

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION-KUMASI

**ASSESSING THE SKILLS OF ROADSIDE MECHANICS IN DIAGNOSING
AND FIXING PROBLEMS OF VEHICLE SYSTEMS AND COMPONENTS IN
THE TAMALE METROPOLIS**



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JULY, 2016

**ASSESSING THE SKILLS OF ROADSIDE MECHANICS IN DIAGNOSING
AND FIXING PROBLEMS OF VEHICLE SYSTEMS AND COMPONENTS IN
THE TAMALE METROPOLIS**

**A DISSERTATION PRESENTED TO THE DEPARTMENT OF
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FOR THE AWARD OF MASTER OF TECHNOLOGY
(MECHANICAL) DEGREE.**



**BY
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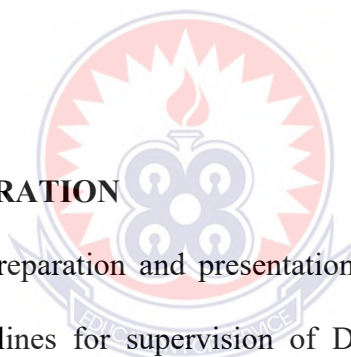
DECLARATION

STUDENT'S DECLARATION

I, BABA ZIBLIM, declare that this dissertation, 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 work was supervised in accordance with the guidelines for supervision of Dissertation as laid down by the University of Education, Winneba.

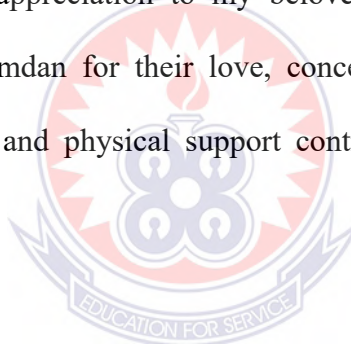
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DATE.....

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DEDICATION

I dedicate this study to my father Mahama Ziblim unfortunate enough; he is resting in eternal peace. I also dedicate it to my dear wife Rashidatu, and children Jamilatu, Rahama and Hamdan, and to my best friend Abukari Mohammed, Finally to my mother Ziblim Napari who laid a strong foundation to my education.



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ABBREVIATIONS

CS – Customer Satisfaction

DVLA – Driver and Vehicle Licensing Authority

GSDI – Ghana Skills Development Initiative

ICT – Information and Communication Technology

LESDEP – Local Enterprise and Skills Development Programme

MMDA – Metropolitan, Municipal and District Assemblies

MSE – Micro and Small- scale Enterprises

MVRSI – Motor Vehicle Repair and Service Industry

NBSSI – National Board for Small Scale Industries

NBTE – National Board for Technical Education

OBD – On Board Diagnostic I, II, III.

OSHS - Occupational Safety and Health Standards

PDL – Potable Data Link

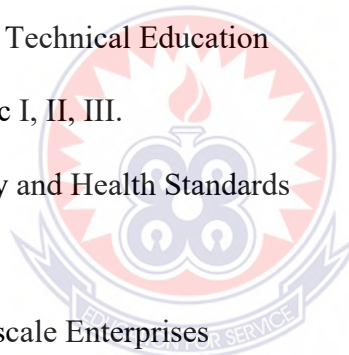
SME – Small and Medium-scale Enterprises

SPSS – Statistical Package for Social Sciences

TQM – Total Quality Management

TVET – Technical and Vocational Education and Training

UNDP – United Nations Development Programme



ABSTRACT

This dissertation assesses the skills of roadside mechanics in diagnosing and fixing problems of vehicle system and components in the Tamale Metropolis. In the study, the various vehicle repair and maintenance skills used by roadside mechanics, challenges facing them and the satisfaction level of drivers who patronize their services were investigated using a questionnaire. Table 1 revealed that a large number of the auto-mechanics in the Tamale Metropolis have considerable years of auto repair working experience, but lack the ability to inspect and repair modern electronic vehicles due to low educational and technical levels. Table 2 also indicates that, the auto mechanics lack the ability to use modern diagnostic equipment, manufacturer's manuals, computers and internet which have characterized modern vehicle repairs, in their repair practices. They also lack adequate tools, equipment and other logistical supports. It can be concluded that most of the drivers are not satisfied with the quality of service rendered by the automotive service garages especially in the area of electronics. It is recommended that, government assist in training roadside mechanics to upgrade their knowledge and skills in the area of electronics. Government of Ghana could also give these tools (scan tool) to the mechanics on hire purchase. Training institutions and organizations such as the universities, polytechnics, National Board for Small Scale Industries (NBSSI), etc., should assist particularly in the form of education, training and equipment to these local garages. This is to enable them remain in business and prevent garage closures due to their inability to repair modern automotive vehicles.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

These days have witnessed a rapid growth of automotive industries all over the world. 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. These call for a skillful mechanic to be able to deal with modern day vehicle design. The skills of auto mechanic are often developed contemporaneously in workshop. Practical skills referring to the ability to use tools effectively and in an efficient manner, the ability to undertake the work of the day such as brake repair, transmission rebuilding and the like, and the ability to diagnose problems associated with repair of automotive vehicles (Barber, 2003).

According to Uwameiye and Omofonmwan (2014), roadside mechanics acquire skills but these practical skills only involved assembling of parts. These practical skills are mostly devoid of diagnostic skills and knowledge information. Because of this deficiency, apprentices were hardly able to perform any operations that are new to them, except those they have seen their master carry out. In the practice of skills, the recipients observe the master trainer perform the operations, and through imitation, the apprentices then practice the skills until they become proficient in them. Kayumuddin and Shakila (2013) indicated that productivity was low in automotive workshops in Bangladesh as the service was rendered by hands. Tools and equipment used were mostly outdated and these affected their ability to work on complex systems especially electronic and automatic transmission systems. The study further revealed that abundant labour is available in Bangladesh and as such all of these workshops used labour intensive technology.

The study conducted by Sambo and Shamang (2012) showed that working experience or number of years spent with master craftsman affects the skills acquired by apprentice. To become a master craftsman, you need to have strong practical skills. You need to be good at problem-solving and faults detection. You also need to have good human relations and great customer service skills (Institute of motor industry 2012). The Internet is even spreading to mechanics, with certified mechanics providing advice online. Mechanics themselves now regularly use the Internet for information to help them in diagnosing and/or repairing vehicles. Service manuals for vehicles have become significantly less prevalent with computers that are connected to the Internet taking their position (Jeffrey, 2015). In repairing cars, the main role of the mechanic is to diagnose the problem accurately and quickly. They often have difficulty in diagnosing electronic faults. Study shows that their job may involve the repair of a specific part or the replacement of one or more parts as assemblies (Funkhouser, 2013). Roadside mechanics have to compete with large companies which use expensive diagnostic equipment and have advantages in purchasing, distribution and marketing. Small companies can compete effectively by providing superior customer service or offering specialized services (Auto repaired Business and Trends, 2012).

Jalal (2015) discovered from a skill gap analysis that majority of the mechanics in Nigeria lack the relevant knowledge about vehicle electrical and electronic components repair. Technology in the auto sector advances continually at a very fast pace. Most cars on our roads today are built with a lot of electronically controlled systems. The only way to catch up with this advancement is training and re-training. According to Kayumuddin and Shakila (2013) in the past few years, the auto industry in India has seen major changes in designs and special features, and keeping these cars maintained and on the road takes highly skilled technicians and mechanics to diagnose and fix problems.

Mechanics are responsible for inspecting, repairing and maintaining cars, buses, trucks, motorcycles and other vehicles. In recent years, the systems and components of these vehicles have become more complex. However, mechanics lack the skills to work not only with special tools and diagnostic equipment, but also with sophisticated electronics and computer systems. (Funkhouser, 2013).

African Economic outlook (2005) report indicated that Small and Medium Enterprises (SMEs) in Ghana are the focal point of the government's efforts to spur growth and reduce poverty. SMEs of the automotive service centres are found in both urban and rural areas, and cover wide spectrum of automotive vehicle service activities. These auto service garages need to compete globally, providing quality service is necessary to increase productivity. The reason why automotive industry is chosen for this research is that the automotive industry can be considered as one of the most important and strategic industries in the service sector. Thus, there is the need for automotive service industry, comprising the small and medium enterprises (SMEs) to conform to the quality standard in order to provide good quality service for cars. Osman et al. (2009) describes their concern towards total quality management (TQM) in the automotive industry as being crucial to the general quest for quality-serviced cars and the increasing competition between the local car service garages and the standard car service garage. Quality in the sense that, surviving in the industry will depend on quality of services delivered to prospective customers. In a competitive industry, such as the automotive industry, customer service makes the difference between a firm's overall success and failure. When poor service is experienced, both the firm and the customer are negatively impacted, the customer receives poor service and the firm loses future potential sales. Rajnish and Satyendra (2010) stated that, quality of service rendered by mechanics is at the core of the success of any service firm, and the automotive service dealership

industry is no exception. In addition, customers are much concerned about quality after sales service received irrespective of the service dealership. In the motor industry, it is standard practice for vehicle manufacturers to conduct ongoing research to monitor customer perceptions of the quality of the service provided by their dealers, namely the franchised vehicle retailers. Determining the influence of service quality in the automotive service industry in Ghana is needed as a strategy for continuous improvement of service quality in order to fulfill customer's satisfaction. The need to fulfill customer's satisfaction depends significantly on the product performance, reliability, responding to customers' needs and wants and continuous improvement. Focusing on the local automotive fitting shops, this research is focused on assessing the skills of roadside mechanics. This area of investigation has not been given full attention in automotive industry in Ghana. Mechanics in the automotive industry in Ghana provide services which are seen to have great impact on the economic development in the country, yet, their services are often said to be influenced by a number of factors. When this happens the image of the service provider is greatly affected. A number of cars in the country receive after sales services at roadside auto workshops as an alternative to standard dealership service centres. These service workshops are mostly handicapped in terms of skills and modern facilities among others in their quest to providing quality services to their prospective customers. The numerous problems revealed by past studies associated with skills of roadside mechanics conducted in some parts in Ghana makes it necessary to undertake a study to assess the skills of roadside mechanics in the Tamale Metropolis.

1.2 Statement of the problem

These days are marked with enormous improvement in roads, highways and transportation system in Ghana. A large number of vehicles and motorcycles are plying these roads. These vehicles need servicing and repairs every time they are operated and used. Temporary servicing and repairs workshops are set up by the road sides and the highways to provide petty repairs and servicing to those vehicles and motor cycles. When the vehicles ply on the roads or during their movements through roads they need some services to keep them fit for plying. It is, thus, inevitable that some repairing workshops should be set up near the road side to render services to the vehicles when they go out of order or become inoperative. Mechanics are responsible for inspecting, repairing and maintaining cars, buses, trucks, motorcycles and other vehicles. In recent years, the systems and components of these vehicles have become more complex. Mechanics today lack the skills to work not only with special tools and diagnostic equipment, but also with sophisticated electronics and computer systems, (Funkhouser, 2013). Roadside mechanics play important role in the socio-economic development of Ghana. They provide services to car owners to put their cars on road. Since most vehicles are now being manufactured and controlled by modern technology, it takes a skillful auto mechanic to properly diagnose and fix problems associated with vehicles. According to Kayumuddin and Shakila (2013) in the past few years, the auto industry has seen major changes in designs and special features, and keeping these cars maintained and on the road takes highly skilled technicians and mechanics to diagnose and fix problems.

Unfortunately there seems to be inadequate mechanics who are experts in carrying out the right diagnosis which can save automotive owner's time and potentially a substantial amount of money. Few studies have been carried out to assess the skills of roadside mechanics. The few studies that were conducted in Ghana (Edunyah, 2015; Akpakpavi,

2015; Agebure, 2014) did not measure the satisfaction level of the clients (vehicle owners) and also did not include Tamale Metropolis, even though a good number of roadside mechanics can be found in Tamale. It has therefore become imperative to assess the skills of the roadside mechanics in the Tamale Metropolis in diagnosing and fixing problems of vehicle systems and components.

1.3 Purpose of the study

The purpose of this study was to assess the skills of roadside mechanics in diagnosing and fixing problems of vehicle systems and components. The study therefore obtained the views of the master craftsmen and their chief apprentices on the needed skills and difficulties they faced in their workshops. It also sought to examine the extent to which roadside mechanics can fix vehicle problems.

1.4 Objectives of the study

The main objective of the study is to assess the skills of road side mechanics in diagnosing and fixing problems of vehicle systems and components. The following are the specific objectives that will lead to the achievement of the main objective:

1. To assess the skills needed by roadside mechanics to diagnose and fix problems of vehicle systems and components.
2. To determine the challenges roadside mechanics really face in diagnosing problems of vehicle systems and components.
3. To determine the satisfaction level of clients who patronize roadside mechanics.

1.5 Research questions

In conducting a study that looks at the skills in diagnosing and fixing problems of vehicle systems and components, the researcher intends to find answers to the following questions:

1. What are the skills needed by roadside mechanics to properly diagnose and fix problems of vehicle systems and components?
2. What are the challenges that roadside mechanics really face in diagnosing problems of vehicle systems and components?
3. To what extent can roadside mechanics satisfy their clients?

1.6 Significance of the study

This study will be useful since it seeks to assess the skills of roadside mechanics. The research will be of great significance to preparation of a repair manual based on the findings of the study. The study will promote effective implementation of skills issues on the roadside mechanics in the Metropolis. It will draw the attention of the mechanics to the common challenges that keep emerging. The study will also be useful to research students and research organizations since the research report will provide an important source of literature for further studies relative to the issue. It is in the light of the above, that the researcher found it necessary to scientifically assess the skills of roadside mechanics in diagnosing and fixing problems of vehicle systems and components in the Tamale Metropolis.

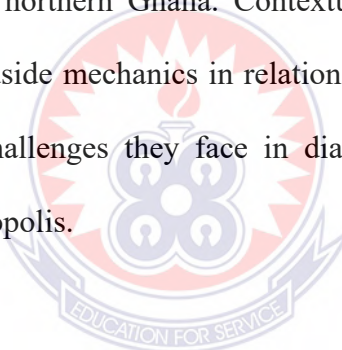
1.7 Limitations of the study

The researcher anticipates certain challenges in the conduct of this study. In the first place, there will be the difficulty of convincing the roadside mechanics to provide their views and opinions on the phenomenon being investigated. In view of the fact that, some

roadside mechanics consider information on certain vital parts of vehicle engines to be sensitive and delicate such as the automatic shift transmission gear box, and may be reluctant to release such information. However, the essence of the research (academic purpose) will be sufficiently explained to the roadside mechanics in Tamale. Confidentiality will also be assured to the effect that information obtained would be treated as such.

1.8 Delimitations or scope of the study

The research was limited to the operations of roadside mechanics, located in the Tamale Metropolis in the Northern Region of Ghana, in contributing to the repair and maintenance of vehicles in northern Ghana. Contextually, the research looked at the operations and skills of roadside mechanics in relationship with stakeholders within the northern region, and the challenges they face in diagnosing and fixing problems of vehicles in the Tamale Metropolis.



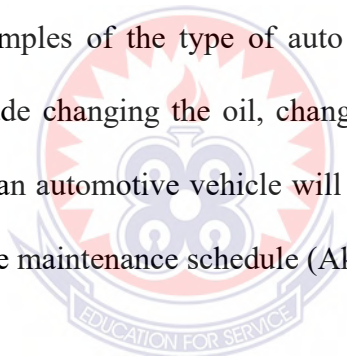
1.9 Organization of the study

The study will be organized into five chapters. Chapter one of the study deals with the introduction which comprises background to the study, statement of the problem, objectives of the study, research questions, significance of the study, scope of the study and the organization of the study. Chapter two deals with a review of literature to enable the researcher grasp the understanding of the concepts for the study. Chapter three presents the methodology in order to bring out the processes of data collection. Chapter Four presents and analyses the data leading to findings. Finally, the last which is chapter five summarizes the findings, comes out with the conclusion and eventually proposing recommendations to address the challenges.

CHAPTER TWO

LITERATURE REVIEW

The use of automotive vehicles on our roads plays a key role in road transportation system. In Ghana where land transport is largely in use compared to water, air as well as other modes of transportation, the use of automotive vehicles, either diesel or petrol driven is predominant. However, the vehicles cannot remain new forever. A continuous use of the vehicles results in their general wear, tear and breakdowns and as the parts breakdown and wear out, so, must be maintained. When something is maintained, the idea is to keep it in a good and functional state. Vehicle maintenance refers to a practice where an automotive is serviced on a regular basis to prevent a major breakdown or the need for major repair. Examples of the type of auto services that may be sought for maintenance purposes include changing the oil, changing the spark plugs, and rotating the tires. It is believed that an automotive vehicle will last longer and operate better if a person adheres to the vehicle maintenance schedule (Akpakpavi, 2014).



2.1 Skills requirements of roadside mechanics

Motor vehicles which were manually operated some centuries back are now electro-mechanically operated. Computers are common place in modern day automotive design; braking, steering, starting and suspensions system are few examples of items now technologically operated (Duffy, 1995). Automotive technology has been evolving since the turn of the century. Santini (1992) stated that during the period from 1930 to 1970, the main body of automotive technology was mechanical they were relatively simple for any roadside mechanic to repair. By the early 1980's the introduction of information technology in automotives has triggered the most rapid technological advancement in the automotive industry. With the computers available, automotive designers have developed

numerous sensors and controls. Now computers have even been used as components parts for brakes, steering, chassis systems and other parts of automobile. Technologies have recently been incorporated in all new automotive subsystems and have become standard implementation on many others. Such features as antilock braking system and airbag could only be achieved practically through the use of technology. These features are rapidly becoming standard features in all new automotive owing to change in customer's taste for automotive and status symbols attached to car ownership. All these systems require maintenance and repairs. The competencies required to maintain automotive of the 1900,s show little similarity with the competency required of the 1970s. Lindsay (2013), Stated that around 1970,s and 1980,s roadside mechanics used what is termed the 'try and error' to repair almost all automotives. Rapid development of automotive technology has presented some challenging problems for roadside mechanics in the country. Ribbens (1998) noted that the use of scan tools like On-Board Diagnostic, One, Two and Three (OBDI, OBDII, and OBDIII) are common place in the repair of automotive in the manufacturer's approved service centres today. The on-board diagnostic (OBD) is an automotive term referring to a vehicle's self-diagnostic and reporting capability. OBD systems give the vehicle repairer access to the status of the various vehicle sub-systems and give the mechanic a clue as to where to look at when a problem occurs on the vehicle. But for one to be able to use this tool the mechanic must be able to understand the principles behind its usage (Edunyah, 2015).

The US Department of Labour Statistics (2012) estimated that due to the increasing average lifespan of cars and growth in the number of cars being driven, the department projected the demand for automotive mechanics to increase 9% between 2012 and 2022. Those with specialized knowledge or training will have the best opportunities. The rate of change in technology is exponentially increasing. Nations, industries, and individuals

must develop their capabilities to keep abreast of technological changes and to harness technology. Automotive workshops are category of small industry that contributes to the maintenance of vehicles. The repairing workshop plays an important role in the economy of every nation through maintaining motor vehicles in an efficient manner which helps in making transport services more efficient. Automotive workshops and repair shops can be divided into several categories. Firstly, there are the auto parts stores that also maintain service operations. A majority of automobile repair workshops are independently owned and operated businesses (Kayemuddin & Kayum, 2015).

In Ghana, most of the vehicle maintenance and repair jobs are performed by roadside mechanics, this research seeks to assess the skills of the mechanics in the advent of automotive technology advancement and the opportunities available to these roadside mechanics so as to prevent them from becoming career disabled due to increase in vehicle technology. The Motor Vehicle Repair and Service Industry (MVRSI) is a thriving industry, with several small open-air garages in towns across Kenya (Kinyanjui, 2000). With increasing technical sophistication, the human resource in the MVRSI requires continuous development of technical and interpersonal skills necessary for them to remain relevant in their practice. Barber (2003) advanced three reasons for the importance of technical training: changes in administrative structures, technological advancement and tougher occupational health and safety laws. He provides an example of a vehicle repair mechanic who has to undertake extensive ongoing training to maintain and fix the latest models of cars with computer-operated parts, keyless entry, global positioning systems, automated stabilizing systems, and other related inventions. In Kenya United Nations Development Programme [UNDP] (2010) observed that most Vocational Education and Training (VET) institutions used very old models of vehicle engines for their automotive practical training. Thus, the graduates are confronted with

challenges at the workplace because their training is not aligned to the technological know-how required for the industry (Kitainge, 2003).

Education as a means of survival is referred to as the change in the behavior of an individual from birth to death. This means that what an individual learns as a way of acquiring knowledge and knowing about a certain concept(s), which brings about changes in the individual, is education. During the 1940s (the colonial era), education in Nigeria was geared towards the training of people who would be able to read and write and subsequently be employed as clerks and interpreters (Fafunwa, 1974). The observation above seems to have narrowed the meaning of education, as its boundary did not extend beyond reading and writing. Education does not only imply the process of going to school, as it is more than just having a formal education, hence education is described by Urevbu (1991) as the total process of human learning by which knowledge is imparted, faculties trained and skills developed. From this definition, school is only one agent through which education is provided. There are other agencies of education as well: the home, the family, the peer group, the mass media, churches and so on. Acquisition of knowledge is realised through informal, non-formal and formal means.

Today, non-formal apprenticeship programs are provided in many areas such as tailoring, hair weaving and iron bending, carpentry, brick laying, auto-mechanics, auto-body repairing, air conditioner maintenance, tire vulcanising, electrical installing, furniture making, welding/ fabrication, sheet metal work, machining (turning), fitting and foundry work and so on. An important component of the non-formal apprenticeship programs in Nigeria is that a contract agreement is entered into between the master craftsman and the apprentice. Such contractual agreement incorporates the fee payable by the apprentice and the period of training. Also spelt out is the penalty when either party breaks the contract. Uwameiye and Iyamu (2002) stated that the set-up for the training workshop

involves the master craftsman (trainer), and the apprentice (trainee). The master craftsman has full control of the workshop. The roadside workshops are organised along the line of the master/apprentice situation, where the master craftsman owns all the tools, workshops and skills from which the apprentices benefit. Ugonabo and Ogwo (1991) reported that the system is faced with the task of providing a range of training and technical competence needed by the society and the economy, and through articulated measures, enhances the economic well-being of the nation. According to Okogba (1991) they often illiterate or semi-illiterate master models develop training programs lacking basic theoretical concepts. Although local tradesmen may function successfully in the labour market, they remain in the final analysis in the lower cadre of manpower personnel and their practical expertise degenerates into mechanical manipulation. It is no gainsaying that the roadside apprentice program has contributed immensely to the Nigerian economy. It has provided training opportunities to many Nigerians who would have become social nuisances to the public. It has become an indispensable complement to formal education. A lot of demands are being made on it. However, the contribution the roadside apprenticeship is making to the national economy is high, leaving the master craftsman to control the training situation of the apprentice seems to place too much responsibility on that person. The Federal Republic of Nigeria's realisation of the importance of the roadside apprenticeship can be seen in its policy which states that "the question of accreditation for roadside mechanics and others who complete training programs through non-formal education will be undertaken by the National Board for Technical Education (NBTE)". It is more than three decades since this policy was promulgated, but no roadside mechanic has been accredited, and there is no plan for implementing the policy. Also, there have not been any objective statements written for these apprentice programs (Uwameiye & Omofonmwan, 2004).

The local automotive repair and maintenance garages in Ghana are essentially classified as micro, small and medium scale garages. These designations are 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 garages can be further grouped into urban and rural. Automotive vehicle garages essential helps to service and maintain the vehicles (Akpakpavi, 2014).

Modern automotive are a blend of 20th century and 21st century technology. The designs of modern vehicles have advanced to a very sophisticated level. Unlike the old mechanical operated vehicle systems, the modern vehicles are being operated and controlled by computerized electrical sensors. Indeed, almost every other function within the engine is controlled by an onboard computer. Moreover, common to majority of the new trend cars is the brain box and other electronic gadgets that sense instant faults in the vehicle and immediately notifies the driver through the dashboard display. The modern trend of mechanical services therefore requires the use of more complex and highly technological specialty diagnostic equipment to analyze vehicle faults for repair and service. To ensure this for efficiency, safety, comfort, style and so on, competent professional hands are required. As vehicle technology and maintenance processes are advancing, the problems facing automotive garages in the country have rather compounded. Currently, it is a common knowledge that a large proportion of the auto mechanics, both the experienced and trainees, of the local garages in the country find it extremely difficult to diagnose, repair and maintain modern cars. Indeed, this has worked

to the effect that most of the local garages in the country, especial the micro and small ones are now currently out of business.

Apprenticeship training leads to the acquisition of skills as well as basic scientific knowledge. It is a planned program and learning experiences that begins with exploration of career options, supports basic life skills, and enables achievement of high preparation for industry-defined work, and advanced and continuing education (Washington-Office of Superintendent of Public Instruction, 1996; Maclean & Wilson, 2009). Vocational education is a practical instruction that gives learners specific occupational skills. It is “training for a specific vocation in industry or agriculture or trade” (Webster, 1993). Thus vocational education and training prepares learners for careers that are based in manual activities and traditionally non-academic that relate to a trade, occupation or vocation. Specifically, vocational and technical education gives individuals the skills to learn and become productive citizens and for advancement in the workplace (Oni, 2006). Some scholars perceive technical and vocational education as one of the “bulwarks of social efficiency” as the preparation of a well-trained workforce. (Camp, 1983). And because of the unrelenting changes in the new global economy one may not be relevant in the labor market in future without a certain level of technical skills. The neglect of vocational and technical education in Nigeria leads to the dearth of skilled technical manpower to maintain the nation’s critical infrastructure and to tackle its developmental challenges (Dike, 2009).

Before deciding how you will develop your small engine repair shop, you need to research what similar businesses are going to be profitable. You should also consider the following key aspects of your business: available or proposed facilities in your community, the ability to locally ship heavy equipment, and your target market or the expected reach of your business. Finding out what similar businesses are doing and the

types of services they provide is a very valuable use of your time. Look for businesses in other parts of the state that you want to be like, and interview the business owners to learn from their experiences. If you are starting up your similar business in a different region, owners of comparative businesses are likely to be more willing to share information about their challenges and what lessons they have learned to stay in business (University of Alaska Center for Economic Development, 2008). Before you consider other business-related requirements, you should evaluate your community and its ability to support a profitable small engine repair shop. While small engine repair shops can cater to community demands in scale and service, your community may not have enough demand to make it profitable, or there may not be room for another small engine repair shop. If your community is very small and already has some sort of small engine repair shop, you might find it hard to develop a new business, unless you have a significant edge over your competitors. It is very important to do this kind of research. Use the location evaluation worksheet to find out what the community has to offer, and what competition already exists. The other aspect of evaluating location is deciding where to locate your small engine repair shop. The best location for you will depend on the scope of your business and the layout of the community. You want to be visible and easily accessible to people doing other things in your community. If in doubt, ask around the community and see where others think the most convenient location would be. Some small business owners have developed shops adjacent to their homes. This might be a low cost start-up alternative but, before investing in this location, find out whether if there are community zoning or other requirements that restrict this type of activity (University of Alaska Center for Economic Development, 2008).

The most common automotive repair workshop in Ghana is the local garages where a group of automotive mechanics come together to offer automotive maintenance and repair services. They operate under the informal sector with normally one master owning the shop. The shop is normally built on a piece of land hired from a landlord. A typical local automotive repair workshop has master mechanics that have different specialization in automotive systems. They include automotive electrician, automotive mechanic, welder, brake binder, interior vehicle liner, body sprayer, etc. However, in Ghana, a classical local automotive repair workshop has not less than three master mechanics in their specialized areas of automotive electrical, automotive mechanic and brake binder. Each master normally has apprentice trainees who are studying under them. Similar study conducted by Adei and Osei- Bonsu (2011) in Kumasi, the second largest city in Ghana also indicated that about 54% of sprayers including auto body sprayers practiced their work in the open air but stored their solvents and equipment in small wooden structures, 13.3% of sprayers practiced in a wooden structure which served as their workshop, and also storage place for their solvents and equipment. Another group of automotive repair workshops are garages owned by one person but employs automotive mechanics specialized in different areas. Automotive repair workshops belonging to this category are few in number relative to individual masters owning their garages. They are also engaged in the repair and maintenance of vehicles. Workshops owned by international automobile companies are also opened to the general public for general vehicle repair and maintenance but most people do not patronize their services because of the relatively high fees charged. In Ghana, vehicle owners prefer local automobile workshops for carrying out repair and replacement of parts. This is usually because of proximity and low service charges.

African mechanics are so great and we can see their skills in swapped engines from one car to another. In US, the same skill is used in swapping V8 Chevy engines into Jaguars. One of the silver linings of embargo in Cuba is that you can still see cars made in the fifties refurbished. In United States and Europe, those are called vintage cars. It takes specially trained mechanics and panel builders to turn those old cars into middle age men's little darlings that make their ladies compete for time spent on these cars. The fear is that very soon, the skills of our mechanics may be limited to old cars and older men and women that work on them. The new trainees may eventually lose out on the new automotives to work on since most of them are not made in Africa. The skills needed to work on new cars may have to be imported as we import some constructions materials and technicians for roads, bridges and sophisticated high rise buildings. (Nigeria Village Square, 2015). Roadside mechanics and technicians have been losing business to world's big auto dealers. Auto dealers are emphasizing it in their contracts that if you take their cars out to an unauthorized mechanics, your warrantee would be voided. They want to make it impossible to even change tire or oil at a nearby mechanic. So we have to take the cars to a dealer, no matter how far it is from our villages. However, the time designer skilled mechanics work on the fairly used cars today is being limited by the international big car makers. These new cars are so module-complex in closed system that you have to take them to the authorized dealers for service. Cross training in different car makes is dying since the big manufacturers only train dealership mechanics on how to work on their automotives. Indeed the whole of Africa must prepare for BP i.e. Beyond Petrol. The way automotives are going high tech, most of the future cars are going to be run on electricity.

Before we get to that, we must solve the problem our mechanics are having with these new and fairly used cars. Some African countries are not sitting idle waiting for the rest of the world to pass them by. Apart from South Africa that has always kept up with the rest of the world while the many of their people are still left behind like the rest of us, some states governments in Nigeria are changing the old mentality of mechanics. Anambra and Lagos State have reformed the old dirty mechanics we used to know and many of them are taking courses to upgrade their skills in high tech auto plants. The same is true in Kaduna; and in Ondo mechanics are encouraged with new facilities, locations and training to also prepare them for the new technology that is already here. So, ultra-modern Mechanic Village was launched in Akure recently towards this goal. The used car market is big in Africa because most people cannot afford to buy brand new cars. Even when they can buy brand new cars, fairly used or older cars are more prestigious and cheaper. They come with respect and class. If we are concern about creating jobs for our mechanics and getting them employed in the future, the time was like yesterday not in the future. Anambra, Lagos, Kaduna and Ondo must do more. The real business is in car parts, maintenance and service of old and new cars. If they do not want our friendly neighbourhood mechanics to touch the new cars we bought with our own money, we need to open more manufacturing plants in Africa, not more assembly plants. Moreover, there is no reason for importing cars parts from overseas when those made in Africa create skills and jobs out of our demands for more products. Unfortunately, not all of us can afford the dealerships' prices. There are some exotic cars in many capitals and big cities of Africa that are not serviceable locally. Nigerians of dubious wealth are known to have flown their Mercedes, Ferraris, BMW and others on their private planes for services in Europe. So they have no problem if the dealers decided to run our roadside mechanics out of business. This problem is not like any other

where our exotic tastes create foreign demands for goods and services. We had Peugeot assembly plants doing well until we refused to patronize them in the 80s while importing cars we had no input in their assembly or manufacture. Talking about cutting our noses to spite our faces, we could care more (Nigeria Village Square, 2015).

Automotive service technicians and mechanics could use high-tech skills to inspect, maintain, and repair automobiles and light trucks with gasoline engines. The increasing sophistication of automotive technology now relies on workers who can use computerized shop equipment and work with electronic components, while maintaining their skills with traditional hand tools. Because of these changes in the occupation, workers are increasingly called "automotive service technicians," and the title "mechanic" is being used less and less frequently (School Soup, 2015).

According to Uwameiye and Omofonmwan (2014), roadside mechanics acquire skills. These practical skills only involved assembling of parts. These practical skills are mostly devoid of diagnostic skills and knowledge information. Because of this deficiency, apprentices were hardly able to perform any operations that are new to them, except those they have seen their master carry out. In the practice of skills, the recipients observe the master trainer perform the operations, and through imitation, the apprentices then practice the skills until they become proficient in them. Kayumuddin and Shakila (2013) indicated that productivity was low in automotive workshops in Bangladesh as the service was rendered by hands and use tools and equipment which were mostly outdated and these old tools affected their ability to work on complex systems especially electronic and automatic transmission systems. The study further revealed that abundant labour is available in Bangladesh and as such all of these workshops used labour intensive technology.

The study conducted by Sambo and Shamang (2012) showed that working experience or number of years spent with master craftsman affects the skills acquired by apprentice. To become a master craftsman, you need to have strong practical skills. You need to be good at problem-solving and faults detection. You also need to have good human relations and great customer service skills (Institute of motor industry, 2012). The Internet is even spreading to mechanics, with certified mechanics providing advice online. Mechanics themselves now regularly use the Internet for information to help them in diagnosing and/or repairing vehicles. Service manuals for vehicles have become significantly less prevalent with computers that are connected to the Internet taking their position (Jeffrey, 2015). In repairing cars, the main role of the mechanic is to diagnose the problem accurately and quickly. They often have difficulty in diagnosing electronic faults. Study shows that their job may involve the repair of a specific part or the replacement of one or more parts as assemblies (Funkhouser, 2013). Roadside mechanics have to compete with large companies which use expensive diagnostic equipment and have advantages in purchasing, distribution and marketing. Small companies can compete effectively by providing superior customer service or offering specialized services (Auto repaired Business and Trends, 2012). Jalal (2015) discovered from a skill gap analysis that majority of the mechanics in Nigeria lack the relevant knowledge about vehicle electrical and electronic components repair. Technology in the auto sector advances continually at a very fast pace. Most cars on our roads today are built with a lot of electronically controlled systems. The only way to catch up with this advancement is training and re-training. According to Kayumuddin and Shakila (2013) in the past few years, the auto industry has seen major changes in designs and special features, and keeping these cars maintained and on the road takes highly skilled technicians and mechanics to diagnose and fix problems. Mechanics are responsible for inspecting,

repairing and maintaining cars, buses, trucks, motorcycles and other vehicles. In recent years, the systems and components of these vehicles have become more complex. However, mechanics lack the skills to work not only with special tools and diagnostic equipment, but also with sophisticated electronics and computer systems. (Funkhouser, 2012).

Innovations in the automotive industry have gradually transformed what it means to be an auto repair worker. As the cars on our streets have become more computerized, so, too, has the job of maintaining and fixing these vehicles. And so a trade that was once largely mechanical is today primarily technical, and therefore requires workers to be skilled computer users, strong readers and able mathematicians (Halzack, 2013). According to Otis (2007) the skills of an auto mechanic will vary greatly. Some mechanics develop the skills to work on all parts of a vehicle, while others choose to specialize in a particular field. He father said that a competent car mechanic should also have mastery over a wide variety of integrated skills, such as the electrical system, fuel system, and the air conditioning system. Computer skills are also needed in the day-to-day operations, and are as much a part of the tool box as wrenches. As knowledge is gained, it becomes easier to move into higher paying positions.

As time goes on, many older master craft men may be out of business because they don't possess the computer skills necessary to work on modern cars and also impact knowledge on the aspiring auto mechanics of today. With additional skills, it's easy to gain employment. And, if you've acquired the proper training and skill set, doors will open wide for you. The ability to endure the profession is a key ingredient that most auto mechanics possess. It's a given that most mechanics have entertained a lifetime fascination with cars. Thus, it's rare to jump from one career field to the next once you're

a mechanic. Around the fifth year, many auto mechanics have been exposed to a variety of problems, and have gained enough experience to become specialists. Continual training is ongoing. Ten years out, the most experienced and ambitious automotive mechanics may open their own shops, and those working at dealerships may have risen to supervisory positions (Otis, 2007). In addition to helping individuals develop technical knowledge and vocational skills necessary for the world of work, they should also be helped to relate skills to development, predisposition, personal construct and frame of reference, for these influences skill development. There should also be a way of encouraging them to put these skills into effective practice. Give training and impart the necessary skills to individual who shall be self reliant economically (Umunadi & Kennedy, 2013).

2.1.1 Facilitation of acquisition of skills in Ghana

The government of Ghana through the Ministry of Local Government and Rural Development established the Local Enterprises and skills Development Programme (LESDEP) as a public-private partnership in April, 2011. LESDEP has successfully opened offices in all 170 Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana with the sole objective of creating and facilitating the acquisition of technical, entrepreneurial and other specialized skills that will lead to the creation and management of sustainable businesses by the unemployed youth in the country, and providing start-up equipment and post-set-up support services to micro and small enterprises in Ghana (Local Enterprises and Skills Development Programme (LESDEP, 2013). Laudable as the interventions are, studies still show that up to 50% of the small-scale businesses in operation in developing countries including Ghana have a deteriorating performance and are stagnant at the micro and small-scale levels without progressively growing into

medium or large-scale enterprises (Bowen et al. 2009). In Ghana, it is earlier estimated that 25 to 30% of micro and small-scale enterprises [MSEs] fewer than five years collapse annually (Ministry of Trade and Industry, 2004). Hence, it is important to examine why some MSEs [vehicle repair garages] are surviving while others are collapsing in Ghana especially in the Tamale Municipality so as to guide stakeholders to tailor the appropriate interventions to address the needs of vehicle repair garages. Ghana is experiencing an increasing vehicular population. For instance, in 1996, the total number of vehicle registered with Driver Vehicle and licensing Authority (DVLA) in Ghana stood at 27,064, excluding an estimated 29,845 government vehicles and others not presented for the bi-annual roadworthy test (Maunder and Pearce, 2001). This figure rose to 52,881 vehicles in 2000 and as at 2010, the vehicular population in Ghana stood at 771,594 (Driver Vehicle and Licensing Authority (DVLA), 2013). As at March 2012, the total vehicle population in Ghana stood at approximately 1,425,900 (Tetteh-Addison, 2012). This has resulted in the increase demand for the service of vehicle repair garages accordingly. In the US, these shops are the only individuals authorized to perform warranty and recall repairs by the manufacturers and distributors. In the European Union a recent law allows motorists more flexibility in selecting where they can get their car serviced (The EC Block Exemption Regulation, 2003).

The development of physical infrastructure not only accelerates the pace of economic growth of the country but also firmly supports the development of social and other sectors. Transport occupies the lead position among physical infrastructures. The development of transport directly influences the development of both productive and social sectors, the former represented by agriculture, industry, commerce, etc, and the latter represented by education, health, etc. Taking this reality into consideration, special

attention has been given to the development of the transport sector from the very beginning of the planned development.

There are various challenges facing Suame Magazine, such challenges when dealt with, will remove obstacles to innovation and job creation at the biggest industrial cluster in Ghana and arguably West Africa. Along with advances in automotive technology, vehicular repairs have also become increasingly sophisticated – new equipment, software and techniques are needed to determine the root cause of failure for many components in modern vehicles. Unfortunately the application of new automobile technology to diagnosis of vehicle faults within the Suame Magazine is largely non-existent. The main reasons for this are: Lack of exposure and basic knowledge of ICT skills by operators and inadequate facilities available where artisans can learn ICT and auto diagnosis skills (Suame Magazine Fihankra Project, 2013).

One of the biggest challenges for this cluster is the increasing ICT-driven entry barrier in the global automotive industry which manually-based artisanal operations of the current cluster cannot keep pace with. This technological barrier affects not only the artisans, but also vehicle manufacturers, since customers are unable to secure quality support and servicing for modern vehicles. This leads to tarnishing of many vehicle brands, and creates an obstacle to newer vehicles entering the growing market in Ghana. Many of the residents and artisans in Suame Magazine have had very little formal education and literacy rates are low. This impedes business development, creating barriers to business management and growth which include difficulties in: Learning to use ICT, developing relationships with clients from outside Suame Magazine, understanding and following clients' requirements, establishing formal documents and business processes, maintaining business records and developing business plans, marketing products and

services, legally registering businesses, gaining credibility for work and business development and the formal economy (Suame Magazine Fihankra Project, 2013). Most of the MSMEs in Suame Magazine are currently working in the informal economy. Few businesses are registered and most are low-technology small-scale, family-based enterprises, many of which suffer from fluctuating production and have difficulty accessing capital and wider markets, all characteristics of the informal sector. Similarly, much of the employment in the Magazine is informal with work carried out by artisans on their own account or with no written contract and no employment benefits or legal protection. Internationally, low-skilled, manual employment in the informal sector is associated with low wages and poverty. Health and safety standards and other conditions of employment are generally low. Thus many of the artisans in the Magazine have a precarious existence with few buffers between themselves and poverty in the event of ill-health, adverse economic conditions or other misfortunes. This emphasises the need for businesses and individuals within Suame Magazine to gain enhanced ICT and business skills and hence access to the formal economy if they are to achieve growth, raise standards and improve livelihoods (Monney et al. 2014).

Globally, protection of workers against work-related injuries and illnesses has over the years been an issue of great concern to employees, workers, governments, and the general public. This is because a safe working environment does not only promote the physical, mental and social well-being of workers, but also saves cost associated with medical bills, compensation, work interruption, loss of experienced personnel, and others resulting from accidents at the workplace (Monney et al. 2014). The International Labor Organization estimates that every year approximately 270 million work-related accidents are recorded worldwide, resulting in the death of some 2 million people. Apart from the accidents resulting in fatalities, non-fatal accidents at the workplace, in some cases, leave

victims with loss of body parts, skin diseases, musculoskeletal and reproductive disorders, cancer, mental and neurological illnesses, respiratory and cardiovascular diseases. Studies have shown that employees in small and medium enterprises are more prone to work-related hazards and risks. This is partly attributed to inadequate resources, poor technical capacity and ignorance of occupational safety and health standards (OSHS). The sector also suffers neglect from OSHS legislations and services. In Ghana, OSHS legislations that seek to address issues regarding the welfare of employees at the workplace are fragmented. There is the Labor Act 2003 (Act 651), the Factories, Offices and Shops Act 1970 (Act 328) and the Workmen's Compensation Law 1987 (PNDC Law 187). The implementation of these legislations is hugely fraught with several challenges, as has been reported in available literature. In spite of this, a draft national OSH policy was additionally developed in 2011. This clearly depicts the quandary in which authorities find themselves with regards to occupational health and safety issues. This has resulted in several challenges, including deficient standards, poor enforcement of laws, discrepancies, and overlap of functions. Worse still, the Department of Factories Inspectorate which is mandated to ensure a safe and healthy working environment in Ghana is not acting (Monney et al. 2014). According to IBM Business Consulting Services (2004), the automotive industry is facing new and pressing challenges. Globalisation, individualisation, digitalisation 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. Only those companies that find new ways to create value will prosper in the future.

2.1.2 Vocational Skills and Training

According to the World Bank's (1994) study on vocational education and training in developing countries shows that, entry into self-employment in the lower tier of the informal sector (both urban and rural) requires few skills. Those that are required are easily learned informally. In upper-tier enterprises, however, especially those in manufacturing and repair, higher skill levels are essential. Middleton, Ziderman and Van Adams (1993) stated that, the skills required in the informal sector are different from those required in modern sector workplaces is hardly surprising. On the other hand, there is the surprising possibility that informal sector workers may need an even more demanding set of skills as the smallness of microenterprises compels workers to regularly perform a wide range of technical and business tasks. Thus, for example, a wayside auto mechanic will talk with a customer, diagnose mechanical problems, delegate some tasks to other workers and do some tasks himself, calculate the repair charges, etc., while these same tasks would likely be divided along rigid, specialized lines in the service department of a large automobile dealership.

In West Africa, traditional apprenticeship is the most common means of skill acquisition for informal sector workers: "a remarkable blend of work, practical training and moral upbringing is the main avenue to self-employment in micro-enterprises and thus a cornerstone of informal sector development" (Fluitman et al. 1994). In Ghana, for example, it has been estimated that approximately 55% of informal sector workers learned their skills from informal apprenticeships (World Bank Ghana SAR, 1995). Small entrepreneurs in the urban informal sector in Francophone Africa learned their trade through traditional apprenticeship (Bas, 1989). Terms of apprenticeships such as cost, duration, physical working conditions, and substance of the training vary significantly among countries and trades, depending upon such factors as the relative

supply and demand for such positions in a particular trade in the given location, and on whether or not the master is a relative (Fluitman, et al. 1994). The first problem in the skill acquisition process is under-investment by all stakeholders. This is because the cost of skill acquisition exceeds the benefit to any single stakeholder. Since the benefits of skill acquisition do not accrue exclusively to the trainees, we could view training as a public good and formulate the unwillingness to invest in skill acquisition or the under-provision of training as the free-rider problem (Athena infonomicsindia, 2013).

The challenges facing vocational training today include the need for advanced technological skills, collaboration and teamwork, dramatic technological advancement in workplace and changing family structure (McElvey, Hall & Lynch, 1997). Since the 1990`s technological advancements have accelerated beyond expectation. The technology associated with many career fields is constantly changing. Vocational technical education must, therefore, deliver meaningful and relevant programs to learners with future employment as the goal (Bronker, 1993). Again, being technologically educated today is not enough to guarantee job success. The world of work needs experienced, competent and specialized human beings with the ability to learn quickly and understand sophisticated technology. There is the need for vocational technical education to prepare individual with skills necessary to find and maintain employment. This will involve the provision of skills such as critical thinking, problem solving, career development, and lifelong learning (Naylor, 1986). This task is attainable if vocational and technical education in Ghana sees change in terms of structures, programs, processes, and practices in order to be effective in meeting the expectations and challenges in contemporary times. Over the years a number of jobs have disappeared while others have come into being. The workforce has also changed with a shift from

manufacturing to the computer information era (Kappner, 1993). Again, there has been the movement away from manufacturing to service-oriented jobs.

2.2 Challenges faced by roadside mechanics in the performance of their duties

The problems faced by the local garages in the country as far as the repair and maintenance of modern cars are concerned could be attributed to reasons such as, low technical educational levels of auto mechanics, high cost of operations, lack of diagnostic machines, waste of time in detecting faults, damage to engines without the use of diagnostic machines in detecting faults, lack of appropriate maintenance practices, loss of customers and so on (Akpakpavi, 2014).

A visit to some micro and small garages in the industrial estates in Ghana including, ‘Kokompe’ in Accra, ‘Suame Magazine’ in Kumasi and Tema reveals that vehicle diagnosing, repair and maintenance activities are carried out without sound and state-of-the-art maintenance practices

Holland (1998) noted that, out of the 20 to 30 percent of new businesses that make it through their inaugural year of operation, only half of them will survive beyond the fifth year anniversary. Rwigema and Venter (2004) acknowledged that the failure rate of small businesses [vehicle repair garages] in most developing countries far exceeds that of success. Marlow (2009) indicated that the rate of failure of small scale businesses [vehicle repair garages] in developing countries is higher than in the developed world. Akabueze (2002) earlier noted that, the rate of business [vehicle repair garage] failure continues to increase because of the obstacles affecting small-scale business performance in developing countries including Ghana. Some researchers identified these obstacles to include: lack of business management skills, lack of financial resources, lack of up-to-date technologies, generally bad economic conditions, poor location, unfair laws and

regulations coupled with poor infrastructure (Kiiru et al, 1991 & Akabueze, 2002). Amyx (2005) found that one of the major obstacles is the negative perception of potential clients about small businesses as lacking the ability to provide quality services and are unable to satisfy more than one offer simultaneously. As a result, some larger companies are offered project in the industry because of their reputation alone to the detriment of small-businesses. Hodgetts and Kuratko (1995) revealed that the quality of management of micro and small-scale enterprises [MSEs] is not the best and some policy-makers are of the view that they lack innovation, entrepreneurial flair, financial acumen, practical knowledge, marketing, and human resource management in their operations. As a result, some do not reach their full potential and fail to grow, leading to job and wealth lost for their respective regions in which they are based. Bokea et al. (1999) identified infrastructure such as the provision of access roads, water, adequate power, telecommunication, and sewerage as a major limitation in the development of MSEs. They explained that, universally, MSEs face the extra burdens of procedural and administrative problems relating to registration, licensing, formalization, and resource acquisition, in terms of their access to and management of finance, space, land and people. Longenecker et al. (2006) stated that lack of planning, improper financing, and poor management has been posited as the main causes of failure of small enterprises. Power shortages which result in load shedding coupled with high electricity bills were identified as major problems faced by small-scale businesses (Tushabomwe-kazooba, 2006). To avert this situation, Governments, over the years, have implemented a number of interventions. For instance, Government established the National Board for Small-Scale Industries (NBSSI) by an Act of Parliament (Act 434 of 1981) of Ghana. NBSSI began operations in 1985 with a Head Office in Accra, ten (10) Regional Secretariats, and one hundred and ten (110) Business Advisory Centres in the districts. The main

objectives of the NBSSI are to contribute to the creation of an appropriate environment for micro and small enterprises (MSEs) development, to promote the development of an enterprise culture in Ghana, to provide nonfinancial support for sustainable small-scale enterprises development, to facilitate access to credit for small enterprises, and to strengthen sector associations within the MSE sector (National Board for Small-Scale industries NBSSI, 1990; Tetteh, 2009).

Velde et al. (1999) said, the nature of the roadside indigenous apprenticeship, which is unorganized and unstructured, calls for reform. A reform in this direction calls for high training on the part of the master craftsman to meet industrial needs, and deliver quality vocational education courses which are based on industry competency standards and involve workplace learning. Workers in the informal economy tend to have characteristics that Portes et al. (1989) subsume that, the general profile of owner-operators and apprentices in the informal sector in West Africa reveals an endemic poverty in both financial and technical status. The literature notes the poor conditions of businesses (infrastructure, equipment, materials, etc.) in the sector and the quality of the products and services offered. Most micro-entrepreneurs are poor and have few material possessions. The field research from Chad confirms this, as Chadian owner-operators generally use only low quality materials, tools and equipment. Only 32% of microenterprises surveyed in Chad had electricity (Muskin, 1997).

Many workers in the informal economy have correspondingly limited technical ability due to their low levels of education and literacy. Informal sector workers and apprentices in West Africa are likely to be from the marginalized classes; many are school dropouts. Apprentices surveyed in Chad constitute a mixed bag in terms of educational attainment, as it is found that, contrary to what might be expected from a relatively young group of workers, they did not have significantly higher levels of education than the owner-

operators, and many were dropouts. It was posited that this likely due to the deterioration of the school system during the Chadian civil war. There are other aspects of characteristics of the informal sector workforce that lead researchers to think more hopefully about the current state of educational attainment and skills of informal sector workers. The common portrayal of the informal sector as anti-modern and essentially inferior to the formal sector gives rise to the notion that all jobs within the informal sector require minimal skills and competencies, and that basic literacy and numeracy training may be all that is required for informal sector workers to operate. As was noted above, to the contrary, many entrepreneurs in the informal sector are often called upon to perform a much broader range of functions, from manual labor to bookkeeping to customer service. Informal sector operators -- rural or urban -- must learn to integrate more diverse aspects of the trade and the business, acquire minimal technical competency more quickly and solve unique practical problems more often than a typical worker in a modern sector establishment (Middleton et al. 1993). Middleton et al. (1993) also indicated that, informal sector workers may actually require, in some ways, a much more comprehensive kind of education and training than their formal sector counterparts.

2.3 Extent to which roadside mechanics can satisfy their clients

Initially researchers lack agreeable definitions and methodology (Peterson and Wilson, 2014) regarding customer satisfaction. This inconsistency results from the vital debate regarding whether satisfaction is outcome or process (Yi, 2001) and later on Bolton and Drew, (2004) admits this disputable fact and stated “everyone knows what satisfaction is until asked to give a definition then it seems nobody knows’. Customer satisfaction literature does not show any coherence toward explaining the concept as some researchers shows it an emotional response (Cadotte et al. 2000) or a pure cognitive

response (Bolton and Drew, 2004). Similarly some people argued that it can be composed of both cognitive and affective dimensions (Westbrook, 2012). In few instances operationalized definitions may also include a cognitive dimensions like repurchase intentions (Westbrook and Oliver, 1991) and some people did not mention it either way and just argued that it is an evaluation response or a summary of total psychological state (Oliver, 1981) or simply an overall purchase evaluation (Fornell, 1992) or a fulfillment response. Despite all the models proposed, customer satisfaction (CS) is a popular model in CS research whose results are similar to those of Oliver (1980, 1981, 1991). A recent research on this issue describes CS as a summary of affective response that varies in intensity and focuses on product choice, purchase and consumption, though its time of determination varies and is limited (Giese and Cote, 2000). But as the research is based on customer satisfaction so I will take the definition as a cumulative (Saleh and Ryan, 1992; Fick and Ritchie, 1991), hospitals (Babakus and Mangold, 1992; Soliman, 1992) and banking (Kwon and Lee, 1994). The studies have also been carried in less obvious industries such as libraries (Cook et al. 2003) and the public sector (Wisniewski, 2001).

The motor industry plays a critical role in the economy of Ghana, with respect to employment. Customer satisfaction is a fundamental aspect of service provision, and this is especially the case with motor vehicles, where substantial profits are generated in the servicing of vehicles. There are numerous challenges facing the industry regarding service quality experienced. One industry where this is of critical importance is the motor industry. Customer satisfaction has received extensive attention in the literature, with several studies being carried out in a wide variety of industries such as the hospitality industry and tourism (Saleh and Ryan, 1992; Fick and Ritchie, 1991), hospitals (Babakus and Mangold, 1992; Soliman, 1992) and banking (Kwon and Lee,

1994). The studies have also been carried in less obvious industries such as libraries (Cook et al. 2003) and the public sector (Wisniewski, 2001). Limited published research has been conducted into customer satisfaction in the motor industry with respect to the servicing of vehicles. This means that the issue of customer satisfaction in the motor industry is largely unknown factor, making this study exploratory in nature.

Academics and practitioners believe that customer satisfaction is the highest priority of a company (Peterson and Wilson, 2014) and every organization strives that its customer remains satisfied with its products and services. Customer satisfaction is surely a very critical element towards retaining profitable business relations with the customers. It is well established that customer satisfaction leads to increased loyalty and profitability (Matzler et al. 2003). There are various studies that conclude that there is a positive relationship between customer satisfaction and profitability of the firms (Ittner and Larcker, 1998). Customer satisfaction and perceived service quality are very interlinked constructs (Eisingerich & Bell, 2008).

According to Bopke (2015) honesty is in short supply in most mechanic workshops in the country, because clients are always in a hurry and do not want to pay what would provide a lasting solution to their problems. People want cheap things. They want to pay second-hand fees for first class service. However, according to autorepair.com, the problem is rather with mechanics who like cutting corners. This means that they may create more problems for an unsuspecting car owner by replacing a bad part with a used part, even when the client has paid for a new one. Although this is illegal, some mechanics do this so that the car owner will have no option but to bring the car back for the problem to be fixed again. According to settleschools.com, a mechanic can be a car owner's best friend or worst nightmare. When car problems arise, people depend heavily

on their mechanic to diagnose and repair the issue in as little time as possible. They expect mechanics to work quickly and ethically.



CHAPTER THREE

RESEARCH METHODOLOGY

This chapter gives an overview of various methods that were used by the researcher to collect data. These include research design, target population, sample and sampling procedure, instruments used for data collection, data collection procedures and methods of data analysis.

3.1 Research design

Survey research design was used. Floyd and Fowler, (2002) stated that survey research method has the ability to produce statistics, that is quantitative or numerical descriptive about some aspects of the study population. Generally, a survey research method also allows the researcher to collect data from a fraction of the population. That is, a sample, rather than from every member of the population. This design were used in order to conduct accurate investigation in to skills needed and challenges faced by roadside mechanics in diagnosing and fixing problems of automotive components and systems. The same design was used to determine the level of client satisfaction. This particular design was applied by the researcher because it is only a part of the population that is going to be studied. Information was obtained from a sample rather than the entire population. This ranged from one day to a few weeks. Descriptive survey research collects data in order to answer questions covering the current status of the subject in the study. It also allows for quick collection at comparatively cheap cost.

3.2 Population

The study was conducted in the Tamale Metropolis in the Northern Region of Ghana. The population of auto workshops in the Tamale Metropolis is about one hundred and two (102). Out of the number 64 are members of Ghana national Association of Garages, Tamale Zone (Ghana national Association of Garages, Tamale Zone, 2016). The other thirty eight 38 were not registered with any association (Field data, 2016). Also number of registered vehicles in the Tamale Metropolis as at 2015 was about nine thousand (9,000) (Addison, 2015). Out of the 102 auto workshops, eighty master craft men and one sixty (160) drivers including eighty (80) private and eighty (80) commercial drivers were randomly selected. Two (2) drivers were selected at each workshop; this will include one commercial driver and one private vehicle driver. This constituted the sample for the study, which was base on the willingness of the mechanics and the drivers to be part of the study. All the selected master craft men and the drivers in the sample were issued with questionnaire developed. Majority of the master craft men were located in the industrial area as well as other locations in the Tamale Metropolis.

3.3 Sample and sampling procedure

The researcher realised that the population of the roadside mechanics and their clients in the Tamale Metropolis were too large if everybody is to be considered; therefore a simple random sampling was used. According to McLeod (2014), simple random sampling is the best method for selecting a sample from a population of interest. This procedure selects a sample without bias from the population. It also ensures that each member of the population had an equal and independent chance of being included in the sample.

3.4 Instruments used

The researcher use questionnaires in order to give detailed level of content. According to Annum (2015), questionnaire is a reliable instrument for data collection. Two questionnaires were used one for roadside mechanics and the other for their clients. The questionnaire for roadside mechanics contains preamble and three sections A B and C. Section A contains information on personal details of roadside mechanics. Section B contains information about Skills needed by roadside mechanics to diagnose and fix problems of vehicle systems and components. Section C is about challenges face by roadside mechanics in the performance of their duties. The other questionnaire involves the extent to which roadside mechanics can satisfy their clients which also contains section A and B. Questionnaires were administered to respondents because the method yields high response rate at low cost and enables the researcher to explain and answer questions from the respondents. Respondents were expected to react to the statements by either agreeing or disagreeing with them. Whereas '5' represented a strong agreement, '1' represented a strong disagreement. Where a respondent could not read or write the researcher interpreted the statements and helped to fill in their responses on the questionnaire.

3.5 Reliability of Instrument

The reliability of the instrument was obtained by testing the questionnaire. The data collected were subjected to Cronbach Alpha reliability test using Statistical Package for Social Science [SPSS]. On the skills of roadside mechanics, items 6 to 25 of section B which covered skills requirements of the roadside mechanics had a computed Cronbach Alpha of 0.837 indicating that, the statements were reliable while that of items 26 to 47 of section C which covered challenges facing the mechanics had a computed Cronbach

Alpha of 0.864. Also, on satisfaction level of private vehicle owners, items 5 to 32 of the questionnaire had a computed Cronbach Alpha of 0.901. On the part of the commercial vehicle drivers the computed Cronbach Alpha was 0.768. Also the pre-testing of questionnaire was conducted with 10 master craftsmen. They were selected randomly from the Metropolis. These respondents were not part of the actual sample of the study. Respondents were encouraged to make useful suggestions. My supervisor helped in validating the questionnaires by restructuring some of the statements.

3.6 Data collection procedure

The researcher visited the workshops, introduced his topic and explained the assistance needed from them. The questionnaires were explained to the master-craftsmen and their clients and they were helped to fill the questionnaires. The researcher also came to consensus with the respondents about the time limit for filling the questionnaires. Once the time limit reached, the researcher collected the questionnaires from the master-craftsmen and their clients for data analysis.

3.7 Methods of data analysis

Descriptive statistics was used to analyze the data. According to Trochim (2006), descriptive statistics helps to simplify large amount data in a sensible way. It reduces lot of data into a simpler summary. Percentages and proportions were applied to establish the skills needed and difficulties faced by roadside mechanics in diagnosing and fixing problems of vehicle systems and components. The same procedure was used to determine the level of client's satisfaction. To enhance understanding of the findings, tables were used.

CHAPTER FOUR

RESULTS

The data collected on the demographic characteristics such as gender, age, educational level, and working experience of the sample were analyzed using the Statistical Package for Social Science [SPSS] to answer the research objectives and presented as follows:

4.1 Research Question One

What are the skills needed by roadside mechanics to properly diagnose and fix problems of vehicle systems and components?

Table 1: Demographic characteristics of roadside Mechanics

Gender	(%)	Age	(%)	Education	(%)	How long in Industry	(%)
Male	100	Below 20 yrs	5	None	35	Below 5 yrs	5
Female	0	21-30 yrs	18.8	Basic	22.5	6-15 yrs	40
		31-40yrs	35	Secondary/ Tech	30	16-25 yrs	28.8
		41-50yrs	31.3	Tertiary	12.5	26-35 yrs	18.8
		51-60yrs	7.5			36-45 yrs	7.5
		60 and above	2.5				

Table 1 reports the data collected from the 80 respondents, who were mainly master craft men of vehicle repair garages in the Tamale Metropolis, on their gender, age, education, and experience. The table revealed that all master craft who own vehicle repair garages in the Tamale Metropolis were all male. In addition, Table 1 shows that majority of the master craft men in the Tamale Metropolis aged between 31-40 years. It is also observed that 31.3 % of the master craft men were aged between 41-50 years. Moreover, 5% were below 20 years. While 2.5 % was aged between 60 years or more. Table 1, revealed that majority of the master craft men representing 35% of the master craft men did have education. Also, it is noticed that 30% of the respondents held secondary/Technical certificates. Moreover, 22.5% of the respondents held basic education certificate. Furthermore, 12.5% of the respondents held tertiary certificates.

Also, from Table 1, it is noticed that 40% of the entrepreneurs of vehicle repair garages in the Tamale Metropolis had between 6 and 15 years of operational experience in vehicle repair business. Moreover, 5 % of the respondents had five years or less experience in the operation of vehicle repair garages. It is further observed that 28.8 % of the respondents had worked in vehicle repair garages for periods ranging between 16 and 25 years and 18.8 % of the respondents had worked in vehicle repair garages between 26-35 years, while 7.5% of the respondents had worked for 36- 45 years.

The data gathered on the skills of roadside mechanics of vehicle repair garages in the Tamale Metropolis were analyzed and presented in Table 2 below.

Table 2: Skills Requirements of Roadside Mechanics

Skills of Roadside Mechanics	Percentage					Mean	S.E
	1	2	3	4	5		
6. I have the skill in performing engine tune-up accurately	3.8	3.7	0	30	62.5	4.44	0.11
7. I time injection pumps to engines accurately in the shop	0	5	1.2	35	58.8	4.48	0.09
8. I have the skill in timing valves to an engine accurately	0	1.2	1.2	32.5	65	4.61	0.07
9. I am able to calibrate fuel injection pump accurately	6.2	12.5	10	33.8	37.5	3.84	0.14
10. I have the skill in performing ignition timing accurately	2.5	2.5	5	36.2	53.8	4.36	0.1
11. I fix problems on single point fuel injection systems	6.3	12.5	15	36.2	30	3.71	0.13
12. I fix problems on multi point fuel injection systems	5	10	15	42.5	27.5	3.78	0.12
13. I am able to overhaul an engine	3.8	2.5	0	11.2	82.5	4.66	0.1
14. I have the skill in performing phase angle test accurately	13.8	22.5	16.2	28.8	18.8	3.16	0.15
15. I have the skill in working on lubrication systems	2.5	3.8	2.5	31.2	60	4.43	0.1
16. I have the skill in repairing air braking systems	6.2	10	5	42.5	36.2	3.93	0.13
17. I am able to fix problems in servo assisted hydraulic system	6.2	16.2	5	31.2	41.2	3.85	0.14
18. I fix problems on generating(alternator) systems	18.8	31.2	7.5	25	17.5	2.91	0.16
19. I install sensors in the engine management system	13.8	28.8	18.8	23.8	15	2.98	0.15
20. I fix problems on manual transmission systems	5	15	11.2	35	33.8	3.78	0.14
21. I fix problems on automatic transmission systems	18.8	23.8	12.5	28.8	16.2	3	0.16
22. I have the skill in using scan tool for diagnosis	35	26.2	7.5	17.5	13.8	2.49	0.16
23. I have the skill in fixing problems on water cooling systems	1.2	6.2	6.2	41.2	45	4.23	0.1
24. I have the skill in fixing problems on air cooling systems	3.8	13.8	5	42.5	35	3.91	0.13
25. I fix problems on vehicle suspension systems accurately	1.2	8.8	7.5	30	52.5	4.24	0.11

1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree

Table 2 revealed that, Almost all (92.5%) the master craft men in the Tamale Metropolis strongly agreed or agreed that, they can carry out engine tune- up accurately while 3.8% were in disagreement. The study found that, on the issue of timing injection pump to engine 98.8% of the respondents which forms the majority strongly agreed or agreed to the statement but none of them strongly disagreed. More than half (65%) of the master craft men strongly agreed that they can time valves accurately to an engine only small proportion (1.2%) of the mechanics disagreed. Furthermore, on the area of calibrating injection pumps 71.3% of the entrepreneurs of vehicle repair garages in the Tamale Metropolis strongly agreed or agreed that, they have the necessary skills to calibrate an injection pump. Ten percent remains neutral and 6.2 % strongly disagreed. On ignition timing more than half (53.8%) of the mechanics, strongly agreed or agreed that, they have the needed skills to perform ignition timing accurately. However, 66.2% strongly agreed or agreed that, they have the ability to fix problems on single point petrol injection system. Almost half (42.5%) of the master craft men of vehicle repair garages in the Tamale Metropolis agreed that they can fix problems on multi-point fuel injection system. Majority (82.5%) of the master craft men of vehicle repair garages in the Tamale Metropolis strongly agreed that they have the skills of overhauling an engine, only 5% strongly disagreed to the statement. The study also revealed that less than half (47.6%) of the roadside mechanics in the Tamale Metropolis can perform phase angle test accurately. Furthermore, it is observed from Table 2 that the majority (60%) of the master craft men of vehicle repair garages in the Tamale Metropolis strongly agreed that they have the skill in fixing problems of vehicle lubrication system accurately. Only 6.3% strongly disagreed or disagreed to the statement. The study indicated that, almost half (42.5%) of the respondents of vehicle repair garages in the Tamale Metropolis agreed that they have the technical competence to work on vehicle braking system. Also,

on the issue of generating system half (50%) of the respondents strongly disagreed or disagreed that they have the skill in fixing problems of vehicle generating system while 17% of the entrepreneurs strongly agreed to the statement. Furthermore, with installation of sensors in the engine management system almost half (42.6%) of the respondents of vehicle repair garages in the Tamale Metropolis strongly disagreed or disagreed that they have the skills in installing sensors in the engine management system. Fifteen percent (15%) strongly agreed and 13.8% strongly disagreed. Also, more than half (68.8%) of the respondents are of the view that they have the skills to fix problems on manual transmission systems but 5% strongly disagreed. On the area of automatic transmission systems less than half (45%) of the mechanics of vehicle repair garages in the Tamale Metropolis strongly agreed or agreed that they can fix problems on automatic transmission systems 12.5% remains neutral. On scan tool diagnosis, 61.2% of the entrepreneurs of vehicle repair garages in the Tamale Metropolis strongly disagreed or disagreed that they can use scan tool for diagnosis and only 13.8% strongly agreed to the statement. Majority (86.2%) of the master craft men in the Tamale Metropolis endorsed that they have the skills in fixing problems on water cooling system while 76.5% strongly agreed or agreed that they have the skills in fixing problems on air cooled engines. In the case of vehicle suspension system majority of the master craft men representing 82.5% strongly agreed or agreed that they have the skills to adequately fix problems on vehicle suspension system.

Table 3: Correlation Matrix of Skills of Roadside Mechanics

	1	2	3	4	5	6	7	8	9	10
1. Engine tune – up accurately	1									
2. Time injection pumps to engines	0.73 ^a	1								
3 Timing valves to engine accurately	0.35 ^b	0.42 ^a	1							
4. Calibrate fuel injection pump accurately	0.13	0.22 ^b	0.42 ^a	1						
5. Performing ignition timing accurately	0.10	0.27 ^b	0.47 ^a	0.48 ^a	1					
6. Fix problems on single point fuel injection	0.22 ^b	0.36 ^a	0.27 ^b	0.27 ^b	0.49 ^a	1				
7. Fix problems on multi point fuel injection	0.05	0.22 ^b	0.21	0.3 ^a	0.45 ^a	0.83 ^a	1			
8. Overhaul an engine	0.47 ^a	0.25 ^b	0.32 ^a	0.05	-0.02	0.19	0.15 ^b	1		
9. Performing phase angle test accurately	0.16	0.20	0.34 ^a	0.60 ^a	0.31 ^a	0.25 ^b	0.28 ^a	0.06	1	
10. Working on lubrication systems	0.29 ^a	0.13	0.39 ^a	0.30 ^a	0.12	-0.45	-0.14	0.24 ^b	0.22	1

^aP<0.01^bP<0.05

Table 3 reports the correlation matrix of some skills possessed by roadside mechanics in the Tamale Metropolis. It is observed that mechanics who possessed the skills of engine tune- up also have the skill in timing injection pumps to engine ($r = 0.73$, $P < 0.01$). It can be seen that mechanics who can perform ignition timing can equally carry out valve timing ($r = 0.47$, $P < 0.01$). The roadside mechanics also believe that if you can carry out overhauling then you can equally perform valve timing. ($r = 0.32$, $P < 0.01$).

Table 4: Cronbach's Alpha α of skills variables

Variables	scale variance	Total Correlation	Cronbach's Alpha α
1. I have the skill in performing engine tune up accurately	118.3	0.33	0.83
2. I time injection pumps to engines accurately in the shop	120.1	0.33	0.83
3. I have the skill in timing valves to an engine accurately	120.4	0.42	0.83
4. I am able to calibrate fuel injection pump accurately	114.8	0.37	0.83
5. I have the skill in performing ignition timing accurately	117.5	0.41	0.83
6. I fix problems on single point fuel injection systems	112.7	0.47	0.82
7. I fix problems on multi point fuel injection systems	113.9	0.46	0.83
8. I am able to overhaul an engine	121.6	0.18	0.84
9. I have the skill in performing phase angle test accurately	109.4	0.53	0.82
10. I have the skill in working on lubrication systems	119.7	0.28	0.83
11. I have the skill in repairing air braking systems	112.4	0.49	0.83
12. I am fix problems in servo assisted hydraulic braking systems	111.8	0.46	0.83
13. I fix problems on generating(alternator) systems	110.3	0.46	0.82
14. I install sensors in the engine management system	110.9	0.49	0.83
15. I fix problems on manual transmission systems	116.8	0.3	0.84
16. I fix problems on automatic transmission systems	110.5	0.47	0.83
17. I have the skill in using scan tool for diagnosis	108.9	0.49	0.83
18. I have the skill in fixing problems on water cooling systems	115.5	0.5	0.83
19. I have the skill in fixing problems on air cooling systems	115.5	0.38	0.83
20. I fix problems on vehicle suspension systems accurately	116.1	0.42	0.83

Table 4 shows the values of Cronbach's Alpha α which are all above 0.82 indicating that the questionnaire of this study has good reliability which covered the skills requirements of the roadside mechanics. The closer the Cronbach Alpha α coefficient index is to one, the greater the likelihood of the instrument to produce consistent scores. However, the closer the coefficient index is to zero, the lower the likelihood of the instrument to produce consistent scores. Thus, a good instrument is one whose reliability coefficient index is closer to one.

4.2 Research Question Two

What are the challenges that roadside mechanics really face in diagnosing problems of vehicle systems and components?

Table 5: Challenges Faced by roadside Mechanics

Resources (Tools and Equipment)	Percentage					Mean	S.E
	1	2	3	4	5		
26. I have challenges in working under vehicles	10	13.8	2.5	20	53.8	3.94	0.16
27. I have challenges with lifting tools. example cranes	16.2	26.2	2.5	27.5	27.5	3.24	0.17
28. I have challenges in keeping Parts clean	22.5	35	6.2	12.5	23.8	2.8	0.17
29. I have challenges in blowing air cleaner elements	15	10	6.2	30	38.8	3.68	0.16
30. Outmoded phase angle test machines	8.8	11.2	8.8	32.5	38.8	3.81	0.15
31. Outmoded wheel alignment machine	11.2	7.5	7.5	40	33.8	3.78	0.15
32. Outmoded wheel balancing machine	11.2	10	11.2	36.2	31.2	3.66	0.15
33. Outmoded injection pump calibrating machines	6.2	16.2	10	32.5	35	3.74	0.14
34. Outmoded scan tools	13.8	15	10	28.8	32.5	3.51	0.16
35. Inadequate battery charging facilities	6.2	17.5	3.8	30	42.5	3.85	0.15
36. Lack of headlamp beam setter	11.2	20	50	25	38.8	3.6	0.16
Resources (Personnel)							
37. I do not have personnel to keep my records	10	28.8	5	18.8	37.5	3.45	0.17
38. I have no technical education background.	20	17.5	6.2	21.2	35	3.34	0.18
39. I have small number of apprentices who can work independently.	15	25	6.2	27.5	26.5	3.25	0.16
40. I lack management experience needed to run my shop	26.2	30	8.8	8.8	26.2	2.79	0.18
Skill (Modern Electronic Vehicles)							
41. I have challenge in maintaining air flow sensor	6.2	16.2	5	28.8	43.8	3.88	0.15
42. I have challenges in maintaining exhaust gas oxygen sensor	10	15	5	32.5	37.5	3.73	0.15
43. I have challenges in maintaining crankshaft position sensor	11.2	21.2	6.2	27.5	33.8	3.51	0.16
44. I have challenges in maintaining coolant temperature sensor	12.5	30	2.5	26.2	28.8	3.29	0.16
45. I have challenges in maintaining throttle position sensor	7.5	26.2	3.8	28.8	33.8	3.55	0.15
46. I have challenges in working on integrated circuits	2.5	27.5	7.5	27.5	35	3.65	0.14
47. I have challenges in maintaining actuators	10	23.8	3.8	35	27.5	3.46	0.15

1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree

This section discusses the results of research question two obtained from the questionnaire. The result from the questionnaire is presented in Table 5 for easy understanding and is grouped in sections based on the items in the questionnaire. The responses from the questionnaire section one sought to find out the challenges faced by

roadside mechanics in terms of tools and equipment, revealed that, majority (73.8%) of the roadside mechanics lack work pits. In the case of challenges of lifting tools more than half (55%) of the roadside mechanics endorsed the statement that they have challenges with lifting tools and equipment. The study discloses that less than half of the roadside mechanics do not have places to keep their parts after dismantling. The study also exhibited that majority (68.8%) of the master craft men do not have compressed air facilities. Majority of the respondents (71.3%) agreed or strongly agreed that their phase angle test machines are outmoded. Also more than half of the respondents (73.8%) were of the view that their wheel balancers are old and to be changed to meet current demands. On the issue of injection pump calibrating machines, 67.5% including agreed or strongly agreed accepted that their calibrating machines are outmoded while small proportion of the respondents (22.4%) disagreed, or strongly disagreed to the statement. Seventy two point five percent (72.5%) agreed or strongly agreed that their scan tools are outmoded, the same applies to their beam setters. The studies revealed that majority, (56.3%) of the roadside mechanics do not have personnel to keep their records and most of them (56.2%) do not also have Technical education background. The study also discloses that most of the mechanics lack apprentices who can work independently. Good number (56.2%) of the roadside disagrees or strongly disagree that they do not have management experience needed to run their workshops. In the case of air flow sensor, exhaust gas oxygen sensor, crankshaft position sensor, coolant temperature sensor, throttle position sensor and actuators, majority agreed or strongly agreed that they do not have the skill to maintain them.

4.3 Research Question 3

To what extent can roadside mechanics satisfy their clients?

Table 6: Demographic characteristics of Private Car Owners

Gender	%	Age	%	Highest Education	%	How Long in Driving	%
Male	83.8	20 and below	1.2	None	21.2	20 and below	80
Female	16.2	21-30 yrs	23.8	Basic	17.5	21-30 yrs	15
		31-40 yrs	45	Secondary/Technical	22.5	31-40 yrs	3.8
		41-50 yrs	23.8	Tertiary	38.8	41-50 yrs	1.2
		51-60 yrs	6.2				
		60 and above	0				

Table 6 presents the data collected from the 80 respondents, who were private vehicle owners in the Tamale Metropolis, on their gender, age, education, experience and analyzed revealed that, majority (83.8%), of private vehicle owners in the Tamale Metropolis were male. In addition, Table 6 shows that majority of the private car owners in the Tamale Metropolis aged between 31-40 years. It is also observed that 23.8 % of the private were aged between 41-50 years. Moreover, none was above 60 years. While 2.5 % was aged between 60 years or more. It is also observed that most (38.8%) of the private vehicle owners have tertiary education 21.2% do not have education at all. Also, from Table 6, it is noticed that 80% of the private vehicle owners in the Tamale Metropolis had 20 and below years of operational experience.

Table 7: Satisfaction level of Private car owners

		Percentage					Mean	S.E
General servicing		1	2	3	4	5		
5	Change of my vehicle engine oil	0	1.2	7.5	77.5	13.8	4.04	0.06
6	Replacement of my vehicle oil filters	0	2.5	3.8	78.8	15	4.07	0.06
7	Blowing of my vehicle air cleaner element.	1.2	11.2	40	33.8	13.8	3.48	0.1
8	Greasing of my vehicle spring shackles.	3.8	6.2	27.5	46.2	16.2	3.65	0.12
Fuel System								
9	Repairs of my vehicle single point fuel injection system	2.5	23.8	40	30	3.8	3.09	0.11
10	Repairs of my vehicle multi point fuel injection system	8.8	13.8	42.5	26.2	8.8	3.13	0.12
11	Repairs of my vehicle fuel lift pump	3.8	1.2	11.2	60	23.8	3.99	0.1
12	Replacement of my vehicle fuel filter	0	1.2	10	66.2	22.5	4.1	0.07
Engine Overhauling								
13	Repairs of my vehicle cylinder head	3.8	2.5	16.2	58.8	18.8	3.86	0.1
14	Repairs of my vehicle crankshaft assembly	5	1.2	22.5	50	21.2	3.81	0.12
15	Fixing of my vehicle cylinder block liners	6.2	2.5	25	42.5	23.8	3.75	0.12
16	Repairs of my vehicle oil sump	3.8	1.2	17.5	63.8	13.8	3.83	0.09
Electrical System								
17	Repairs of my vehicle charging system	2.5	5	18.8	66.2	7.5	3.71	0.09
18	Repairs of my vehicle lighting system	1.2	5	22.5	56.2	15	3.79	0.09
19	Repairs of my vehicle ignition system.	1.2	3.8	18.8	62.5	13.8	3.84	0.08
20	Repairs of my vehicle horn.	0	1.2	15	62.5	21.2	4.04	0.08
Suspension System								
21	Repairs of my vehicle dampers.	3.8	8.8	15	52.5	20	3.76	0.11
22	Repairs of my vehicle suspension springs.	3.8	5	15	51.2	25	3.89	0.11
23	Repairs of my vehicle chassis mountings.	2.5	3.8	20	52.5	21.2	3.86	0.1
24	Repairs of my vehicle suspension bushes.	0	10	16.2	45	28.8	3.93	0.1
Steering System								
25	Repairs of my vehicle steering gearbox.	11.2	25	26.2	31.2	6.2	2.96	0.13
26	Repairs of my vehicle ball joints.	1.2	7.5	10	51.2	30	4.01	0.1
27	Repairs of my vehicle tie rods.	1.2	7.5	15	46.2	30	3.96	0.1
28	Repairs of my vehicle steering arms.	1.2	7.5	7.5	61.2	22.5	3.96	0.95
Brake, cooling and transmission systems								
29	Repairs of my vehicle cooling system.	0	2.5	6.2	50	41.2	4.3	0.08
30	Repairs of my vehicle braking system.	1.2	3.8	7.5	56.2	31.2	4.13	0.09
31	Repairs of my vehicle automatic transmission system.	12.5	7.5	43.8	22.5	13.8	3.18	0.13
32	Repairs of my vehicle manual transmission system.	1.2	7.5	12.5	67.5	11.2	3.8	0.09

1 = very dissatisfied; 2 = dissatisfied; 3 = neutral; 4 = satisfied; 5 = very satisfied

Table 7 measures the satisfaction level of private vehicle owners about the services they received from roadside mechanics. The Table is grouped into sections as follows: General servicing, fuel system, engine overhauling, electrical system, suspension system, steering system and braking, cooling and lubrication. Almost all the private vehicle owners (91.3%) in the Tamale Metropolis are very satisfied or satisfied with the way roadside mechanics change their vehicle engine oil. Majority 78.8% of the car owners are also satisfied with the replacement of filters to their engines. On the issue of blowing their vehicle air cleaner element, 40% remain neutral and 33.8% were satisfied. Almost half 46.2%) of the drivers were satisfied 10% very dissatisfied or dissatisfied with the way the roadside mechanics grease their vehicle's spring shackles. Most of drivers (40%) remain neutral about the repairs of faults on their vehicles single point fuel injection system while 33.8% were very satisfied or satisfied. In the case of multi- point fuel injection system almost half of the drivers (42.5%) remain neutral and 55% were very satisfied or satisfied. More than half of the drivers (60%) were satisfied with the repairs of their vehicles fuel lift pump and replacement of fuel filters.

The study discloses that majority (77.6%) of the drivers were very satisfied or satisfied with the repairs of their vehicles cylinder heads and also half of them were satisfied with the repairs of the crankshaft assembly of their vehicles. Small proportion of the drivers were (8.7%) very dissatisfied or dissatisfied and almost half of them (42.5%) were satisfied with the work of the mechanics. Majority (66.2%) of the drivers were satisfied 18.8% of the car owners were neutral about the repairs of their vehicles charging systems moreover, more than half of the drivers (71.2%) were very satisfied or satisfied. The study found that small proportion of the drivers (5%) was very dissatisfied or dissatisfied and 62.5% were satisfied. Majority (72.5%) of the drivers were very satisfied

or satisfied with the repairs of their vehicles dampers, moreover small proportion (8.8%) of the drivers were very dissatisfied or dissatisfied with the performance of the roadside mechanics in respect to the repairs of their vehicles suspension springs. However, more than half (52.5%) of the drivers were satisfied with the repairs of their chassis mountings. On the issue of steering, the drivers nearly equal split for very satisfied or satisfied (36.2%) and very dissatisfied or dissatisfied (37.4%). However, majority (81.2%) of the private car owners was very satisfied or satisfied with the repairs of their vehicles ball joints. The study also found that almost half (46.2%) of the drivers were satisfied with the repairs of their tie rods. It also revealed that almost (83.7%) all of the drivers were very satisfied or satisfied with the repairs their vehicle steering arms. In the case cooling system none of the drivers was very dissatisfied with the performance of the roadside mechanics. However 87.4% of the drivers were very satisfied or satisfied with the repairs of their vehicles braking system, almost half (43.8%) remains neutral and small proportion of them (13.8%) were very satisfied with the repairs of their vehicles automatic transmission systems but majority (78.7%) of the private car owners were very satisfied or satisfied with the repairs of their vehicle s manual transmission system. Table 8 presents the data collected from the 80 respondents, who were commercial vehicle owners in the Tamale Metropolis, on their gender, age, education, experience and analyzed revealed that, all commercial drivers (100%) in the Tamale Metropolis were male.

Table 8: Demographic characteristics of Commercial Car Owners

Gender	%	Age	%	Highest Education	%	How Long in Driving	%
Male	100	20 and below	2.5	None	63.8	20 and below	63.8
Female	0	21-30 yrs	5	Basic	33.8	21-30 yrs	32.5
		31-40 yrs	36.2	Secondary/Technical	6.2	31-40 yrs	1.2
		41-50 yrs	37.5	Tertiary	6.2	41-50 yrs	2.5
		51-60 yrs	12.5				
		60 and above	6.2				

Furthermore, Table 8 shows that majority of the commercial car owners in the Tamale Metropolis aged between 41-50 years. It is also noticed that 36.2 % of the commercial car owners were aged between 31- 40 years. Moreover, 6.2% were above 60 years. It is also observed that more than 63.8% of the commercial car owners have no education at all. Small proportion (6.2%) has tertiary education. Also, from Table 8, it is noticed that 63.8% of the commercial vehicle owners in the Tamale Metropolis had 20 and below years of operational experience.

Table 9 measures the satisfaction level of commercial vehicle owners about the services they received from roadside mechanics. The Table is grouped into sections as follows: General servicing, fuel system, engine overhauling, electrical system, suspension system, steering system and braking, cooling and lubrication.

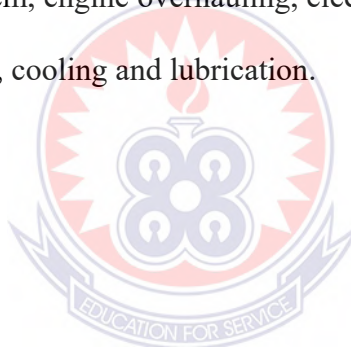


Table 9: Satisfaction level of commercial car owners

		Percentage					Mean	S.E
		1	2	3	4	5		
General servicing								
5	Change of my vehicle engine oil	13.8	3.8	6.2	65	11.2	3.56	0.13
6	Replacement of my vehicle oil filters	13.8	8.8	3.8	56.2	17.5	3.55	0.14
7	Blowing of my vehicle air cleaner element.	17.5	12.5	10	28.8	31.2	3.44	0.17
8	Greasing of my vehicle spring shackles.	8.8	15	15	46.2	15	3.44	0.13
Fuel System								
9	Repairs of my vehicle single point fuel injection system	6.2	11.2	11.2	43.8	27.5	3.75	0.13
10	Repairs of my vehicle multi point fuel injection system	6.2	11.2	7.5	55	20	3.71	0.12
11	Repairs of my vehicle fuel lift pump	8.8	16.2	6.2	43.8	25	3.6	0.14
12	Replacement of my vehicle fuel filter	5	12.5	6.2	57.5	18.8	3.75	0.12
Engine Overhauling								
13	Repairs of my vehicle cylinder head	5	3.8	5	63.8	22.5	3.95	0.11
14	Repairs of my vehicle crankshaft assembly	20	7.5	13.8	40	18.8	3.3	0.16
15	Fixing of my vehicle cylinder block liners	10	7.5	10	52.5	20	3.65	0.13
16	Repairs of my vehicle oil sump	2.5	5	20	62.5	10	3.75	0.09
Electrical System								
17	Repairs of my vehicle charging system	11.2	10	10	57.5	11.2	3.48	0.13
18	Repairs of my vehicle lighting system	12.5	11.2	6.2	43.8	26.2	3.6	0.15
19	Repairs of my vehicle ignition system.	10	12.5	12.5	40	25	3.58	0.14
20	Repairs of my vehicle horn.	3.8	13.8	10	50	22.5	3.74	0.12
Suspension System								
21	Repairs of my vehicle dampers.	7.5	2.5	0	65	25	3.98	0.11
22	Repairs of my vehicle suspension springs.	8.8	12.5	8.8	48.8	21.2	3.61	0.13
23	Repairs of my vehicle chassis mountings.	10	7.5	11.2	51.2	20	3.64	0.13
24	Repairs of my vehicle suspension bushes.	11.2	8.8	10	48.8	21.2	3.6	0.14
Steering System								
25	Repairs of my vehicle steering gearbox.	17.5	12.5	8.8	52.5	8.8	3.23	0.14
26	Repairs of my vehicle ball joints.	15	7.5	5	56.2	16.2	3.51	0.14
27	Repairs of my vehicle tie rods.	7.5	8.8	11.2	57.5	15	3.64	0.12
28	Repairs of my vehicle steering arms.	5	7.5	6.2	65	16.2	3.8	0.11
Brake, cooling and transmission systems								
29	Repairs of my vehicle cooling system.	3.8	7.5	3.8	68.8	16.2	3.86	0.1
30	Repairs of my vehicle braking system.	7.5	11.2	12.5	55	13.8	3.56	0.12
31	Repairs of my vehicle automatic transmission system.	16.2	15	16.2	31.2	21.2	3.26	0.15
32	Repairs of my vehicle manual transmission system.	2.5	11.2	13.8	52.5	20	3.75	0.11

1 = very dissatisfied; 2 = dissatisfied; 3 = neutral; 4 = satisfied; 5 = very satisfied

Majority of the commercial vehicle owners (76.2%) in the Tamale Metropolis are very satisfied or satisfied with the performance of roadside mechanics in changing their vehicle engine oil. Majority (73.7%) of the commercial car owners are also satisfied with

the replacement of filters to their engines. In the case of blowing their vehicle air cleaner element 60% were satisfied or very satisfied. Almost half (46.2%) of the drivers were very satisfied or satisfied with the way the roadside mechanics grease their vehicle's spring shackles. More than half of the drivers (55%) were satisfied with the repairs of their vehicles single point fuel injection system. In the case of multi- point fuel injection system more than half of the drivers (55%) were satisfied and 20% were very satisfied. The study also found more than half of the drivers (68.8%) were satisfied or very satisfied with the repairs of their vehicles fuel lift pump and change of their vehicle fuel filters.

The study revealed that, majority (86.3%) of the drivers were very satisfied or satisfied with the repairs of their vehicles cylinder heads and also almost half (40%) of them were satisfied with the repairs of the crankshaft assembly of their vehicles. Small proportions of the drivers (10%) were very dissatisfied or dissatisfied and more than half of them (52.5%) were satisfied with the work of the mechanics. Majority (62.5%) of the drivers were satisfied 10% of the car owners were neutral about the repairs of their vehicles charging systems. Moreover, more than half of the drivers (74.5%) were very satisfied or satisfied. The study also revealed that small proportion (12.5%) of the drivers was very dissatisfied with the repairs of their vehicles lighting system. Half (50%) of the drivers were satisfied with the repairs of their vehicles horns. Moreover none of the drivers was neutral about the repairs of their vehicles dampers. Seventy percent of the drivers were very satisfied or satisfied with the performance of the roadside mechanics in respect to the repairs of their vehicles suspension springs. However, more than half (51.2%) of the drivers were satisfied with the repairs of their chassis mountings. Over half (52.5%) of the drivers were satisfied about the repairs of their vehicles steering gearboxes. However, majority (72.4%) of the commercial car owners was very satisfied or satisfied with the

repairs of their vehicles ball joints. The study also found that more than half (57.5%) of the drivers were satisfied with the repairs of their tie rods. The research revealed that almost (81.2%) of all the drivers were very satisfied or satisfied with the repairs their vehicle steering arms. On the issue of cooling system 68.8% of the drivers were satisfied with the performance of the roadside mechanics. However 68.8% of the drivers were very satisfied or satisfied with the repairs of their vehicles braking system. More than half (52.4%) of the commercial drivers were very satisfied or satisfied with the repairs of their vehicles automatic transmission systems but majority (72.5%) of the commercial car owners were very satisfied or satisfied with the performance of the roadside mechanics.



CHAPTER FIVE

DISCUSSIONS OF FINDINGS

5.1 Skills Requirements of Roadside Mechanics

As shown in Table 1 majority of the auto mechanics in the Tamale Metropolis have over 10 years of working experience, indicating that they possess enough experience in repair and maintenance of automotive vehicles. However, despite their vast experience in automotive repair practices, most of the mechanics in the Tamale Metropolis find it difficult to diagnose and repair modern automotive vehicles using scan tools, especially modern electronic engines, automatic transmission systems, engine management system, steering system as well as charging system. The mechanics inability to repair and maintain modern automotive vehicles could be largely attributed to their low levels of education. As indicated in Table 1, over 35% of auto mechanics in the in the Tamale Metropolis do not have education at all. Twenty two point five percent (22.5%) possess basic education 30% for technical/ secondary and only 12.5% were up to tertiary level. This low level of education of the auto mechanics in the Tamale Metropolis has caused a major setback in that most of them are ignorant and not quite familiar with the advancing technological know-how of the trade. Some of them cannot read and write, and so find it difficult referring to instruction manuals, which has rather characterize modern auto repair practices. Again, the mechanics low levels of education have resulted in situation where most of them find it extremely difficult identifying the components of modern electronic engines by their technical names correctly. Moreover, from observations, apart from possessing low educational levels, a very large number of the auto mechanics in the Tamale Metropolis do not have knowledge in computer skills which are pre-requisites for repairing modern automotive vehicles. However, modern practices of automotive vehicle faults diagnosis, repair and maintenance require highly trained mechanics. The

job of an auto mechanic has become increasingly specialized in the 21st century. With the rapid advancement in technology, the mechanic's job has evolved from purely mechanical, to include electronic technology. Because vehicles today possess complex computer and electronic systems, mechanics need to have a broader base of knowledge than in the past. This goes to affirm what Santini said Santini (1992) stated that during the period from 1930 to 1970, the main body of automotive technology was mechanical they were relatively simple for any roadside mechanic to repair. By the early 1980's the introduction of information technology in automotives has triggered the most rapid technological advancement in the automotive industry. Fully skilled modern automotive repairers must have good reading ability and computer skills. Restoring automotives to their original form, state and working condition requires mechanics to follow instructions and diagrams in technical manuals. The internet is even spreading to mechanics, with certified mechanics providing advice online. Some mechanics now regularly use the internet for information to help them in diagnosing and/or repairing vehicles. Service manuals for vehicles have become significantly less prevalent with computers that are connected to the internet taking their position. It is therefore incumbent on the auto-mechanics in the Tamale Metropolis 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 automotives without being kicked out of business due to technological advancements.

5.2 Challenges facing roadside mechanics

On the issue of whether the garages in the country have adequate tools and equipments to enable them conveniently and speedily inspect and repair modern automotives vehicles, majority of the garages in the Tamale Metropolis did not have enough tools and

equipments only small proportion of them had almost all the required tools and equipment. Table 5 depicts this finding in percentage terms. As shown above, majority of the garages in the Tamale Metropolis do not have adequate working tools and materials. Apart from not having most of the required basic tools and equipment, the garages also do not have modern vehicle diagnostic equipments such as: oscilloscope, diagnostic code readers, portable data link, computer diagnostic testers, exhaust gas analyzers, computers, internet connectivity, etc. therefore the garages are currently finding it extremely difficult to inspect, repair and maintain current trend of automotives vehicles leading to gradual job losses as observe by Akpakpavi (2014) said. He stressed that, the problems faced by the local garages in the country as far as the repair and maintenance of modern cars are concerned could be attributed to reasons such as, low technical educational levels of auto mechanics, high cost of operations, lack of diagnostic machines, waste of time in detecting faults, damage to engines without the use of diagnostic machines in detecting faults, lack of appropriate maintenance practices, loss of customers and so on. The job of an auto mechanic has become increasingly specialized in the 21st century. Until the 1960s, all one needed was a good wrench set, a strong pair of pliers and a couple of sizes of screwdrivers and one could repair most cars. Modern cars are much more evolved, with hundreds of computer chips and solid state electronic parts. It requires specialized equipment to diagnose problems with these sophisticated electronic devices. With the electronic diagnostic equipments, mechanics compare the data produced by the diagnostic equipment to the standards provided by the manufacturer. This enables the mechanics to accurately diagnose problems based on the latest information downloaded from manufacturer databases. Hence, auto mechanics today have to learn how to use modern electronic diagnostic equipment as well as all of the traditional tools of the trade. To remain competitive in the globalized market, and to

continue to function effectively in this 21st century, the garages in Tamale Metropolis need to stock the relevant modern and even ultra modern tools and equipment necessary for modern car repairs. They should also endeavor to update and upgrade their technical competencies on the usage and correct working functioning of modern automotive vehicle repair tools and equipments. Indeed, this is the only way the garages in the Tamale Metropolis can survive.

A large percentage of them use tools and infrastructures of low quality because they cannot afford the high quality ones that enhance proper fitting required. Engines are removed manually instead of using crane or hydraulic lift, and so on. As illustrated in Table 5, a good number of the garages in the Tamale Metropolis do not have adequate tools while the few ones that appear to have fairly adequate tools have such tools characterized with sub-standard attributes. The results are stress and consequent damage to auto parts. Moreover, most of the garages in the Tamale Metropolis are currently working in the informal economy. Few garages are registered and most are low-technology small-scale, family-based enterprises, many of which have difficulty accessing capital and wider markets – all characteristics of the informal sector. Health and safety standards and other conditions are generally low. However, in developed countries such as the USA, Germany, China and the rest, heavy capital investments are made in vehicle automotive garages to ensure that they establish reputable service garages that are competitive, and safety practices are observed (US Department of Labour statistics (2012)). Again, most of the garages in these developed countries are operated formally and the necessary documentations and registrations are done even with insurance companies. These garages therefore are able to access capital and wider markets, and are also able to easily win international contracts. Indeed, many of the garages in the Tamale Metropolis have a precarious existence with few buffers between

themselves and poverty in the event of ill-health, adverse economic conditions or other misfortunes. To this end, it can be pointed out categorically that, as a result of low capital investments, most of the garages in the Tamale Metropolis are not able to generate enough income as they should. It is therefore incumbent on the owners of the garages in the Metropolis to make some additional capital investments in their garages to ensure that they establish garages with international reputes that will continually win the attraction and admiration of their customers.

One of the biggest challenges for the local garages is the increasing ICT-driven entry barrier in the global automotive industry which manually-based practices of the current garages in the Metropolis cannot keep pace. This technological barrier affects not only the auto mechanics, but also vehicle manufacturers, since customers are unable to secure quality support and servicing for modern vehicles. This leads to tarnishing of many vehicle brands, and creates an obstacle to newer vehicles entering the growing market in Ghana. Also, the remove and replaced methods of vehicle repairs adopted by particularly the garages in the Metropolis tend to render them rather ineffective since they spend a lot of time trying to diagnose faults on vehicles which they never succeed in doing. They rather end up causing severe damages to modern engines with eventual high cost of operation and customer loss. However, vehicle electronics continue to get more complex, thus, making it harder to find faults. As a result, a very large majority of garages worldwide have resolve to extensive usage of wide verities of automotive diagnostic equipments and tools in their modern automotive repair and maintenance practices. Indeed, even though the acquisition of these modern vehicle diagnostic equipments requires substantial capital investments, it is imperative that the small and medium garages in the country are updated and upgraded with these modern diagnostic equipments. This will not only assist them in repairing and maintaining the modern

vehicles on the roads, but will also generally boost the transportation industry in the country.

5.3 Client Satisfaction

In today's world keeping and retaining customers is most demanding than ever and it is the only way to survive and compete in dynamic world. As retaining a customer is much easier than attracting a newer one so patronizing the purchase intent of the consumers is of great benefit and big concern for every organization. The study shows that both the private vehicle owners and commercial vehicle owners in the Tamale Metropolis were satisfied that, the roadside mechanics have the skills to repair certain parts and components but they lack the skills necessary for the repairs of the electronic components such as charging system, engine management system, single and multi-point fuel injection system as well as the repairs of steering gear boxes. It shows that, as the customers got high quality or expected quality they show higher satisfaction and would ultimately become more loyal. Any resource which is used to enhance the customer satisfaction should be considered as a perfect investment rather than an expense (Berndt, 2009). The reason is that as you would improve your service quality your customer would become more satisfied and loyal and ultimately they would become a permanent revenue generating source of the garage. The study also inferences that when the garages achieve the high customer satisfaction they would surely enjoy the promising return (Berndt, 2009). Customer satisfaction is a fundamental aspect of service provision, and this is especially the case with motor vehicles, where substantial profits are generated in the servicing of vehicles. There are numerous challenges facing the industry regarding service quality experienced as endorsed by both commercial and private vehicle owners shown in Table 7 and 9 above.

CHAPTER SIX

SUMMARY OF FINDINGS CONCLUSION AND RECOMMENDATIONS

6.1 Summary of Findings

From Table 2, the mechanics seems to be content with their current inadequate skills levels just because they have the capability to maintain some components and systems of some vehicles, especially the old models of vehicles in the Metropolis but they still lack the skills for repair of modern electronic vehicles as indicated in Table 2. Occasionally, the few well endowed garages in the country such as Toyota Ghana, Japan Motors and others do well to organize in-service training in the form of conferences, workshops, seminars, symposia, etc., for the garages in the country. This is to enable the less endowed garages in the Tamale Metropolis to update and upgrade their technical competencies and to keep abreast with current best auto repair practices. Unfortunately, however, an informal interview with some of the master craft men in the Tamale Metropolis reveals that they hardly take advantage of these training programs to upgrade their skills due to lack of time and sometimes the minimum training cost involved. Moreover, to become proficient in a complex specialty such as automotive air-conditioning, electronic engine management systems, automatic transmission repairs as well as other similar specialty repairs might require another year or two of training or on the job experience. On-going training including classes at manufacturers' facilities to learn new technologies is common and mechanics are expected to keep up with ever-changing systems through reading and on-the-job practice. Again, there are also training and in-service training programs available on the internet to enable mechanics to become proficient in their auto repair practices. Indeed, education and training is a lifelong process. The mechanics in the Tamale Metropolis should see re-training programs as fundamental to their sustenance and survival in the current auto repair industry. They

should therefore take advantage of the training programs offered by the aforementioned organizations in the country to continually polish their skills.

6.2 Conclusion

In this dissertation, the modern auto repair practices in the Tamale Metropolis auto vehicle repair garages have been assessed. Automotive vehicle repair garages help to maintain the vehicles on the roads. Currently, most of the vehicle repair garages in the Tamale Metropolis are faced with numerous challenges including: Lack of skills to repair modern electronic vehicles, low capital and infrastructure base, inability to acquire and use modern vehicle diagnostic equipments and tools, low educational levels, lack of training and re-training, inability to use computers and internet facilities for vehicle repairs. The days of being only mechanically inclined are gone for most roadside mechanics. Now the general engineering mechanic and roadside mechanics or diagnosticians must be able to understand and appreciate the use of technology as a business tool. Once the mechanic understands how the technology behaves, the vehicle of today will not be complicated to repair as they may think. If roadside mechanics in the Tamale Metropolis fails to adapt to technological changes and advance accordingly. Ghana will lose competent mechanics some few years to come because of their inability to convert or adapt technological changes to modern methods.

One objective of this research work was to determine the satisfaction level of drivers who patronize the services of roadside mechanics in the Tamale Metropolis. It can be concluded that most of the drivers are not satisfied with the quality of service rendered by the automotive service garages especially in the area of electronics. Again, it could be concluded that the practices of the automotive repair services in the Tamale Metropolis

could be improved by giving the master craft men the needed professional training and also adequately resourcing them in terms of modern equipment and logistics.

6.3 Recommendations

Based on the findings and conclusions drawn from this study, the following recommendations are put forward to help the automotive repair garages to operate at competitive advantage.

1. In order to meet the increasing demand of after sales service, the dealership service garages need to work in collaboration with the roadside mechanics.
2. Roadside mechanics also contribute to economic growth of the country so, they should be giving every opportunity to undergo a series of training to upgrade their technical knowledge in the use of diagnostics tools and basic vehicle electronics training through the Skills Development Fund (SDF) initiative.
3. A government subsidy given to roadside mechanics to upgrade their knowledge in their trade area is likely to bring more benefits in terms of employment generation.
4. The government of Ghana could also give these tools (scan tool) to these mechanics on hire purchase.
5. It was established by the result that, level of education of the mechanics is low and this can greatly influence service quality. It is therefore recommended that, the master craft men in the automotive repair service garages avail themselves for educational training when the need arises.
6. Government must be encouraged to continuously support them to meet the challenges of the fast changing automotive technology systems.
7. The GSDI (Ghana Skills Development Initiative) programme should be extended to cover more mechanics.

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APPENDIX**TOPIC: ASSESSING THE SKILLS OF ROADSIDE MECHANICS IN
DIAGNOSING AND FIXING PROBLEMS OF VEHICLE SYSTEMS AND
COMPONENTS IN THE TAMALE METROPOLIS****QUESTIONNAIRE**

The researcher is a student of University of Education, Winneba Kumasi Campus, who is writing a dissertation on the assessment of skills of roadside mechanics in diagnosing and fixing problems of vehicle systems and components in the Tamale Metropolis. It has become necessary to seek your views on some issues relating to the topic through this questionnaire. Please indicate your view on each statement by ticking [] in the appropriate column, the response that suits the extent to which you agree with the statement. Please be assured that your responses would be kept highly confidential. This questionnaire is designed to gather information about the skills of roadside mechanics. Do not indicate your name or anything that could lead to identification. Please respond to all statements appropriately. For the location of the shop, use the space provided. Thank you very much for the anticipated co-operation.

SECTION A : DEMOGRAPHICS		
INSTRUCTIONS: For questions 1- 5, please kindly select by ticking in the appropriate column, which in your opinion, is the most appropriate answer to the questions.		
1	Your gender	Male [], Female []
2	Your age group	20 and below [], 21 to 30 [], 31 to 40 [], 41 to 50 [], 51 to 60 [], 60 and above []
3	Your highest education	Basic [], Secondary/Technical [], Tertiary [], None []
4	How long have you been in the auto industry?	5 years or below [], 6 - 15 years [], 16 - 25 years [], 26 -35 years [], 36 - 45 years [], 46 and above []
5	Your shop location within Tamale Metropolis

SECTION B: Skills needed by roadside mechanics to diagnose and fix problems of vehicle systems and components. Please select by ticking in the appropriate box; using the following scale; 5= strongly agree; 4= Agree; 3=Neutral; 2= Disagree; 1= Strongly disagree		1	2	3	4	5
6	I have the skill in performing engine tune – up accurately					
7	I time injection pumps to engines accurately in the shop					
8	I have the skill in timing valves to an engine accurately					
9	I am able to calibrate fuel injection pump accurately					
10	I have the skill in performing ignition timing accurately					
11	I fix problems on single point fuel injection systems					
12	I fix problems on multi point fuel injection systems					
13	I am able to overhaul an engine					
14	I have the skill in performing phase angle test accurately					
15	I have the skill in working on lubrication systems					
16	I have the skill in repairing air braking systems					
17	I am able to fix problems in servo assisted hydraulic braking systems					
18	I fix problems on generating(alternator) systems					
19	I install sensors in the engine management system					
20	I fix problems on manual transmission systems					
21	I fix problems on automatic transmission systems					
22	I have the skill in using scan tool for diagnosis					
23	I have the skill in fixing problems on water cooling systems					
24	I have the skill in fixing problems on air cooling systems					
25	I fix problems on vehicle suspension systems accurately					

SECTION C: Challenges faced by roadside mechanics in the performance of their duties; please select by ticking in the appropriate box; using the following scale; 5= strongly agree; 4= Agree; 3=Neutral; 2= Disagree; 1= Strongly disagree						
Resources (Tools & Equipment)		1	2	3	4	5
26	I have challenges in working under vehicles due to inadequate work pits					
27	I have challenges with lifting tools. example cranes					
28	I have challenges in keeping Parts clean due to inadequate work benches					
29	I have challenges in blowing air cleaner elements due to inadequate compressed air facilities					
30	Outmoded phase angle test machines					
31	Outmoded wheel alignment machine					
32	Outmoded wheel balancing machine					
33	Outmoded injection pump calibrating machines					
34	Outmoded scan tools					
35	Inadequate battery charging facilities					
36	Lack of headlamp beam setter					
Resources (Personnel)						
37	I do not have personnel to keep my records					
38	I have no technical education background.					
39	I have small number of apprentices who can work independently.					
40	I lack management experience needed to run my shop					
Skills (Modern electronic vehicle)						
41	I have challenge in maintaining air flow sensor					
42	I have challenges in maintaining exhaust gas oxygen sensor					
43	I have challenges in maintaining crankshaft position sensor					
44	I have challenges in maintaining coolant temperature sensor					
45	I have challenges in maintaining throttle position sensor					
46	I have challenges in working on integrated circuits					
47	I have challenges in maintaining actuators					

**TOPIC: ASSESSING THE SKILLS OF ROADSIDE MECHANICS IN
DIAGNOSING AND FIXING PROBLEMS OF VEHICLE SYSTEMS AND
COMPONENTS IN THE TAMALE MTEROPOLIS**

CLIENT SATISFACTION QUESTIONNAIRE

SECTION A : DEMOGRAPHICS		
INSTRUCTIONS: For questions 1- 5, please kindly select by ticking in the appropriate column, which in your opinion, is the most appropriate answer to the questions.		
1	Your gender	Male [<input type="checkbox"/>], Female [<input type="checkbox"/>]
2	Your age group	20 and below [<input type="checkbox"/>], 21 to 30 [<input type="checkbox"/>], 31 to 40 [<input type="checkbox"/>], 41 to 50 [<input type="checkbox"/>], 51 to 60 [<input type="checkbox"/>], 60 and above [<input type="checkbox"/>]
3	Your highest education	Basic [<input type="checkbox"/>], Secondary/Technical [<input type="checkbox"/>], Tertiary [<input type="checkbox"/>], None [<input type="checkbox"/>]
4	How long are you being driving	20 and below [<input type="checkbox"/>], 21 to 30 [<input type="checkbox"/>], 31 to 40 [<input type="checkbox"/>], 41 to 50 [<input type="checkbox"/>], 51 to 60 [<input type="checkbox"/>], 60 and above [<input type="checkbox"/>]

SECTION B: Road side mechanics' client's satisfaction of services provided. Please select by ticking in the appropriate box; using the following scale; 5= Very satisfied; 4 = Satisfied 3=Neutral; 2= Dissatisfied; 1 = Very dissatisfied						
General servicing		1	2	3	4	5
5	Change of my vehicle engine oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Replacement of my vehicle oil filters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Blowing of my vehicle air cleaner element.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Greasing of my vehicle spring shackles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fuel System						
9	Repairs of faults in my vehicle single point fuel injection system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Repairs of faults in my vehicle multi point fuel injection system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Repairs of my vehicle fuel lift pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Replacement of my vehicle fuel filter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engine Overhauling						
13	Repairs of my vehicle cylinder head	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Repairs of my vehicle crankshaft assembly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Fixing of my vehicle cylinder block liners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Repairs of my vehicle oil sump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Electrical System						
17	Repairs of my vehicle charging system					
18	Repairs of my vehicle lighting system					
19	Repairs of my vehicle ignition system.					
20	Repairs of my vehicle horn.					
Suspension System						
21	Repairs of my vehicle dampers.					
22	Repairs of my vehicle suspension springs.					
23	Repairs of my vehicle chassis mountings.					
24	Repairs of my vehicle suspension bushes.					
Steering System						
25	Repairs of my vehicle steering gearbox.					
26	Repairs of my vehicle ball joints.					
27	Repairs of my vehicle tie rods.					
28	Repairs of my vehicle steering arms.					
Brake, cooling and transmission systems						
29	Repairs of my vehicle cooling system.					
30	Repairs of my vehicle braking system.					
31	Repairs of my vehicle automatic transmission system.					
32	Repairs of my vehicle manual transmission system.					