

**MAINTENANCE AND OPERATIONS OF SEWAGE DISPOSAL SYSTEM IN  
DOMESTIC BUILDINGS IN NIGER STATE, NIGERIA.**

**BY**

**TONGWE, Zumji**

**2018/3/74398TI**

**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION,  
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE.**

**APRIL, 2023.**

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**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF INDUSTRIAL  
AND TECHNOLOGY EDUCATION, SCHOOL OF SCIENCE AND TECHNOLOGY  
EDUCATION, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER  
STATE, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE  
AWARD OF BACHELOR OF TECHNOLOGY (B. TECH) DEGREE IN  
INDUSTRIAL AND TECHNOLOGY EDUCATION.**

**APRIL, 2023**

## **DECLARATION**

I, **TONGWE, Zumji**, with matriculation number **2018/3/74398TI**, an undergraduate student of the department of Industrial and Technology Education, certify that the work embodied in this project is original and has not been submitted in part or full for any other diploma or degree of this or any other University.

**TONGWE, Zumji**

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**2018/3/74398TI**

Sign and Date

## **CERTIFICATION**

This project has been read and approved as meeting the requirement for the award of B. Tech degree in Industrial and Technology Education, School of Science and Technology Education, Federal University of Technology, Minna.

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External Examiner

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Signature and Date

## **DEDICATION**

This research work is dedicated to God Almighty, the maker of heaven and earth, my father, late Tongwe Sale, and my mother, late Rahila Tongwe.

## ACKNOWLEDGEMENTS

First of all, I want to give God the glory, for being there for me throughout these years of struggles, indeed His is faithful.

My solemn appreciation goes to my able supervisor, Dr. A.M Hassan who forms the pillar of this research, thanks for the time and attention you have given to this despite your tight schedule with the university; it is only God that can reward you.

I want to appreciate my family especially my parent, Late Rev. and Mrs. Tongwe Sale for their moral and financial, its my Ernest prayer that the lord will grant you eternal rest, my beloved brothers and sisters Morgak, Rotshak, Nakup, Happy. My extended family Nenkang, Racheal Enji, Panshak, Kirit, Chorbe, Nendirmwa, Roda, Apostle, Praise, Nenki, Emma, Ritji, Naomi, I thank you all for your love and support.

I appreciate the department of Industrial and Technology Education and its ITS and each staff for impacting so much knowledge, I keep wondering what it would have been without meeting you people, I appreciate the lecturing of all my department staffs, it is only God that can reward you all in full.

I thank God for my uncles and aunties who were also there for me. Thank you all for your moral and financial support.

It is said that the people you meet in life sums up the kind of person in you, it is at this junction I will like to appreciate the impact of my friends. I want appreciate every member of 'comm-unity' which comprises of faith, Bigvi, Gold and others so numerous to mention. I appreciate the effort of my course mates; Sodiq, Aboki, Jan, Ibrahim, Kolo, Moses, Janet, Jumi, Hauwa and so many, my typist Sanusi.

Finally, my appreciations goes to my friends thank you all for your love and support.

## ABSTRACT

*This study examined the strategies for enhancing academic-industrial partnership on solid waste management in Niger state. Three research questions were developed to guide the study and three null hypotheses were tested at 0.05 level of significance. It employed a survey research design. The study used a four-point scale questionnaire, which contains a total of 24-items, as instrument. In all, 58 technical teachers and 22 NISEPA staff made up the sample for the study, giving rise to a total sample size of 80. The result showed Provision of internship training and on –the- job training by industries, Involvement of industries in evaluating students relevant learning experiences acquired in the technical colleges can improve school-industry partnership. The study recommended among other things, Industry base job skill should be included in the curriculum of technical colleges for skill acquisition.*

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## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the study

Waste is a product or substance which is no longer suited for its intended use. Individuals, organizations and governments have advanced several definitions to describe the term waste (Kevin *et al.*, 2015). Waste is often associated with unused or discarded material (Hincapié *et al.*, 2015). Alabi *et al.* (2020) conceptualize waste as material thrown away or set aside as worthless. Waste can also be seen as a scrap from the application of any process, or any substance, which requires to be disposed of. Thus, it can be defined as any material discarded as having no consumer value to the person abandoning it Luthra, (2017). However, what an individual calls a waste is subject to the value judgment of such a person. An output of a process may be considered a waste if it has no further use, but it could be a valuable by-product if reused or recycled. Contreras-Lisperguer *et al.* (2017) contend that a material is only a waste if it is useless; as soon as it is usable, it becomes a resource.

Waste could be in gaseous, liquid or solid forms. Solid waste is seen as a heterogeneous mass of discarded materials arising from human activities (Periyasamy *et al.*, 2022). Sources of municipal solid waste can be classified into seven: residential (household or domestic waste), commercial, institutional, street sweeping, construction and demolition, healthcare/sanitation and industrial wastes (Ndum, 2013) in (Alabi *et al.*, 2020). There must be proper management of solid waste at every sector.

Solid waste management has become a global problem especially in developing countries of the world. One of the major factors that directly contribute to solid waste generation is urbanization and population growth. World population reached seven billion in 2011 and continues to rise with projection nearing 9.3 billion by 2050 (Mega & Mega, 2016). Urban

areas are the most populous areas in the world, especially in developing countries, where people migrate from rural areas to urban areas in search of better life and employment (Mega & Mega, 2016). This increase in population which is accompanied by unexpected and unplanned rapid urbanization on the one hand and economic growth in developing countries on the other, have accelerated the generation rate of municipal solid waste (Saadeh *et al.*, 2019). The amount of household solid waste produced daily is significantly increasing in the cities of developing world. While the capacity and effectiveness of municipalities in providing municipal solid waste services remains undesirably low, (Medina, 2010). This result in the inability of the municipal corporations of the developing countries to handle the increasing quantities of wastes generated. These uncollected wastes litter the streets, roads and public places, this inefficient management and disposal of solid waste is an obvious cause of degradation of the environment in most cities of the developing world (Naresh *et al.*, 2018). In order to enhance solid management process in any state there must be adequate partnership between the solid waste industries and technical colleges.

Partnership is defined as an agreement between two or more bodies on achieving common goals between the partners (Cooke *et al.*, 2020). Partnership can involve more than two people or body, partnership also occur between industries such as solid waste management industries and educational bodies such as technical colleges. Solid waste management industries is define as an organization whereby activities such as solid waste management take place and various operations of field take place. Solid waste management industries go into partnership with technical college in order to bridge theoretical knowledge and practical knowledge together (Ogbuanya & Tongshuwal, 2020). Technical college is a branch of vocational and technical education which train students with several skills in different crafts (Owo & Deebom, 2020). As a result of training individual with different skills in crafts, solid waste management industries and technical colleges come together in partnership in order to

equip students with adequate practical skills needed in their field of learning. Enhancing partnership between solid waste management industries and technical colleges is a mutually accepted training partnership in which school learning experience (knowledge and practical skills) are complemented through on-the-job training in an industry.

According to Chinyere and Afeez (2022) Technical Colleges in Nigeria are established to prepare individuals to acquire practical technical skills and basic scientific knowledge. Chinyere and Afeez (2022) also opined that technical colleges are intended to prepare students for entry into various occupations such as operatives, artisans, and craftsmen. Saleh (2022) observed that the rapid development witnessed in all sectors of the economy after independence makes it mandatory to improve the standard of craftsmanship. Technical colleges therefore are saddled with the task of providing, imparting or teaching practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of the economy and social life. People trained in technical colleges are expected to acquire valuable skills in various areas of specialization in order to best fit into the solid waste management industry. Isaac, Enyiche and Obed (2019) stated that industries always allege that technical colleges teach skills which are too remote from those required. Saleh (2022) pointed that technical colleges and industries have different roles to play in technical man power production in Nigeria.

School based learning activities are those activities that are provided by the school for effective production of man power. Isaac, Enyiche and Obed (2019) explained that the school based learning activities should involve provision of qualified technical teachers, provision of suitable class room facilities and instructional materials. Largent-Necessary (2021) stated that school based activities should focus on career exploration and counseling of students, providing program of study based on higher academic standard, integrating academic and

vocational learning, and evaluation of students' academic strength and weakness. In addition, Largent-Necessary (2021) pointed out the responsibilities of schools to include: – provision of necessary man power, allocation of training time table and the length of training, planning in cooperation with industries where training should be carried out, evaluation of students to find out the extent to which they have acquired skills they are supposed to acquire, supervision of students during training and setting the procedure that facilitate students participation in additional training in industry based environment. The school – based activities should be naturally complemented with the industry-based activities.

Industry- based or work-based learning is a planned work experience, work place mentoring and instructions in electrical industries. Industries in partnership or cooperation with the technical colleges should provide work based learning activities such as internship, on-the-job training, mentoring and cooperation education (industrial attachment) to expose students to new technologies. Largent-Necessary (2021) stated the function of industries to include: assessment of training resources of institution to find out if the institutions are capable of giving the students adequate training and background on those occupations required in the industries. If students from technical colleges are to be adequately skilled and not to remain jobless, it is obvious that there is need for industries to intensify efforts to train students. Scholars, organizations and concerned Nigerians have advocated for ways that could improve partnership between technical colleges and industries among which could also be done administratively by government and regulating body. Administration in the context of this work is the meeting point between the technical colleges and the industries, which is the SIWES, established by Industrial Training Fund (ITF), not how the technical colleges and industries administration are done.



Administrative strategies involved those activities set by the government as a meeting point for training the students, and other strategies set by the government to enhance technical colleges and industry relationship, to equip students with necessary skills needed for world of work. But not how the technical colleges and waste management industries administration is done respectively. Adebayo and Akinyemi, (2022) noted that an encouraging step towards enhancing partnership between waste management industries and technical colleges in Nigeria was the establishment of Industrial Training Fund (ITF) in 1970. ITF is charged with promoting and encouraging the acquisition of skills in industry and commerce to meet the need of the economy. In an attempt to achieve this aim, ITF initiated Student's Work Experience Scheme (SIWES) in 1973 to provide avenue for students to have industrial exposure in their own disciplines during the course of study. However in the curriculum and course specification of general installation and maintenance work by National Board for Technical Education, NBTE (FRN 2014), supervised industrial Training/Work Experience (SIWES) is compulsory for Advance National Technical Certificate (ANTC). But only accounts for about 5% of the total hour required. This is not even enough for skill acquisition. Those at the National Technical Certificate (NTC), at year 1-3 now SS1-3 do not have such opportunity. Ayonmike and Okeke (2016) opined that the selection of contents in technical education curriculum involves job identification, task analysis, and job clustering.

Unfortunately, it appears that most graduates of technical colleges in Nigeria, especially Niger State lack adequate practical skills to work in the waste management industries or become self-employed. But rather, they prefer to gain office work where no practical skill is required (Ayonmike & Okeke, 2016). This may be attributed to their inability to learn the required skills in the course of their studies, to enable them enter the world of work. Consequently strategies should be created to enhance partnership between solid waste

management industries and technical colleges for effective training of vocational personnel and solid waste management.

## **1.2 Statement of the Problem**

Waste generation has been on the increase since 1960 in Nigeria. The rate of waste generation increased from 0.37 kg/capita/day in the late 1960s/early 1970s Alabi *et al.* (2020) to 0.55 kg/capita/day between 2012 and 2015 Oyo state waste Management Authority. In 2012, about 635,000 tons, approximately 0.55 kg/person/day quantity of waste was generated in the city (Odewumi et al., 2016) in (Alabi *et al.*, 2020). Oyelaran and Rufai (2015) in Alabi *et al.* (2020) disaggregate the waste generated in the city of Ibadan into organic waste (accounting for 42% by weight), paper (10%), textile (2%), glass (4%), metal (5%), wood (3%) and plastics (9%). Some of the wastes are hazardous, flammable, or non-biodegradable. Without adequate provision for residential solid waste management, a diverse range of disease vectors will likely breed or feed within and around houses and residential neighbourhoods, reducing quality of life, wellbeing and hindering sustainable development (Kouassi *et al.*, 2021).

In the past, waste management tends to be the responsibility of the public sector. However, this responsibility cannot be performed exclusively by the public sector because government alone cannot afford the huge financial, technical, administrative and human resources required to carry out the responsibility effectively.

On the opinion of Ogbuanya and Ohanu (2018) there should be proper partnership between the technical and industries in order to be able to acquire adequate skills related to solid waste management. Most countries have found an effective way to train their technical man power in new technologies through cooperation/partnership between industries and technical institutions. On the contrary in Nigeria including Niger state inadequacy in

partnership between solid waste management industries and technical colleges has resulted in dearth of skilled and technical man power. Even though students industrial works experience scheme (SIWES) which is intended to back up training of students with relevant job experience to expose them to latest technological advances in industries is not well implemented at the National Technical Certificate (NTC) year 1-3 now SS1-3. Hence there is a need to determine the administrative strategies, school-based and industry based activities that will enhance partnership between solid waste management industries and technical colleges to expose students to more practical and skills acquisition in Niger state with state of the art of technologies in solid waste management industries.

### **1.3 Purpose of the Study**

The purpose of this study is to identify strategies for enhancing academic-industrial partnership on solid waste management in Niger state. Specifically this study will determine:

1. Administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state.
2. School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.
3. Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

### **1.4 Significance of the Study**

The study will be of benefit to the following: Technical colleges and other vocational training centres, waste management industries, students, Government and National Board for Technical Education (NBTE) and curriculum planners.

Technical colleges and vocational training centres will benefit since there have been no guidelines on how collaborative training will be carried out. If the guidelines are identified and included in their training program or curriculum it will be used in the training to equip the student's trainee with adequate skills to handle the equipment and machinery of waste management industries in this global technological advancement. There will be staff development when waste management industries are involved in training technical teachers through workshop and seminars. Sharing of ideas would increase as technical teachers will be well equipped to train and impart necessary skills to students. Technical colleges can organize conferences in conjunction with waste management industries on areas related to waste management industry and technical colleges' partnership.

The findings from the study could be of benefit the waste management industries such as Niger State Environmental Protection Agencies (NISEPA) and because partnership between waste management industries and technical colleges will enhance the exposure of students to real life experience during their training. Industrial equipment, machineries and tools would be properly handled, operated, managed and maintained by the students for effective performance and productivity. It will further help the industries on better ways of managing waste in the state.

Students will benefit from the study, since partnership between solid waste management industries and technical colleges must have exposed the students to real life situation on industrial equipment, tools, machine to improve their technical skills in line with the present technological advancement. It will also help the students with step-by step training from the industries and to systematically expose them to the latest technological advancement in the waste management industries and to enhance on-the-job school-industry experience.

Government will also benefit from this study as it will help them in making policy that can serve the interest of the skilled personnel. The study will also help policy makers to improve on the policy on education that would strengthen the relationship of technical colleges and waste management industries for human capital development.

National Board for Technical Education (NBTE) as a regulatory body for all technical programmed of technical colleges would find the information on the use of partnership useful for improving partnership between technical colleges and waste management industries for skills acquisition. And would use it to guide the technical colleges in the country on how to go about implementing partnership in the colleges. The information could serve as a basis for recommending to the NBTE possible areas of adjustment in the curriculum of the technical colleges. This is to accommodate the demand arising from the use of partnership for the improvement of skills acquisition by students in technical colleges.

Curriculum planners will benefit, because it would help them to consider all the activities that are necessary to plan and develop technical education curriculum that will provide the kind of man power needed in the society.

### **1.5 Scope of the Study**

The study will be carried out to determine the strategies for enhancing academic-industrial partnership on solid waste management in Niger state. The study will specifically cover the activities on administrative strategies, school-based activities and industrial based activities for enhancing academic-industrial partnership on solid waste management in Niger state. Administrative strategies, school-based activities, industries-based activities constitutes the activities need to enhancing academic-industrial partnership on solid waste management in Niger state. Therefore, the study will seek opinion of industrial supervisor and technical teachers as the respondents on the administrative strategies, school-based activities,

industrial-based activities that could enhancing academic-industrial partnership on solid waste management in Niger state.

## **1.6 Research Questions**

The following research questions will guide the study;

1. What are the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state?
2. What are the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state?
3. What are the Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state?

## **1.7 Hypotheses**

The following null hypotheses formulated will be tested to guide the study at 0.05 level of significance.

**H<sub>01</sub>** There is no significant difference in the mean responses of NISAPA staffs and technical teachers on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state.

**H<sub>02</sub>** There is no significant difference in the mean responses of NISAPA staffs and technical teachers on the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

**H<sub>03</sub>** There is no significant difference in the mean responses of NISAPA staffs and technical teachers on the Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

The review of related literature to this study is organized under the following subheadings:

#### **2.1 Theoretical Framework**

**2.1.1** Theory of Skill Development

**2.1.2** Theory of skill acquisition

#### **2.2 Conceptual Framework**

**2.2.7** Concept of partnership

**2.2.8** Waste Management

**2.2.9** School –industry partnership for technology growth

**2.2.10** Administrative strategies for improving school-industry partnership

**2.2.11** School-based activities that will improve school-industry partnership.

**2.2.12** Industry-based activities that can improve school-industry partnership.

#### **2.3 Review of Empirical Studies**

#### **2.4 Summary of Review of Related Literature**

## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

The review of related literature to this study is organized under the following subheadings:

#### **2.1 Theoretical Framework**

##### 2.1.1 Theory of skill acquisition

Robert DeKeyser\_(2007) noted that the Skill Acquisition Theory of development has three stages: declarative, procedural, and automatic (from ACT-R Theory). Declarative knowledge refers to explicit knowledge about a topic, as in "knowing" and talking about grammar rules. Procedural knowledge is implicit knowledge that refers to behaviour, such as speaking or writing a language. Of course, there are different levels of proficiency in using a language, and thus automaticity is not an "all-or-nothing affair". Automaticity occurs toward the endpoint of extensive practice, toward the point at which one has become completely fluent in a language. From the perspective of SAT, the sequence of these stages is crucial, as is the appropriate combination of abstract rules and concrete examples at the declarative stage. According to DeKeyser, (2007) skill Acquisition Theory does not explain all of language learning and apparently is most effective at beginner levels. He states that SAT works best with

1. high-apptitude adult learners engaged in
2. the learning of simple structures at
3. fairly early stages of learning
4. in instructional contexts



It seems obvious that young children will not respond as well as adults to the use of declarative knowledge as their ability to understand rules and explanations is more limited. Conversely, as rules become more complex, they may become too difficult to understand in the form of declarative knowledge. Thus, it's possible that learning (or acquiring) complex rules may rely more upon implicit processes. Anderson and Schunn (2007) say something similar: As knowledge domains become more advanced, their underlying cognitive structure tends to become more obscure. Thus, while it may remain easy to provide feedback on what the final answer is, it becomes difficult to provide feedback on the individual mental steps that lead to the final answer. Teachers often are unaware, at an explicit level, of what this knowledge is and do not know how to teach it to children. Anderson and Schunn (2007) are pointing to the need to diagnose a task and break it down into its components in order to provide effective feedback. When we can't componentialize a task, then feedback becomes considerably less effective. Thus, with respect to error correction, we need

- rules that are not obscure,
- examples of the rules, and
- Understandable explanations of those rules.

The ability to use declarative knowledge in the learning process does not accelerate acquisition. Rather, it eliminates wasted time and effort

## **2.2 Conceptual Framework**

### **2.2.1 Concept of partnership**

Public Private Partnership and cooperation are critical to the development of high quality vocational education and Training (VET) because they allow for regular communication between employers (industries) and VET providers (technical institutions). This

communication also allows employers to have input into the curriculum of VET and often gives them recruiting tool to attract skilled workers (Grubb, & Lazerson, 2004).

Cooperation between industry and technical institution require new ways of thinking. It requires a considerable formal flexible education system to share the needs, problems; issues, strength and weakness of vocational programmed. Cooperation between technical institution and industry also require teachers and administrators to share the internal workings of technology education with representative from industry. Successful partnership can generate mutual respect and trust among school and industry leaders and allow mutual problems to be solved and share goals reached. These outcomes may help educational leaders increased access to and improve the quality and efficiency of technical education for employment programmed.

Scholars in the field of vocational and technical education have continued to call for a better and improved relationship between technical institutions and the industries in which they serve. And there was a called for the need for interaction between the industry and technical colleges in order to produce the right type of engineers, technologists, technicians and craftsmen to serve the country. Since the main institution's training facilities are outdated and inadequate, making practical training difficult to meet the modern need trends in the industries (Audu, Abdulkadir and Abdul, 2013). Hence a change of direction is required to close up the widening gap between technical vocational education TVE (Technical colleges graduates and the industry in terms of the requisite skills required for employment in the industries. Therefore it is a matter of necessity that government should enact a law to compel cooperation between technical institutions and the industries to work out a programmed for the overall educational development of young Nigerians.

The experience of United State of America is pertinent with regard to industry and educational institution partnership. Sherman (1983), recalled that the concept of educational institution and industry entering into partnership is not new. He observed that industries of the United States of America have been cooperating with educational institutions to educate young and adults for more than a century and that the value of industries input into the educational arena is reaching new heights. According to Sherman, this partnership is viewed as one method of providing innovation and quality for schools of future.

Roth (1987) in his own contribution outlined four ways in which partnership may benefit schools and industries as follows:

- Providing other individuals and institution opportunities to perceive another organization's point of view and a chance to win and ally.
- Expanding the capacities of participating institutions to deal with the challenges that each entity must meet in its line of operations and helping to build the kind of understanding that create support.
- Serving as a means of contributing to quality education programmed.
- Bringing increased access to knowledge, time, human resources and financial assistance from other sectors in the community as well as reducing the cost and liability of doing business for each participant.

Clark (1984) reported that one of the education and training thrust of the 1980's has been the emergence of new partnership and cooperation effort between industry and technical institution. According to him, "These partnership and cooperation efforts can work to the benefit of both education and industry program". Similarly, the United States office of Technology Assessment (1984 as cited in Gofwen 2007) reported that as the rate of

technological change accelerates, both industries and educational institutions are faced with increasing and changing demands for technological related instructions. But in Nigeria, the industries do not have much involvement in training, funding and curriculum development of our technological institutions which are the trademark of industrialization in the development nations. (Olorufemi and Ashaolu, 2008). Audu,(2013) stated that, there is no link and interaction between the industries and the technological institutions in research activities and manufacturing. Hence, business and industry should become increasingly involved in education and training. One of the ways by which students who involved in vocational technical programmed have gained work experience over the years is the supervised Work Experience (SIWES) being organized by Industrial Training Fund (ITF) in 1973. According to Obanor, and Kwasi (2013), it was established to solve problem of lack of adequate practical skills preparatory for employment in industries by Nigeria graduates of tertiary institutions. The scheme exposes students to industry based skills necessary for a smooth transition from classroom to the world of work. It affords students of tertiary institutions the opportunity of being familiarized and exposed to the needed of experience in handling machinery and equipment which are usually not available in the educational institutions. But such opportunities were not made available to students of technical colleges. However no doubt, the SIWES programme has failed, especially for the purpose it was established (Obanor, 2013). Most students leave school in search of companies to undergo the industrial training program. Some get lucky and get a suitable place of their choice, while others are being frustrated to stay at home during this period, due to rejection by numerous companies applied as a consequence of funding or population limit in the specific industry. Some will say we are in a world where “connection” is needed to secure a suitable working place. Also some students acquire an industrial training placement that is not related to their course of study, may be they got frustrated of searching for a relevant placement or become of the

enormous stipend they would receive. With regard to technical colleges in Nigeria, this scheme appears to have met with a lot of obstacle as stated above at the level of implementation. One of these obstacles was identified by Yabani (1992) as lack of industries in the environment where most technical colleges locate. This perhaps, prompted the need for proper partnership between industries and technical colleges as obtainable in other parts of the world for relevant skill acquisition.

### **2.2.2 Waste Management**

Waste management is the process of managing waste materials (normally those produced as a result of human activities). In order to define waste management, we need to include several different processes such as collection, transport, processing, recycling, disposing, and monitoring of waste. According to Atsegbua (2003), waste management does not just end at collection, transporting processing, recycling or disposal and monitoring of wastes materials but refers to the collection, keeping, treatment and disposal of wastes in such a way as to render it harmless to human and animal life, the ecology and environment generally. In other words, the primary aim of managing wastes is for the safety of human, animal, ecology and environment. We could as well add here that any other aim that goes in contrary to the aims mentioned above does not constitute waste management. Attah (2009) added that waste management could also be said to be the organized and systematic dumping and channeling of waste through or into landfills or pathways to ensure that they are disposed of with attention to acceptable public health and environmental safeguard and that a proper waste management will result in the abatement or total elimination of pollution.

Waste management is a growing public concern in Nigeria. In many cities of the country, waste management is poor and solid wastes are dumped along roadsides and into open areas, endangering health and attracting vermin. In Nigeria, there is a steady increase in waste

quantity and variety due to population growth and industrialisation (Imam et al., 2007) while the basic solid waste management system based on collection, transportation and disposal remains highly inefficient and ineffective, especially in the urban centres (Ayotamuno and Gobo, 2004). Nigeria is the most populous and the tenth largest country in Africa with a population of over a hundred and fifty million people across a landmass of 923,768 square kilometres (WDI, 2010).

Statistics show that the population growth rate of Nigeria as at 1991 was 3.0% and an urban growth rate of about 5.5% per annum, while the average waste generation rate is put at 0.49 kg per day. Urban centers in Nigeria has also witnessed a steady rise in waste generation due to urbanization and increase in population, for instance Abuja the nation's capital generates between 0.55-0.58 kg of waste per person per day, and Lagos state one of the most populous cities in the world generated 4 million tons of waste in 1995 and by year 2000, the quantity of municipal solid waste generated in Lagos metropolis alone was estimated to have increased to 998, 081 tons while Minna the Niger state capital generates about 90 tons of solid waste per day among others. These have put enormous pressure on the ability of the public sector to collect all the wastes generated.

Currently, the level of waste collected in Nigerian cities averages between 30-50 percent of waste quantities generated (Adedire, 2017). As a result, a large proportion of the solid waste generated remains uncollected. Large parts of the cities, particularly, the low income areas receive little or no attention of the public sector. The fundamental deficiency of the solid waste management is attributed to government's failure to assume basic responsibility in raising sufficient funds to provide acceptable levels service (Lohri 2014). While all the waste generated in developed countries are collected, in the developing countries, most of the waste

produced are not collected (Cointreau, 2006). For cities to be relatively clean, at least 75 percent of the waste should be collected (UNDP, 2005).

### **2.2.3 School –industry partnership for enhancing academic-industrial partnership on solid waste management in Niger state**

Technological advancement is on the increase daily in some developed countries such that a piece of equipment becomes obsolete within a given period. Since the world today is a world of technology, the industrial sector in developing countries like Nigeria, being profit oriented are on the lookout for technological advances that could increase their profit margin in less time with greater efficiency. According Netherland Organization for International Cooperation in Higher Education (NICHE, 2010) there are various challenges that TVE graduates are facing in terms of practical skills acquisition, in most developing countries, especially in Nigeria, TVE is narrow in scale, scope, quality and relevance. The programs are not relevant to the requirements of the local labor market, the curricular and syllabi are outof-date and the institutions lack the tools and equipment essential for practical skills acquisition. Where present, the equipment in workshops and laboratories is often out-of-date, bearing little resemblance to the technologies presently used by industry (NICHE, 2010). Insufficient training equipment leads to trainee overcrowding during practical lessons, with most of the students only observing the demonstration and not having the chance to get some hands-on practice. Due to the fact that the institutions are poorly resourced, the education and training remain theoretical and the graduates are not considered more skilled than their academic counterparts by the labor market. The institutions thereby acquire a poor image, and produce graduates with lower employability (NICHE, 2010). Olaitan, Nwachukwu, Igbo, Onyemachi and Ekong (1999) remarked that, training institutions in Nigeria as is characteristic of depressed economics are hardly able to review their facilities to keep pace with technological

progress like in the other developed countries, the resultant effect of this situation is that the trainees from those institutions enter the world of work only to discover that the equipment with which they were trained have been modified or have drastically deviated from those in which they were trained with. This may be one of the reasons why private employers often contented that University and technical institutions have little or no practical work content (Okorie, 2000). In proffering solution to this problem, Okorie pointed that there should be a better cooperation between training institutions and private employers in order to improve the practical work content in training institutions. Commenting on the same subject, Olaitan (1996) remarked that solution to poor quality of graduates rest with forging closer links and cooperation between industries and training institutions. He further stressed that employers of technical manpower, if they have a stake in the quality of manpower produced, would display greater commitment through job training and financial contribution to promote the quality of training in technical institutions. Such employer according to him having contributed materially; would be more forth coming in exposing trainees on industrial attachment to worthwhile work experiences that would enable them to acquire skills and knowledge in latest technologies and would help to evaluate their job performances.

In the same vein, Okolie (1991), observed that school- industry relation has not been given adequate attention in Nigeria, this he confirmed when he said that “in spite of efforts so far made, the level of cooperation between industries and technical institutions still fall short of what is envisaged in the policy”. However, the interaction between technical institutions of higher learning and industries represents a means of contributing quality technical education programmed. Such high interaction is also needed in technical college’s education. The more fact that vocational technical education exists to service the industry is enough reason for industry to forge a closed working relationship with the vocational education system. The challenge for industry to succeed in an increasingly competitive world market is contingent



upon skilled personnel who learn, grow and adapt to the changing markets and technologies. Clearly, industry has a survival stake in quality of technical education programmed.

There are many different types of collaborative ventures between industries and technical institutions. Greenberg (1984) identifies the following six patterns of partnerships as follows.

- Cross training
- Cooperative work study
- Traditional pattern
- Adult and continuing education
- Share facility
- The consultant pattern.

According to Greenberg, most of these patterns overlap: for example a community college may use share facilities while providing training for both industry and educational institutions school trainees. He defined the traditional pattern as a model where an educational institution typically a community college, delivers some or all the training needed by a particular business or industry, this often overlaps with the adult and continue education pattern where a student may receive a degree or certificate while receiving specific job related training.

The oldest and most common collaborative efforts between industry and educational institutions in the united states according to Greenberg is the cooperative work study programmed that made it possible for students to received part of their education on the job where they can gain skill that are best learned within all the problems and constraints that are part of a private sector operation. This according to Greenberg is a collaborative programmed that utilizes a combination of industry and educational institution personnel, facilities and curriculum. Cross training efforts permits both educational institution and industry to pool

their resources together for the training of students. Greenberg emphasized that college and university are well suited for the consultant pattern of partnership.

The united states of America's experience shows that relationship between colleges and industries is very cordial and students can acquire the necessary skills. In recent study conducted by UNESCO (2002), it was reported that most of the countries' technical and vocational system have either formed effective links with industries and commerce or are more moving towards this direction. UNESCO (2002) further stressed that in most of the industrialized countries, training in new technologies is provided within workplace (in some large – scale enterprises) or at the premises of technical and vocational education institutions, which are well equipped with necessary tools to deliver such training.

In cases where technical and vocational education institutions lack sufficient equipment, machinery, hard and software to provide such training, in order to introduce new technologies, some large enterprises and corporations provide the necessary funds or equipment and facilities that are needed for cooperative industry/institutional training in the use of new technologies. In Germany the “Dual System Qualification” in vocational training was introduced (Rainer, 1992). In the Dual System qualification, vocational schools and industry training start at secondary II level. The large part of the learning takes place in the production sector than in school. China too was not left out in skill acquisition; such education is given to her students at factories, farms and mines before proceeding to higher institutions (Aina, 1993).

In view of what is obtained in these developed countries there is need for partnership between institutions and solid waste management in the training of our work force for the nation Nigeria particularly in Niger state.

#### **2.2.4 Administrative strategies for enhancing academic-industrial partnership on solid waste management in Niger state**

Scholars, organizations and concerned Nigerians have advocated for a number of ways that could improve partnership between technical institutions and industries. Dikko (1994) observed that an encouraging steps towards establishing relationship between technical institutions and industries is the introduction of the Students Industrial Work Experience Scheme (SIWES) which was initiated by Industrial Training Fund (ITF). ITF was established in 1977 by Federal Government of Nigeria under the enabling decree No. 47, to effective – coordinate all activities of SIWES and to run some short time courses for industries and other related organization.

The scheme is a cooperative skill development-programmed or a leading step to partnership between technical institutions and industries, designed to expose and prepare students for the real work situations they are likely to meet in the field of specialization after graduation from school (Bala, 2007). The students who acquired work experience are more readily to transit from school to the world of work and fit into it. Bala (2007) summarized benefits commonly gain from SIWES as follows:

- It provides an opportunity development of activities needed for proficiency in technical programmed.
- It provides a desirable type of motivation and develops students interest in technical programmed
- It develops originality, initiative, self-confidence and managerial ability in students.
- It develops desirable relationship with employers and ability in cooperation with others

- It helps the students to develop right attitude to work.

SIWES provides students with opportunity to acquire job skills under actual working condition Bala further stressed that SIWES programmed also served as a laboratory where students put in practice the knowledge and skills acquired while in school. Dikko (1994), however, expressed disappointment on the scheme when he remarked that the programmed is not adequately meeting the needs of industries personnel as a result of improper coordination due to lack of cooperation between institutions and industries. As a result of that, most industries in the country do embark on retraining the products of the nation's technical institutions.

Olaitan, (1996) noted that the cause of poor placement is partly the inability of technical programmed to secure the respect of employers. He added that, constraints suffered by SIWES programmed in technical education in the country include poor planning, inadequate fund, poor attitude of students toward the programmed, failure to recognize SIWES as a course and failure to evaluate the programmed. Furthermore, in the Curriculum and Course Specifications of General Installation and Maintenance Work by National Board for Technical Education (NBTE) Federal Republic of Nigeria (FRN, 2001). Supervised Industrial Training/Work Experience (SIWES) is only account for about 5% of the total hours required for the programmed for only advance craft programmed, Advance National Technical Certificate (ANTC) in Technical Colleges.

This component of the course which may be taken in industry or in college production unit is compulsory for the full time students. But those at the National Technical Certificate (NTC) year1-3 now SSI-3 do not have such opportunity. Their own SIWES exercise is not compulsory, and takes place mostly at the second year of their study during long vocation of one month and without any supervision and marks or score attached to it. It can be noted that

it is not in the curriculum at the level of technical college education, which is the level of craftsmen production to industries. Udo, (1988), in Bala (2007) emphasized on the need of compatibility between the programmed and the structure of the school curriculum and changing technologies.

The author also said SIWES should be regarded as an integral part of the entire school curriculum and as an extension of the classroom/laboratory instruction. Suggesting ways of proffering solution to this problem, Dikko (1994) noted that since the acquisition of the skills expected from a particular training programmed depends on the relevance of the course contents to the skills required in industries, the academic curricular of the educational institutions therefore are important area that required cooperation between industries and these institutions. The curricular most be relevant to the peculiarities of our situation must address most essentially the current industrial demands with the aim of making our technological institutions graduates relevant to the needs of the industry (Ayofe, Ajetola and Oyewole, 2009). Reddan and Harrison (2010) argue that Technical and Vocational Education (TVE) institutions need to restructure their programs to be responsive to the needs of the job market, especially the industry. To achieve this goal, the TVE curricula must focus on outcomes in terms of the skills, knowledge and attitudes required by industry. To bring out this revolution, Dikko (1994) stated that the institutions must set up industrial committee, similar to Academic Advisory committee. Where the industrial Advisory Committee, exist, the role of this committee should go beyond giving mere approval for courses run by the institution but should monitor the implementation of the approved courses. It is essential that various curriculum and syllabus of the institution be discussed with as many employers as possible. This exercise should be on a continuing basis if the teaching in the institution is to keep pace with rapid advancement in technology and the changing needs of the industries. A more cordial relation will thus develop between construction industry and technical colleges.

Ighedo (1994) supported the setting up of Advisory committee when he pointed out that it is evident that career programmed is bound to the defective if there is no input from appropriate personnel in the relevant occupational fields. Practitioners in career option for which training programmes are conceived and designed properly constituted into programmed Advisory Boards have been recognized to be of vital importance as they provide information useful for improving programmed performance and consequently public support. Writing about structure of the Advisory committee, Ighedo noted that, the number and structure of such committee are determined by the areas in which the school is offering training, and that this view is supported by the Oregon guide which prescribed that each curriculum must be served by a separate committee or sub-committee composed as follows:

- Employees and/or employers association
- Experienced qualified workers in the occupation concerned.
- Existing post-secondary programmed involving the same or similar occupational education area.
- Labour organization where appropriate.

He further outlines the function of the Advisory committee by saying that it is evident that one of its principal function is to provide input relating to the manpower situation in occupational field. Manpower supply and demand, labour mobility, rate of attrition and potential students interest all of which are vital for projecting effective demand. The importance of correctly assessing potential students' interest was found to be vital for success of the curriculum. Another function of the committee according to him is that the committee will continue to be of immense benefit to curriculum planners. They will also help to

determine and establish for a programmed trainee entry behaviour, training facilities, equipment, identify access community resources and conduct follow-up study of graduates.

In addition, Dikko (1994) recommended that the industrial coordinating units should be well established. These units could be utilized in fostering closer link between institution of learning and the industries. They should be developed and utilized to collect information on problem facing industries, with a view to referring these to relevant departments. Through the activities of these units real-life case study should be readily available to teacher and students as well. The coordinating units should be able to carry out surveys of skills needed by industries around the institutions and be able to advise the appropriate arms of the institutions of learning on areas where updating skills courses should be ran. The units by virtue of their position are industrial liaison office and should be appropriately channeled for guiding students in career/ job placement opportunities. Although, this industrial liaison office has been established in technical institutions and universities, this unit has not been well coordinated to foster effective link and cooperation between institutions and industries. There is need to properly constitute and coordinate the various industrial liaison offices in the technical institutions to facilitate cooperation between industries, and institutions in Nigeria.

In a study conducted by UNEVOC in 1996, various forms of administrative links have been considered effective all over the world to facilitate school and industry cooperation. The report of the study pointed out that in Bostwana, permanent joint consultation exists through advisory committee of government and local levels. In Benin Technical Commissions are responsible for the development of training programmed. Mexico according to the report, has established within the Technical Vocational Education a Directorate a sub-directorate responsible for liaison within industry and employers. There is an Advisory Council for Vocational Education in Norway according to the report. This Advisory council consists of

13 members 10 out of whom represent work organizations and industries. In each of these countries, there is Vocational Training Committee, the majority of whose members also come from working life.

Mark (2004) described technical educational curriculum as a product curriculum and recommended model of curriculum planning in technical education development as follows:

- Step 1: Diagnosis of need
- Step 2: formation of objectives
- Step 3: selection of content
- Step 4: Organization of content
- Step 5: Selection of learning experiences
- Step 6: Organization of learning experiences
- Step 7: Determination of what to evaluate and the ways and means of doing it (Evaluation).

He reported the view of Finch and Crunkitton (1999) who pointed out that curriculum must be responsive to community needs. They maintained that employers in the community are likewise, obligated to indicate what their needs are and to assist the school in meeting these needs. This assistance according to them might consist of employers serving on curriculum advisory committees. In conclusion, the emphasized that school industry partnership is often equated with curriculum quality and success. King (1994) in his own opinion noted that drawing a course content of any vocational subject is not prerogatory of the school only, but a joint effort of all sectors who directly or indirectly benefit from the products of vocational education since the vocation oriented curriculum serves the needs of the society. According



to him, this implies that industry and private sector should be able to contribute to the curriculum development for vocational technical education programme since they are in a position to know exactly what should be included in the syllabus.

### **2.2.5 School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state**

UNESCO (2002), in its study conducted on school industry relation discovered that some countries have found an effective way of training their man-power in new technologies through cooperation between industries and technical institutions Orikpe (1993) pointed out that industries and technical institutions have different roles to play in technical man power production in Nigeria. He explained that the school-based learning activities should involved provision of qualified teachers and suitable classroom facilities and instructional materials for school instruction. Dyankov (1996) pointed out that the responsibilities of schools to include:-provision of necessary manpower, allocation of training time table and length of training, selection of adequate and innovative learning content and activities for training, planning cooperation with industry where training should be carried out evaluation of the students to find out the extent to which they have acquire skills they are suppose to acquire and supervision of students during training. Harperin (1994) posits that school-based learning focuses on career exploration and counseling of students; selection of a career major a program of study based on high academic and skills standard. Schools should also infuse the entire curriculum with career related activities which will prepare the young people for employment after successful completion of vocational training (Halperin, 1994).

Hudelson 1994 further pointed out that the school should assist the student in making transition to a good first job and a high skill. Ranner (1999) defines school-to-work transition

as the training system in institutions and program that prepare young people for employment after successful completion of vocational education.

Halperin (1994) pointed out that school-to-work transition is a locally based education initiatives that brings educators, students, business and industry together to help young people move smoothly from classroom to careers. In essence school-to-work transition infuses the entire curriculum with career related activities, rather than offer vocational education as a separate component of the school program. It includes cooperative and youth apprenticeship. According to Hudelson (1994) school-to-work transition program assist students in making the transitions from school to a good first job and a high skill. Hudeleson further maintained that school –to –work partnership established between schools and employer assist students in preparing for a high quality jobs requiring technical skills, or further education and training. School –to – work transition provides each student with worksite orientation to build a direct relationship between the student and the employers. School to- work transition referred to as on-the-job training apprenticeship, cooperative education agreement or other programs designed to prepare students to enter the job market (Lueking 1999).

In addition, the school should be able to provides each student with worksite orientation, to emphasize that the students have a role and function in the workplace. Egbita (2006) posits that this orientation should include how to listen and take decision, observe safety precautions, ask question, and seek help, act in a professional manner and handle interpersonal conflicts.

This preparation can be provided by the school in the classroom instruction, workshops and should be supplement by visits to the workplace to address the connection between the students, upcoming work-based experience and their educational career plans. Various enterprises benefited from the training facilities offered by the vocational and technical

training institutions which provided education and upgrading of their employee through full-time, short courses and part time evening courses or weekend classes, as well as correspondence courses, instructional television programmes or other instructional materials development by teaching personnel at technical and vocational institutions.

### **2.2.6 Industry-based activities that can enhance academic-industrial partnership on solid waste management in Niger state**

Work-based or industry-based activities or learning is a planned programmed of job training or experience, paid work experiment, workplace mentoring and instructing in general workplace competencies and all aspect of industries. Orikpe (1993) opined that industries should provide work-based learning activities such as internship, on-he-job training, mentoring and cooperative education (industrial attachment) to expose students to the latest technological up-date. According to Dyankov (2002), cooperation between technical and vocational institution and various industrial, agricultural, business and other enterprises has a feature of collaborative work. According to him, educational and training institutions should benefit from the industries on physical facilities, machinery and equipment. Industries should offer “on the job” training at their premises, or assisted to equip educational institutions with valuable equipment and machinery. In addition providing the expertise of their specialists for technical advice on curriculum content or for the design of training programmed, development of software and other instructional materials. Some specialists should be involved in part-time teaching and assist in vocational guidance, counseling, testing and evaluation. Industries should also offer opportunity for some technical teachers and instructors to participate in the research work of industrial enterprises using their high-tech laboratories, or to work on industrial machinery in the production process so as to upgrade their knowledge and skills and keep abreast with new technological development.

In Mauritius, personnel from industries are actively involved in training programmed and also serve on the examination board. According to UNEVOC (1996), India and Republic of Korea, Cooperative education has been initiated by the Government. For example, in India, some automobile repairs/maintenance workshops in the state Andra Pradesh offered their facilities for some hands on experience to the students in automotive technicians' courses provided in three Government/private junior colleges during the course of training. In Poland, practical training of technical and vocational students takes place in school workshops and in the industries. In Portugal share facilities involved vocational establishments enter into contracted agreement with enterprises determining the rights and the obligations of the two parties and specifying also the entitlement and obligation of each trainee. According to the report in most countries, industries and technical institution cooperate to organize seminar, workshops and conferences for introducing new technologies to students, teachers and industrial employees.

In a like manner UNESCO (2002) pointed out that some countries have found an effective way to train technical manpower in new technologies through cooperation between advanced industries and training establishment which involves.

- Use of industrial equipment by trainers and educators on company premises.
- Implementation of joint, cooperative programmed of research and training management system as new and existing technologies converge; and
- Donation of specific equipment to the training institutions by industrial and commercial enterprises.

Other countries like Thailand and Zimbabwe offered technical and financial assistance to vocational institutions. The project incorporated one day a week training in the college,

followed by four days weekly in the industry. The trainees are accepted after the course of study.

### **2.3 Review of Empirical Studies**

Umeh (2014) conducted a study on impediments to and optimization strategies for solid waste management in Anambra State with the objective of determining the impediments to solid waste collection, storage, transportation, treatment and disposal and optimization strategies for improved waste management. Eleven specific objectives with corresponding eleven research questions and five hypotheses guided the study. Pertinent literature was reviewed and the study utilized the descriptive research design. The population for the study consisted of all the solid waste management workers in Anambra State. The entire population was used for the study because it was manageable. Structured questionnaire served as the instrument for data collection. Face validity of the instrument was ensured through the constructive inputs of five experts. Data generated were analyzed using mean scores and standard deviation while t-test statistic and Analysis of Variance (ANOVA) were used to test the five null hypotheses at .05 level of significance. Results showed that in Anambra State, financial constraint is a major impediment to solid waste collection; non-compliance of people to disposing waste at designated areas is a major impediment to waste storage; bad road network poses highest impediments to solid waste transportation; absence of appropriate technologies and ignorance on how to treat and recycle waste poses greater impediment to solid waste treatment; poor recycling method indicates the highest impediments to solid waste disposal while poor consumption by the agricultural sector is not an impediment. Also, the study found out that there is a significant difference in the impediments to solid waste management based on gender, job description, unlike job status, job experience and location at .05 level of significance. Majority of the respondents preferred organizing seminar,

workshops and in-service training for workers as the educational optimization strategy, and upgrading workers' working conditions as attitudinal optimization strategy, for solid waste management in Anambra State. Based on these findings, the study recommended among others that: solid waste management should be well funded and workers' welfare improved; roads and inter streets road network should be improved; modern technologies should be provided and in-service training given to workers on how to use them.

Olukanni (2019) carried out a study on partnership between the public and the private sectors in providing efficient solid waste management (SWM) services. While the responsibility of providing SWM services lies with the public sector, the sector has not been able to meet the demand for efficient service delivery, especially in developing countries. In a bid to increase efficiency and lower costs incurred in rendering these services, the involvement of the private sector has been sought. With a focus on major Nigerian cities, partnerships between the local government and private operators in SWM have been analysed based on the level to which the partnership has improved the SWM services. This paper provides an understanding that the success of any public-private partnership relies on the extent to which all stakeholders perform their duties. If the public sector is slack in monitoring and supervising the activities of the private operators, the latter may focus on profit generation while neglecting efficient service delivery. Also, legislation is an important part of SWM. Without the right legislation and enforcement, waste generators will not be mandated to dispose their waste properly. The public sector as a facilitator is responsible for creating an environment for private operators to function, particularly through legislation, enforcement and public sensitization.

Nwosu (2020) conducted a study on Review of Solid Waste Management Strategies in Nigeria. The global population and increased urbanization have resulted in the increased production of municipal solid waste, thus, becoming a critical issue as a result of its poor

management and inappropriate disposal. This is particularly the case of developing countries. This study assessed Solid Waste Management (SWM) strategies commonly adopted by different state waste management Authorities in Nigeria with a view to develop a sustainable roadmap for the management of solid waste in Nigeria. It assessed the Traditional Solid Waste Management Strategy (TSWMS), Waste Minimisation Strategy (WMS) as well as the Technological Strategy (TcS) employed, laying focus on their challenges and benefits. The study depended on a desktop study approach; hence, data were obtained from secondary data as the main source of information with emphasis on published journals, conference papers, newspaper posts and statutory reports from government agencies relevant to the current study. Results from the review showed that waste management across various parts of Nigeria is poor, interwoven with several challenges at all phase of the management process with little benefits recorded on alternative SWM strategy. The reason for the low success rate of some of this management strategies were noted as; increase in population, area covered, increase in urbanization and industrialization, tenure of government, over dependence on government authorities for waste management, finance and other factors of the environment. Although most waste authorities rely heavily on the TSWMS, WMS and the TcS showed a better and promising alternative strategy when inculcated into the already existing strategy. Based on this finding, a roadmap for the actualization of a sustainable integrated solid waste management strategy was recommended for adaptation and adoption by the Nigerian SWM Authorities and Agencies.

Odewole (2022) carried out a study examined the strategies for enhancing partnership between Automobile industries and technical colleges in Minna metropolis, Niger state. Three research questions were developed to guide the study and three null hypotheses were tested at 0.05 level of significance. Descriptive survey research design was adopted. The study used a four-point scale questionnaire, which contains a total of 30-items, as instrument.

In all, 58 Automobile teachers and 42 supervisors made up the sample for the study, giving rise to a total sample size of 80. The result showed Provision of internship training and on – the- job training by industries, Involvement of industries in evaluating students relevant learning experiences acquired in the technical colleges can improve school-industry partnership. The study recommended among other things, Industry base job skill should be included in the curriculum of technical colleges for skill acquisition.

#### **2.4 Summary of Literature Review**

The literature review is discussed under the following subheading: Concept of partnership, Waste Management, School –industry partnership for technology growth, Administrative strategies for improving school-industry partnership, School-based activities that will improve school-industry partnership, Industry-based activities that can improve school-industry partnership. Relevant and accurate literatures were reviewed in the study.



## **CHAPTER THREE**

### **3.0 METHODOLOGY**

#### **3.1 Design of the Study**

The study adopt the descriptive survey research design used to identify strategies for enhancing academic-industrial partnership on solid waste management in Niger state. Survey design according Nworgu (1991) is aimed at collecting data on and describing in a systematic manner, the characteristics features or facts about a given population. The design is suitable for the study because it solicit information from Technical teachers of technical colleges and NISEPA staffs in Niger State.

#### **3.2 Area of the study**

The study will be carried out in all technical colleges in Niger state and Niger state environmental protection agency (NISEPA). Niger state falls on the land mass area of about 76,363km<sup>2</sup> and with the population of about 3,950,349 (NPC, 2006) and the study was carried in out Niger state in order to enhancing academic-industrial partnership on solid waste management in Niger state in order to help students get acquainted with relevant skills needed.

#### **3.3 Population for the Study**

The population for the study consists of 80 respondents comprising 58 technical teachers in six technical colleges and 22 NISEPA staff. The tables below show the list of technical colleges:

List of technical colleges in Niger state	No. of technical teachers(respondents)
Government Technical college Eyagi Bida	10
Government technical Minna.	10
Suleiman technical college Suleja	10
Federal Science and technical college Shiroro	10
Government technical college Kontongora	10
Government technical college New-Bussa	8
Total	58

### **3.4 Sample and Sampling Technique**

There will be no sampling since the population was small and manageable.

### **3.5 Instrument for Data Collection**

The researcher designed a structured questionnaire as an instrument that was used in collecting data for the study. The questionnaire was made up of four sections (A, B, C, and D). Section 'A' contains items on personal information of the respondents. Section 'B' seeks Administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state. Section 'C' find out School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state. While Section 'D' find out Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state. The questionnaire items were based on four points scale types. Items for section 'B', 'C' and 'D' contain four responses category each. The response categories for section 'B', 'C' and 'D' are strongly Agree (SA), Agree (A), and Disagree (D)

and strongly disagree (SD). These response categories will be assign numerical values of 4, 3, 2 and 1 respectively. Respondents were require checking (√) against the response category that best satisfies their opinion.

### **3.6 Validation of instrument**

The instrument will be validated by three lecturers in the department of Industrial and Technology Education, Federal University of Technology, Minna and contributions on the appropriateness of the instrument will be considered in the production of the final copy of the research instrument.

### **3.7 Administration of the instrument**

In order to determine the reliability of the research instrument, a pilot test was be conducted using fifteen in other locations. During the test, the questionnaires were distributed by the researcher. The questionnaire was filled by the respondents and then returned to the researcher. The data collected was analyzed using Crombach Alpha and reliability coefficient of 0.78 was obtained. This value obtained indicates that the instrument is reliable and can be used for the study.

### **3.8 Method of data collection**

The instrument that will be used for the data collection was administered to the respondents by the researcher and three research assistant in the study area.

### **3.9 Method of data analysis**

Data collected will be analyzed using mean and standard deviation for the research questions while t-test was used to test the hypothesis at the 0.05 level of significant. A four (4) point rating scale was to analyze the data as shown below.

Strongly Agree	(SA)	=	4points (3.5 – 4.0)
Agree	(A)	=	3points (2.5 - 3.49)
Disagree	(D)	=	2points (1.5 – 2.49)
Strongly Disagree	(SD)	=	1point (1.0 – 1.49)

Therefore, the mean value of the 4 point scale is:

$$\bar{X} = \frac{4+3+2+1}{4} = \frac{10}{4} = 2.5$$

The cutoff point of the mean score of 2.50 will be chosen as the agreed or disagreed point.

This will be interpreted relatively according to the rating point scale adopt for this study.

Therefore, an item with response below 2.49 and below was regard or consider as disagreed while an item with response at 2.5 and above was regarded or considered as agreed.

## CHAPTER FOUR

### PRESENTATION AND ANALYSIS OF DATA

#### 4.1 Research Question 1

What are the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state?

**Table 4.1: Mean responses of the NISAPA staffs and technical teachers on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state.**

		N <sub>1</sub> = 22	N <sub>2</sub> =58		
S/N	ITEMS	$\bar{X}$	SD	Remark	
1	NUT and Industries should set up school industry advisory committees to monitor implementation of approved courses in technical colleges	3.24	0.889	Agreed	
2	Government should set up coordinating units/boards to carry out survey of skills needed by industries and giving feed back to relevant departments	3.31	0.773	Agreed	
3	Government should establish industrial liaison offices/coordinating units in technical colleges	3.40	0.722	Agreed	
4	Government should establish laws that will encourage industries and technical colleges to develop training programmes that can meet their internal needs	3.32	0.725	Agreed	
5	Industries should be encouraged to develop training programmes in technical colleges in relation to their internal needs	3.35	0.677	Agreed	
6	Industrial based job skills should be included in the curriculum of technical colleges for skill acquisition	3.35	0.677	Agreed	
7	Industries should be involved in screening and recommending courses or trades in technical colleges	3.41	0.706	Agreed	
8	Establishment of vocational and apprentice training centres in specific area of operations	3.41	0.758	Agreed	

**N=80**

$\bar{X}$ = mean of the respondents

N<sub>1</sub> = No. of NISEPA staffs

N<sub>2</sub>= No. of Technical teachers

**SD** = standard deviation of the respondents

Table 4.1 showed that both the NISAPA staffs and technical teachers agreed on all items from 1 to 8. This is because none of the mean response was below 2.50 which was the beach mark of agreed on the 4-points response options. The standard deviation score ranged between 0.677 and 0.889. This showed that the responses of the NISAPA staffs and technical teachers on the items were not divergent.

#### 4.2 Research Question 2

What are the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state?

**Table 4.2: mean response of the NISAPA staffs and technical teachers on the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.**

		N <sub>1</sub> = 22	N <sub>2</sub> =58		
S/N	ITEMS	$\bar{X}$	SD	Remark	
1	Jointly organizing seminars, workshops by technical colleges and industries can improve school-industry partnership	3.56	0.726	Agreed	
2	Industries and Technical Colleges sharing of facilities can improve school-industry partnership	3.54	0.728	Agreed	
3	Provision of programme of studies based on high academic standard can improve school industry partnership	3.58	0.652	Agreed	
4	Involvement of industries in evaluating students relevant learning experiences acquired in the technical colleges can improve school-industry partnership	3.45	0.614	Agreed	
5	Organizing cross training between industries and technical institutions personnel can improve school industry partnership	3.31	0.608	Agreed	
6	Counseling of students for career exploration in specific vocation relevant to industries can improve school industry partnership	3.29	0.599	Agreed	
7	Involving industries in setting and marking of practical examinations in technical colleges can improve school-industry partnership	3.35	0.713	Agreed	
8	Industrial training attachment for students in industries can improve school industry partnership	3.50	0.656	Agreed	

**N=80**

$\bar{X}$ = mean of the respondents

$N_1$  = No. of NISEPA staffs

$N_2$  = No. of Technical teachers

**SD** = standard deviation of the respondents

Table 4.2 showed that both the NISAPA staffs and technical teachers agreed on all items. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. The standard deviation score ranged between 0.599 and 0.728. This showed that the responses of the NISAPA staffs and technical teachers on the items were not divergent.

### 4.3 Research Question

What are the Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state?

**Table 4.3: mean responses of the NISAPA staffs and technical teachers on the Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.**

		$N_1= 22$		$N_2=58$
S/N	ITEMS	$\bar{X}$	SD	Remark
1	Provision of internship training and on –the- job training by industries	3.57	.742	Agreed
2	Assessment of training facilities of technical colleges to find out if they are capable of giving the students adequate background in those occupations required in the industry	3.57	.776	Agreed
3	Examination of craft curriculum of the training programme of technical colleges to ensure that their occupational interest is covered	3.68	.612	Agreed
4	Provision of funds for the execution of technical colleges programmes	3.51	.595	Agreed
5	Involving technical teachers/instructors working on industrial machinery in the production process so as to upgrade their knowledge and skills to keep abreast with new technological advancement	3.30	.624	Agreed
6	Provision of occupational placement for graduates of technical college programme by the industries	3.30	.582	Agreed
7	Provision of instructional materials to technical	3.36	.716	Agreed

colleges by the industries

8	Donating information and communication technology equipment and tools to technical colleges	3.54	.594	Agreed
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**N=80**

$\bar{X}$  = mean of the respondents

$N_1$  = No. of NISEPA staffs

$N_2$  = No. of Technical teachers

**SD** = standard deviation of the respondents

Table 4.3 showed that both the NISAPA staffs and technical teachers agreed on all items from 1 to 8. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. The standard deviation score ranged between 0.582 and 0.742. This showed that the responses of the NISAPA staffs and technical teachers on the items were not divergent.

#### 4.4 Hypothesis 1

There is no significant difference in the mean responses of NISAPA staffs and technical teachers on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state.

**Table 4.4 T-test on administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state.**

**$N_1 = 22$  AND  $N_2 = 58$**

Respondents	N	X	SD	Df	Tcal	P-value	Remark
<b>NISEPA staffs</b>	22	3.39	0.50	78	0.489	0.06	NS
<b>Technical teachers</b>	58	3.47	0.52				

**N=80**

$\bar{X}_1$  = mean of NISEPA staffs

$\bar{X}_2$  = mean of technical teachers

$N_1$  = No. of NISEPA staffs

$N_2$  = No. of technical teachers

**SD<sub>1</sub>** = standard deviation of NISEPA staffs



**SD<sub>2</sub>** = standard deviation of technical teachers

**NS**=Not Significant

Table 4.4 showed that there was no significant difference in the responses of NISAPA staffs and technical teachers on all the items as administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state; therefore the null hypothesis of no significant difference was upheld at 0.05 level of significance.

#### **4.5 Hypothesis 2**

There is no significant difference in the mean responses of NISAPA staffs and technical teachers on the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

**Table 4.5 T-test on the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.**

**N<sub>1</sub> = 22 AND N<sub>2</sub> = 58**

<b>Respondents</b>	<b>N</b>	<b>X</b>	<b>SD</b>	<b>Df</b>	<b>Tcal</b>	<b>P-value</b>	<b>Remark</b>
<b>NISEPA staffs</b>	22	3.28	0.53	78	0.539	0.10	NS
<b>Technical teachers</b>	58	3.35	0.56				

**N=80**

$\bar{X}_1$ = mean of NISEPA staffs

$\bar{X}_2$  = mean of technical teachers

**N<sub>1</sub>** = No. of NISEPA staffs

**N<sub>2</sub>**= No. of technical teachers

**SD<sub>1</sub>** = standard deviation of NISEPA staffs

**SD<sub>2</sub>** = standard deviation of technical teachers

**NS**=Not Significant

Table 4.5 showed that there was no significant difference in the responses of NISAPA staffs and technical teachers on all the items as School-based activities that will enhance academic-

industrial partnership on solid waste management in Niger state; therefore the null hypothesis of no significant difference was upheld at 0.05 level of significance.

#### 4.6 Hypothesis 3

There is no significant difference in the mean responses of NISAPA staffs and technical teachers on the Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

**Table 4.6 T-test on the strategies for overcoming the challenges faced by women in career advancement in building construction industries.**

**N<sub>1</sub> = 22 AND N<sub>2</sub> = 58**

<b>Respondents</b>	<b>N</b>	<b>X</b>	<b>SD</b>	<b>Df</b>	<b>Tcal</b>	<b>P-value</b>	<b>Remark</b>
<b>NISEPA staffs</b>	22	3.40	0.52	78	0.328	0.09	NS
<b>Technical teachers</b>	58	3.33	0.51				

**N=80**

$\bar{X}_1$  = mean of NISEPA staffs

$\bar{X}_2$  = mean of technical teachers

N<sub>1</sub> = No. of NISEPA staffs

N<sub>2</sub> = No. of technical teachers

SD<sub>1</sub> = standard deviation of NISEPA staffs

SD<sub>2</sub> = standard deviation of technical teachers

NS=Not Significant

Table 4.6 showed that there was no significant difference in the responses of NISAPA staffs and technical teachers on all the items as Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state; therefore the null hypothesis of no significant difference was upheld at 0.05 level of significance.

#### 4.7 Findings of the study

The following are the main findings of the study; they are prepared based on the research questions and hypothesis tested.

1. The finding on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state showed that all the respondents agree on all the items, among all is Industrial based job skills should be included in the curriculum of technical colleges for skill acquisition.
2. The finding on the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state showed that all the respondents agree on all the items, among all is Involvement of industries in evaluating students relevant learning experiences acquired in the technical colleges can improve school-industry partnership.
3. The findings on Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state shows that showed that all the respondents agree on all the items, among all is Assessment of training facilities of technical colleges to find out if they are capable of giving the students adequate background in those occupations required in the industry.
4. There was no significant difference in the responses of NISAPA staffs and technical teachers on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state.
5. There was no significant difference in the responses of NISAPA staffs and technical teachers on the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state
6. There was no significant difference in the responses of NISAPA staffs and technical teachers on the Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

#### **4.8 Discussion of findings.**

The result from table 4.1 shows the findings on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state. The findings is revealed that NUT and Industries should set up school industry advisory committees to monitor implementation of approved courses in technical colleges, Government should set up coordinating units/boards to carry out survey of skills needed by industries and giving feed back to relevant departments, Government should establish industrial liaison offices/coordinating units in technical colleges, Government should establish laws that will encourage industries and technical colleges to develop training programmes that can meet their internal needs, Industries should be encouraged to develop training programmes in technical colleges in relation to their internal needs, Industrial based job skills should be included in the curriculum of technical colleges for skill acquisition, Industries should be involved in screening and recommending courses or trades in technical colleges, Establishment of vocational and apprentice training centres in specific area of operations. The findings of the study is inline with Gberesuu *et al.* (2021), that institutions should set up industrial/institutional advisory committee similar to academic advisory committee to approve courses as well as monitor the implementation of approved courses, and that it is essential that various curriculum and syllabus of technical institutions be discussed with as many employers as possible.

The result of the hypothesis on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state shows that there was no significant difference in the responses of NISAPA staffs and technical teachers on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state.

Table 4.2 shows the result of the findings on the administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state. The findings of the study reveal Jointly organizing seminars, workshops by technical colleges and industries can improve school-industry partnership, Industries and Technical Colleges sharing of facilities can improve school-industry partnership, Provision of programme of studies based on high academic standard can improve school industry partnership, Involvement of industries in evaluating students relevant learning experiences acquired in the technical colleges can improve school-industry partnership, Organizing cross training between industries and technical institutions personnel can improve school industry partnership, Counseling of students for career exploration in specific vocation relevant to industries can improve school industry partnership, Involving industries in setting and marking of practical examinations in technical colleges can improve school-industry partnership, Industrial training attachment for students in industries can improve school industry partnership. The findings of the study is inline with Isaac *et al.* (2019) that industries and technical institutions have different roles to play in technical man power production in Nigeria. He explained that school- based activities should involved provision of qualified teachers, classroom facilities, and instructional materials for instruction

The result of the hypothesis on the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state shows that there was no significant difference in the responses of NISAPA staffs and technical teachers on the School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

The result from table 4.3 reveal the findings on Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state. The findings of

the study revealed that Provision of internship training and on –the- job training by industries, Assessment of training facilities of technical colleges to find out if they are capable of giving the students adequate background in those occupations required in the industry, Examination of craft curriculum of the training programme of technical colleges to ensure that their occupational interest is covered, Provision of funds for the execution of technical colleges programmes, Involving technical teachers/instructors working on industrial machinery in the production process so as to upgrade their knowledge and skills to keep abreast with new technological advancement, Provision of occupational placement for graduates of technical college programme by the industries, Provision of instructional materials to technical colleges by the industries, Donating information and communication technology equipment and tools to technical colleges. The findings of the study is inline with Islam *et al.* (2020) that industries in collaboration or cooperation with schools should provide worked based learning activities such as internship, on- the job training mentoring and cooperative education to expose students to new technologies

The result of the hypothesis on the Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state shows that there was no significant difference in the responses of NISAPA staffs and technical teachers on the Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary of the Study

The main focus of this research study was to find out the strategies for enhancing academic-industrial partnership on solid waste management in Niger state.

Chapter 1 of the study discussed the background of the study, the statement of problem, purpose, significance, scope and the research questions were all stated and discussed for the conduct of this research.

The review of related literature looked into Concept of partnership, Waste Management, School –industry partnership for technology growth, Administrative strategies for improving school-industry partnership, School-based activities that will improve school-industry partnership, Industry-based activities that can improve school-industry partnership. Various views of different authors concerning the topic were harmonized in a comprehensive literature review and empirical studies.

A survey approach was used to developed instrument for the study; the respondents identified as the population of the study were the NISAPA staffs and technical teachers. The entire respondents were used. A number of 80 questionnaires were administered. The instrument used was analysed using frequency count, and mean scores. The research questions were discussed base on the findings from the responses and results of the instrument used.

Implication of the study and conclusions were also drawn from the findings discussed. Recommendations and suggestions for further study were formulated and stated according to the findings of the study.

## **5.2 Implication of the Study**

The findings of the study had implications for government, industries, technical colleges and students of technical colleges of Niger state. From the outcome of the study, it implies that: If the identified areas where collaboration between technical colleges and industries is enhance technical teachers and students would have become acquainted with industrial facilities for training thereby making learning effective both theoretical and practical.

## **5.3 Contribution to Knowledge**

1. The study revealed that even though industrial based activities enhanced academic industrial-partnership, more effort needs to be put in the areas of internship training and assessing the facilities of technical colleges so that they give students adequate background based on their areas of interest.
2. The study has equally added to the already existing literatures in the field of industrial and technology education.

## **5.4 Conclusion**

Based on the findings of the study, the following conclusions were drawn: students of technical colleges can only acquire skills for employment and to be self-employed after graduation when there is collaboration between industries and technical colleges. Because these industries possessed the necessary technological skills, tools, equipment and machineries, that these students can be expose to during their course of training. Therefore the rate of unemployment could be reduced when these technical colleges' students are expose to modern technologies in industries through the administrative activities, school based activities and industry based activities to be able to serve the industries, the society and to be self-employed after graduation.



## **5.5 Recommendations**

Based on the findings of the study, the following recommendations were made:

1. Industry base job skill should be included in the curriculum of technical colleges for skill acquisition.
2. Technical teachers/instructors should visit industrial enterprises to familiarize themselves with the current technologies, sharing of facilities between technical colleges should be encouraged. Curriculum and syllabus of technical colleges be discussed with many employers as possible on the formation of curriculum objective, selection of curriculum content, organization of the content, selection of learning experience and the organization.
3. Training equipment, machines, laboratories workshops, ICT library and classrooms should be provided to technical colleges by government and philanthropies in the society for effective training.

## **5.6 Suggestion for Further Study**

The following are suggested for further studies:

1. Mechanism for improving quality of management of Technical colleges for skill acquisitions.
2. Professional capacity building needs of technical teachers for effective teaching of Students of technical colleges in Niger State

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## Appendix

### QUESTIONNAIRE

**FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE**

**SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION**

**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION**

A QUESTIONNAIRE ON STRATEGIES FOR ENHANCING ACADEMIC-INDUSTRIAL  
PARTNERSHIP ON SOLID WASTE MANAGEMENT IN NIGER STATE

INTRODUCTION: Please kindly complete this questionnaire by ticking the column that best present your perception about the topic. The questionnaire is for research purpose and your view will be confidentially and strictly treated in response to the purpose of the research work.

#### SECTION A

##### PERSONAL DATA

Technology education Lecturers :

NISEPA staff:

Note: A four (4) point scale is used to indicate your opinion, tick the options which best describe your agreement as shown below:

Strongly Agree (SA) = 4points

Agree (A) = 3points

Disagree (D) = 2points

Strongly Disagree (SD) = 1points

**Section B:** Administrative activities that will enhance academic-industrial partnership on solid waste management in Niger state.

S/N	Items	Scales			
		SA	A	D	SD
1	NUT and Industries should set up school industry advisory committees to monitor implementation of approved courses in technical colleges				
2	Government should set up coordinating units/boards to carry out survey of skills needed by industries and giving feed back to relevant departments				
3	Government should establish industrial liaison offices/coordinating units in technical colleges				
4	Government should establish laws that will encourage industries and technical colleges to develop training programmes that can meet their internal needs				
5	Industries should be encouraged to develop training programmes in technical colleges in relation to their internal needs				
6	Industrial based job skills should be included in the curriculum of technical colleges for skill acquisition				
7	Industries should be involved in screening and recommending courses or trades in technical colleges				
8	Establishment of vocational and apprentice training centres in specific area of operations				

Section C: School-based activities that will enhance academic-industrial partnership on solid waste management in Niger state

S/N	Skill Items	Scales			
		SA	A	D	SD
1	Jointly organizing seminars, workshops by technical colleges and industries can improve school-industry partnership				
2	Industries and Technical Colleges sharing of facilities can improve school-industry partnership				
3	Provision of programme of studies based on high academic standard can improve school industry partnership				
4	Involvement of industries in evaluating students relevant learning experiences acquired in the technical colleges can improve school-industry partnership				
5	Organizing cross training between industries and technical institutions personnel can improve school industry partnership				
6	Counseling of students for career exploration in specific vocation relevant to industries can improve school industry partnership				
7	Involving industries in setting and marking of practical examinations in technical colleges can improve school-industry partnership				
8	Industrial training attachment for students in industries can improve school industry partnership				

Section D: Industry-based activities that will enhance academic-industrial partnership on solid waste management in Niger state.

S/N	Skill Items	Scale			
		SA	A	D	SD
1	Provision of internship training and on –the-job training by industries				
2	Assessment of training facilities of technical colleges to find out if they are capable of giving the students adequate background in those occupations required in the industry				
3	Examination of craft curriculum of the training programme of technical colleges to ensure that their occupational interest is covered				
4	Provision of funds for the execution of technical colleges programmes				
5	Involving technical teachers/instructors working on industrial machinery in the production process so as to upgrade their knowledge and skills to keep abreast with new technological advancement				
6	Provision of occupational placement for graduates of technical college programme by the industries				
7	Provision of instructional materials to technical colleges by the industries				
8	Donating information and communication technology equipment and tools to technical colleges				