

## Effective Supply Chain Network: A Sustainable Approach to Waste Management in South-Eastern Nigeria.

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### ABSTRACT

The study was carried out to examine the effective supply chain network as a sustainable approach to waste management in Enugu and Anambra States. The specific objectives were to examine the extent management of waste have aided employment generation in Enugu and Anambra states and to determine the extent supply chain network of waste management have aided wealth creation in Enugu and Anambra States. The research was conducted in two states in the south eastern Nigeria namely - Enugu and Anambra States. A survey research design was adopted for the study while sample size of 315 respondents was obtained from a population size of 1480 small scale business entrepreneurs dealing on six types of business namely. Welding, mechanics, plastics, aluminum, electrical and shoes. The sample was obtained using Yaro Yamen Structured questionnaire was used to obtain data for the study. Data was analyzed using frequency tables and percentages. Formulated hypotheses were tested using t-test statistic. The study revealed that management of waste have positively and significantly aided employment generation as calculated value  $t(22.0) >$  critical values at  $t(1.645)$  and that supply chain network of Waste Management have positive and significantly enhanced the growth of small business entrepreneurs in Enugu and Anambra state. We therefore concludes that effective supply chain network is a sustainable approach to waste management in South-Eastern Nigeria. We also recommended the need for government support to small scale entrepreneurs in utilization of effective supply chain of waste management to create employment and grow the sector of Nigeria economy.

Keywords: waste, management, sustainability and Supply Chain.

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### INTRODUCTION

The main aim of this study is to examine the effective supply chain network as a sustainable approach to waste management in South Eastern Nigeria using Enugu and Anambra States as the case study. In order to realize sustainable development, sufficient waste management is very important in our quest to attain economic growth and development. Sustainable economic growth is necessary for prosperity (growth in gross domestic product, increase in personal income. etc) but this also in turn causes waste. Based on the literature and formal empirical research, viewed the fact that a movement towards sustainability is only possible if we manage to develop concepts that integrate economic and environmental goals. These challenges could be best realized with the application of certain Sustainable Supply Chain Networks and supply chain management methods. The setup of Sustainable Supply Chain Networks strongly supports the realization of a circular economy by way of closing

process chains between enterprises within an industry and by implementing joint environmental protection measures. This significantly enables the avoidance and reduction of waste and saves costs as well as improves the competitiveness of the members. The study looked at the three possible value chain lines as it explores the lines namely: Reduce waste, Recycle Waste and Reuse Waste. This is to prove wealth lies in the depths of the dump sites. The statement of the problem is that government and individuals do not pay adequate attention to what a sustainable waste management can offer in aiding the drive for economic growth, create wealth, create gainful employment and assuring sustainable development.

Reducing and/or avoiding waste was already an important issue since the early 1970s. Initially, waste was reduced by end-of-pipe-technologies, followed by process- and product-integrated environmental

technology developments in the 1980s. These concepts were isolated applications that focused on a single enterprise. Today, waste management has to be considered in the context of sustainable development. Throughout most of history, the amount of waste generated by humans were insignificant due to low population density and low societal levels of the exploitation

#### JUSTIFICATION

The two states chosen for this study namely Anambra and Enugu states were chosen as a proto type of occurrences in south Eastern states of Nigeria. Waste dump sites are visible and uncontrollably scattered across these states. Though their various waste management agencies try to deal with the wastes, its seems that their efforts are slow in yielding results. Moreso when it has been observed that these agencies (ESWAMA - Enugu State Waste Management Agency and ANSWAMA - Anambra Waste Management Authority) are only interested in relocating the waste products thereby not adding any value in the chain network. This study is very

of natural resources. Common waste produced during pre-modern times was mainly ashes and human biodegradable waste, and these were released back into the ground locally, with minimum environmental impact. Tools made out of wood or metal were generally reused or passed down through the generations.

important because its extracted the importance and significance of adding value to the waste management network vis a vis as it creates jobs to the teeming youths of both states along the chains and also create wealth to the government or private sector that has been opportune to invest therein. It was also provided answers on how to eradicate various diseases that are transmitted because of the non use of the wastes for valued purposes. Therefore Anambra and Enugu states gave the study very clear picture of what obtains in other states in the south eastern Nigeria.

#### STATEMENT OF THE PROBLEM

The general perception around our federal, state, local governments and Individual is a lack of in-depth knowledge of positive derivable of what effective waste management can bring to our ailing economy. It is a modern practice in Europe and other Western countries that waste is cash lying idle in the trash site. And if properly harnessed with an effective supply chain network, the transfer of raw material, its recycling, etc, will reduce cost of production, ensure availability of raw materials, engage a lot of the youth in employment, create wealth and equally reduce the cost of goods as well as reduce health hazards could by intent disposal waste. The multiplier effect will be visibly seen in the quality of our environment increase in the rate of the productivity and improvement in the standard of living. It is

a visible sight in most cities in south eastern Nigeria to see heaps of dump sites and yet many youths are jobless because it has not been exposed to the fact that in the dump sites lies great wealth. Government on its side have not been able to explore this opportunity, hence government and individuals do not pay adequate attention to what a sustainable waste management can offer is aiding the drive for growth, create wealth and create gainful employment and assuming sustainable development. It is based on these short comings that the study is based and it is designed to harness the importance of waste management and advocate a supply chain network for its sustainability, hence the study on effective supply chain network. A sustainable approach to waste management in South Eastern Nigeria.

#### AIM AND OBJECTIVES OF THE PROJECT

The main aim of this study is to examine the effective supply chain network as a sustainable approach to waste management in South Eastern States of Nigeria. While the specific objectives are to

1. Examine the extent management of waste have aided employment

generation in Enugu and Anambra states.

2. Determine the extent supply chain network of waste management enhances growth of small business entrepreneurs in Enugu and Anambra States.

## SCOPE OF THE STUDY

The study revolved the area of supply chain network as sustainable approach to waste management in South Eastern States of Nigeria. However, the study limited

itself to Enugu and Anambra States bearing in mind the similarity between the States and the rest of other States in South Eastern States of Nigeria.

## REVIEW OF RELATED LITERATURE

Following the onset of industrialization and the sustained urban growth of large population centres in England, the buildup of waste in the cities caused a rapid deterioration in levels of sanitation and the general quality of urban life. The streets became choked with filth due to the lack of waste clearance regulations. However, it was not until the mid-19th century, spurred by increasingly devastating cholera outbreaks and the emergence of a public health debate that the first legislation on the issue emerged. [1].

### ❖ WASTE MANAGEMENT DEFINED:

Waste management or Waste disposal is all the activities and actions required to manage waste from its inception to its final disposal.<sup>[1]</sup> This includes amongst other things, collection, transport, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling.

### ❖ WASTE HIERARCHY:

The waste hierarchy refers to the "3 Rs" reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of waste minimization. The waste hierarchy remains the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste; the waste hierarchy is represented as a pyramid because the basic premise is for policy makers to take action first and prevent the generation of waste. The next step or preferred action is to reduce the generation of waste i.e. by re-use. The next is recycling which would include composting. Following this step is material recovery and waste-to-energy. Energy can be recovered from processes i.e. landfill and combustion, at this level of the hierarchy. The final action is disposal, in landfills or through incineration without energy recovery. This last step is the final

resort for waste which has not been prevented, diverted or recovered. The waste hierarchy represents the progression of a product or material through the sequential stages of the pyramid of waste management. The hierarchy represents the latter parts of the life-cycle for each product. [2]

### WHY WASTE MANAGEMENT?

#### **Protects the Environment and Reduce Health Hazards**

When waste is disposed of properly, we can prevent hazardous materials from contaminating the environment. One would not want to walk out of one's house and into a yard full of used paper bags and all kinds of trash. Not only is it unpleasing to the eye but also some types of environmental contaminants do cause a lot of health damage to the people. For instance, motor oil that is not disposed properly could end up in water streams and cause pollution in rivers and lakes. Fertilizers and cleaning supplies make water unsafe for drinking and disrupt the natural habitat in land and water of various plants and animals. Proper waste disposal ensures that nothing ends up in the environment in an uncontrolled way to cause pollution. [3].

#### **Recycling helps you make extra money**

Sort all your recyclables and make some money out of it! Waste disposal can be pricey at times and one is expected to do all that is possible to recycle first and then dispose of all waste materials. Do we know that the question is "can we make money from our garbage?" This is because recycling has become a lucrative business since it utilizes already present materials. Manufacturers have come to appreciate recycling since they cut the cost of mining or purchasing raw materials when there is plenty of recyclables to be found. One can sell recyclable materials such as plastics, glass, wood and iron which could be remade into new items. Recycling also helps to reduce the amount of trash that ends up in the environment and protects it from pollution. A good example could be

seen visibly at tinkers at Obosi in Anambra States and Coal Camp in Enugu State where vehicles are being dissected and various components recycled to be recited as copper iron ore etc for reproduction. This is not for free but for financial gain. Other item of reuse and recycle include plastic items and some materials, disposed matter cans. Dimloe materials etc that form a source of raw material for further reproduction.

#### **Reduce waste. Recycle waste and Reuse waste:**

The beauty about recycling is you can reduce waste recycle and reuse it as raw materials for a new products.

#### **Why do we need safety?**

We need to make sure we are properly storing and disposing our trash because it can be harmful to others. Whether it's disposing our trash in the right type of trash liner or container, it can be critical to us and other people's safety. Waste that is not properly disposed can be hazardous to our safety. Sharp objects such as glass and rusty metals could cause serious injuries and infections, especially for playing children that could put our children in the hospital for a while with the attendant hospital costs. Pieces of plastic that are not disposed properly end up choking animals in the environment and killing them. Some kinds of environmental contaminants can also spread serious illness and disease if not disposed in the right way. Proper waste management and disposal removes all these hazardous materials from the environment making it safer for both human beings and animals as well.

#### **❖ SOME MODELS FOR WASTE MANAGEMENT:**

##### **Waste handling practices: Curbside Collection**

Curbside collection is the most common method of disposal in most European countries, Canada, New Zealand and many other parts of the developed world in which waste is collected at regular intervals by specialized trucks. This is often associated with curb-side waste segregation. In rural areas waste may need to be taken to a transferred stations. Waste collected are transported to an appropriate disposal facility. In some areas, vacuum collection is used in which waste are transported from the home or commercial premises by vacuum along small bore tubes. Systems are in use in Europe and North America. [4].

#### **What is the 'Supply Chain', Management and Networks**

1. A supply chain is a network between a company and its suppliers to produce and distribute a specific product, and the supply chain represents the steps it takes to get the product or service to the customer.
2. Supply chain management is a crucial process, because an optimized supply chain results in lower costs and a faster production cycle. (www.investopedia.com). Therefore it is necessary to ensure that cost of supplies do not exceed the profits of emanating from reducing waste, recycling and reuse of waste. This enhances production profitability and creation of employment.
3. A supply chain is the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, through to its eventual delivery to the end user. The supply chain segment involved with getting the finished product from the manufacturer to the consumer is known as the distribution channel.
4. Supply chain management (SCM) is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. The three main flows of the supply chain are the product flow, the information flow and the finances flow. SCM involves coordinating and integrating these flows both within and among companies.[5].

#### **❖ THE IMPORTANCE OF SUPPLY CHAIN MANAGEMENT**

It is well known that supply chain management is an integral part of most businesses and is essential to company success and customer satisfaction. These could be found in the area of:

### **Boost Customer Service**

- Customers expect the correct product assortment and quantity to be delivered.
- Customers expect products to be available at the right location.
- Right Delivery Time - Customers expect products to be delivered on time .
- Right After Sale Support - Customers expect products to be serviced quickly.

### **Reduce Operating Costs**

- **Decreases Purchasing Cost** - Retailers depend on supply chains to quickly deliver expensive products to avoid holding costly inventories in stores any longer than necessary. For example, electronics stores require fast delivery of 60" flat-panel plasma HDTV's to avoid high inventory costs.
- **Decreases Production Cost** - Manufacturers depend on supply chains to reliably deliver materials to assembly plants to avoid material shortages that would shutdown production.
- **Decreases Total Supply Chain Cost** - Manufacturers and retailers depend on supply chain managers to design networks that meet customer service goals at the least total cost. Efficient supply chains enable a firm to be more competitive in the market place  
Improve Financial Position
- **Increases Profit Leverage** - Firms value supply chain managers because they help control and reduce supply chain costs. This can result in dramatic increases in firm profits.
- **Decreases Fixed Assets** - Firms value supply chain managers because they decrease the use of large fixed assets such as plants, warehouses and transportation vehicles in the supply chain
- **Increases Cash Flow** - Firms value supply chain managers because they speed up product flows to customers.
- **Foundation for Economic Growth** - Societies with a highly developed

supply chain infrastructure (modern interstate highway system, vast railroad network, numerous modern ports and airports) are able to exchange many goods between businesses and consumers quickly and at low cost. As a result, the economy grows. In fact, the one thing that most poor nations have in common is no or a very poorly developed supply chain infrastructure.

- **Improves Standard of Living** - Societies with a highly developed supply chain infrastructure (modern interstate highway system, vast railroad network, numerous modern ports and airports) are able to exchange many goods between businesses and consumers quickly and at low cost. As a result, consumers can afford to buy more products with their income thereby raising the standard of living in the society. For instance, it is estimated that supply chain costs make up 20% of a product's cost in the U.S. but 40% of a product's cost in China. If transport damage is added in, these costs make up 60% of a product's cost in China. The high Chinese supply chain cost is a major impediment to improving the standard of living for Chinese citizens. Consequently, China has embarked on a massive effort to develop its infrastructure.
- **Job Creation** - Supply chain professionals design and operate all of the supply chains in a society and manage transportation, warehousing, inventory management, packaging and logistics information. As a result, there are many jobs in the supply chain field. For example, in the U.S., logistics activities represent 9.9% of all dollars spent on goods and services in 2006. This translates into 10,000,000 U.S. logistics jobs.
- **Opportunity to Decrease Pollution** - Supply chain activities require packaging and product transportation. As a by-product of these activities, some unwanted environmental pollutants such as cardboard waste and carbon dioxide fuel emissions are generated. For example, paper and paperboard

accounted for 34% of U.S. landfill waste in 2005. Only 50% of the 84 million tons of paper and paperboard waste were recycled. Also, carbon dioxide emissions from transportation accounted for 33% of total U.S. CO<sub>2</sub> emissions in 2005. As designers of the network, supply chain professionals are in a key position to develop more sustainable processes and methods.

- **Opportunity to Decrease Energy Use** - Supply chain activities involve both human and product transportation. As a by-product of these activities, scarce energy is depleted. For example, currently transportation accounts for 30% of world energy use and 95% of global oil consumption. As designers of the network, supply chain professionals have the role of developing energy-efficient supply chains that use fewer resources.

❖ PROTECT CULTURAL FREEDOM AND DEVELOPMENT

- **Defending Human Freedom** - Citizens of a country depend on

METHODOLOGY:

The research design adopted for the study was a survey research. A research design is part of the research methodology which serves as outline, a general arrangement or plan that address the problem of scientific inquiry [7]. The design employed in any research undertaking is therefore determined substantially by the nature of the study. This study would at Effective

military logistics to defend their way of life from those who seek to end it. Military logisticians strategically locate aircraft, ships, tanks, missiles and other weapons in positions that provide maximum security to soldiers and other citizens. Also, superior logistics performance yields military victory. For example, the B-2 Stealth Bomber is able to deliver bombs to target without being detected by enemy radar.

- **Protects Delivery of Necessities** - Citizens of a country depend on supply chain managers to design and operate food, medicine and water supply chains that protect products from tampering. Sophisticated packaging techniques, state of the art surveillance cameras, global positioning systems and RFID inventory tracking are some of the methods used to deter terrorists from accessing these vital logistics systems. [6].

AREA OF THE STUDY

The study was carried out in Anambra and Enugu States, mostly the States waste Management Boards and authorities as well as some manufacturing firms that deal with

the reduce, recycle and reuse of waste as a means of creating production, profitability and employments [9].

POPULATION OF THE STUDY

The population of the study was made up of 1,480 of organizations (mostly small business entrepreneurs that has something to with reducing, recycling and reusing of waste as a means for creating production, profitability and creating employments in Anambra State and Enugu States. [10] While Anambra State constitute 435, Enugu

constitute 1,045 entrepreneurs dealing on six types of businesses namely: welders, mechanics, plastics, aluminium, electrical and shoes.

Sample Size Determination

Following the population understudy as state in the table A below.

Table A: Showing the population of small scale entrepreneur involved in waste management in Anambra and Enugu States.

S/N	States	Types of business						Total
		Welders	Mechanics	Plastics	Aluminium	Electrical	shoes	
1.	Anambra	65	85	65	55	80	85	435
2.	Enugu	260	185	150	190	160	100	1045
	Total	325	270	215	245	240	185	1480

Source: Field study, Anambra and Enugu, 2018

On the bases of the above a sample size of 315 was obtained using Yaro Yamani (1964) states as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = Sample size  
 N = Total population = 1,480  
 E = Error margin of 5%  
 1 = Constant

On substitution we obtained

$$\begin{aligned} n &= \frac{1480}{1 + 1480(0.05)^2} \\ &= \frac{1480}{1 + 3.7} \\ &= \frac{1480}{4.7} \\ &= 315. \end{aligned}$$

Based on this therefore Bowley's proportional allocation formula was employed in allocating the sample size of

315 to the various stratum of Anambra and Enugu States [8].

$$\begin{aligned} nh_j &= \frac{n N_{hj}}{N} \\ nh_j &= \text{Stratum Sample Size} \\ n &= \text{Total Sample Size} \\ N_{hj} &= \text{Stratum population} \\ N &= \text{Total population} \end{aligned}$$

For Anambra

$$\begin{aligned} n &= \frac{315(435)}{1480} = \frac{137,025}{1,480} \\ &= \underline{93} \end{aligned}$$

For Enugu

$$\begin{aligned} n &= \frac{315(1,045)}{1480} = \frac{329,175}{1,480} \\ &= \underline{222} \end{aligned}$$

$$\text{Therefore } 93 + 222 = \underline{315}.$$

## DATA PRESENTATION ANALYSIS AND TEST OF HYPOTHESES

Here in Table B is the Data presentation.

Table B: Showing Data Presentation based on Distribution and return rate of questionnaire

S/N	State	Copies of questionnaire distributed	Copies returned and valid	Valid total	Valid percent
1.	Anambra	93	93	92	100
2.	Enugu	222	222	221	100
	<b>Total</b>	<b>315</b>	<b>315</b>	<b>313</b>	<b>100</b>

Source: Field Study, 2018

Based on the table B analysis and test of hypotheses was anchored on the valid return percent of 100 which represents a total of 315 respondents in Anambra and Enugu States.

Response on the extent management of waste in south eastern states have aided employment generation in small scale entrepreneurs in Anambra and Enugu over the past 10 years.

Table C: Management of waste have significantly aided employment generation in my business within the past 10 years

Types of business	SA	A	U	SDA	DA	Total
Welders	20	25	3	4	7	59
Mechanics	25	15	-	5	4	49
Plastics	20	21	1	2	2	45
Aluminum	24	25	2	5	6	62
Electrical	28	20	-	1	2	51
Shoes	25	20	1	2	1	49
<b>Total</b>	<b>142</b>	<b>126</b>	<b>7</b>	<b>19</b>	<b>21</b>	<b>315</b>

Source: Field Study, 2018

Table C above show that 142 and 126 respondents strongly agree and agree respectively that they have significantly generated employment within the past 10 years. Thus accounts for 45 percent and 40 percent respectively to the total respondents of 315. While 21 and 19

respondents either disagree (SDA) or strongly disagreed on employment generation respectively. These accounts for 6% and 7% respectively. While 7 are undecided accounting for 0.02 percent of the total respondents.

### TEST OF HYPOTHESIS 1

In order to test hypothesis 1 Table C above was adopted. Ho management of waste have not significantly aided employment generation in South Easter States of Nigeria. H<sub>1</sub> management of waste have significantly aided employment generation in South Eastern state of Nigeria. Here we applied t-test statistics. In doing so the average

sample size desired in Table C above was ;adopted i.e. 142, 126, 7, 19 and 21.

This was ranked in a 5 points likert scale of 7 → 1, 19 → 2; 21 → 3; 126 → 4 and 142 → 5. Hence Table C (1) was obtained.



Table C(1) Showing

Responses	Score (x)	Frequency (f)	FX	(X - X) <sup>2</sup>	F(X - X) <sup>2</sup>
Strongly Agreed (SA)	1425	142	710	0.656	93.17
Agree (A)	1264	126	504	0.0361	4.55
Undecided (U)	7	7	7	10.1761	71.23
Strongly Disagree (SDA)	192	19	38	4.7961	91.13
Disagree (DA)	213	21	63	1.4161	29.74
Total		315	1322		289.82

$$\text{Means } X = \frac{\sum fx}{\sum f} = \frac{1322}{315} = \underline{\underline{4.19}}$$

$$\text{Population Means } (\mu) = \frac{1+2+3+4+5}{5} = \frac{15}{5} = \underline{\underline{3.0}}$$

$$\text{Sample Mean} = \frac{\sum fx}{\sum f} = \frac{1322}{315} = \underline{\underline{4.19}}$$

$$\text{Sample variance } (S^2) = \frac{\sum f(X_i - X)^2}{n-1} = \frac{289.82}{315-1} = \frac{289.2}{314} = \underline{\underline{0.92}}$$

$$\text{Sample standard duration } (S) = \sqrt{0.92} = \underline{\underline{0.96}}$$

Formulating the null and alternate hypothesis

Ho:  $\mu \leq 3.0$ . Accept null hypothesis if the calculated value of t is less than or equal to critical value from t-distribution

table) otherwise reject it and accept alternate hypothesis. Hi:  $\mu > 3.0$ .

Calculating the value of t.

$$t(n-1) = \frac{X - \mu}{\frac{S}{\sqrt{n}}} = \frac{4.19 - 3.0}{\frac{0.96}{\sqrt{315}}} = \frac{1.19}{0.054089872}$$

$$\text{Calculated value} = \underline{\underline{22.0}}$$

Decision: Since the calculated value t(22.0) > Critical value of t(1.645) we reject the null hypothesis and accept the alternate hypothesis. Then we conclude that management of waste has

significantly aided employment generation in South Eastern State of Nigeria. This assertion is supported by the responses of respondents.

Table D: Responses on the extent supply chain network of waste management enhance growth of small business entrepreneurs.

Supply chain network of waste management have been a veritable tool for the growth of my business in terms reducing waste recycling and reuse of waste for growth profitability and production.

Categories	SA	A	U	SDA	DA	Total
Welders	19	21	4	10	5	69
Mechanics	20	18	2	5	4	49
Plastics	14	13	-	9	9	45
Aluminum	14	14	10	12	12	62
Electrical	16	14	1	10	10	51
Shoes	12	13	1	12	11	419
Total	95	93	18	58	61	315

Source: Field Study, 2018

Table D shows that a total of 167 out of 315 respondents at least agreed that supply chain network of waste management have significantly enhanced the growth of their business. This accounts for 69 percent of total valid respondents

while a total of 109 accounting for about 34 percent of total valid respondents disagreed that supply network of waste management have not significantly enhanced the growth of their business and 18 accounting 6 percent were undecided.

#### TEST OF HYPOTHESIS 2:

In order to test hypothesis 2, data in table D was adopted.

Ho. Supply chain network waste management have not significantly enhanced the growth of small business entrepreneurs in Enugu and Anambra States.

enhanced the growth of small business entrepreneurs in Enugu and Anambra State. Here we also applied t-table statistics. In doing so the average sample size derived in table D above was applied i.e. 95, 93, 18, 58, and 51.

H<sub>1</sub>: Supply chain network waste management has significantly

This was ranked in a 5 points likert scale of 18 → 1, 51 → 2; 58 → 3; 93 → 4 and 95 → 5.

Table D(1) Showing data on the extent supply chain network waste management have enhanced the growth of small scale business.

Responses	Score (x)	Frequency (f)	FX	(X - X) <sup>2</sup>	F(X - X) <sup>2</sup>
Strongly Agreed (SA)	5	95	475	1.9044	180.92
Agree (A)	4	93	372	0.1444	13.43
Undecided (U)	1	18	18	6.8644	123.56
Strongly Disagree (SDA)	3	58	174	0.1296	7.52
Disagree (DA)	2	51	102	2.6244	133.27
Total		315	1141		459.27

$$\text{Means } X = \frac{\sum fx}{\sum f} = \frac{1141}{315} = \underline{\underline{3.62}}$$

$$\text{Population Means } (\mu) = \frac{1+2+3+4+5}{5} = \frac{15}{5} = \underline{\underline{3.0}}$$

$$\text{Sample Mean} = \frac{\sum fx}{\sum f} = \frac{1141}{315} = \underline{\underline{3.62}}$$

$$\text{Sample variance } (S^2) = \frac{\sum f(X_i - \bar{X})^2}{n-1} = \frac{459.27}{315-1} = \frac{459.27}{314} = \underline{\underline{1.46}}$$

$$\text{Sample standard duration } (S) = \sqrt{1.46} = \underline{\underline{1.21}}$$

Formulating the null and alternate hypothesis

Ho:  $\mu = \leq 3.0$ . Accept null hypothesis if the calculated value of t is less than or equal to critical value from t-distribution table) otherwise reject it and accept alternate hypothesis. H<sub>1</sub>:  $\mu > 3.0$ .

Calculating the value of t.

$$t(n-1) = \frac{X - \mu}{\frac{S}{\sqrt{n}}} = \frac{3.62 - 3.0}{\frac{1.21}{\sqrt{315}}} = \frac{0.62}{0.068175776}$$

$$\text{Calculated value} = \underline{\underline{9.09}}$$

$$\text{Critical value of } t(315)(0.05) = 1.645$$

Decision: Since the calculated value t(9.09) > critical value at t(1.645), we reject the null hypothesis and accept the alternate hypothesis which states that supply chain network of waste

management have positively and significantly enhanced the growth of small business entrepreneurs in Enugu and Anambra States.

#### SUMMARY OF FINDINGS

Here the summary of findings was based on the objectives.

1. The study revealed that management of waste have positive and significantly aided employment, generation in Enugu and Anambra States. This is evidenced in Table (C) where 85 percent of respondents affirmed to this and calculated value at t(22.0) > critical value at t(1.644) leading to acceptance of alternate hypothesis.

2. The study also revealed that supply chain network of waste management have positive and significantly enhanced the growth of small business entrepreneurs in Enugu and Anambra States also evidenced in Table D, where 60 percent of respondents affirm to this and supported by calculated value at t(9.09) > critical value at t(1.645) leading to the acceptance of the alternate hypothesis.

#### CONCLUSION

We therefore conclude that Effective supply chain network is a sustainable approach to waste management in South-Eastern Nigeria in that it gives opportunity for aided

employment generation as well as enhance the growth of small business entrepreneurs.

## RECOMMENDATIONS

Based on the findings, we therefore recommend that:

1. Government need encourage small scale entrepreneurs through provision of attractive incentives to enable them utilize the opportunity to reduce, recycle and reuse materials considering as waste into useful item, with this they can create more employment opportunities to the teaming youths and reduce crime rate.
2. Following up with recommendation 1 above Government are charged to encourage the utilization of supply chain network of waste management especially among the small scale entrepreneurs to enlenght the growth of this sector of economy as the growth will encourage more creation of employment opportunities and economic development.

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