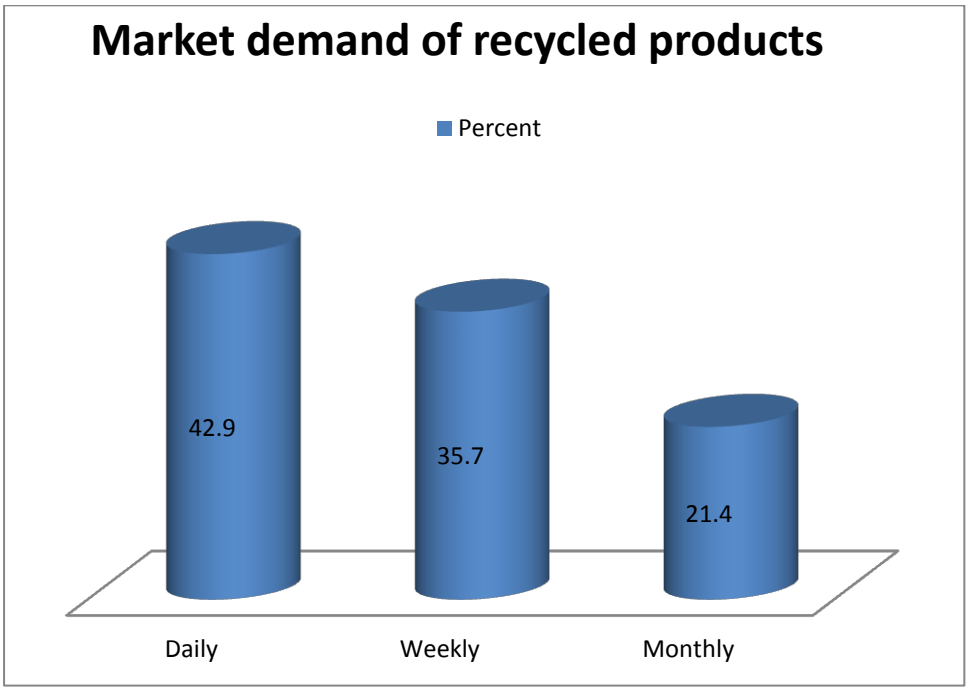


Figure 4.1, above shows the results of the respondents' views on the competitiveness of the aluminium recycled products. The results revealed that the majority of the respondents (71%) reported that the aluminium recycled products cannot compete with the industrial made products. Whereas, 29% of the respondents reported that these products can compete with those products which are industrial manufactured.

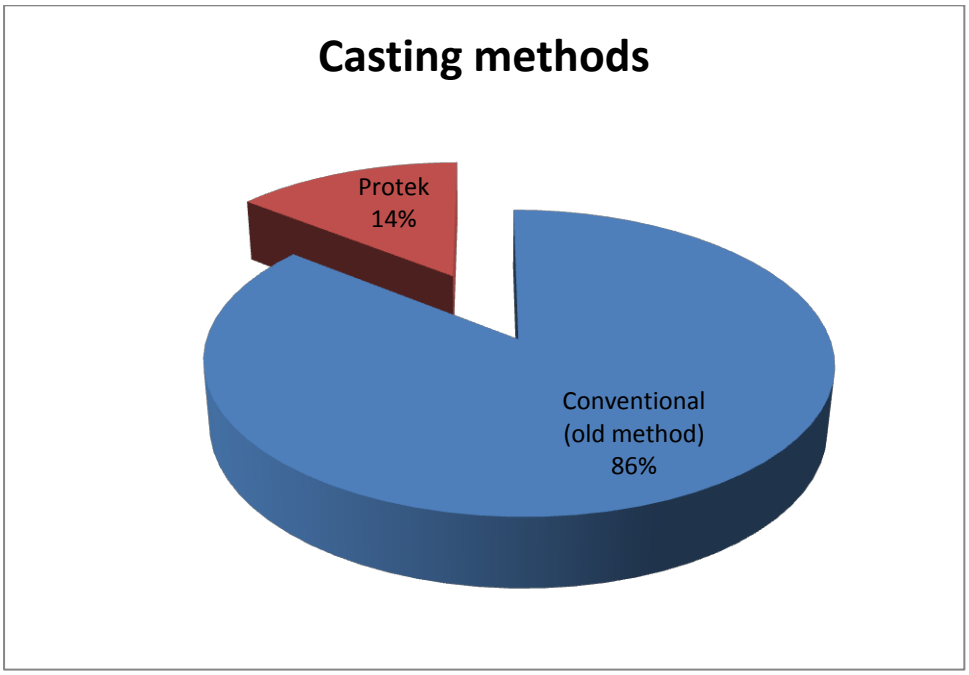
Figure 4.2: percentage distribution of the demand of recycled aluminium products on the market



The figure above shows the distribution of the demand of the recycled aluminium products on the market. The findings from figure 4.2, revealed that (42.9%) of the respondents were those whose products are sold daily. Also (35.7%) of the respondents reported that they sell their products weekly and (21.4%) of the respondents usually sold their products monthly.

4.3 ADOPTION OF THE CASTIG NEW TECHNOLOGY

Figure 4.3: Types of casting methods currently used by casters



The respondents were asked to indicate the types of casting method they are using to make the aluminium recycled products. The responses of the respondents are presented in figure 4.3. Study findings in figure 4.3 revealed that 14% of the respondents were using Protek (modern) technology of casting. The results further indicated that the majority 86% of the respondents were using Conventional (old method) of castings.

Figure 4.4: Awareness of the new casting technology

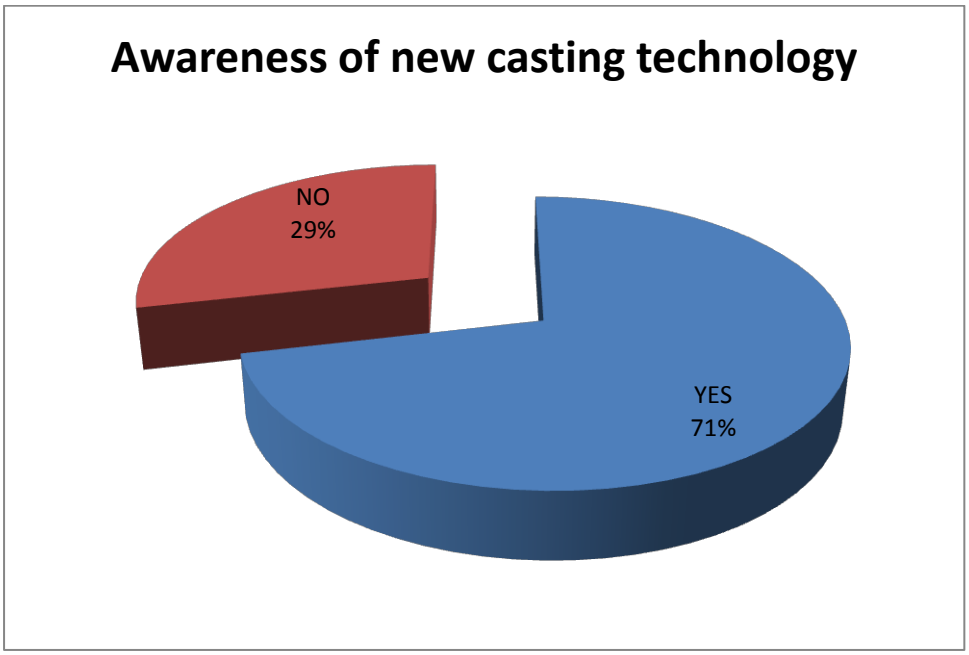
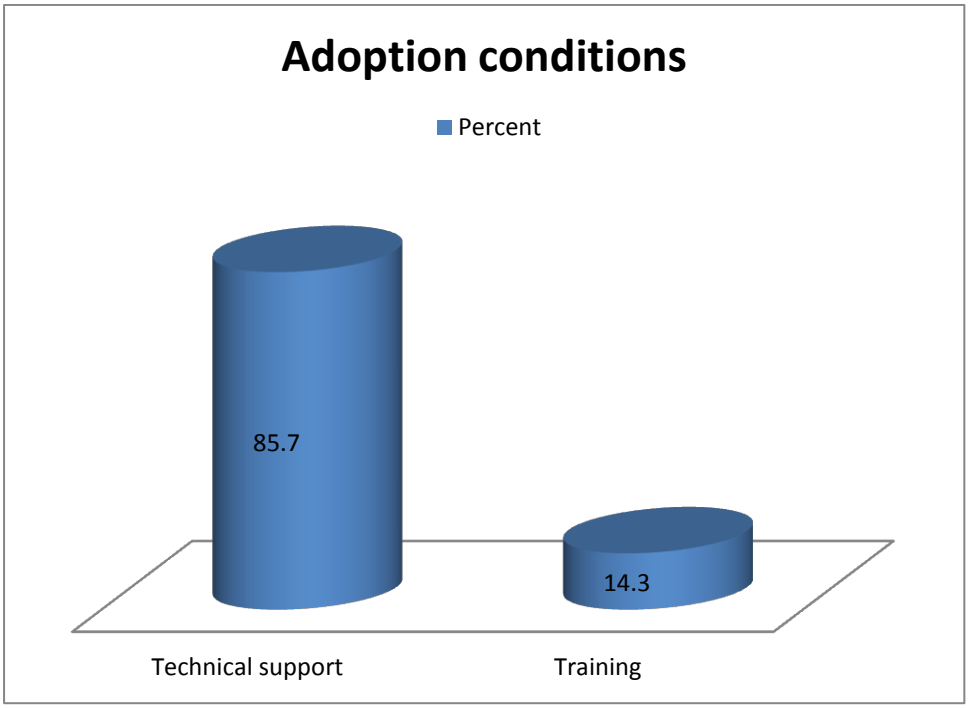


Figure 2.0 shows the distribution of youths who were aware of the new casting technology (Protek). As evidenced from figure 4.4 above, the majority 71% of the respondents were aware of the new technology of casting. The respondents who were not aware of the new technology were represented by 29 percent.

Figure 4.5: Percentage distribution of the conditions under which respondents would want to adopt the new technology

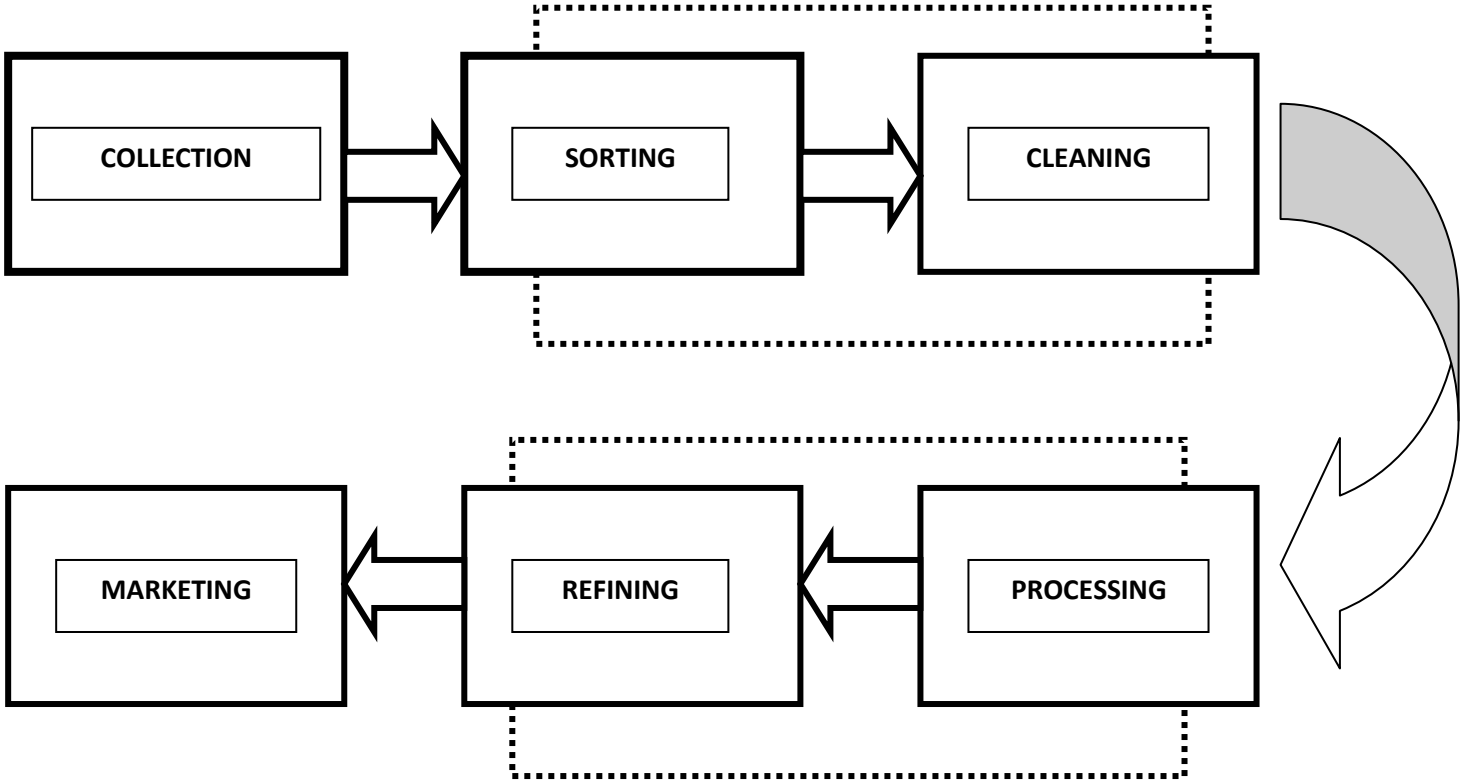


The respondents were asked to indicate under what conditions they would want in order to adopt the new casting technology. The findings presented in figure 4.5, clearly show that most of the respondents wanted to adopt the new casting under the condition of technical support. The results revealed that the majority 85.7% of the respondents wished to adopt the new technology under technical support, while 14.3% represents those who wanted to adopt the new casting technology under the condition of training.

4.4 BUSINESS OPPORTUNITIES IN THE ALUMINIUM VALUE CHAIN

This section summaries the feedback from the participants and analyses the opportunities that are in the aluminum value chain at each stage of the aluminum recycling process.

ALUMINIUM VALUE CHAIN



4.4.1 OPPORTUNITIES IN THE RECYCLING PROCESSESS

Figure 4.6: percentage distribution of the opportunities in the aluminum value chain

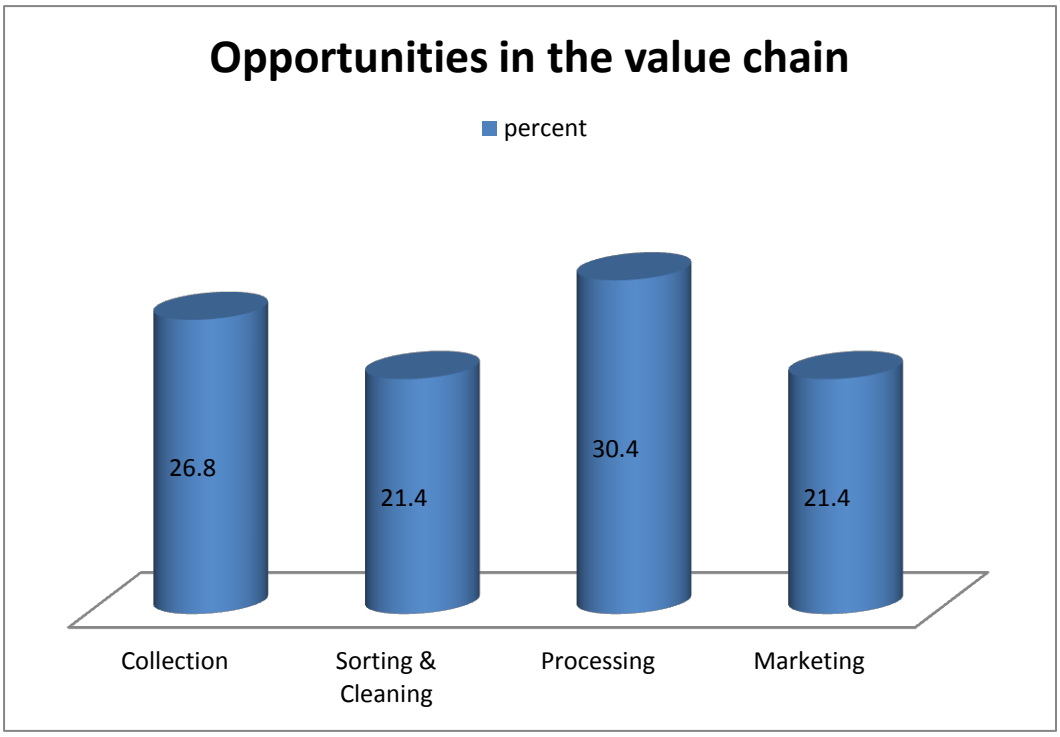


Figure 4.6 represents the distribution of the participants' feedback from the places visited. The youths were asked at which stage they were willing to work. As evidenced from the figure above, the majority 30.4% were willing to work at processing stage while the minorities 21.4% were those who were willing to work at the sorting and cleaning and marketing stages. The participants who were willing to work at collection stage were represented by 26.8%.

4.4.2 CASTING PROCESSESS PER STAGE FROM THE COMPOUNDS

4.4.3 COLLECTION STAGE

Figure 4.7: percentage distribution of youths from compounds at collection stage

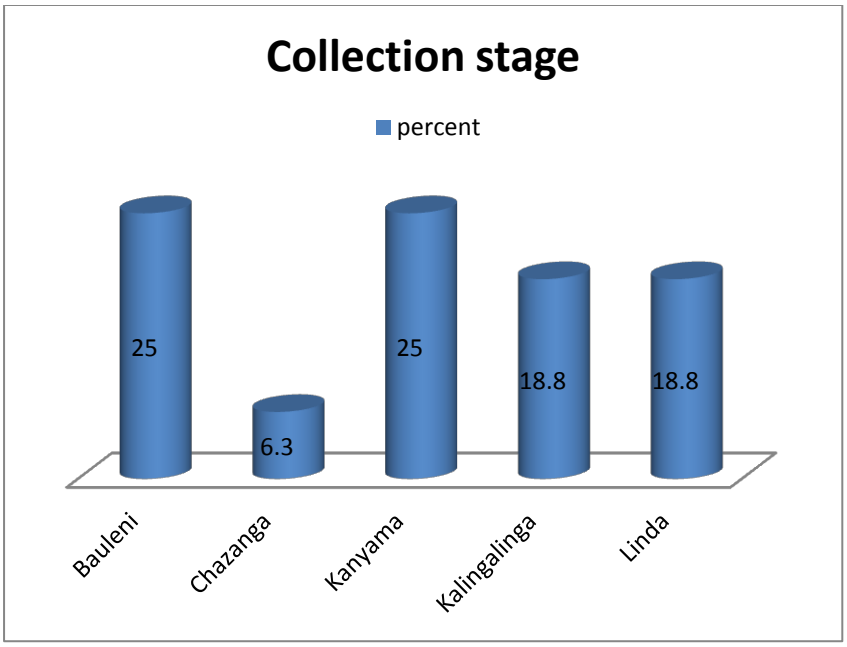
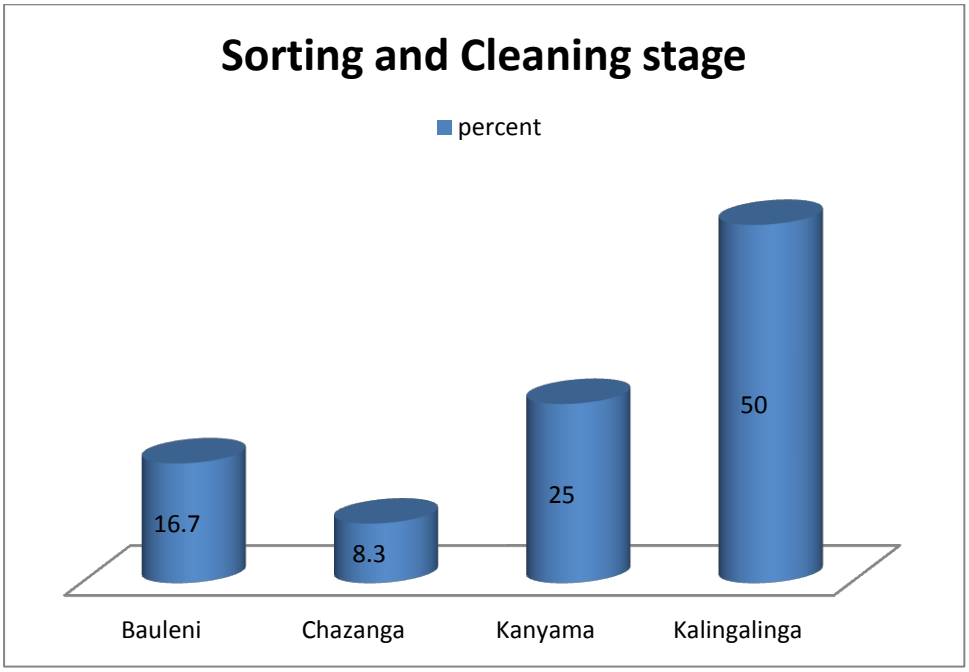


Figure 4.7 shows the distribution of youths interested at collection stage in the value chain from the sampled compounds. As evidenced from figure 4.7 above, Bauleni and Kanyama had the majority of youths at 25% each followed by Kalingalinga and Linda representing 18.8% each. The Chazanga compound represents a mere 6.3% of youths who are interested at collection stage.

4.4.4 SORTING AND CLEANING STAGE

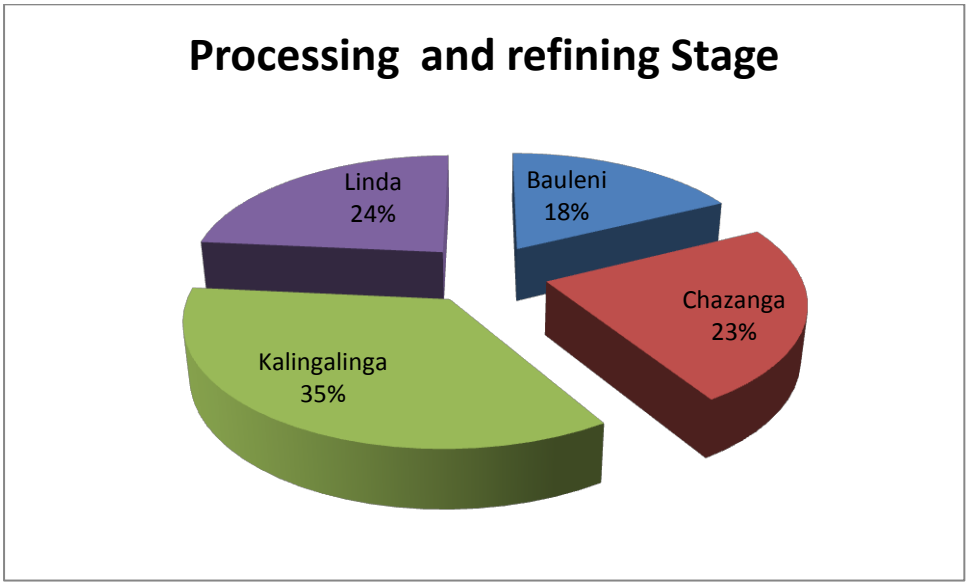
Figure 4.8: percentage distribution of youths from compounds at sorting and cleaning stage



As evidenced from figure 4.8, the majority (50%) of youths interested in sorting and cleaning were form Kalingalinga compound while the minority (8.3%) was those youths from Chazanga. Whereas, Kanyama compound was represented by 25% of youths interested at sorting and cleaning stage.

4.4.5 PROCESSING AND REFINING STAGE

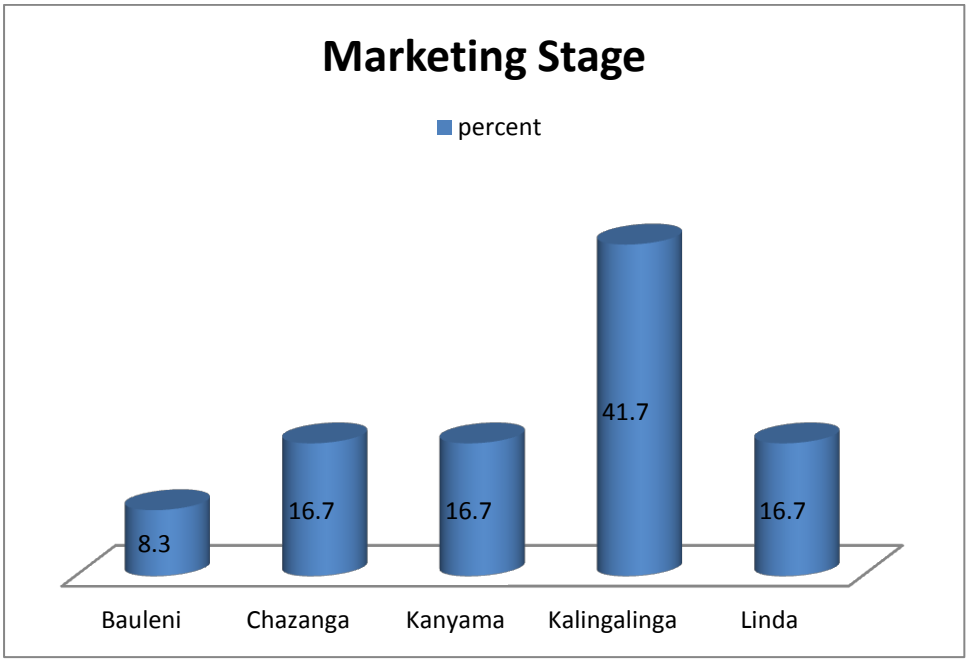
Figure 4.9: percentage distribution of youths from compounds at processing and refining stage



As evidenced from figure 4.9, the majority (35%) of youths interested in processing and refining were form Kalingalinga compound while the minority (18%) was those youths from Bauleni. The youths from Chazanga and Linda compounds were represented by 23% and 24% respectively.

4.4.6 MARKETING STAGE

Figure 4.10: percentage distribution of youths from compounds at marketing stage



There was equal distribution of the youths interested in marketing the aluminum products from Chazanga, Kanyama and Linda at exactly 16.7% each, while Kalingalinga with the highest percentage of 41.7 % of youths interested in marketing. Bauleni compound was represented by 8.3% of the youths interested at marketing stage.

4.5 CHALLENGES

Table 4.4: percentage distribution of the challenges in the casting process of aluminium recycled products.

CHALLENGES	PERCENT
Lack of financial support	21.8
Scarcity of raw materials (aluminium scraps)	10.9
Lack of improved technology	18.2
Cost of casting energy (charcoal)	18.2
Lack of proper market for the aluminium recycled products	7.3
Lack of safety measures during casting	7.3
Lack of cooperatives	16.4
Total	100.0

There are many challenges that are faced in aluminium recycling sector. The study sought to establish some of the challenges that are faced by most casters. The results in Table 4.4 show that 21 % of the respondents were facing the challenge of lack of financial support. Those casters who were facing the problem of cost of energy (charcoal) and lack of improved technology were represented by 18.2 %. Whereas, those facing the challenge of scarcity of raw materials (scrap metals) were represented by 10.9 % and those who faced lack of proper markets for the aluminium recycled products and lack of safety measures during casting were represented by 7.3 % each. Finally those respondents facing the lack of cooperatives were represented by 16.4

CHAPTER FIVE

5.0 SUMMARY OF THE FINDINGS

The aim of this study was to determine the unexploited capabilities and opportunities in the recycle aluminum value chain among the youth in six selected residential areas in Lusaka district of Zambia. To our knowledge, this was one of the few studies to be conducted in Zambia that has focused on the youths in relation to exploit opportunities in the aluminium recycling process.

Among the main objectives of this study was to profile competitive products that can be made from aluminum recycling process. The youths consulted mentioned a number of competitive products that can be made from recycled aluminum. Among the products outlined were;

- Pots
- Spoons and forks
- Septic tank lids
- Toy guns for the children
- Roofing sheets
- Windows and door frames
- Rings, necklaces and bracelets
- Coffins and door handles
- Hung wires
- Wine cups

The practitioners of the recycled aluminum products were also consulted and the aluminum products that they are currently making were presented in the table above, (see Table 4.2).

The practitioners who were interviewed also emphasized that they can produce others type of aluminum products. The findings of the study revealed that most of the practitioners 50% were making pots and only about 14.3% of the practitioners were making other products such as earthing boxes. It is clearly from the finding that pots, pans and spoons were the most produced recycled products among the practitioners.

The respondents were also willing to produce other types of products such as pressing Irons, Earthing boxes and coffin handles out of recycled aluminum. From the findings, the majority 42.9% reported that they can start making earthing boxes and 14.2% were those who can make coffin handles and pressing irons. It is concluded that casters are confined to a few number of products that they can make out of recycled aluminum, this can be attributed to the level of education attained because most of them attained primary level, (see Table 4.1).

Further, the other study objective was to determine the conditions under which the casters would be willing to adopt the improved casting technology. It is important to point out that currently most of the casters are using the conventional (old method) of casting process since 86% of the respondents reported that they were currently using conventional method of casting. Among the major findings of the study is that, notwithstanding the high levels of awareness of the new casting method, Protek method is less used among the casters who participated in this study. Only about 14% of those interviewed indicated that they had been using the Protek. About 71% of the respondents interviewed were aware of the (Protek) new method of casting. Most of respondents used the conventional method because they had no means of accessing the new Protek which is used by few casters who were given by the IDDS team.

All the respondents interviewed were willing to adopt the new method of casting. About 85.7% of the respondents were willing to adopt the new technology under the technical support. Conducting training for the casters is very important as it gives them the knowledge

on how to use the Protek since most of them attained primary level, 14.3% of the respondents were willing to adopt the new casting technology under the condition of trainings.

Furthermore, one of the major objectives of the study was to determine the business opportunities present in the aluminum recycle value chain. As the majority of many youths continued to live under the poverty level in the country, it is important for the government to formulate policies that can alleviate poverty levels. The 2010 Population and Housing census show that poverty levels have remained high despite recording a decline between 2006 and 2010. The proportion of the population falling below the poverty line reduced from 62.8 percent in 2006 to 60.5 percent in 2010. The percentage of the extremely poor marginally declined from 42.7 percent to 42.3 percent (CSO, 2010). Therefore, the opportunities in the aluminum value chain can help to curb the levels of poverty in the country if the project is implemented by the relevant major stakeholders.

According to the findings of this study, opportunities in four major stages of the aluminum value chain were presented. The youths who participated were willing to venture into the business of aluminum recycling. The majority 30.4% were willing to work at the processing stage. About 21.4% were willing to work at the sorting and cleaning stage.

The collection stage was also outlined as one of the most important stage in the process of recycling aluminum because in most compounds there is the ongoing business of buying scrap metals. About 26.8% of the youths were willing to venture into the business of collecting aluminum scrap metal for sell. In relation to Brazil, a national program named Integrated Solid Waste and Carbon Finance Project developed strategies for incorporating waste pickers into local waste management systems. Organizing waste picking activities into recycling cooperatives has been one of Brazilian Business Commitment for Recycling main activities as well. The catadores (waste pickers) earn a living by collecting recyclables from the nation's trash heap, these are men and women who dig through the garbage and picks out

aluminum can, plastic bottle, and glass container (http://www.wiego.org/). While their jobs may seem humble, their sweat and solidarity are helping to transform Brazil into a true world power in recycling. Collection of aluminum scrap metal for sell can empower the majority of unemployed youths in density areas in Zambia.

Marketing of the recycled aluminum products is vital in the recycling process. The response was overwhelming as 21.4% of the youths consulted indicated the interest in the marketing stage of the aluminum products.

Finally the study sought to establish the challenges that are associated with the aluminum recycling process. The major challenge was lack of financial support for the casters to purchase the raw materials, transport their goods to the selling places and funds to buy the casting energy (charcoal) which most of those interviewed indicated that charcoal was costly for the casting process. It was evidenced in Table 3 that the majority 21.8% of the respondents were facing the challenge of financial support.

The other major challenge was the market for the recycled aluminum goods. The markets for recycled aluminum products are potentially vast but in developing countries it is not fully exploited due to limitations in the products produced (OECD, 2006). It is clearly indicated by the findings of this study that 50% of the casters were producing pots only. There is some evidence that markets for some recyclable products are subject to important failures and barriers, and this can be costly. For one thing, inefficient markets are frequently subject to price volatility. About 7.3% of the respondents indicated that there are no proper markets for the products. The markets for these products are seasonal because the major customers of the recycled aluminum products are the farmers from villages. The products are highly sold during the harvest time when the farmers sell their agricultural products. In Nigeria, about one tenth of the practitioners were found to have, at one time or the other, abandoned the profession for between 2 to 5 years at a stretch. The reasons usually adduced for the break

include low demand, health-related problems and inadequate finance. The break is understandable because the trade is open to competition from other producers scattered all over the South-West. There is a general preference for aluminum pots and spoons within the Nigerian social con- text, especially in the South-West where large-scale cooking for social activities like wedding ceremonies or other big social events is common. In fact, every house-hold is desirous of having sets of aluminum pots. A competitive edge over industrial aluminum products exists in this regard (http://dx.doi.org).

Further, lack of cooperatives and lack of improved technology were other challenges that the aluminum sector is facing in Zambia. The findings indicated that lack of cooperatives and lack of improved technology represented 16.4% and 18.2% respectively. These challenges attributes to inefficiencies in the recycling process.

5.1 CONCLUSION

In Zambia, the aluminium recycling casting is not fully explored; this hinders the creation of employment opportunities in the aluminium industry which can promote effective resource utilization and thereby contributing to the process of industrialization and national development. This study affirms that there are business opportunities in the aluminium value chain. From the study findings it is clear that the full exploitation of opportunities in aluminium industry can empower the youths in the country with a skill to survive on. This can be achieved through institutional and policy frameworks which include systematic documentation, involvement of research institutions in value addition, provision of adequate funding mechanism for exploitation particularly in business opportunities development around the sector.

5.2 RECOMMENDATIONS

1) There is the need for government, particularly at the grassroots, to acknowledge and support aluminium recycling development.
2) There is need for the creation of specialised markets which would serve as product outlets and possibly evolve to secure international interest.
3) There is need for the facilitation of capacity development and establish the cooperatives for aluminium casters.
4) There is need for the recognition of outstanding individuals; and the provision of venture funding. To fund those youths who will be willing to venture in the business of recycling aluminium.

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WORK PLAN

TABLE

DATE	**ACTIVITIES**
PROPOSAL DRAFT SUBMISSION	**6TH TO 14TH NOVEMBER**
DATA COLLECTION	**20TH TO 5TH DECEMBER**
DATA ANALYSIS	**8TH TO 12TH DECEMBER**
REPORT SUMBMISSION	**15TH TO 19TH DECMBER**

BUDGET

SUMMARISED BUDGET

LUNCH,TRANSPORT,TALKTIME	**2365**
STATIONARY AND DRINKS	**131.9**
VENUES	**810**
TRANSPORT REFUNDS	**1580**
TOTAL EXPENSES(ZMK)	**4886.9**

APPENDIX

QUESTIONNAIRE FOR THE ALUMINIUM CASTERS

SECTION A: BACKGROUND DATA

Q1. What is your sex?

(1) Male
(2) Female

Q2. How old were you at your last birthday

……

Q3. What is your marital status?

(1) Single
(2) Married
(3) Divorced
(4) Widowed

Q4. What is the highest level of education attained?

(1) Primary
(2) Secondary
(3) Tertiary
(4) No education

Q5. What is your employment status?

(1) Employed
(2) Unemployed
(3) Self employed

SECTION B: COMPETITIVE OPPORTUNITIES

Q6. How safe is the process of casting aluminum?

……

……

Q7. What type of products do you produce?

……

……

Q8. Are you able to produce other products apart from what you produce?

(1) Yes
(2) No

Q9. If yes to Q8, what other products can you produce?

……

……

Q10. What is the major challenge with the quality of products you are currently producing?

……

……

Q11. What is the:

(A) Products produced ……

(B) Selling price ……..

(C) Cost of production of one unit ……..

Q12. How often are your products purchased?

(1) Daily
(2) Weekly
(3) Monthly

Q13. Do you think your products can compete with industrial made products?

(1) Yes
(2) No

Q14. Given an opportunity to make other products what would you make and what would you require?

Product ……

Requirements: ……...

……..

……..

SECTION C: TECHNOLOGY ADAPTION

Q15. Are you aware of the new casting technologies?

(1) Yes
(2) No

Q16. If yes to Q15, what type of casting technologies have heard?

……
……

Q17. What type of casting method are you currently using?

(1) Conventional (old method)
(2) Modern (Protek)
(3) Others (specify)……

Q18. What are some of the key issues that you think are critical to the selection of a particular casting method?

(1) Safety
(2) Cost
(3) Ease to use

Q19. Are you willing to adopt the new casting technology?

(1) Yes
(2) No

Q20. How would you rate the current casting process you are using?

(1) Safety (1. Not safe ……..5. Very safe)
(2) Cost (1. Not costly……5 Very costly)
(3) Ease of use (1. not easy to use……5 Very easy to use)

Q21. Are you willing to adopt a new casting technology?

(1) Yes
(2) No

Q22. If yes to Q21, under what conditions would you want to adopt the new casting technology?

(1) Affordable
(2) Technical support
(3) Training

SECTION D: BUSINESS OPPORTUNITIES IN THE VALUE CHAIN

Q22. What are your current sources of the raw material?

…….

…….

Q23. How do you collect your raw material?

……
……
……

Q24. List the challenges that you are facing in running your casting.

(1) Lack of financial support
(2) Scarcity of raw materials (aluminum scraps)
(3) Lack of improved technology
(4) Cost of casting energy(charcoal)
(5) Lack of proper market for the aluminum recycled products
(6) Lack of safety during casting
(7) Lack of cooperatives

Q25. What challenges are you facing in the aluminum recycling process?

……
……
……
……

Q26. Are there any established cooperatives that you are working with?

(1) Yes
(2) No

Q27. If yes to Q26, which ones are these and what support have been able to access through them?

……
……

Q28. Is there an established centre where you sell your products?

(1) Yes
(2) No

Q29. Who are the buyers of the products that you produce?

……

……

THE END: THANK YOU FOR THE COOPERATION

FOCUS GROUP DISCUSSION SCHEDULE WITH YOUTHS

Themes for Discussion

Basic skills acquired by youths

- Are you employed?
- What trade or skill do you have?

Adoption and knowledge of technology (casting)

- What do you know about aluminum?
- Are you aware of aluminum based products?
- What do you know about aluminum casting
- Do you know how to practice the process of casting?

Opportunities in the value chain

- Would you like to learn about aluminum casting?
- Would you like to venture into aluminum casting business
- Are you aware of scrap metal collection?
- Would you like to venture into aluminum casting business?
- Are you aware of scrap metal collection?
- Would you like to venture into the business of collecting aluminum scrap for sell
- Would you be willing to take up the position of selling agent for the recycled aluminum products?

Challenges in Aluminum casting

What challenges do you think can be associated with aluminum recycle process in:

(1) Collection of aluminum scrap metal
(2) Sorting and cleaning of aluminum scrap metal?
(3) Processing and refining/
(4) Marketing the products?

What do you think can be done to address these challenges?

ALUMINUM RECYCLING PROJECT FEED BACK FORM

NAME:

……

CELL:

……

AREA OF RESIDENCE:

……..

1. What stages are you interested in the aluminum recycling value chain?

……
……
……
……

2. Why?

……
……
……
……

THANK YOU FOR YOUR COOPERATION