UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

AN EVALUATION OF THE PROSPECTS AND CHALLENGES OF AUTO-MECHANIC WORKSHOPS IN THE INFORMAL SECTOR IN THE KUMASI METROPOLIS

ERNEST COBBINA

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A Project Report in the Department of MECHANICAL TECHNOLOGY EDUCATION, Faculty of TECHNICAL EDUCATION, submitted to the School of Graduate Studies, University of Education, Winneba in partial fulfillment of the requirements for the Award of Master of Technology (Mechanical Technology Education) Degree

AUGUST, 2017

DECLARATION

STUDENT'S DECLARATION

I, ERNEST COBBINA, declare that this Project Report with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE: …….....

DATE: ……....

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this Project Report was supervised in accordance with the guidelines for supervision of Project Report as laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: **PROF. MARTIN AMOAH**

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DATE: ……....

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DEDICATION

I dedicate this dissertation to all those whose have made a significant difference in my life, especially, my wife Mom, Ms. Charity Koranteng, my wife and my kids

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ABBREVIATIONS

CNC	Computer Numerical Control
COTVET	Council for Technical Vocational Education and Training
EPA	Environmental Protection Agency
EPA	Environmental Protection Agency
GNA	Ghana News Agency
GRA	Ghana Revenue Authority
HAPs	Hazardous Air Pollutants
ILO	International Labour Organization
KMA	Kumasi Metropolitan Assembly
NBSSI	National Board for Small Scale Industries
NGOs	Non-Governmental Organizations
OBD	On-Board Diagnostic
PDL	Portable Data Link
SDF	Skills Development Fund
SMATI	Suame Magazine Automatics Technical Institute ()
SMIDO	Suame Magazine Industrial Development Organization
VOCs	Volatile Organic Compounds

ABSTRACT

The study explored the prospects and challenges in the informal auto-mechanic sector focusing on auto-mechanics enterprises within the Kumasi Metropolis. Specifically, the study sought to examine the prospects of the auto-mechanic enterprises, examine the challenges facing auto-mechanic enterprises, and the preparedness of auto-mechanics to exploit the potential prospects to their advantage. By adopting the quantitative approach to research, the researcher administered a survey to a sample of 164 managers/owners of auto-mechanic enterprises within the Suame Magazine in the Kumasi Metropolis. Among the emerging prospects in the auto-mechanic industry as revealed in study were the growing number of automobiles in the country, the removal of taxes on imported spare parts, the establishment of the Suame Magazine Automatics Technical Institute, the advancement in automobile repair and maintenance technology, and the availability of cheap labour due to high unemployment in the country. Also, the major challenges faced by auto-mechanics included erratic supply of electricity to auto-mechanic workshops, high cost of electricity and fuel, high cost of spare parts due to depreciation of the Ghana Cedi against the US Dollar, limited sources of finance and high interest on bank loans, and lack of training on application of modern methods of automobile repair among others. Despite the numerous challenges that impeded the growth of auto-mechanic enterprises in the informal sector, it was deduced that the ability of auto-mechanics to take advantage of the emerging opportunities in the industry would inure to their benefit and lead to a significant improvement in their operations.

CHAPTR ONE

INTRODUCTION

1.1 Background to the Study

Since the late nineteenth century when the French woodworking machinery makers, Rene Panhard and Emile Levassor built their first car in 1890 with an engine designed in Germany by Gottlieb Daimler and Wilhelm Maybach, the automobile industry has seen groundbreaking innovations such as the manufacturing of high-speed and electronically controlled automobiles (Akpakpavi, 2014). Also, with the advent of computer and electronic technologies, the world has witnessed the growth of complex but luxurious automobiles from renowned automobile manufacturing companies across the globe.

Fapetu and Akinola (2008) reveal that the design of vehicles has advanced to a very sophisticated level, and unlike old mechanically operated vehicles, modern vehicles are being operated and controlled by computerized electronic sensors. For instance, the latest vehicle ignition systems are controlled electronically without employing the use of manual reset contact breaker points. Hence, they contend that the modern trend of mechanical services requires the use of more complex and highly technological and special diagnostic equipment to analyze vehicle faults for repair and servicing.

Concurring with Fapetu and Akinola (2008), Edunyah (2015) in his study on technology and the modern automobile industry, avers that over the years there has been enormous technological improvement to the modern day vehicle design for it to be safer, efficient and pleasing to the customer. He posits that the most recent achievement in the modern vehicle with regards to repair is the On-Board Diagnostic (OBD) system.

According to him, this improvement has made modern vehicles more efficient with regards to performance and has also made repairs of vehicles simple and less stressful. However, this technological advancement in vehicle design and repairs pose great challenge to most local auto-mechanics in Ghana (Akpakpavi, 2014). Thus, vehicle repair and maintenance by auto-mechanical workshops in the informal sector take place in the context that does not create a fully integrated approach to dealing with the sophisticated and electronic nature of modern vehicles, hence the full potential of many of such automobile workshops is not wholly realized.

In Ghana, Akpakpavi (2014) asserts that majority of auto-mechanic technicians in the informal sector lack the expertise and technological know-how to diagnose faults, repair and maintain sophisticated electronic vehicles and carry out fault diagnostics, repair and maintenance activities without sound and state-of-the- art maintenance practices. He contends that a number of factors such as low educational levels of auto-mechanics, low capital and infrastructure base, inability to acquire and use modern vehicle diagnostic equipment and tools, low educational level of auto-mechanics, lack of training and re-training, inability to use computer technology to enhance vehicle repairs, inability to identify parts of modern vehicle engines by their correct technical names and functions, low income levels, lack of access to bank loans, and above all loss of customers and eminent closures as some of the challenges facing the industry in Ghana.

In a study of the informal sector in Ghana, Osei-Boateng and Ampratwum (2011) found that 80 percent of the Ghanaian workforce is employed in the informal sector. It was revealed that the local auto-mechanic workshop sector forms a significant component of the informal sector in terms of job creation. The Suame Magazine Industrial Development

Organization (SMIDO) and other local mechanical workshops often referred to as "magazine" have over the years been a source of employment to young people who have interest in the trade of vehicle repair and maintenance. Studies have shown that the auto-mechanic sector with a large number of local mechanical workshops across the country is a sector with tremendous growth prospects and a source of employment to young people at the time of increasing unemployment in the country.

In an unemployment-stricken economy like Ghana where unemployment in both the formal and informal sectors is rife, the need for developing the auto-mechanic sector into a skills development sector to enhance job creation is more important than ever. There is no gainsaying that majority of the Ghanaian youth are trapped in a vicious circle of poverty, low skills, low productivity and low income. Therefore, a study that seeks to identify the challenges and prospects of local mechanical workshops brought about by the changes in modern vehicle technologies is timely and necessary.

1.2 Statement of the Problem

It must be emphasized that with the rapid advancement in technology, the auto-mechanic's job has evolved from purely mechanical, to include electronic technology because vehicles today possess complex computer and electronic systems, which demands that auto-mechanics have a broader base of knowledge than in the past (Akpakpavi, 2014). Thus, modern practices of automobile vehicle faults diagnosis, repair and maintenance, require highly trained auto-mechanics. To survive in this era of sophisticated automobile technology, the practice of restoring automobiles to their original form, state and working condition requires auto-mechanics to follow instructions and diagrams in technical manuals in order to make precise three-dimensional measurements of the position of one

body section relative to another as well as diagnose and repair the vehicle. Akpakpavi claims that due to the increasingly labyrinthine nature of the technology that is now incorporated into automobiles, most automobile dealerships and independent workshops now provide sophisticated diagnostic computers to each technician, without which they would be unable to diagnose or repair a vehicle. In this regard, he opines that it is incumbent on auto-mechanics in the informal sector in the country to keep updating and upgrading their technical competencies and skills in order to enable them to continually develop the capability to inspect and repair modern automobiles without being kicked out of business due to technological advancements.

In January, 2009 the then Vice-President, Mr. John Dramani Mahama embarked on a campaign to garner support for the establishment of a model institutional engineering training centre known as the Suame Magazine Automatics Technical Institute (SMATI) for artisans of Suame Magazine and across the country (http://www.ghananewsagency.org). Some few years later, in its headline story on April 15, 2013 captioned "Ghana's Model Vehicle unveiled by Suame Magazine Artisans", myjoyonline.com reported that SMIDO has formally unveiled a prototype car at a ceremony in Kumasi, in its quest to harness the engineering potential of artisans in vehicle manufacture at the light industrial area otherwise known as the Suame Magazine (http://business.myjoyonline.com). The model car named "SMATI Turtle 1" was built by the local auto-mechanics in partnership with a Netherlands based NGO, AARDSCHAP Foundation using simple tools from a cluster of engineering workshops at Suame Magazine. The vehicle was set for shipment to Europe for an international exhibition to attract investors for large-scale commercial production to serve the African market. Interestingly, the name of the vehicle was strategically chosen to

reflect the immediate need for national intervention to salvage the imminent collapse of the artisanal engineering industry in the country epitomized by Suame Magazine. However, it has been four years now, and the story of "SMATI Turtle 1" and government's plan to establish a model institutional engineering training centre for artisans of Suame Magazine is history or at best still a dream yet to come to fruition. The bold step by SMIDO to attract national and international recognition and support to put artisanal engineering at the forefront of the country's quest for industrialization and create jobs for the teeming youth of Ghana is yet to be materialized due to lack of support and commitment from the government.

In addition, in the Ghana News Agency (GNA) headline story on November 29, 2013 captioned "SMIDO Develops Zero-Fuel Consumption Vehicle", the country was greeted with the joyous news that SMIDO was on the verge of manufacturing a vehicle that will neither run on fuel, oil or water (http://www.ghananewsagency.org). A prototype of such innovative breakthrough which was christened "SMATI Magnetic A", was set to be unveiled within the first quarter of 2014. The "SMATI Magnetic A" was designed and developed by engineers and artisans of the Science, Engineering and Technology Hunt for Innovation-Incubation and Investment Unit (SETH III Unit) of SMATI. According to Mr. Samuel Ampiah, Head of SETH III Unit, the vehicle which was powered by a motor battery with direct current ranging from 12 volts to 60 volts energy had been designed to serve as the world's most environmentally-friendly automobile that does not use fuel, oil and water for cooling, no carbon emissions and had virtually very little maintenance, which will save users some money and would set a new standard in global automobile technology and establish a Ghanaian Global Technological Trademark.

However, it is interesting to know that the case of SMIDO and its groundbreaking innovations is a single example of the numerous auto-mechanic workshops in the country who through no formal engineering training are putting innovative ideas into practice but lack the necessary support and environment to transform these ideas into automobile machines in large scale. Considering the imminent challenges that auto-mechanics in the informal sector are exposed to due to the rapid advancement in automobile technology as indicated by Akpakpavi (2014), in comparison with the potential prospects revealed by the activities of SMIDO and SMATI, suffice it to say that the time is now for researchers, policymakers, and the government to take a critical look at the operations of mechanical workshops in the informal sector. Therefore, this study is deemed very relevant in the sense that it seeks to evaluate the challenges and prospects auto-mechanic workshops in the informal sector of Ghana focusing on the Kumasi Metropolis.

1.3 Purpose and Objectives of the Study

The study sought to explore the prospects and challenges of auto-mechanic workshop operations in the informal sector in the Kumasi Metropolis. In line with the purpose of the study, the study sought to achieve the following specific objectives:

1. To examine the prospects of the auto-mechanic enterprises in the Kumasi Metropolis.
2. To examine the challenges facing auto-mechanic enterprises in the Kumasi Metropolis.
3. To assess the preparedness of owners of auto-mechanic enterprises in the informal sector in taking advantage of the potential opportunities available to them.

1.4 Research Questions

The following research questions were posed to aid the achievement of the specific objectives of the study:

1. What are the prospects of the auto-mechanic enterprises in the Kumasi Metropolis?
2. What are the challenges facing auto-mechanic enterprises in the Kumasi Metropolis?
3. How prepared are owners of auto-mechanic enterprises in the informal sector in taking advantage of the opportunities available to them?

1.5 Significance of the Study

The study is relevant in the sense that it provides rare insight into the state of mechanical workshop operations in the informal sector in Ghana which is under-researched. A study into the challenges and prospects of mechanical workshop operations will help to bring to light the factors that inhibit the growth of the sector while highlighting the potential prospects that can be exploited. In this direction, the findings of the study will be useful to policy makers in terms of availing them to the current state of mechanical workshop operations and how best they can make the sector viable to improve job creation. Therefore, suffice it to say that the findings and recommendations of the study will have far-reaching ramifications for relevant policy makers, researchers, entrepreneurs, and the government at large, who are concerned about developing the auto-mechanic sector.

1.7 Scope of the Study

In terms of scope, the study was limited to the prospects and challenges associated with auto-mechanic workshop operations in the Kumasi Metropolis. The study focused on auto-mechanics because they form the large portion of artisans in mechanical workshops in the informal sector. The Kumasi Metropolis was selected as the study area because it has the most organized auto-mechanics and other mechanical artisans across the country under the umbrella body named SMIDO. Again, it has pioneered some of the technological breakthroughs in the automobile repair and maintenance industry in Ghana.

1.8 Organization of the Study

The study was organized in five chapters. Chapter One comprises the background of the study, the statement of the problem, the purpose and objectives of the study, research questions, the significance of the study, scope of the study, as well as the organization of the study. Chapter Two comprises of the literature review pertaining prospect and challenges of auto-mechanic operations. Chapter Three presents the methodology employed for the study by outlining the research design adopted, the population and sample size, as well as the data collection instruments used. Also, issues of validity and reliability of the instruments, data collection procedures, and data analysis techniques are discussed in this chapter. Chapter Four involves the analysis and discussion of the results of the study. Finally, Chapter Five presents the summary of the findings, conclusion, recommendations, and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents an exhaustive but incisive review of relevant literature related to the topic of study. The review focuses on issues such as an overview of the global automobile industry and the automobile repair and maintenance industry. The historical background of automobiles, modern developments in the industry, the effect of technology on the industry, and challenges affecting the industry are discussed. Also, the chapter presents an overview of the auto-mechanic industry in Ghana, and examines the factors that inhibit the operations of auto-mechanic workshops as well as the potential prospects in the auto-mechanic sub-industry which could be harnessed to enhance the growth and development of the sector. In addition, strategies recommended for stimulating the growth and development of the auto-mechanic industry are highlighted in this chapter. Finally, the chapter ends with a summary of the relevant issues discussed in the literature review.

2.1 An Overview of the Automobile Industry

Before proceeding to give a general overview of the automobile industry, it is necessary to describe the main subject of concern (automobile). Automobile is a wheeled vehicle used for land-transport of people and goods and powered by a fossil fuel based internal combustion engine (Wad, 2010). In a more technical sense, an automobile is a complex motorized mechanical product that consists of a number of systems and powered by an internal combustion engine that is used to transport people and items from one location to another (Akayeti, 2015). Thus, an automobile comprises several major systems, each of which contains many subsystems, components, and interfacing parts. A typical

automobile such as car or any other type of vehicle is composed of over15,000 parts and accessories that must be designed to be well-suited to the given specifications (Brunnermeier & Martin, 1999).

History has it that, the turn of the twentieth century witnessed the dawning of an era of engine powered machine with wheels for carry people and goods from one location to another at a relatively faster speed than the manually operated machines and other means of transports at the time. Thus, the automobile industry gained grounds as a new industry that was capable of producing automobiles for commercial purposes in the early twentieth century. However, the quest to improve upon bicycle, motorcycle, buggy, and other movable machinery, industrialists in Europe and the United States developed prototypes of what later became known as automobiles of vehicles in the late nineteenth century (International Encyclopedia of the Social Sciences, 2008). In its 2015 edition of the Global 2000: The World's Biggest Automobiles Companies, the Forbes Magazine listed the top ten automobiles manufacturers in the world in the 2015 as follows: Toyota Motors, Volkswagen, Daimler, BMW Group, Honda Motors, General Motors, Ford Motors, Nissan Motors, Hyundai Motors, and SAIC Motors.

Notwithstanding, it is worthy to note that, the dominance in global automobile production has gradually shifted from Western Europe (early to mid-twentieth century) to US and now to the Asia-Pacific region. With Japan as the region's major automobile manufacturing hub, and China, India, and South Korea following through, the region has overtaken Western Europe and North America in automobile productions (Forbes Magazine, 2015). Notable among the automobile companies in the Asia-Pacific region are Toyota, Honda, Nisan, Suzuki, Isuzu, Mitsubishi, and Mazda – Japan, SAIC Motors, BAIC

Motors, FAW Jie Fang, BYD, Chang'an, Geely, Wanxiang, Donteng, Winling, Brilliance - China, Tata Motors – India, Hyundai – South Korea, Proton – Malaysia among others. Western Europe and North America rank second and third respectively in global automobile production with Germany, France, UK, and Italy being the major producers in Western Europe, and the US being the largest manufacturer in North America. On the other, the major consumers of automobiles in the world North America, Asian Pacific and Western European respectively (Forbes Magazine, 2015).

With the increasing complexities of the global business environment, coupled with changing global economic conditions, some of the giants in the automobile industry such as Toyota and General Motors have relocated some of their production centers to emerging developing economies in order to help them operate efficiently in a globally competitive marketplace. Thus, automakers and large suppliers of vehicle parts are deeply engaged in multiple regional production systems where regional parts production tends to feed final assembly plants that produce finished vehicles for regional markets (Sturgeon, Memedovic, Biesebroeck, & Gereffi, 2009).

As one of the oldest industries in the world dating back the late nineteenth century, the automobile industry is said to be the single largest manufacturing sector in the World requiring large capital outlay and most resource-intensive (Mildenberger & Khare, 2000). The nature of the products (automobiles) produced by the industry, the automotive industry shares strong linkages with other industries such as minerals (metals), electrical and electronics, fibre and apparel, and other industries whose products are used by the automobile industry in raw materials in manufacturing automobiles. As one of the fastest growing industries in the world with its dynamic growth phases explained by nature of

competition, product development and life cycle, technological advancement and consumer demand, the automobile industry to said to be a very complex and evolving one (Nag, Banerjee, & Chatterjee, 2007).

The automotive industry is dynamic and vast, accounting for approximately one in ten jobs in industrialized countries. Developing countries often look to their local automotive sector for economic growth opportunities, particularly because of the vast linkages that the auto industry has to other sectors of their economy. Today, the global automobile industry is concerned with consumer demands for styling, safety, and comfort; and with labor relations and manufacturing efficiency ((Nag, Banerjee, & Chatterjee, 2007). Not only is the industry struggling to meet the increasing unique and sophisticated consumer demands, it also faces a lot of challenges. For instance, Nunes and Bennet (2008); Orsato and Wells (2006) contend that the automobile industry currently faces a mirage of economic challenges notably overcapacity; saturated and fragmenting markets; capital intensity; and persistent problems with achieving adequate profitability. Strong dependence on fossil fuels and large consumption of raw material lead the environmental problems. As a result, in a near future, it is expected that the sector will face strong pressures and take initiatives in order to reduce the environmental burdens from car use and its production process.

According to the IBM Business Consulting Services (2004), the automotive industry is facing new and pressing challenges. Globalization, individualization, digitalization and increasing competition are changing the face of the industry as we know it. In addition, increasing safety requirements and voluntary environmental commitments by the automotive industry will also contribute to the changes ahead. Size is no longer a

guarantee of success. Furthermore, it has been reported that along with record growth, the industry is also facing unprecedented challenges (Price Waterhouse Coopers, 2014). Consumer expectations are transforming. New technologies are dramatically changing vehicles, from the advent of the 'connected car' and enhanced driver support to better fuel efficiency and new or improved powertrains. Automotive manufacturers and suppliers are confronted with ever greater complexity as a result of increasing numbers of products and options, shorter technology cycles, increasing pressure to innovate and global supply networks. And at the same time they need to balance the needs and demands of customers, investors, regulators, non-governmental organizations (NGOs) and even the general public has become a major challenge to automobile manufacturers.

From the overview of the automobile industry, it was found that the manufacturing of automobiles started in the late nineteenth century in Western Europe (French and Germany). However, starting from the early twentieth century, the US had almost dominated the automobile industry with the mass production of gasoline-powered vehicles for sale. Today, the global automobile industry has become very complex the much complex as a result of advancement in automobile technology and the fierce competition from auto-makers from the Asian-Pacific region. The region's largest auto-makers from Japan, China, Korea, China, and India have overtaken the US and now have the largest market share in the automobile production and sales. Also, the industry as seen major mergers and acquisitions by automobile giants such as General Motors, Ford Motor Corporation, Volkswagen among others. The industry faces several challenges from customer sophistication, environment concerns, global economic crisis, and emerging market forces in Asia among other factors. However, the increasing advancement in

automobile technology is a great opportunity for the automobile industry in terms of enhancing its growth and eliminating some of the challenges.

2.2 Overview of Automobile Repair and Maintenance Industry

In the global business environment, the automobile industry may be referred as a sector comprising of a wide range of companies which are involved in the design, development, manufacturing, and marketing of automobiles such as cars, trucks and other kinds of vehicles. As clearly described, the automobile industry does not include related industries that are involved in the automobile retail, servicing, repair and maintenance of automobiles sold out end-users. Hence, the automobile repair and maintenance industry otherwise referred to auto-mechanic workshops is not classified as part of the larger automobile industry. However, it must be emphasized that, automobile repair and maintenance has become part of the much broader automobile retail, service and repair industry.

The automobile repair and maintenance sub-industry herein referred to as auto-mechanic workshops is involved in the upkeep of every component of motor vehicles, from bodies and interiors to the mechanical and electrical systems. Auto-mechanic workshops can be classified as belonging to the broader automobile repair and maintenance industry. The automobile repair and maintenance industry is involved in the upkeep of every component of motor vehicles, from bodies and interiors to the mechanical and electrical systems. It includes the reconditioning and conversion of engines, both non-factory based engine reconditioning and the conversion of cars from left to right-hand drive.

The automobile repair and maintenance industry comprise enterprises who provide after-sale services, repair and maintenance services in well-equipped automobile workshops. It also includes individual auto-mechanics in the informal sector who own and operate automobile workshops and provide informal apprenticeship training to young people. The training involves the transmission of skills from a master craftsman to a young apprentice who learns the trade on the job by way of observation, imitation and repetition, thus by working and assisting their master craftsman (Aggarwal, Hofmann, & Phiri, 2010). Aggarwal et al. describe the master craftsman as a highly skilled worker who can work independently without guidance and is responsible for training of apprentices under him. Generally, the automobile repair and maintenance industry comprises of different but interrelated trades such as auto-mechanic services, automobile specialist services, automobile electricians, and automobile vehicle body services.

In the business of automobile repair and maintenance, the key players who are referred to as auto-mechanics working in mechanical workshops carry out diagnostic procedures, testing, servicing and repair of vehicles. Notably among some of the activities they perform in the course of their operations include: the overhaul, servicing and repair of mechanical parts of motor vehicles and other heavy mobile equipment such as engines, transmissions (clutch, gear box and differential) and suspension systems (springs, steering, brakes, wheels and tyres); and the use of diagnosis procedures to determine faults, repair and servicing of engines and engine components, cooling systems, petrol fuel systems, emission control systems, clutch assemblies, manual transmissions, drivelines, braking, steering and suspension systems.

2.3 Automobile Repair and Maintenance Industry in Ghana

The Ghanaian automobile repair and maintenance industry is made up of individuals, small scale firms and business enterprises who engage in the servicing, repair and maintenance of all kinds of vehicles. The individuals who own automobile workshops and operate as sole proprietorship are usually referred to as auto-mechanics while enterprises engaged in providing the repair and maintenance services are referred to as automobile workshops. The work of an auto-mechanic technician is to test, diagnose, service or completely repair faults on vehicles to an acceptable standard (Okuta, & Dawha, 2014). The industry comprises two major sectors namely the formal sector and the informal sector.

The formal sector is made of enterprises specially established to provide professional vehicle repair and maintenance services. Automobile repair and maintenance workshops in the formal sector are established as registered enterprises and located mostly within the major cities of the country. While some of the automobile workshops in the formal sector provides general servicing, repair and maintenance of all kinds of vehicles, others provide specialist after sales services for a particular kind of vehicles. Among the major automobile workshops that provide services for special kind of vehicles are Japan Motors Auto Parts (Nissan vehicles) Toyota Ghana Company Limited (Toyota vehicles) Hyundai Motors and Auto Plaza (Hyundai vehicles), Modern Auto Services (SsangYong, Lifan, etc.) Silver Star Auto Ltd. (Mercedes Benz, Suzuki, and Foton trucks), Mechanical Lloyd (Land Rover and BMW vehicles) among others.

On the other hand, automobile workshops in the informal sector are operated by individuals without any formal educational training and in most cases are not registered as business enterprises. The informal sector is made up of small enterprises such as vehicle repairs and maintenance shops, automobile spare parts dealers and many others who are unable to source huge financial assistance from the financial institutions to enhance their operation due to inadequate collateral security (Akayeti, 2015). Automobile workshops in the informal sector have grown steadily since the introduction of automobiles in Ghana in the early 1990s. They are usually located by the road side or designated places called "magazine" and provide repair and maintenance services for all kinds of vehicles. The sector engages in the servicing, repair and maintenance of all kinds of vehicles provides jobs for young people who learn the trade of vehicle repair and maintenance.

For the purpose of this study, the researcher seeks to focus on the informal sector of the automobile repair and maintenance industry. According to Akpakpavi (2014), the informal automobile repair and maintenance sector in Ghana may be classified as micro, small and medium scale garages based on staff strength. The micro garages employ up to 5 employees with fixed assets (excluding land and building) not exceeding the value of $10,000; small garages are those employing between 6 and 29 employees or having fixed assets excluding land and building not exceeding $100,000; medium garages employ between 30 and 99 employees with fixed assets of up to $1m. The local automobile workshops can be further grouped into urban and rural. Automobile vehicle workshops essential helps to service and maintain the vehicles.

2.4 Prospects of Auto-Mechanic Operations

Bemoaning the appalling state of the informal automobile repair and maintenance sector in Ghana, Agyeman-Duah (2008) indicated that the sector which has a large concentration of workshops and spare parts shops in Suame Magazine in Kumasi and Kokompe in Accra has not received the needed to achieve its potentials in contributing to the industrial growth in Ghana. Some of the potential prospects of the informal auto-mechanic sector are discussed as follows:

2.4.1 Establishment of Auto-Mechanic Villages

The Suame Magazine is arguably the largest informal sector village in the country accommodating several hundreds of small scale engineering firms, repair workshops, scrap yards, workshop all with a population of about 200000. The area is a major centre for vehicle repair attracting vehicles from not only Ghana but from neighbouring countries in the West African sub-region. However, the sector faces an eminent collapse if efforts are not made to build capacity of auto mechanics to meet modern challenges in the automobile industry (Edunyah, 2015).

The establishment of the Suame Magazine Automatics Technical Institute (SMATI) and the Suame Magazine Industrial Development Organization (SMIDO) in 2009 for the auto-mechanics in the informal sector presents many opportunities for the development of the sector (Edunyah, 2015). The purpose for establishing these institutions was to help build the technical capacity of auto mechanics especially at Suame and other areas across the country so as to enable them meet modern challenges in the automobile repair and maintenance industry. Studies have shown that auto-mechanics in the informal

sector find it difficult in diagnosing faults and repairing defects with modern vehicles that come with brain box, chips and diagnostics for repairs due to lack of capacity in modern technology. Therefore, establishment of SMATI and SMIDO came as a sigh of relief auto-mechanics in the informal sector. However, since their inception there have not been any major transformation in the skill-set of the auto-mechanics in tackling the challenges of advancement in automobile technology. Auto-mechanics seem not to take advantage of the facility to upgrade their skills and develop their potentials.

The idea of establishing a technologically oriented mechanic village for the Ghanaian automobile repair and maintenance industry have not received the needed attention from the relevant stakeholders in the industry. Over time, city-wide automobile workshop practice has not helped in developing the industry into a mechanical engineering hub for skills training and manufacturing of automobiles or vehicles parts. It has been asserted that if automobile repair and maintenance enterprises in different cities and towns can be confined to well-established mechanic villages, the collection, preservation, recycling and reuse of scrap metals, spare parts, spent oil will become effective (Nwachukwu, Alinnor, & Feng, 2012). Nwachukwu et al. describe a mechanic village as the allocation of several acres of land mapped out for automobile mechanic who come together to share ideas and develop new ways of operation as against citywide automobile workshop practice. The setting up of mechanic villages will make it easy for the government in terms of equipping auto-mechanic with the requisite training needs to cope with the changing trends in the design of modern automobiles.

2.4.2 Abolishment of Taxes on Imported Spare Parts

There is no gainsaying that government's fiscal policies such as taxation increases cost off reduction and reduces profit margin of businesses and other organizations. Studies have shown that auto-mechanic enterprises like any other scale and medium-size enterprises in the informal sector shown expressed their displeasure with increasing taxes imposed by the government on not only the profit they make, but high duties and levies on spare parts, oil products, and other raw materials. For instance, Borgave and Chaudhari (2010); Manojkumarr (2015) noted that managers of auto-mechanic enterprises find government tax policies such as taxes on spare parts, petroleum taxes, indirect taxes on oil products and other raw materials as policies that have negative repercussions on their operations and affect their growth and expansion. Therefore, the recent abolishment of import duties on spare parts by government in Ghana is seem as a positive step reducing tee tax burden of auto-mechanic workshop. It is believed that this measure is an opportunity for auto-mechanics to import the needed spare parts into the country at a lesser cost than previously.

2.4.3 Establishment of Automobile Remanufacturing and Recycling Facilities

In a survey conducted by Asafo-Adjaye (2012), he observed that the automobile repair and maintenance industry in Ghana do not have the facilities for remanufacturing or recycling of scrap. He defines remanufacturing as a process whereby a worn out, discarded or used product usually referred to as the 'core' are recovered from commercial usage and transformed into new products to be re-introduced into the stream of commerce. The process involves the disassembly, cleaning, inspection, functional testing, reconditioning

or replacement of worn parts, re-assembly and quality assurance testing of the assembled core to specifications similar to that of a new one. However, the survey revealed a general lack of awareness of the industry's potentials for remanufacturing and recycling. This means the prospects of the industry expanding it include activities of remanufacturing and recycling of use metals is still left unexplored by the large number of auto-mechanics in the informal sector.

2.4.4 Partnership with Technical Institutions for Training in Automobile Technology

The advancement in automobile technology though poses a challenge to auto-mechanics in the informal sector, it is equally a good opportunity for them in terms of enhancing the efficiency of their operations. This is because technological improvement in the repair and maintenance of modern vehicles such as the OBD makes repairs of vehicles simple and less stressful (Edunyah, 2015). In order to be abreast with new automobile technologies, the Suame Magazine and other automobile workshops in the country can collaborate with the mechanical engineering departments of the universities and polytechnics for special training in the new automobile technology required for the repair and maintenance of modern vehicles.

2.4.5 Availability of Cheap Labour

The informal sector of the automobile repair and maintenance industry in Ghana rely on the youth for labour. With the high level of illiteracy in Ghana, owners of automobile workshops and auto-mechanics have the benefit of attracting more young

people as apprentices to lean the trade of vehicle repair and maintenance. With the high rate of unemployment in Ghana, getting young people to work as apprentices so that they can earn some money at the end of the day should not be a difficult task. For instance, Kayemuddin and Kayum (2013) reported that there is abundant labour supply in automobile workshops sector in Bangladesh hence the sector is more labour intensive.

2.5 Challenges facing the Automobile Repair and Maintenance Industry

The automobile repair and maintenance industry like any other industry faces some challenges that hinder the effective operation of the major players in the industry. Focusing on the informal sector of the industry, this section presents the major challenges facing automobile workshops and auto-mechanics revealed in prior literature.

2.5.1 Unreliable Power Supply and High Electricity Tariffs

In recent times, the issues of erratic power supply and high cost of electricity have gained significant attention when discussing the challenges facing small and medium sized enterprises like automobile workshops. Automobile workshops use electricity to perform some of their repair and maintenance activities. Therefore, irregular power supply and frequent power outages affect the operations of automobile workshops. In India, the recent load shedding exercise which necessitated for strict time limits on the use of electricity by the firms greatly affected the activities of automobile workshops (Manojkumarr, 2015). The problem of erratic power supply caused many enterprises to cut down production drastically though demand had not fallen.

2.5.2 Unfavourable Government Economic Policies

According to Manojkumarr (2015), government's taxation policies, population figures and automobile buying capacity of people were factors that affected the auto-mechanic operations. He emphasized that in terms of the stability of the country's economy, the state of the economy affected the level of economic activity which subsequently affects the patronage commercial vehicles. A review of the challenges of the Indian Auto Component Industry revealed that the industry faces high cost of production due to inflation and unfavourable government policies of indirect taxes such as customs and excise duties (Borgave & Chaudhari, 2010).

2.5.3 Lack of Funds and other Financial Constraints

Several studies have posited that lack of finance and low capital has been the bane of automobile workshops like other small scale enterprises. The problem of inadequate capital and inaccessible credit facilities pose a major financing challenge to auto-mechanics. For instance, Kayemuddin and Kayum (2013) aver that the informal automobile repair industry in Bangladesh is bedeviled with lack of working capital and difficulty in accessing credit facilities. As indicated by Osotimehin, Jegede, Akinlabi, and Olajide (2012), the lack of short, medium and long term capital, inadequate access to financial resources and credit facilities affect the growth of micro and small scale enterprises like automobile workshops. Aggarwal, Hofmann and Phiri (2010) reveal that auto-mechanics enterprises in Malawi are confronted with inaccessible credit facilities; limited space to operate; increased competition from modern and well-equipped automobile workshops in the formal sector leading to low revenue, and difficulty in

passing on the increasing cost of inputs to customers resulting in pressure on profit margins.

2.5.4 Lack of Managerial Skills

In their evaluation of the challenges and prospects of micro and small scale enterprises development in Nigeria, Osotimehin et al. (2012) revealed that owners of small scale enterprises lack the necessary managerial skills and financial literacy to manage their businesses efficiently. It was found that such enterprises do not keep proper books of account or records of their financial transactions, do not have a functional organizational structure, and do not prepare management reports. In most cases the owners who may not have any formal business background performs all the managerial and financial functions of the enterprise. Similarly, Kayemuddin and Kayum (2013) aver that the informal automobile workshop sector faces managerial problems such as improper book-keeping and costing systems, and lack of modern technical know-how.

Some of these challenges hamper the efficient performance of small scale enterprises and affect their chances of accessing external credit from banks and other sources. This is because ordinarily banks and other financial institutions would be interested in the true statement of financial position of an entity before granting a credit facility to the entity. Therefore, in instances where the entity fails to keep proper books of account then they put themselves in a difficult situation in terms of proving to the banks that indeed they are credit worthy and have the financial muscle to pay back the loan when it falls due.

2.5.5 Lack of Knowledge in Modern Automobile Technology

It must be emphasized that sophisticated technological features are rapidly becoming standard features in all new automobile owing to changes in customer's taste and preferences for automobiles. The advancement in automobile technology necessitate that people engaged in the repair and maintenance of modern vehicles require knowledge in these technologies in order to able to diagnose faults and repair these kind vehicles.

Not until recently, vehicles were more mechanical and did not require much technological knowledge to operate and therefore were relatively simple for any auto-mechanic with some level of training to repair (Edunyah, 2015). However, with the advancement in automobile technology, more automobile subsystems have been incorporated into vehicles to make them more luxury, easy to operate electronically, and user friendly requiring less manual operations. Studies have shown that the advancement in automobile technology coupled with the increasing customer demand for more luxurious, user friendly and less manually operated vehicles mean auto-mechanics without formal training in automobile technology are likely to face a major challenge with the advent of automobile technology (Akpakpavi, 2014).

In Ghana, Akpakpavi (2014) asserts that majority of auto-mechanics in the informal sector lack the expertise and technological know-how to diagnose faults, repair and maintain more sophisticated electronic vehicles and carry out fault diagnostics, repair and maintenance activities without sound and state-of-the- art maintenance practices. Aggarwal, Hofmann and Phiri (2010) revealed that the auto-mechanics in the informal sector in Malawi find it difficult in upgrading their skills and facilities in line with rapid technological advancement. Thus, as automobile technology advances to greater heights,

auto-mechanics without the benefits of formal training to cope with the changing trends in the automobile industry are likely to encounter a lot of challenges when repairing modern vehicles with sophisticated computerized systems and electronic gadgets.

2.5.6 Use of Obsolete Equipment and Methods of Operation

Auto-mechanics can no longer rely on the old methods of diagnosing faults with vehicles but must acquire knowledge in the use of highly modern technological diagnostic equipment such as the On-Board Diagnostic (OBD) to analyze vehicle faults for repair and maintenance. In this direction, Osotimehin et al. (2012) bemoaned the use of obsolete equipment and methods of operation because of owner's inability to access new technology. Also, Akayeti (2015) found that the informal auto-mechanic sector in Ghana was characterized by the use of conventional machine tools, rudimentary welding and forming processes to produce parts in small quantities while Computer Numerical Control (CNC) machine tools were virtually non-existent in the sector.

Edunyah (2015) found that the major challenges facing roadside mechanics in Ghana in the advent of vehicle technology is the lack of skills required for operating the OBD scan equipment. The OBD is a vehicle self-diagnostic and reporting capability technology that helps to easy diagnose faults in vehicle by giving the auto-mechanic full access to the various components and sub-systems of the vehicle for easy identification of faults. This means that auto-mechanics who are not abreast with modern automobile technology and do not understand principles behind the use of OBD and other useful technological equipment are likely to be rendered jobless in the very near future. To this end, he recommended that roadside mechanics in the country should take advantage of the

Skills Development Fund (SDF) administered by Council for Technical Vocational Education and Training (COTVET) to upgrade their skills in the use of the modern methods of vehicle repair and maintenance.

2.5.7 Lack of Training Facilities and Inadequate Skilled Personnel

In a study on informal apprenticeship in Malawi, it was revealed that technical training in the informal sector by means of apprenticeship was bedeviled with several challenges. Aggarwal et al. (2010) outlined some of the challenges to include the use of children below the legal working age as apprentices, overly long periods of apprenticeship training which seem more exploitative, low quality of apprenticeship training, and the lack of technological know-how on the part of master craftspersons. In India, Borgave and Chaudhari (2010) revealed that the Indian Auto Component Industry was constrained by unavailability of skilled labour and technology. In Bangladesh, Kayemuddin and Kayum (2013) found that the auto-mechanic sector lacks proper training facilities and qualified auto-mechanic engineers with practical training. They revealed that this challenge leads to the production of low quality apprentices. In assessing the state of development of automobile design and manufacturing in Ghana, Akayeti (2015) revealed the lack of qualified automobile design and manufacturing engineers resulting in the production of low quality apprentices. Okuta and Dawha, (2014) attributed the lack of special skills and technological expertise needed to diagnose faults with vehicles and perform the necessary repair can be attributed to deplorable state of vocational and technical training institutions that are mandated to train auto-mechanics in developing countries and the shortage of qualified and skilled instructors in such institutions.

2.5.8 Environmental Challenges

The activities of the automobile repair and maintenance industry pose a challenge to the environment and for that matter is a serious concern to the public. The public, civil society organizations, environmental protection agencies and governments have over the years put enormous pressures on enterprises to make sure that they comply with environmental safety rules and regulations. Sutherland et al. (2004) aver that the auto industry and its suppliers are aware of the ever increasing need to address environmental issues in their products and processes. In examining the environmental challenges facing the automotive industry globally, Sutherland et al. (2004) in their review of the technical literature, found that environmental concerns associated with the following manufacturing processes: casting, glass manufacturing, painting/coating/plating, machining, joining, plastics processing, part washing. Generally, 2800 kg of solid waste is produced in the materials processing/manufacturing life cycle stage for a generic vehicle. Casting sand represents another large solid waste contributor (about 120 kg/vehicle or 2 million tons/year for the US automotive industry). Casting processes also produce airborne emissions of environmental concern (NOx, VOCs, etc.). The set of processes (including coating and painting operations) used to produce an appealing finish for the vehicle body has resulted in the largest per vehicle emissions of Volatile Organic Compounds (VOCs) and Hazardous Air Pollutants (HAPs).

In terms of the impact of the activities of automobile workshops on the environment, Nwachukwu, Alinnor, and Feng (2012) indicated that disposing used automobile oil on the ground cold result in excessive trace metal pollution of topsoil and insecurity of food products in the affected areas. They aver that as automobile engine and

transmission run simultaneously, metal particles wear and collect in the oil and this defect increases as the automobile gets older. While the issue pf environment pollution caused by the wrongful disposal of used engine oil and other kinds of vehicle oil may be of serious concerns in developed countries, such challenge is mostly overlooked in Ghana by the relevant state agency such as the Environmental Protection Agency (EPA) agencies though it is a big treat to public health and the natural environment.

2.6 Strategies for Developing the Automobile Repair and Maintenance Industry

In a workshop on upgrading informal apprenticeship in Africa organized by the Skills and Employability Department of ILO in 2010, it was recommended that informal apprenticeship needs to be recognized as a training system on its own right, because it has a high potential for upgrading and that reforms need to build bridges to the formal training system. In India, as reported by Manojkumarr (2015), the government is considering giving incentives to the auto component industry to boost exports, with the Ministry of Commerce and the Department of Heavy Industry conducting a joint assessment of the sector. In examining the challenges faced by informal apprenticeship in Africa, the ILO (as cited in Aggarwal, Hofmann, & Phiri, 2010) identified important knowledge gaps and suggested the need to better understand the informal rules, such as social norms, customs and traditions regulating informal apprenticeship and practices, and the ways to enforce them.

On the issue of financial support, Osotimehin et al. (2012) suggested that in order to improve the performance and growth of automobile workshops, there is the need for new lending schemes and credit facilities, tax holidays for automobile workshops, and

government's fiscal incentives and grants towards making the small and micro business and apprenticeships schemes vibrant among others. Kayemuddin and Kayum (2013) recommended the role of international agencies in contributing financial support to enhance the activities of auto-mechanics. They opine that problem of financial constraints bedeviling the operations of automobile workshops can be curbed with financial assistance from the financial institutions and the foreign donors.

As part of recommendations for enhancing the activities of automobile repair and maintenance industry, Okuta and Dawha (2014) suggest that government should support the training and workshops of auto-mechanics in the country to help upgrade their technical competencies and skills in order to enable them to continually develop the capability to inspect and repair modern automobiles without being kicked out of business due to technological advancements. In Ghana, Akpakpavi (2014) opined that training institutions and organizations such as the universities, polytechnics, the Ghana Institution of Engineers, Gratis Foundation, National Board for Small Scale Industries (NBSSI), should extend assistance particularly in the form of education, training and equipment to automobile workshops in the informal sector. This e said will enable them to remain in business and prevent their eminent closure due to the excessive completion form workshops in the formal sector coupled with their lack of expertise to repair modern automobile vehicles. Again, it was suggested that government, the financial institutions as well as other private organizations should assist to re-tool and equip the small and medium automobile workshops in the country with modern equipment, especially the electronic vehicle diagnostic equipment such as OBD, oscilloscopes, scanners, diagnostic code

scanners, computerized diagnostic testers, portable data link (PDL), exhaust gas analyzers which are needed to make their work easier and faster.

It has been argued that the work of auto-mechanics and knowledge in automobile technology cannot be separated from vocational and technical education because this form of education is the most appropriate for imparting such skills and knowledge in people (Okuta & Dawha, 2014). This means that government must place strong emphasis on vocational and technical training and education and support it with the needed resources so that it can produce the skilled labour required by the automobile repair and maintenance industry. Okuta and Dawha contend that to achieve this objective, there should be intensive public awareness and sensitization on the dangers of neglecting vocational and technical education and the need to put strong emphasis on the acquisition of practical skills if we want to indeed grow the automobile repair industry. To support the auto-mechanics in the informal sector so that they can contribute to economic growth of the country, Edunyah (2015) recommended that they should be giving every opportunity to undergo a series of training to upgrade their technical knowledge in the use of the OBD tool and basic vehicle electronics training through the Skills Development Fund (SDF) initiative. Again, he suggested that government should support to auto-mechanics in the informal sector to upgrade themselves in terms of acquiring the needed training and skills to enhance their performance.

2.7 Summary

The literature review focused on six thematic areas namely an overview of the automobile industry, overview of automobile repair and maintenance industry, automobile repair and maintenance industry in Ghana, challenges facing the automobile repair and maintenance industry, prospects of the automobile repair and maintenance industry, and strategies for developing the automobile repair and maintenance industry. The automobile repair and maintenance industry is concerned with the servicing, repair and maintenance of vehicles that have to been sold out to the end-user. The industry comprises of different but interrelated trades such as auto-mechanic services, automobile specialist services, automobile electricians, and automobile vehicle body services. The Ghanaian automobile repair and maintenance industry is made up the formal sector and the informal sector which comprise of individuals, small scale firms and business enterprises who own automobile workshops and provide servicing, repair and maintenance of all kinds of vehicles. Unlike the formal sector, the informal sector which is made up of local auto-mechanics and small scale automobile workshops located in by the roadside or designated areas with the major cities and towns are bedeviled with a lot of challenges. Notable among the challenges erratic power supply and high cost of electricity, high cost of spare parts, unfavorable government economic policies, advancement in automobile technology, lack of managerial skill-set to manage automobile workshops in the informal sector, financial constraints such as difficulty in accessing credit and inadequate capital. Other factors include use of obsolete equipment and methods in diagnosing faults, lack of skilled manpower to train auto-mechanics in new technological developments in the automobile industry, lack of knowledge in information and communication technology on the part of

road side auto-mechanics, lack of government support for the industry. Despite the numerous challenges affecting the operation of auto-mechanics and automobiles in the informal sector, the sector is exposed to some opportunities which can be utilized to promote the growth and development of the sector.

CHAPTER THREE

METHODOLOGY

This chapter presents the methods employed to achieve the objectives of the study. It contains a description of the research design adopted for the study as well as the research approach that underpins the researcher's choice of methods for data collection and analysis. It also presents the population, sample and sampling techniques, methods for data collection and analysis. In addition, the chapter includes issues pertaining to pre-testing of instruments and ethical considerations.

3.1 Research Design

In conducting research, it is important to outline the overall operational framework that guides the study. This framework is necessary because it informs the kind of research questions to formulate in order to achieve the specific objectives of the study, the methods to employ for data collection and analysis and how the results of the study will be presented. This framework employed guide the researcher in obtaining answers to the pertinent research questions may be referred to as research design.

Research design is a framework that guides the collection and analysis of data in a logical sequence such that there is a link between the research questions, results of the study and the conclusion of the study (Yin, 2003; Bryman, 2008). Thus, it "sets out the guidelines that link-up the elements of methodology adopted for a study; relating the research paradigm to the research strategy and then the strategy to methods for collecting empirical data" (Denzin & Lincoln, 2000 p.22).

With regards to the purpose of the study and the specific objectives set out to be achieved, the descriptive survey research design was deemed appropriate for the study. This is because the study sought to evaluate the views of auto-mechanics on the prospects and challenges related to automobile operations through the administration of a questionnaire. A descriptive survey research design is a procedure for obtaining information about the attitudes, opinions, or characteristics of research participants using questionnaires and/or interviews in order to obtain a thorough description of the issues under discussion (Creswell, 2012). Considering the nature of the study, this design was deemed appropriate in that it will help in obtaining detail information relating to the prospects and challenges of automobile repair and maintenance workshops in the informal sector of Ghana. Also, for the purposes of data collection and analysis, the quantitative approach to research was adopted for the study.

3.2 Population

Generally, the population of a study may comprise a large group of subjects such as people, objects, animals, plants, organizations from which a sample may be obtained. It refers to "a collection of all possible individuals, objects or measurement that have one or more characteristics in common that are of interest to the researcher" (Arthur, 2012 p.109). The target population for the study comprised owners/managers of auto-mechanic workshops in the informal sector within the Kumasi Metropolis.

3.3 Sample and Sampling Techniques

Sampling is very important in cases where it is not feasible to reach all the subjects within the population of interest. It is the process of selecting a sample or subset of the target population for purpose of making observations or making statistical inferences about the population (Neuman, 2007). On the other hand, a sample is a fraction of the population which is representative of the population to the extent that it exhibits the same characteristics as the population (Arthur, 2012).

Considering the nature of the study, the sample for the study comprised 164 owners of auto-mechanic workshops within Suame Magazine in the Kumasi Metropolis. The sample was selected using the purposive and convenience sampling techniques respectively. Purposive sampling is a non-probability sampling technique that involves the selection of a sample based on the researcher's own judgement of the units of the population deemed appropriate for the purpose of obtaining the relevant responses or data. This sampling technique was employed because the researcher intended to reach specific identified units or groups within the population of interest (Neuman, 2007), because of their knowledge and expertise in the issues involved in the study and their ability to provide the relevant answers (Saunders, Lewis & Thornhill, 2009).

Since the prospective respondents were scattered across a wide area of the Suame Magazine and were busily going about their daily operations, the researcher adopted the convenience sampling technique to attract those who he could reach out to as well as those who were willing to participate in the study. During the period of data collection, the researcher was able to reach out to 256 owners of auto-mechanic workshops. However, only 164 of them were willing and agreed to participate in the study. Hence, the sample

size used for the study comprised 164 owners of auto-mechanic workshops. The Suame Magazine was chosen because it is arguably the hub of auto-mechanic workshops in the Kumasi Metropolis and the Ashanti Region in general.

3.4 Data Collection Instruments

This section describes the data collection instruments employed for the study. The choice of appropriate data collection instruments depends largely on the specific research questions and the research approach adopted, thus whether quantitative, qualitative or mixed methods approach (Boateng, 2014). Therefore, consistent with the descriptive survey design, the study employed a questionnaire as the main instrument for collecting primary data from the respondents.

Fraenkel and Wallen (2000) contend that to obtain quantitative data relating to the views, attitudes or behaviours of the respondents on particular subject, questionnaire is considered the most appropriate tool for collecting such data. Over time, the questionnaire has proven to be an effective instrument for securing information about practices and conditions of which respondents are presumed to have knowledge and opinions on (Cohen, Manion & Morrison, 2005). Also, the questionnaire can be used to obtain information from a large sample of respondents within a short period of time and is very useful in providing numerical data for quantitative analysis. On these bases, the questionnaire was employed as one of the major instruments for data collection.

The questionnaire was designed based on the pertinent research questions with constructs adapted from the literature review. It comprises four sections: A, B, C, and D. The first section, Section A consist of dichotomous response questions relating to the

demographic characteristics of the respondents while the remaining sections consist of closed-ended questions based on the three research questions. Section B comprise of questions on challenges facing auto-mechanic operations in the informal sector. Section C comprises questions relating to the potential prospects available to the auto-mechanic industry in the informal sector. Section D comprise of questions on the level of preparedness of auto-mechanics in the informal sector in taking advantage of the potential opportunities available to them. The closed-ended questions were ranted using a five-point Likert scale with a response category of: 1 – Strongly disagree, 2 – Disagree, 3 – Not sure, 4 – Agree, and 5 – Strongly agree.

3.5 Pre-testing of Data Collection Instruments

In order to ensure that the questionnaire was appropriate in terms of measuring what it purports to measure (validity) as well as capable of reproducing data in a consistent manner on repeated trials with just small margin of error (reliability), it was necessary to pre-test the instrument. The practice of pre-testing data collection instruments before they are finally used enables the researcher to fine-tune or make necessary corrections to enhance the validity and reliability of the instruments (Neuman, 2007). Also, it enables the researcher to organize the instruments to meet the objectives of the study and the same time increase the response rate of and the quality of responses (Jones & Lyons, 2004).

Before pre-testing the instrument, a number of steps were taken to enhance the content validity of the instruments. Firstly, the questionnaire was designed based on the pertinent research questions that guided the study. After designing the instrument, an initial

draft was submitted to the researcher's supervisor for perusal and comments. The questionnaire was modified based on the comments and suggestions of the supervisor. Upon, the approval of the questionnaire by the researcher's supervisor, the pre-testing process was initiated by administering the questionnaire to two different groups of respondents outside the sample of the study but included in the target population.

With regards to the reliability of the questionnaire, a test re-test reliability assessment was conducted. The set of questionnaire was first pre-tested with 10 auto-mechanic workshop operators outside the selected sample of respondents for the study. Another set of the same questionnaire was administered to a different group of auto-mechanic workshop operators. The data obtained from the two separate groups were analyzed using SPSS and Cronbach's Alpha reliability coefficient of 0.81 was obtained. The reliability coefficient was deemed appropriate in justifying the reliability of the questionnaire.

3.6 Ethical Considerations and Data Collection Procedures

In conducting a research that involves people as participants or respondents, it is very necessary to ensure that issues of ethical considerations of research in this respect are adhered to. Firstly, to engage people as respondents in a study requires that you seek their consent. This brings up the issue of informed consent. O'Leary (2004) contends that the concept of informed consent emphasizes the importance of the researcher accurately informing the research participants or respondents of the nature of the research, the purpose and objectives of the study, and the processes involved in the data collection stage including time commitment, type of activity and all potential physical and emotional risks

that respondents may be exposed to. This is in line with Bryman's (2010) assertion that in conducting a research involving people, detailed information about the study needs to be given to the potential respondents before asking them to participate in the study. It is after the potential respondents have given their consent upon being fully aware of the aforementioned issues that the researcher can involve them in the study. Thus, informed consent implies that the respondents are competent; participate in the study voluntarily; are aware of their right to discontinue; are not coerced and not induced to participate in the study (O'Leary 2004).

In order to obtain the consent of the potential respondents of the study, the researcher visited the Suame Magazine two weeks before the administration of the data collection instruments. The visit was meant to meet with the leaders of the Suame Magazine Industrial Organization (SMIDO) to inform them of the researcher's intention to use their members as respondents in his research. The researcher introduced himself with an introductory letter form the head of the Department of Mechanical Technology Education of the Faculty of Technical Education, of the University of Education, Winneba. Though the letter clearly stated the purpose of the study, the researcher went further to explain the purpose of the study to them, indicating the reason why SMIDO was chosen as a case study. With the permission of the leaders of SMIDO, the researcher interacted with a number of the auto-mechanic workshop operators to familiarise himself with them and seek their consent to participate in the study. This helped the researcher to know the respondents' readiness to participate in the study and their willingness to provide their candid opinion relating to the questions that will be asked.

3.7 Data Analysis

Data analysis is a very important stage of the research process. It involves the transformation of data into research results (LeCompte, 2010). It consists of examining, categorizing, tabulating, or recombining evidence to address the research questions or the initial propositions of the study (Boateng, 2014). Data from the questionnaire were edited, coded and entered into the Statistical Package for Service Solutions (SPSS) version 21. The data was then analyzed using descriptive statistics comprising frequency counts, percentage scores and mean scores.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

This chapter presents the analysis of results and discussion of findings. The analysis is of two sections – the first part comprises the analysis of results from questionnaire and the second part involves the discussion of the findings was conducted with reference to prior literature to ascertain whether the findings corroborate or contradict those reported by prior related studies.

4.1 Demographic Characteristics of Respondents

Demographic characteristics appear to be important variables that somewhat influence the attitudes and behaviour of people towards a particular phenomenon. Since the study focused on the prospects and challenges of auto-mechanic operations and how mechanics in the Kumasi Metropolis respond to such issues, it was deemed necessary to examine their demographic characteristics to see if they influence the reaction of the respondents with regards to the issues under discussion. The study sampled 164 auto-mechanic operators from the Suame Magazine to who a questionnaire was administered to. Respondents were asked to fill the questionnaire on the spot after which they were handed over to the researcher. The method of administering the questionnaire made sure that at the end the researcher was able to retrieve all the questionnaire from the respondents. Hence, the study achieved a 100% response rate. However, during the process of editing the answered questionnaire, it was found that 14 questionnaires had a large number of questions unanswered and therefore could not be used for any meaningful analysis.

Therefore, the study relied on 150 questionnaires (representing a response rate of 91.5%) which were used for the analysis. The demographic characteristics of the respondents were presented in Table 4.1 as follows:

Table 4.1 Demographic Characteristics of Respondents

Variable	Frequency (N)	Percentage (%)
Gender		
Male	136	90.7
Female	14	9.3
Age		
Below 30 years	12	8.0
30 – 39	74	49.3
40 – 49	38	25.3
50 years and above	26	17.3
Level of Education		
Basic	98	65.3
Secondary/Technical	45	30.0
No formal education	7	4.7
Area of Specialization		
General auto-mechanic technician	78	52.0
Special vehicle parts technician	43	28.7
Vehicle body technician	29	19.3
Years of Work Experience		
Below 5 years	12	8.0
5 – 14	55	36.7
15 – 24	73	48.7
25 years and above	10	6.7

Source: Researcher's Field Data (2017)

As shown in Table 4.1, majority of the respondents representing 90.7% where males compared to 9.3% being females. This seem to suggest that considering the nature of the auto-mechanic industry and the work of auto-mechanics, the industry is somewhat not

conducive for females hence dominated by males. The age distribution of the respondents shows that almost half (49.3%) of them were within the 30-39 age bracket with 17.3% of them being 50 years or above. It can be observed that 82.7% of the respondents were below 50 years which indicates that majority of the them are in their youthful stage. While majority of the respondents representing 65.3% had indicated that their highest level of education is basic education, 4.7% of them indicated that they have never any form of formal education. Though none of the respondents had acquired tertiary education, it was revealed that 95.3% of them had acquired some form of basic or secondary education. Auto-mechanic operations involve different areas of specialization and as revealed in study, slightly over half (52.0%) of the respondents indicated that their area of specialization is general automobile repairs with 19.3% specializing in vehicle body repairs. In terms of work experience, slightly below half (48.7%) of them stated that they have acquired between 15 – 24 years of work experience in the auto-mechanic industry while below one-tenth (6.7%) indicated that they have spent 25 years or more in the industry. Overall, about 92.0% of the respondents had plied their trade as auto-mechanics for over five years. This seem to suggest that majority of the respondents were very conversant with the prospects and challenges in the industry and therefore were in a better position to contribute their views to the study.

4.2 Prospects of the Auto-Mechanic Workshop Industry

As the demand for automobiles in Ghana and across the globe increases, it is believed that the demand for automobile repairs will also increase. In addition, the increasing advancement in automobile technology is likely to present some prospects for

the automobile repair industry. Therefore, Table 4.2 presents the views of auto-mechanics with regards to the potential prospects in the automobile repair industry in Ghana and the Kumasi Metropolis in specificity.

Table 4.2: Prospects in the Auto-Mechanic Industry

Prospects in the Auto-Mechanic Industry	Mean ($\bar{x}$)	SD
Partnership with advanced technical institutions for training		
Availability of automotive and mechanical engineers	4.02	0.45
Training of auto-mechanics in modern automobile technology	3.32	0.56
Introduction of automobile technology courses in universities	2.02	1.54
Favourable government and economic policies		
Increase in the number of automobiles in the country	4.78	0.54
Removal of taxes on imported spare parts	4.65	0.43
The Ghana cedi gaining some strength against the US Dollar	1.65	0.68
Development of auto-mechanic industry		
Establishment of Suame Magazine Automatics Technical Institute	4.20	0.05
Advancement in automobile repair and maintenance technology	3.92	1.62
Establishment of auto-mechanic villages across major cities in the country	2.01	0.83
Collaboration with international agencies for financial support and training	1.05	1.34
Access to credit facilities		
Increase in the number of banks and other financial institutions	3.83	0.63
Fall in interest rate charged on bank loans	1.50	0.89
Financial support from government such as MASLOC	1.07	1.24
Labour supply		
Availability of cheap labour due to high unemployment rate	4.23	0.38
Low cost of training apprentices	1.56	1.04

Source: Researcher's Field Data (2017)

From the results as presented in Table 4.2, technical institutions and the universities appear to play a significant role in term of providing training in automobile engineering and technology as well as developing the skills auto-mechanics through short courses and

seminars. The production of automotive and mechanical engineers by some of the country's universities and polytechnics is seen an important step towards the developing the human resource in the auto-mechanic industry as indicated by a mean score of 4.02. Majority of the auto-mechanics appreciated the opportunity provided by some technical institutions in terms of providing training in modern automobile technology to keep auto-mechanics abreast with new developments in the automobile repair industry ($\bar{x}$ = 3.32). The introduction of automobile technology courses in some tertiary institutions in the country appeared not have a direct influence on the auto-mechanic industry per the view of majority of the respondents hence accounting for a low mean score of 2.02.

There is no doubt that the economic policies of every government and the growth of a country's economy affect almost all sectors and industries of the country. As revealed by the study, the growing demand for various kinds of automobiles and the increase in the number of automobile usage in the country appear to be a positive development that is likely to have a significant impact on the auto-mechanic industry as indicated by a very high mean score of 4.78. This is because an increase in the number and usage of automobiles will lead to increase in demand for automobile repairs. The review of Ghana's tax system by the new government and the removal of import duties on spare parts was received as a sigh of relief by majority of auto-mechanics who use spare parts for their business ($\bar{x}$ = 4.65). Though over the last few months the Ghana Cedi appear to be stable and gaining some strength against its major trading currencies such as the US dollar, the recent stability in the Ghana Cedi was not perceived as an opportunity that auto-mechanics could benefits from as indicated by a lower mean score of 1.65.

Some recent developments in the auto-mechanic industry in Ghana present an opportunity for auto-mechanics expand their activities and increase the quality of the services they provide. Notwithstanding the fact the Suame Magazine Automatics Technical Institute has not been functioning as expected, it is still regard as a major project that will help in the training of auto-mechanics in modern methods of automobile repair and maintenance ($\bar{x}$ = 4.20). The introduction of electronic methods for automobile repair has been recognized as a laudable development that will enhance the operations of auto-mechanics ($\bar{x}$ = 3.92). However, it appeared that the call for the establishment of auto-mechanic repair villages in major cities across the country has not received much attention form the relevant stakeholders ($\bar{x}$ = 2.01). Also, there seem to be no collaboration between the auto-mechanic industry and international agencies which might have resulted in financial and logistical support from the latter ($\bar{x}$ = 1.05).

Over the last few years, the influx of banks and the significant growth in the financial sector of the Ghanaian economy has widen the financial space for both individuals and businesses including the auto-mechanic industry. The growing number of banks and non-bank financial institutions in recent times seem to widen access to credit though the interest rate charged by banks on loans is still high. As revealed by the results, majority of the respondents perceived the increase in the number of banks and financial institution to be a positive development that will provide them with wide access to credit facilities such as bank loans ($\bar{x}$ = 3.83). Despite a slight fall in the monetary policy rate of the Bank of Ghana, interest rates charged by commercial banks on loans are still soaring. The high interest rate on bank loans have become unbearable for majority of auto-mechanic thereby denying them access to bank loans and other credit facilities form the

financial sector as indicated by a low mean score of 1.50. In addition, majority of the respondents bemoan the lack of financial support from government agencies who are deemed to be stakeholders in the auto-mechanic industry. The introduction of MASLOC as a medium for obtaining financial assistance from the government to support small and medium-size businesses has somewhat not achieved its purpose and auto-mechanics in the Kumasi Metropolis still finds it very different to access financial support from the government as indicated by a low mean score of 1.07.

With Ghana's population of about 27million people and the growing rate of employment, labour supply has exceeded the demand for labour thereby creating what may be termed as labour surplus. This implies that the auto-mechanic industry will have access to labour mostly young people who are struggling to make ends meet as a result unemployment. It was found that there is ample workforce from which auto-mechanic can hire apprentices at a relatively cheaper cost when the need arises ($\bar{x} = 4.23$). While the cost of hiring apprentices may be cheap same cannot be said of the cost of training apprentices to become qualified auto-mechanics hence majority of the respondents disagreed with the assertion that the cost of training apprentices is low as indicated by a mean score of 1.56.

The study revealed that the production of automotive and mechanical engineers in the country was a laudable development because it will increase the supply and quality of skilled personnel needed to develop the auto-mechanic industry to higher standard. This gives credence to the assertion of Akayeti (2015) the lack of qualified automobile design and manufacturing engineers resulting in the production of low quality apprentices in the automobile repair industry. Also, the establishment of the Suame Magazine Automatics Technical Institute was deeded a good initiative aimed at providing the avenue for the

training of auto-mechanics in modern methods of automobile repair and maintenance. This corroborates the suggestions of Nwachukwu et al. (2012) that in an effort to enhance the activities of automobile repair industry, it is necessary to establish mechanic villages equipped with the needed resources for the training of auto-mechanics in new and effective ways of conducting the operations.

The removal of taxes on imported spare parts was received good news in that this policy will help reduce the cost of operation. This initiative indicative of the fact that of auto-mechanic enterprises find government tax policies on spare parts, petroleum taxes, and other forms of taxes as policies that have negative repercussions on their operations and affect their growth and expansion as indicated by Borgave and Chaudhari (2010) and Manojkumarr (2015). The availability of labour from which managers of auto-mechanics can hire apprentices at a lower cost implies that the cost of labour will reduce thereby giving auto-mechanics the financial capability to employ more labour when the need arises. This is consistent with the finding of Kayemuddin and Kayum (2013) the abundant supply of labour in automobile repair sector in Bangladesh have contributed to the labour intensive of the sector.

4.3 Challenges facing Auto-Mechanic Enterprises

Despite the prospects available to auto-mechanics as discussed above, there are challenges that hinder them from utilizing the opportunities available to them. Table 4.3 presents the views of respondents on the challenges they encounter in the course of their operations.

Table 4.3: Challenges facing Auto-Mechanic Enterprises

Challenges facing Auto-Mechanic Workshop Operations	Mean($\bar{x}$)	SD
Constraints with electricity and fuel		
The power supply to my garage is erratic	4.74	0.69
The cost of electricity for my garage is very high	4.65	0.54
The cost of fuel for my garage is very high	4.61	0.61
Unfavorable Government Economic Policies		
I do not receive financial support from the government	4.71	0.45
High cost of spare parts due to depreciation of the Ghana cedi	4.52	0.58
The tax and levies I pay is very high	4.03	0.53
Modern trends in Automobile Repair		
I do not have access to training in modern automobile technology	4.13	0.54
I find it difficult using modern electronic equipment for automobile repair	3.25	0.95
I use manual and outmoded equipment and methods for my operations	3.17	0.72
Lack of access to finance		
I have difficulty in accessing credit facilities	4.58	0.58
The interest I pay on bank loans is very high	4.04	0.39
I do not have other sources of finance apart from personal finance	3.84	0.72
Lack of managerial skills		
I find it difficult accessing information to help grow my business	4.06	0.34
I do not have the skills in managing my business effectively	3.07	0.93
I do not have much knowledge in how to manage my finances properly	1.03	1.23
Environmental constraints		
There is no proper disposal site for scrap and used oil products	4.26	0.32
I have difficulty in obtaining site permit and license for my business	4.02	0.75
The sanctions for causing environmental pollution are very severe	1.45	0.96

Source: Researcher's Field Data

There is no doubt that electricity and fuel are among the most important resources that auto-mechanics need in order to perform their daily operations. The irregular supply of these resources and the cost of obtaining them have become major hindrances to the

smooth operation of auto-mechanics in recent times. As reported by majority of the respondents, the daily operations of auto-mechanics are affected by the erratic supply of electricity as indicated by a mean score of 4.74. While the supply of electricity to the garages of auto-mechanics was reported to be unreliable, the cost of electricity to the garages was rather on the increase making it difficult for auto-mechanic to ply the trade ($\bar{x}$ = 4.65). Apart from the rising cost of electricity with is attendant erratic power supply, the cost of fuel used power generators as alternative source of electricity is also on the increase as indicated by majority if the respondents ($\bar{x}$ = 4.61)

The study revealed that some unfavourable economic policies of the government pose a great challenge to the effective operation of auto-mechanics in the informal sector of the Kumasi Metropolis. For instance, the lack of financial and logistical support from the government to auto-mechanics was found to be a major challenge to the industry ($\bar{x}$ = 4.71). Also, it was found that despite the removal of import duties on spare parts, the cost of spare parts is still high as the depreciation of the Ghana Cedi against the US Dollar and this was affect the cost of operation of auto-mechanics ($\bar{x}$ = 4.52). The amount of money paid as tax and levies by auto-mechanics was found to be a major strain on their finances ($\bar{x}$ = 4.03).

The advancement in automobile technology has brought about a drastic change in the methods used for the repair and maintenance of automobiles. As such auto-mechanics who are not abreast with these modern technological methods of automobile repair were likely to lag behind their contemporaries in the formal sector who are proficient in the use of such technologies. As revealed in the study, majority of auto-mechanics in the informal sector do not have the opportunity to learn the new electronic ways of automobile repair

due to lack access to training ($\bar{x}$ = 4.13). Also, it appeared that majority of auto-mechanics in the Kumasi Metropolis were not proficient in the use of modern technological methods of automobile repair due to training in the use of such methods as indicated by a mean score of 3.25. Again, the use of manual and outmoded equipment and methods of automobile repair by majority of auto-mechanics was seen as a constraint to the growth and development of the informal auto-mechanic industry ($\bar{x}$ = 3.17).

The growth of every business largely depends on the financial resources available to the managers of the business. Likewise, the auto-mechanic business, finance has remained one of the major challenges facing auto-mechanics in the informal sector. The difficulty in accessing bank loans and other credit facilities has been reported to be a major hindrance to the growth of many auto-mechanics businesses in the Kumasi Metropolis as reveled by majority of the respondents ($\bar{x}$ = 4.58). A part from the lack of access to credit facilities from banks due to the huge collateral security required, auto-mechanics who manage to obtain bank loans complained of the high interest rate charged on the loans which makes it difficult for them to pay back in time thereby increasing the cost of servicing the loans ($\bar{x}$ = 4.04). Moreover, while auto-mechanics in the informal sector had limited access to credit facilities from the financial institutions, majority of them stated that they have no access to other sources of finance apart from personal financing and this affected operations significantly as indicated by a mean score of 3.84.

The success of every business depends to a large extent on how it is managed. The importance of good managerial skills in enhancing the growth and success of a business cannot be overemphasized. The results of the study indicate that auto-mechanics in the Kumasi Metropolis had a great difficulty in accessing relevant business information

needed to grow their business and expand their market share ($\bar{x}$ = 4.06). While auto-mechanic workshops in the formal sector are managed by well-educated and trained personnel, the case of auto-mechanics in the informal sector is different. For instance, it was found that majority of auto-mechanics in the informal sector lacked the requisite managerial skills to effectively manage their workshops as business entities as shown by a mean score of 3.07. However, in as much as auto-mechanics in the informal sector lacked managerial skills, it was found that they were good at managing their finances though majority of them did not have any formal training in financial literacy ($\bar{x}$ = 1.03).

The impact of automobile repair activities on the environment is of much concerns to the stakeholders in the fight against environmental pollution and the citizens of Ghana at large. While auto-mechanics may take the issues of environmental pollution into consideration in the course of performing their activities, they encounter a serious challenge with regards to how to manage the waste generate by their operations. This has become a major challenge because of the lack of proper disposal site for auto-mechanics to dispose of their waste as shown by a mean score of 4.26. The cumbersome nature of obtaining land permit and the high associated cost has become a major hindrance to the operations of auto-mechanics in the informal sector ($\bar{x}$ = 4.02). While authorities in charge of issuing site permits may use environmental concerns as the basis for not issuing permits to auto-mechanics, the government has also not done much to solve the problem of finding a permanent site for auto-mechanics in the major cities and towns across the country. However, majority of the respondents did not see the sanctions imposed by the Environmental Protection Agency (EPA) and the Kumasi Metropolitan Assembly (KMA)

for violating environmental regulations as severe and therefore did not have a major impact on the operations as shown by a low mean score of 1.45.

The results of the study show that auto-mechanic businesses in the Kumasi Metropolis were saddled with erratic power supply, high cost of electricity and fuel. These challenges affected the smooth operation of the auto-mechanic workshops resulting in low level of productivity and income of auto-mechanics. This appear to be consistent with the assertion of Manojkumarr (2015) that load shedding exercise in some parts of India within the last few years greatly affected the activities of automobile workshops. On the other hand, the lack of support financial support from government to help boost the auto-mechanic industry seem to contract the findings of Manojkumarr (2015) who reported that in India the government is considering giving financial incentives to the enterprises in the automobile repair and maintenance industry to boost their operations.

Despite the removal of taxes on imported spare parts, a large section of auto-mechanics in the informal sector complained about the negative effect of the numerous taxes and levies they payment to the Ghana Revenue Authority (GRA) and the KMA. The payment of high taxes reduces the income of auto-mechanics and this affect the growth of their operations. As indicated earlier by Borgave and Chaudhari (2010); and Manojkumarr (2015) unfavourable tax policies of the government have been found to have a negative effect on the operations of businesses especially SMEs such as auto-mechanic operations.

There is no gainsaying that the current trend of automobile repair and maintenance requires the use of more modern and highly technological diagnostic equipment to analyze vehicle faults for repair and servicing as reported by Fapetu and Akinola (2008). However, study revealed that the rapid advancement in automobile technology which has

necessitated the application of electronic and technological methods for the repair and maintenance of modern automobiles appeared to pose a challenge to auto-mechanics in the informal sector.

Due to their low level of formal education, majority of auto-mechanics in the informal sector who had no training in the use of modern technological methods such as on-board diagnostic system and other electronic vehicle diagnostic equipment and tools found it very difficult to employ these modern methods in their operations as earlier reported by Akpakpavi (2014) who found that auto-mechanics without formal training in modern automobile technology are likely to face a major challenge with the advent of automobile technology. This point was also emphasized by Aggarwal et al. (2010) who revealed that auto-mechanics in the informal sector in Malawi found it difficult in upgrading their skills and facilities in line with rapid technological advancement. Also, the continuous use of manual and outmoded method of vehicle repair by auto-mechanics in the informal sector appear to confirm the assertion to Akayeti (2015) that the informal auto-mechanic sector in Ghana was characterized by the use of manual and conventional tools for their operations even after the advent of modern technological methods of automobile repair.

Another challenge reported by the auto-mechanics was the lack of finance and difficulty in accessing credit facilities from financial institutions. The inability of auto-mechanics to obtain bank loans due the demand for heavy collateral securities and high interest rates has led to the situation were auto-mechanics had no option but to rely self-financing strategies and limited family support. The lack of access to other sources of capital was found to a major constraint to the growth of auto-mechanic operations in the

informal sector. This phenomenon is not quite different from the one reported by Kayemuddin and Kayum (2013) who found that the informal automobile repair industry in Bangladesh is bedeviled with lack of working capital and difficulty in accessing credit facilities. The results further confirm the assertion of Akayeti, 2015); and Akpakpavi (2014) that Auto-mechanics in the informal sector have very limited access to bank loans to enhance their operation due to inadequate collateral security. Moreover, Osotimehin et al. (2012) also reported that the lack of short, medium and long term capital, inadequate access to financial resources and credit facilities affect the growth of micro and small scale enterprises like automobile workshops and this was consistent with result of the study. Similarly, the findings corroborate the position of Aggarwal et al. (2010) that auto-mechanics enterprises in Malawi are confronted with inaccessible credit facilities.

It was found that majority of the owners of auto-mechanic workshops in the informal sector lacked the requisite managerial skills to manage their enterprises. Due to the limited knowledge in business management and the fact majority of them were not educated beyond secondary education, they expressed difficulty in accessing the relevant business and market information needed to expand the operations and withstand the competition from automobile repair workshops in the formal sector. The results support the assertion of Osotimehin et al. (2012); and Kayemuddin and Kayum (2013) that owners of small scale enterprises such as automobile workshops in the informal sector face managerial problems such as improper book-keeping and costing systems, and lack of modern technical know-how. However, the indication that though a large section of auto-mechanics in the informal sector not have formal financial literacy skills, they had no challenge in terms of the managing their finances. This contradicts the assertion of

Kayemuddin and Kayum (2013) that managers of automobile repairs enterprises in the informal sector lack financial literacy skills and for that matter were not able to manage their finances well.

4.4 Level of Preparedness of Auto-Mechanics in utilizing the Opportunities

While a lot of opportunities may abound in the auto-mechanic industry in Ghana, the extent to which auto-mechanics in the informal sector can exploit the prospects and utilize the opportunities therefrom largely depends on the level of their preparedness to take charge of the opportunities. The views of respondents with regards to their level of preparedness to make use of the opportunities in the auto-mechanic industry were presented in Table 4.4 as follows:

Table 4.4: Level of Preparedness of taking advantage of Opportunities

Level of Preparedness of taking Advantage of Opportunities	Mean($\bar{x}$)	SD
I have employed skilled mechanics in my business	4.21	0.89
I have expanded my operations to meet the increasing demand	4.16	0.44
I look out for other sources of capital apart from bank loans and self-finance	3.94	1.01
I have acquired training in modern automobile technology	3.31	1.05
I have invested in modern equipment and technology to boost my operations	3.06	1.14
I have acquired skills in business management	1.08	0.59
I have tried applying for financial support from the government	1.05	0.38

Source: Researcher's Field Data (2017)

As part of efforts to prepare themselves to utilize the emerging prospects in the auto-mechanic industry, majority of auto-mechanics in the informal sector in the Kumasi Metropolis have employed skilled mechanics who have the requisite skill and knowledge in modern methods of automobile repairs to boost their operations as shown by a means

core of 4.21. Others indicated that they have expands their operations to take advantage of the increase in the number of automobiles in the metropolis which has led to growing demand for automobile repair services ($\bar{x}$ = 4.16). While auto-mechanics in the informal sector have complained of limited access to bank loans and overreliance on self-finance, majority of them have started exploiting other sources of finance to expand their operations and meet the increasing demand for automobile repairs as well as survive the competition in the industry ($\bar{x}$ = 3.94). As part of measures for improving their operations, majority of auto-mechanics have acquired training in the use of modern methods for automobile repairs in order to be able to cope with the changing trend and technological innovations in the automobile industry ($\bar{x}$ = 3.31). Coupled with acquiring skills in the use of modern methods of automobile repairs, it was found a lot of auto-mechanics were beginning to invest in electronic equipment and technology required for effective repair and maintenance of modern automobiles ($\bar{x}$ = 3.06). However, much effort was not made to improve the business management skills of a lot of the auto-mechanics since this appeared not to be a major priory for many of them as shown by a low mean score of 1.08. Also, auto-mechanics in the informal sector appeared to have lost all hopes in the government with regards to securing financial and logistical support from the government as indicated by a lowest mean score of 1.05.

Generally, qualified mechanical engineers in Ghana prefer to work in the formal sectors denying the informal auto-mechanic sector of skilled personnel to help enhance the quality of services provided by the sector. In an effort to expand their operations and compete favourably with automobile workshops in the formal sector, managers of auto-mechanic workshops in the informal sector employed skilled mechanics from some of the

country's tertiary and technical institutions to boost their operations. This is a perceived as a good step in that the automobile repair industry have been found to be constrained with the unavailability of skilled labour as reported by Borgave and Chaudhari (2010).

In the search for adequate capital to expand their operations, auto-mechanics in the informal sector resorted to other sources of finance such as family and friends support, group savings, support from micro-finance institutions, and application for financial support from international agencies and the government. This is in line with the suggestion of Kayemuddin and Kayum (2013) Osotimehin et al. (2012) that there is the need for new lending schemes and credit facilities, and the role of international agencies in contributing financial support to enhance the activities of auto-mechanics. Also, the acquisition of training in modern automobile technology and the use of electronic gadgets for repair services as reported by majority of the respondents was in support of the position of Edunyah (2015) that auto-mechanics in the informal sector need to undergo a series of training to upgrade their technical knowledge in the use of the modern electronic equipment and tools for automobile repair.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The chapter presents a summary of the key findings of the study and the conclusions made based on the findings. It also, presents the relevant recommendations made based on the findings for further actions and the suggestion for further research.

5.1 Summary of Findings

The study explored the prospects and challenges in the informal auto-mechanic sector focusing on auto-mechanics enterprises within the Kumasi Metropolis. Specifically, the study was set out to examine the prospects of the auto-mechanic enterprises, examine the challenges facing auto-mechanic enterprises, and the preparedness of auto-mechanics in the informal sector in to take advantage of the potential opportunities available to them. The study involved a sample of 164 managers/owners of auto-mechanic enterprises within the Suame Magazine in the Kumasi Metropolis. The study employed the quantitative approach to research and adopted the questionnaire as the main instrument for data collection.

The key findings of the study with regards to the three pertinent research objectives are presented as follows:

5.1.1 Prospects in the Auto-Mechanic Industry

Among the emerging prospects in the auto-mechanic industry as revealed by the study included the improvement in activities of technical institutions and universities offering mechanical courses towards the training of skilled personnel to enhance the operations of the auto-mechanic industry. The growing number of automobiles in the

country as well as the removal of taxes on imported spare parts were some of the favourable economic factors that were deemed to enhance the growth of auto-mechanic operations. Also, developments in the auto-mechanic industry such as the establishment of the Suame Magazine Automatics Technical Institute and the advancement in automobile repair and maintenance technology were found to be opportunities which could help develop the industry. In addition, the availability of cheap labour due to high unemployment in the country was seen as a good development in that it will help boost labour supply.

5.1.2 Challenges Facing Auto-Mechanic Enterprises

While the auto-mechanic industry may be bedeviled with numerous challenges, the major challenges reported in the study involved the unreliable supply of electricity to auto-mechanic workshops and the high cost of electricity and fuel, high cost of spare parts due to depreciation of the Ghana Cedi against the US Dollar, lack of financial support from government, and the high taxes and other levies paid by auto-mechanics. Other challenges included limited sources of finance and high interest on bank loans, lack of managerial skills to effectively manage auto-mechanic enterprises, lack of training in the use of modern methods automobile repair, and the continues use of manual and outmoded methods of operation.

5.1.3 Level of Preparedness of Owners of Auto-Mechanic Enterprises

In order to take advantage of the emerging opportunities in the auto-mechanic industry, managers of auto-mechanic workshops in the informal sector employed skilled mechanic and trained more apprentices to boost operations while at the same time

expanding their operations to meet the growing demand for automobile repair services. With the limited access to finance from banks by auto-mechanics, a large section explored other sources of finance such as group savings and family support. To cope with the modern trend in automobile repair, auto-mechanics found it necessary to acquire training in the modern and technological method of automobile repair and took a step further by investing in modern electronic equipment and gadgets to enhance their operations.

5.2 Conclusions

The findings of the study appear to suggest that there are emerging opportunities and prospects in the auto-mechanic industry that could be exploited by auto-mechanic workshop operators notwithstanding the numerous challenges bedeviling the industry. However, the extent to which auto-mechanics in the informal sector can exploit the available opportunities depends largely on their level of preparedness to overcome the obstacles that hinder their ability to take advantage of the emerging opportunities. Though government's economic and fiscal policies relating to utility and fuel tariffs, inflation, interest rate, and exchange rate, appeared to be major determinants of the dynamics in the auto-mechanic industry, by analyzing the prospects and challenges, it emerged that auto-mechanics who have or are willing to acquire some level of knowledge and skills in modern automobile maintenance technology in particular among other factors stand a greater chance of being successful in the industry.

5.3 Recommendations

Based on the conclusions of the study, the following recommendations were made for further actions by the relevant stakeholders:

i. Apart of efforts in promoting the operations of auto-mechanics, the government through the Electricity Company of Ghana should designate all auto-mechanic villages as essential areas in their future load shedding schedule to ensure the constant flow of electricity to auto-mechanics workshops. This will help avoid the challenges of erratic power supply that is reported to have a significant effect on the operations of auto-mechanics.

ii. Government should provide financial and logistical support towards the training of auto-mechanics to help upgrade their technical competencies and skills in order to enable them to develop their capability to repair modern automobiles without being kicked out of business due to technological advancements.

iii. Technical institution, universities and polytechnics offering automobile technology and mechanical engineering, the Gratis Foundation, and National Board for Small Scale Industries (NBSSI) among others should extend assistance particularly in the form of education and training of auto-mechanics in the modern methods of automobile repair. Also, government must place strong emphasis on vocational and technical education to encourage the youth to undertake auto-mechanic courses to ensure the availability of skilled personnel required by the automobile repair and maintenance industry.

5.4 Suggestions for Further Research

Based on the findings and limitations of the study, the researcher suggests that future studies in this area of research should consider the following issues:

i. Investigate the challenges that hamper the adoption of modern automobile repair technology by auto-mechanic in the informal sector

ii. Explore the strategies needed to transform the auto-mechanic industry into an automobile assembling industry

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APPENDIX: QUESTIONNAIRE

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

QUESTIONNAIRE FOR AUTO-MECHANIC WORKSHOP OPERATORS

You are kindly requested to fill this questionnaire on the challenges and prospects of auto-mechanic workshop operations in the informal sector. Please you are informed that the confidentiality of the responses you provide and your anonymity as a respondent are greatly assured. I hereby seek your cooperation to participate in this exercise.

Instruction: Please tick (√) the option that best describes your view and briefly explain overleaf when necessary.

Section A: Demographic Characteristics of Respondents

1. Please indicate your gender

   Male [ ] Female [ ]

2. Please indicate your age group

   Below 25 years [ ] 25 – 34 years [ ]

   35 – 44 years [ ] 45 years or above [ ]

3. What is your highest level of education?

   Basic education [ ] Secondary/Technical [ ] Tertiary [ ]

4. Please indicate your area of specialization

   General mechanic technician [ ] Special vehicle parts technician [ ]

   Auto-electrical technician [ ] Vehicle body technician [ ]

5. Please indicate your years of working experience in the industry

   Below 5 years [ ] 5 – 14 years [ ] 15 – 24 years [ ]

   25 years and above [ ]

Section B: Prospects of the Auto-Mechanic Workshop Industry

6. To what extent do you agree or disagree with the following as prospects of the auto-mechanic workshop industry? Please rank your responses using: 1- Strongly disagree, 2 - Disagree, 3 - Not sure, 4 – Agree, and 5 – Strongly agree.

Prospects of the Auto-Mechanic Workshop Industry	**SD**	**D**	**N**	**A**	**SA**
Partnership with Advanced Technical Institutions for Training					
Availability of automotive and mechanical engineers					
Training of auto-mechanics in modern automobile technology					
Introduction of automobile technology courses in universities					
Favourable Government Economic Policies					
Increase in the number of automobiles in the country					
Removal of taxes on imported spare parts					
The Ghana cedi gaining some strength against the US Dollar					
Development of Auto-Mechanic Industry					
Establishment of Suame Magazine Automatics Technical Institute					
Advancement in automobile repair and maintenance technology					
Establishment of auto-mechanic villages in major cities					
Collaboration with international agencies for financial support					
Access to Credit Facilities and other Sources of Funds					
Increase in the number of banks and other financial institutions					
Low interest rate on bank loans					
Financial support from government such as MASLOC					
Labour Supply					
Availability of cheap labour due to high unemployment rate					
Low cost of training apprentices					

Section C: Challenges facing Auto-Mechanic Workshop Operations

7. To what extent do you agree or disagree with the following as challenges facing auto-mechanic workshop operations in the informal sector? Please rank your responses using: 1- Strongly disagree, 2 - Disagree, 3 - Not sure, 4 – Agree, and 5 – Strongly agree.

Challenges facing Auto-Mechanic Workshop Operations	**SD**	**D**	**N**	**A**	**SA**
Electricity and Power					
The power supply to my garage is erratic					
The cost of electricity for my garage is very high					
The cost of fuel for my garage is very high					
Unfavorable Government Economic Policies					
I do not receive financial support from the government					
High cost of spare parts due to depreciation of the Ghana cedi					
The tax and levies I pay is very high					
Lack of Knowledge in Modern Automobile Technology					
I do have access to training in modern automobile technology					
I find it difficult using modern electronic equipment					
Lack of Funds and other Financial Constraints					
I have difficulty in accessing credit facilities					
I do not have more money to run my business					
Use of Obsolete Equipment and Methods of Operation					
I face competition from well-equipped workshops in the formal sector					
The equipment I use in my garage are outmoded					
Lack of Managerial Skills					
I find it difficult accessing business information from the media					
I do not have the skills in managing my business effectively					
I do not have much knowledge in how to manage my finances properly					

Environmental Challenges					
There is no proper disposal site for scrap and used oil products					
I have difficulty in obtaining site permit and license for my business					
The sanctions for causing environmental pollution are very severe					
I am concerned about environmental pollution issues					
Lack of Training Facilities and Inadequate Skilled Personnel					
I do not have knowledge in application of ICT to my business					
I do not have access to training in the modern methods repair					
There are no facilities for remanufacturing or recycling of scrap					
The cost of training apprentices is very high					

Section D: Level of Preparedness of taking Advantage of Opportunities

8. Please indicate with regards to the following areas, the extent to which you are prepared to take advantage of the opportunities available to the auto-mechanic workshop industry. Rank your responses using: 1- Not very prepared, 2 – Not prepared, 3 – Not sure, 4 – Prepared, 5 – Very prepared

Level of Preparedness of taking Advantage of Opportunities	**1**	**2**	**3**	**4**	**5**
I have employed skilled mechanics in my business					
I have expanded my operations to meet the increasing demand					
I take advantage of other sources of capital apart from bank loans					
I have acquired training in modern automobile technology					
I have invested in modern equipment and technology to boost my operations					
I have acquired skills in business management					
I have tried applying for financial support from the government					