

**Impact of integrating road safety measures in trucking industry: A
case study of Nairobi multiple hauling companies**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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DEDICATION

This thesis is dedicated to my dear wife, Sarah Margaret Isaac and my daughter, Joy Mwikali Isaac. They inspired and encouraged me to go an extra mile in pursuit of academic excellence even when the going seemed tough and frustrating.

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DEFINITION OF TERMS

The following are some of the technical terms used in the study:

- Independent Variable** : Is the variable presumed to be the cause of changes.
- Dependent Variable** : Is the variable that is studied to determine the effects of the independent variable.
- Frequency** : Is a measure of the rate of occurrence of an event.
- Hazard** : Is a condition or situation that may be a source of potential harm.
- Harm** : Injury which requires repair, cure or which may be irreparable to people or the environment.
- Loss** : Is any negative consequence resulting from an adverse event.
- Safety Training** : Is a detailed extension of the educational safety program applied to specific occupation, process, jobs or activities.
- Fleet Safety** : A Company's attempt to protect its large dollar investment in vehicles and mobile equipment.
- Accident** : Is any unplanned event that results in personal injury or property damage.

ABSTRACT

Truck accidents and other forms of accidents involving trucks are an unfortunate cost of doing transport business. There is very little research on what messages and mechanisms will most effectively change attitudes to road safety and safe driving practice on the road. According to accidents' records from Multiple Hauliers (E.A), Paddy Distributors and Trailink Transporters, it is evident that highway accidents involving trucks have been gradually increasing over time at an average rate of 33%. Such accidents have raised concern regarding truck safety and cost of doing transport business. It was therefore the purpose of this research work to investigate the impact of integrating road safety in Nairobi trucking companies.

The target population of study comprised of truck drivers, safety managers and maintenance managers of the three trucking companies mentioned above. The methodology mainly consisted of correlation study to investigate the relationship between both the Independent and dependent variables which sought to determine changes over time. Descriptive research design was undertaken through questionnaires and interviews. Random Sampling technique was used to select a sample size of respondents to which questionnaires were administered. Primary data was collected using questionnaires which comprised of open ended and closed ended questions. Data was analyzed using descriptive statistics.

Frequency tables and percentages were used in presentation of the findings. Some of the materials utilized during the study included stationeries, computer software for data analysis, a printer, a photocopier, flash disks and a camera. The results indicated that Nairobi trucking companies do not have effective policies and procedures to address sound road safety management. The study recommends adoption of road safety best practice in order to improve the road safety management and culture. This will translate into better truck safety, effective driver training programs and reduced cost of doing transport business. A further research on the role of civil society in the enhancement of road safety awareness campaign is highly recommended.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the study

With more than 1 million people killed and over 20 million injured in road accidents each year, road safety is an issue of immense human proportions (Peden, 2004). According to Moon (2003), over 75% of these casualties occur in developing and transition countries which account for 32% of motor vehicles. These accidents will continue and very likely increase as motorization increases, unless all stakeholders act together. Likewise, the global economic impact is huge economic losses caused by road accidents amounting to US\$ 500 billion worldwide. According to Moon (2003), the countries in the development and transition stages, their share of this economic loss is estimated to be close to 2% of Gross Domestic Product (GDP), nearly US\$ 100 billion which is nearly equivalent to double all overseas development assistance. These huge economic losses inhibit economic development and perpetuate poverty.

1.1.1 Global Estimates and Patterns of Road Traffic Injuries

Peden (2004) revealed that data collected from the World Health Organization and the World Bank were used for the statistical analyzes that form the basis of the World report on road traffic injury prevention.

According to the report, 1.2 million people died in 2002 as a result of road traffic collisions. This means that an average of 3242 people were killed daily on the World's roads. 20 million to 50 million people were injured or disabled in road accidents. Road traffic injuries were the eleventh leading cause of death Worldwide and accounted for 2.1% of all death globally. Furthermore, these road traffic deaths accounted for 23% of all injury deaths Worldwide. 90% of road traffic deaths occurred in low-income and middle-income countries, where 5098 million people or 81% of the World's population live and own about 20% of the World' vehicles.

1.1.2 Global Trends and Projections of Road Traffic Injuries

According to Peden (2004), key findings on global trends and projections presented in the World report on road traffic injury prevention included the number of road traffic injuries which has continued to rise in the World as a whole, though there has been an overall downward trend in road traffic deaths in high-income countries since the 1970s and an increase in many of the low-income and middle-income countries. Secondly, road traffic injuries are predicted to rise from tenth place in 2002 to eighteenth place by 2030 as a contributor to the global burden of diseases.

Finally, road traffic deaths are predicted to increase by 83% in low-income and middle-income countries (if no major action is taken) and to decrease by 27% in high-income countries. The overall global increase is predicted to be 67% by 2020 if appropriate action is not taken.

1.1.3 Global Estimates of Costs of Road Traffic Crashes

Peden (2004) revealed that road traffic crashes cost US\$ 518 billion globally and US\$ 65 billion in low-income and middle-income countries exceeding the total amount received in development assistance. It is also estimated that the road traffic crashes cost between 1% and 1.5% of Gross National Product in low-income and middle-income countries and 2% of Gross National Product in high-income countries.

1.1.4 Social-Economic and Health effects of Road Traffic Injuries

Research findings by Peden (2004), indicated that road traffic injuries cause emotional, physical and economic harm. There is a moral imperative to minimize such losses. A positive road safety culture is one of the measures necessary for reducing road crash deaths. On economic grounds, the road traffic accidents consume massive financial resources that countries can ill afford to lose.

It is important to estimate the cost of road traffic injuries to society in order to justify the expenditure necessary in promoting road traffic injury prevention and to make the best use of investments when different options are available. It is also important in order to ensure that the most cost-effective safety measures are introduced in terms of the benefits that they will generate in relation to the cost of their implementation.

1.1.5 Cost of Road Traffic Injuries to Households

Key findings by Peden (2004) revealed that low income earners are more likely to lose their household head than middle and high income earners and thus suffer immediate economic effects as a result of road traffic injuries. The loss of earnings, medical bills, funeral costs and legal bills can have a ruinous effect on a family's finances. Among poor people, 32% of the road deaths surveyed in the Bangladesh study occurred to a head of household or head's spouse compared to 21% among those not defined as poor. Over 70% of households reported that their household income, food consumption and food production decreased after a road death.

1.1.6 Trucking Industry in the United States of America

Trucking is an overlooked national resource even in the transportation World. Harkness (2000) revealed that with more than 500,000 interstate trucking companies in the United States, the trucking industry is the engine behind the United States economy. “We are an important part of the quality of life in this country,” says Bill Graves, the president and chief executive officer of the American Trucking Association (Harkness, 2000). Trucking is the driving force behind all companies’ worldwide supply chains, moving nearly everything consumed in the country. Nearly 80% of United States communities receive their goods exclusively by trucks.

Virtually all United States goods touch a truck during at least one leg of the supply chain. Trucking moves nearly 70% of all freight tonnage in the United States of America. Even goods that have traveled by trains eventually wind up on a truck for the last Kilometre of the delivery. Today, the total United States’ freight transportation outlays reach \$771 billion and trucking revenue is over \$650 billion. The industry however, remains heavily regulated in areas of safety and environment which has helped make the industry as safe and environmentally sustainable as it ever has been in its history. Without a financially strong and vibrant trucking industry, the nation’s economy is jeopardized and commerce is put at risk (Harkness, 2000). Motor carriers dominate today’s freight transportation economy.

They represent the overwhelming majority of the domestic transportation market, in terms of both volume and revenue. Trucking is a major employer with about 9 million people working in or supporting the industry. The American Trucking Association's "share the Road" and "Safety education" programs which are designed to educate the public about highway safety are examples of the trucking industry's commitment to keeping highways safe. The American Trucking Association called for a national speed limit of 104 Kilometers per hour and asked the United States Department of Transportation to require electronic speed governors to be set at no more than 109 Kilometers per hour on trucks at the time of manufacture. It is also encouraging to focus on better enforcement of traffic laws to prevent unsafe driving actions by all drivers including those by motorists around large trucks. Accidents at workplaces are enormous and lead to great human suffering and loss of production. The management of an organization has a duty to ensure that health and safety practices are employed to reduce this kind of menace.

1.1.7 Motorist's Perceptions of Trucks on the Highways

Truck accidents are an unfortunate cost of doing transport business. According to Moore (2005), the Federal Government and the private sector of North America attempted to educate the motorists concerning dangerous spots around trucks.

Programs such as “share the Road campaigns” though mildly successful at directing behavior of motorists near trucks, do not address the motorist’s perception of trucks which may determine how they behave around the larger vehicles. Research findings by Moore (2005) directly examine motorist’s perceptions of trucks on the highway and the effect these perceptions have on support for stricter safety regulations of the trucking industry. Accidents involving trucks are often dramatic and unforgiving. Catastrophic truck accidents have raised concern regarding truck safety with both policy makers and the general public. The costs of road transport associated with accidents have been escalating at an alarming rate. Aside from the direct costs to the transporter involved in the accident, additional costs are inflicted on non-involved transporter’s time, fuel and labour as vehicles negotiate delays, detours and congestion.

1.1.8 Impact of Truck Accidents on Business Continuity and the society at large

Charles (2006) revealed that on the evening of March 25, 2004, a tanker truck carrying 12,000 Litres of fuel oil collided with a car on a bridge in Bridgeport, Connecticut. The ensuing blast and fire melted the supports of the bridge resulting in complete closure of heavily used interstate for several days. The detours caused by the accident resulted in gridlock.

It was revealed that the costs from police overtime and the emergency construction of temporary bridge were estimated at over \$10 million. Siegel (2004) reported that though speed was not cited as a specific factor in this accident, a total of ten states nationwide instituted regulations mandating lower speed limits of trucks and the cars on their highways. The study showed that every week in America, more than a hundred people lose their lives and hundreds more are mangled in highway accidents involving trucks. Behind the wheel of the trucks in nearly all these accidents are non-union truck drivers. This great American educator and philosopher Eli Siegel, founder of Aesthetic Realism, explained that accident, maiming, industrial diseases and work-related fatalities have arisen from the very basis of the profit system and that the system is in itself contempt for people.

It is based on bosses and stockholders who do not do the work but take the profits that other people work hard to produce. Based on a national random sample of United States motorists, these results suggest that the general United States driving population's perceptions of trucks is predominantly negative and these perceptions are significant predictors of support for stricter truck speed regulations. Specific education or mass media campaigns can be implemented when these individuals are most likely to travel more Kilometres and more often.

Measures should be put in place for reducing road crash deaths on economic grounds as they consume massive financial resources that countries can ill afford to lose. It is important to estimate the cost of road traffic injuries to society in order to justify the expenditure necessary in promoting road traffic injury prevention and to ensure that the most cost-effective safety improvements are introduced in terms of the benefits that they will generate in relation to the cost of their implementation. Key findings from World Health Organization and the World Bank (2004) revealed that road traffic injuries cause emotional, physical and economic harm. There is a moral imperative to minimize such losses. A stewardship approach can be helpful in examining logistics social responsibility.

Clarkson (1995) found out that a stewardship framework suggests that the interests of all stakeholders (e.g. suppliers, manufacturers, distributors and the local community) have value and no set of interests is more important than any other. Improved public transport operations and safety standards as a result of better legislation, self regulation in the industry, Government and industrial partnership, improved awareness of compliance requirements and corrective enforcement are key to road safety. Clarkson (1995) readily discusses high speed driving on public roads and criticizes road safety campaigns involving cameras and speed bumps.

1.2 Road Safety in Kenya

In Kenya, the level of road discipline is poor and the quality of drivers and their attitudes and behavior play a big role in contributing to Kenya's poor road safety record. There is no national syllabus that driving schools have to follow and the calibre of instructions and also the quality of instructions is generally poor. Most traffic accidents are caused by a multiplicity of factors. This may be a combination of human error, poor road standards and vehicle defects. The above three components are the major factors which significantly contribute to road accidents.

Gelong (1990) found out that 85% of causes of accidents were attributed to human error while 6% were attributed to vehicle condition and 9% to the traffic environment. The environmental factors included road defects, animals, various obstructions and the weather. He also found out that road defects such as potholes do not seem to be a major cause of road accidents against the belief that potholes and other road defects have been thought to be the main causes of road safety problems in the country. Running or walking on the road was found to be the most common cause of accidents where pedestrians are involved. Losing control, speeding, misjudging and overtaking improperly are the next in the order.

Following the collapse of the National Road Safety Council in the mid Eighties, there has been very little formal Co-ordination between various ministries, agencies and the private sector involved in road safety. There is no dedicated source of road safety funding and the exchequer funds voted to various government departments involved in road safety are inadequate. Also there has been little development partner support in road safety since the late eighties. The participation of private sector and civil society organizations has been limited as there lacks a legal framework for their effective involvement and partnership with the government. A high proportion of Kenya's road users walk or use non-motorised means especially bicycles, handcarts and animal carts.

Non-motorized transport users have not been adequately recognized by planners nor have their needs been catered for. They are among the poorest sections of society. Langat and Manyala (2005) revealed that pedestrians and cyclists account for about 40% and 10% of road crash fatalities respectively. With the increasing regulation and costs of motorised transport, there has been a recent upsurge in towns etc, of motorcycle, tuk tuk and bicycles as public transport which is under regulated and poses a safety threat for the public as passengers and other road users.

In the last 15 years, Kenya has seen a significant increase in vehicle numbers, population growth and urban development as well as a substantial increase in public transport operations both motorised and non-motorized. According to Langat and Manyala (2005), the Government introduced legislation in 2004 to regulate the public transport sector including rules governing vehicles, passenger seating capacity, seat belts, use of speed governors and conductor's certificate of good conduct. Road discipline and compliance with traffic laws by Kenyan drivers, passengers, cyclists and pedestrians is poor leading to serious traffic congestion. The Traffic police are the key actors in enforcing traffic law. They are overstretched and under resourced (Langat and Manyala, 2005). Nairobi province records the highest number of crashes and has the greatest concentration of vehicles, pedestrians and crime problems.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Background to literature review

Fleet safety or operator safety is a key component of a company's attempt to protect its large dollar investment in vehicles and mobile equipment (Charles, 1999). Many of the vehicle accidents that occur are a direct result of driver error. But driver error is not the fault of the individual. It is the fault of management's failure to institute a fleet safety program that provides organization, direction and accountability for the fleet of vehicles that the company owns. Commitment to a fleet safety program communicates the value that the company places upon their property and employees. The care given to both vehicles/equipment and employees conveys the company's true view of the value of accident prevention.

A fleet safety program should consist of a written fleet safety program, a vehicle /equipment maintenance procedure, a record keeping process, an operator selection process, an operator training requirements and an operator performance requirement. A company should clearly state its policy regarding fleet safety and delineate what is expected to transpire as a result of its program.

A program on fleet safety should provide the framework for safety management of the company's vehicles and drivers. The program goal must be communicated to drivers and supervisory personnel. It is management's responsibility to recruit and screen new drivers, monitor driver qualification and safety infractions and provide training to upgrade driver's skills and knowledge.

2.2 Past Studies done as regards to road safety in general

Charles (1999) indicated that as a condition of employment and based upon the criteria in a written job description, all potential drivers should be able to pass a physical and mental examination and an alcoholic/drug test. To improve fleet safety, adequately qualified drivers must be recruited and their performance monitored. The great majority of preventable accidents can be shown to be directly related to the performance of the driver. An established formal procedure for interviewing, testing and screening applicants needs to be in place. A defined standard of skill and knowledge should be met by successful applicant. Once a driver is hired, there should be a formal program for monitoring driver's performance. A periodic review of the driving record and periodic review of the driver's health should be conducted. Drivers should be monitored occasionally for drug and alcohol abuse.

A protocol should be in place for identifying deficiencies in driver's skills and knowledge and a procedure should be in place for remedial training. It is well worth the effort to establish a procedure for terminating unqualified drivers. According to Charles (1999), a driver should undergo training related to a company and government policies and procedures. This training should include record keeping, accident and incident reporting, driving requirements and even defensive driving. After classroom training, each driver should be required to take a supervised driving test, or hands-on supervised operational driving to determine his or her competence. This should be done before the driver is released for work related driving assignments.

2.2.1 Speed, Anger, Aggression and young drivers

Carlsson (1990) showed that the issue of road courtesy plainly includes speeding, driver anger, driving aggression and behaviors of young drivers. Choosing a low driving speed is sometimes thought of as a component of courtesy on the road. Person's characteristics lead to their attitude to speed limits. Those who consider that they drive faster than average express more anti-safety opinions and admit more frequently that they breach driving regulations than those who consider that they drive as fast as the average or less fast. Young drivers who are delayed by a vehicle ahead driving slowly may think the worst not the best of the driver.

They may not have the imagination or experience to realize that there could be a good reason. Those breaking the speed limit by a small margin do not seem to have had any particular reason at all for doing so. Those breaking the speed limit by a large margin tended to be more focused on their driving, more upset, more likely to be enjoying the speed and more likely to be feeling under time pressure. It is not only present characteristics of people (attitudes, aspects of personality, etc.) that are predictive of driving behaviors but also their past characteristics.

2.2.2 A Low-Cost Road Safety Intervention

The use of speed bumps in the form of rumble strips and speed humps has been found to be effective on Ghanaian roads. For instance, rumble strips on the main Accra-Kumasi highway at the crash hot spot of Suhum Junction reduced the number of traffic crashes by around 35% (Assum, 2004). Fatalities fell by some 55% and serious injuries by 76% between January 2000 and April 2001. This speed-reducing measure succeeded in reducing or eliminating certain kinds of crashes as well as improving the safety of pedestrians. Speed control bumps and humps have become increasingly common on Ghanaian roads particularly in built-up areas where excessive vehicle speeds threaten other road users.

A wide range of materials including vulcanized rubber, hot thermoplastic materials, bituminous mixes, concrete and bricks have been used in the construction of the speed control areas. Rumble strips are cheap and easy to install. They have been constructed at potentially dangerous places on the Cape Coast-Takoradi highway, the Bunso-Koforidua highway and the Tema-Akosombo highway. Speed humps, in contrast, have been laid to slow down vehicles and improve the safety of pedestrians in the towns of Ejisu and Besease on the Accra-Kumasi highway.

2.2.3 Financing Road Safety

According to Zietlow (2005), the most challenging issue regarding road safety is to establish a stable and sufficient flow of funds to finance road safety organizations. Following the commercialization principle that is becoming more and more accepted worldwide, the stakeholders who receive the benefits should pay for them. This means that road users should mainly finance road safety measures. Besides road users, there are other stakeholders that benefit from improving road safety such as insurance companies, manufactures and distributors of road safety equipment. All of these groups have vested interests in reducing road accidents and should contribute to finance road safety initiatives.

2.2.4 Road Safety Organization

According to Elsenaar (2002), the main objective of an organization is to design, execute and evaluate road safety strategy and plan. Lead responsibility of road safety practitioners should be defined (including a coordinating role) and be accepted by key organizations. A good working relationship involving traffic police, ministries of roads and health, lawmaking and other authorities should be the second priority. Multi-sectoral co-ordination should be based on successful local precedents. If none exist, the road safety co-coordinating body should initially be limited to key ministries. Working groups and technical committees should be used to promote the participation of both business and civil society in developing road safety policy. Council and committee members will have a large role in the success of a program. Members need to be committed and pro-active. A road safety central office will be required regardless of the organizational model chosen with adequate financial and technical resources to be effective. The organization should have or develop ties with decentralized regional authorities.

2.2.5 Road Safety Strategy and Plans

According to Elsenaar (2002), formulating an effective road safety plan should involve development of a strategy based on the nature of road safety deficiencies, crash data analyses and realistic countermeasures. The elements of the plan should be prioritized based on cost effectiveness.

If a strategy is formulated and no sufficient data are available, the next best solution is to adapt projects that have proven their efficiency in comparable countries. It also involves determining an agreed budget range/limit and likely sectoral/organizational allocations. A priority action in the plan should be the development of sustainable funding sources which should include the work programmes of key implementing organizations and not be sector based with responsibility diffused. Elsenaar (2002) further said that the plan should target the critical risks in the country/city based on a rigorous analysis of road safety problems and should identify the role of each sector in addressing the critical risk factors (e.g. seat-belts, pedestrian safety, speed management, etc.). The local staff should take lead role in plan development with plan structure based on what has worked effectively in the country.

Technical assistance should be focused on helping with local development and not producing the plan as a project output. Sector working groups should be developed to ensure the perspectives of vested interested groups are considered. Post crash interventions such as trauma management should be included in road safety plans and greater priority needs to be given to monitoring with performance indicators used to measure input and output as well as outcome such as casualty reduction targets. Local plans should be developed independently and even ahead of national plans.

2.2.6 Road Safety Conceptual Framework

Elsenaar (2002) revealed that given the burden of accident's outcomes (injuries, harms, etc.) which society perceives, it is utterly intuitive to speak about road safety problems. Any approach towards the treatment of the problem must basically rise from a complete understanding of the problem which comprises the definition of the problem and the knowledge of all underlying mechanisms. There is lack of consensus on the definition of road safety problem since many understand it in a very narrow sense as a consequence of crashes harming society (in monetary and social sense) while others see it in a very complex sense as a series of partial mechanisms working together in a system.

There is an agreement on the complexity of road safety system or problem but to reach its understanding, a dissection must be made. Elvik (2004) proposed a framework for a rational analysis of road safety problems. This starts with the definition of a road safety problem as "Any factor that contributes to the occurrence of accidents or the severity of injuries." It further defines objectives of rational road safety analysis as "the identification of those problems that make the greatest contribution to accidents or injuries and that are amenable to treatment".

The taxonomy, a corner stone of this rational analysis of road safety problems aims at providing categorization of road safety problems and has two inseparable parts: Analysis of the size or importance of problem (quantification) and a concept of the amenability of problems to treatment (amenability). Road safety problems are considered having several dimensions such as magnitude, complexity, territoriality, dynamics, severity, inequity, perception and amenability to treatment. The most effective way on how to target road safety problems comes out from the quantification of problems while considering their amenability. This means a priority exclusion of some problems which are not amenable to treatment and prioritization within all other measures in order to allow efficient problems treatment (e.g. cost-effectiveness analysis). Figure 1 shows the quantification of problem which should take into account the quality and availability of data and methods allowing determination of the existing relationships while the amenability of treatment is based on the existing framework and treatment potential.

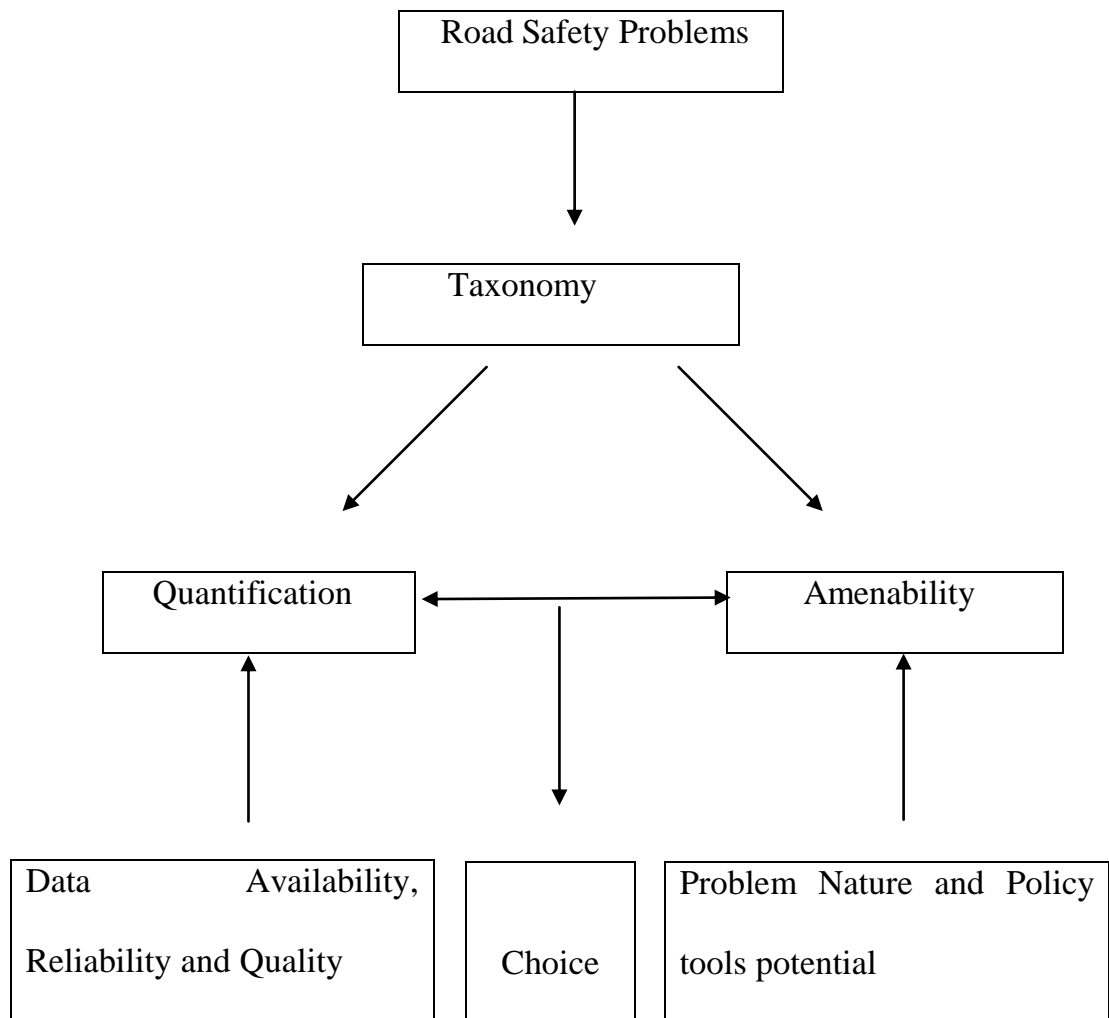


Figure 1 Framework for a rational analysis of road safety problems

The three levels of amenability consist of zero (e.g. accidents due to geographical or extreme weather conditions), intermediate (e.g. driving while intoxicated) and full (e.g. high risk accident locations). According to Elvik (2004), the concept represents a framework for an effective road safety problem treatment.

It however does not provide identification of problems to be considered. The different conceptual models were developed in the past aiming to address this issue as well. The triangle concept and the pyramid concept are the ones preferred by road safety practitioners and researchers worldwide for their simplicity. Elsenaar (2002) revealed that the triangle concept is based on an intuitive understanding that among all the factors present in a complex system of road safety, three cornerstones stand out to be human-being as those traveling in some predefined environment inside or outside moving vehicles. Many different approaches and theories are based on this triangle concept. Approaches and theories such as the driver-vehicle interaction interface, vehicle-road interaction and a abroad study area of both road and vehicle engineers. While the pyramid concept has been preferred by researchers and policy makers, the triangle concept as shown on figure 2 has traditionally been used by road safety practitioners and other stakeholders.

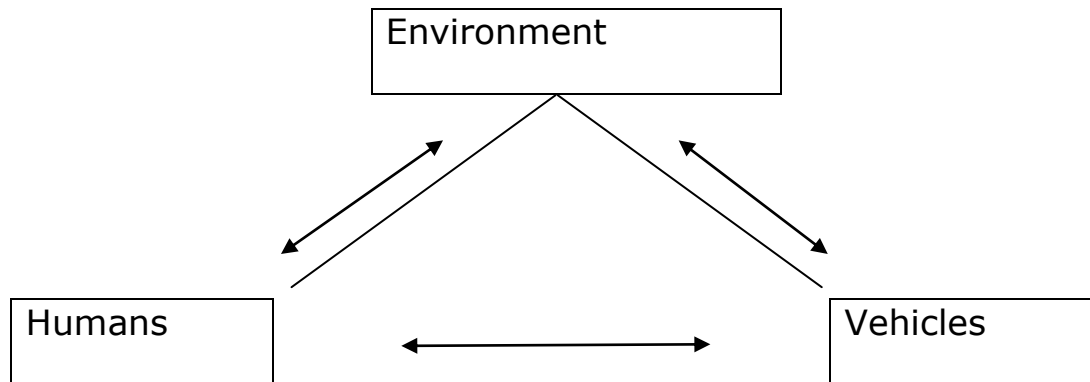


Figure 2 Road Safety Triangle

2.2.7 Systems Approach to Road Safety

Traditionally, analysis of risk has examined the road user, vehicle and road environment separately. Furthermore, there is a tendency by researchers and practitioners to look for one or a few factors, when in actual fact they should be analyzing multiple factors. Building on Haddon's insights, the systems approach (where interactions between different components are taken into account) seeks to identify and rectify the major sources of error that contribute to fatal crashes or crashes that result in severe injury as well as to mitigate the severity and consequences of injury. The essence of using a systems approach is to consider not only the underlying factors, but also the role of different agencies and actors in prevention efforts. Road traffic injuries are a multidimensional problem that requires a comprehensive view when examining the determinants, consequences and solutions.

Any road traffic system is highly complex and can be hazardous to human health. Elements of the system include motor vehicles, roads and road users along with their physical, social and economic environments. Making a road traffic system less hazardous requires a systems approach- understanding the system as a whole and the interaction between its elements and identifying where there is potential for intervention

2.2.8 Factors Influencing Crash Involvement

2.2.8.1 Speed

According to Elvik (2004), the speed of motor vehicles is at the core of the road traffic injury problem. Speed influences both crash risk and crash consequence. The physical layout of the road and its surroundings can both encourage and discourage speed. Crash risk increases as speed increases especially at road junctions and while overtaking as road users underestimate the speed and overestimate the distance of an approaching vehicle. Drivers' speed choice is influenced by a number of factors that can be considered as driver-related factors (e.g. age, sex, alcohol level and the number of people in the vehicle), factors relating to the road and the vehicle (e.g. road layout, surface quality, vehicle power and maximum speed) and finally traffic-related and environment-related factors (traffic density and composition, prevailing speed and weather conditions).

2.2.8.2 Alcohol

Research findings by Moon (2003) showed that impairment by alcohol is an important factor influencing both the risk of a road crash as well as the severity of the injuries that result from crashes. The risk of a road crash when a driver is alcohol-impaired varies with age. Teenagers are significantly more likely to be involved in a fatal crash than older drivers. At almost every blood alcohol level, the risk of crash fatality decreases with increasing driver's age and experience. Teenage drivers who are alcohol-impaired are at increased risk of having a road crash if they have passengers in the vehicle as compared with those driving alone.

A low expectation of getting caught with blood alcohol content above the legal limit has been shown to lead to an increased risk of a crash. The frequency of drinking and driving varies between countries but it is almost universally a major risk factor for road traffic crashes. The extent to which alcohol contributes to road traffic crashes varies between countries and direct comparisons are difficult to make. In many high-income countries, about 20% of fatally injured drivers have excess alcohol in their blood (i.e. above the legal limit). Studies in low-income countries have shown alcohol to be present in between 33% and 69% of fatally injured drivers.

2.2.8.3 Driver Fatigue

Elsenaar (2002) revealed that fatigue or sleepiness is associated with a range of factors. Some of these factors with relevance to road traffic are long-distance driving, sleep deprivation and the disruption of circadian rhythms. Three high risk groups have been identified as young people particularly males (aged 16-29 years), shift workers whose sleep is disrupted by working at night or working long, irregular hours and finally people with untreated sleep apnea syndrome or narcolepsy. Factors that substantially increase the risk of a fatal crash or a crash with serious injuries include driving while feeling sleepy or driving less than five hours of sleep and finally driving between 2pm and 5pm. According to Moon (2003), surveys of commercial and public road transport have revealed that owners of public transport vehicles in pursuit of increased profits frequently force their drivers to drive at excessive speeds, to work unduly long hours and to work when exhausted.

2.2.8.4 Hand-Held Mobile Telephones

According to Elsenaar (2002), the use of hand-held mobile telephones can adversely affect driver behavior as regards to physical tasks as well as perception and decision making. The process of dialing influences a driver's ability to keep to the course on the road. Results of studies on distraction and mental load show that driver reaction times are increased by 0.5-1.5 seconds when talking into a mobile telephone.

As a result of talking into a mobile telephone, the driver performance is particularly affected in maintaining the correct lane position and the headway between two vehicles traveling one behind the other in keeping to an appropriate speed and in judging and accepting safe gaps in the traffic. Elsenaar (2002) showed that drivers who use mobile telephones while driving face a risk of a crash four times higher than the risk for drivers who do not use mobile telephones.

2.2.8.5 Inadequate Visibility

In highly motorized countries, inadequate visibility plays a key role in three types of crashes which include a moving vehicle running into the rear or side of a slowly moving or stationary vehicle located ahead on the roadway at night-time, angled collisions or head-on collisions in daytime and finally rear-end collisions in fog, in daytime and at night. Research findings by Moon (2003) revealed that in low-income and middle-income countries, the phenomenon of pedestrians and vehicles not being properly visible is frequently a serious problem. In such countries, there are fewer roads with adequate illumination and some may not be lit at all. In addition, it is more common for large number of bicycles and other vehicles to have no lights or reflectors and for narrow road space to be shared by fast-moving and slow-moving road users.

2.2.8.6 Road-Related Factors

Road crashes are not evenly distributed throughout the network. They may occur in clusters at single sites, along particular sections of road or scattered across the whole residential neighbourhoods especially in areas of social deprivation. While road engineering can greatly help in reducing the frequency and severity of road traffic crashes, it can also contribute to crashes. The road network has an effect on crash risk because it determines how road users perceive their environment and it provides instructions for road users through signs and traffic controls on what they should be doing. Elsenaar (2002) showed that many traffic management and road safety engineering measures work through their influence on human behavior.

Road engineering factors include those where a road defect directly triggers a crash where some element of the road environment misleads a road user and thereby creates error or where some feasible physical alteration to the road would have made the crash less likely. In the planning, design and maintenance of the road network, four particular elements affecting road safety have been identified as safety-awareness in the planning of new road networks, the incorporation of safety features in the design of new roads, safety improvements to existing roads and finally remedial action at high-risk crash sites.

2.2.9 Factors Influencing Crash Severity

Elsenaar (2002) revealed that the urban centres of low-income and middle-income countries typically contain a great mix of vehicles. Incompatibility of size between different types of road vehicles is a major risk factor especially in impacts between cars and large trucks. The power of the larger vehicle including its mass, geometry and structural properties increases rates of injury and death many times compared with an equivalent car-to-car collision.

2.2.9.1 Non-use of Seat-Belts and Child Restraints in Motor Vehicles

Findings by Elsenaar (2002) showed that the lack or inappropriate use of seat-belts and other safety restraints (child seats and booster seats) are risk factors for the fatalities and injuries that result from road. The most frequent and most serious injuries occurring in frontal impacts to occupants unrestrained by seat-belts are to the head.

2.2.9.2 Roadside Objects

According to Elsenaar (2002), impacts between vehicles leaving the road and solid roadside objects such as trees, poles and road signs are a major road safety problem worldwide. These collisions are usually single-vehicle crashes and frequently involve young drivers, excess or inappropriate speed, the use of alcohol or driver fatigue.

Another problem related to impacts with objects off the road is the occurrence of crashes caused by restricted visibility resulting from poor positioning of these objects.

2.2.9.3 Lack of In-Vehicle Crash Protection

In the past decade, the crashworthiness of private cars for their occupants has improved considerably in many high-income countries, though there is still considerable room for further improvement. In low-income and middle-income countries, regulation of motor vehicle safety standards is not as systematic as in high-income countries. According to Moon (2003), many engineering advances to be found in vehicles available in high-income countries are not standard fittings in vehicles in low-income and middle-income countries.

In addition, the majority of road casualties in low-income and middle-income countries occur outside the car affecting pedestrians, cyclists, motorized two-wheeled vehicle riders or passengers in buses and trucks. As yet, there are no requirements to protect vulnerable road users by means of crashworthy designs of the fronts of trucks or buses. The main injury risks for car occupants arise from the way vehicles interact with each other and with the roadside in frontal and side-impact crashes. In fatal and serious crashes, head, chest and abdominal injuries are predominant.

Among injuries that cause disability, those to the legs and neck are common. Determinants of the degree of severity of injuries include contact by occupant with the car's interior exacerbated by intrusion into the passenger compartment of the colliding vehicle or object, mismatch in terms of size and weight between vehicles involved in a crash, ejection from the vehicle and inadequate vehicle safety standards.

2.2.10 The Role of Non Governmental Organizations

Road safety cannot be the responsibility of government alone. The commercial sector, service organizations and non-Governmental Organizations (NGOs) play an important role in increasing road safety awareness (Elleveset, 1997). Non Governmental Organizations have an important input at grass roots level.

2.2.11 Fleet Safety Program

Charles (1999) revealed that the cost of a fleet of vehicles is a staggering investment and a major cash outlay for companies. In order to reap the full benefits of such an investment, the investor should start with a thorough purchasing process. Once a fleet of vehicles is in place, then the investor wants to get the most mileage out of the purchase.

This can only be accomplished by having a preventive maintenance program in place which includes regularly scheduled maintenance, follow-up to driver complaints and daily pre-shift inspections of vehicles and equipment. A record keeping system for the maintenance program includes a driver's inspection record which is a checklist of things to be checked daily by drivers and any corrections needed to ensure the safety of the vehicles (this should go to the maintenance shop), a scheduled maintenance record which is a maintenance shop record of routine or periodic service for each vehicle, a service record to show all findings and results of the inspections and repairs made along with the date of each such maintenance procedure and finally a vehicle history record which shows a complete history of the vehicle including but not limited to any accidents in which it was involved.

It is paramount that the selection of drivers is a key factor in any fleet safety which may be viewed as a vehicle safety or mechanical safety. But this type of safety depends upon both maintenance and operators. The driver is vital to the prevention of accidents, incidents, vehicle damage and injuries. Careful selection of the driver is paramount to an effective fleet safety program. The selection process should involve access to drivers past employment history, driving record (including accidents), accommodations or awards as well as previous driver's experience.

As a condition of employment and based upon the criteria in a written job description, all potential drivers should be able to pass a physical and mental examination and an alcoholic/drug test. To improve fleet safety, adequately qualified drivers must be recruited and their performance monitored. The great majority of preventable accidents can be shown to be directly related to the performance of the driver.

2.2.12 A Good Investment in Road Safety

According to Mertner (2007), audits are good investments. If the road concepts are healthy from the beginning, the number and severity of accidents can be reduced, saving costs and human suffering as well as avoiding re-investment costs in improving the road. Often, safety improvements have very high economic return. Audits and safety reviews are effective both at the very beginning of a project and during the operation of existing roads. In the countries which have implemented road safety audits and road safety inspections have ended up saving costs and human suffering. The audit is not an approval or rejection of the project. The audit is a tool to ensure that road safety aspects are properly included in the decision-making basis and in the road projects. The audit looks only at safety aspects. However, other aspects obviously influence the decision making.

2.2.13 Health and Safety Training

According to Charles (1999), an established formal procedure for interviewing testing and screening applicants needs to be in place. A defined standard of skill and knowledge should be met by successful applicant. Once a driver is hired, there should be a formal program for monitoring driver's performance. A periodic review of the driving record and periodic review of the driver's health should be conducted. Drivers should be monitored occasionally for drug and alcohol abuse.

A means should be in place for identifying deficiencies in driver's skills and knowledge and a procedure should be in place for remedial training. It is well worth the effort to establish a procedure for terminating unqualified drivers. A driver should undergo training related to a company and government policies and procedures. This training should include record keeping, accident and incident reporting, driving requirements and even defensive driving. After classroom training, each driver should be required to take a supervised driving test, or hands-on supervised operational driving to determine his or her competence. This should be done before the driver is released for work related driving assignments.

2.2.14 Pre-Operational Inspection

Charles (1999) recommended that prior to placing a vehicle in service or on the road, the driver should among others, conduct a pre-operational inspection to ascertain the status of steering wheel (excess play), trailer brakes, all lights including four-way flashers, horn, back up alarm, wind shield wiper and washer, safety belts, parking brake, fuel tank and Cap. The driver should also inspect the working condition of reflectors, tires and wheels (lugs), mirrors, fire extinguishers and warning devices, head lights, clearance lights, identification lights, stop lights, turn signals, safety chains, hoses and couplers, electrical connectors, start engines, oil pressure and air pressure or vacuum (gauge).

2.2.15 Preventable Accidents

A preventable accident is one which occurs because the driver fails to act in a reasonably expected manner to prevent it. In judging whether the driver's actions were reasonable, one seeks to determine whether the driver drove defensively and demonstrated an acceptable level of skill and knowledge (Charles, 1999). The concept of a preventable accident is a fleet safety management tool which helps to establish a safe driving standard for the driver and provides an objective for accident investigations and evaluations.

It also provides a means for monitoring the effectiveness of fleet safety programs and finally assists in dealing with the implementation of safe driving recognition programs. Fleet safety driving performance is dependent on management commitment to the implementation of a formal fleet safety program. The health and safety policy should consist of the general policy statement, the description of the organization on health and safety and details of arrangement for implementing the policy. According to Charles (1999), a road safety research and related output is important for making informed decisions and taking actions on road safety issues. Various organs of Government such as Police department, Ministries of Transport, Road and public works and the private sector (e.g. insurance industry) collect data on road safety but currently lack capacity to analyze it.

Research institutes that can analyze the data have limited access to it and so overall there is limited utilization of the data collected. The various institutions carrying out road safety research are not coordinated and there is lack of framework for identifying road safety research needs, undertaking research, synthesis and dissemination of information. A number of key areas relating to road safety research remain untouched and there is need for research to be more comprehensive.

Likewise, with the need to change people's attitudes and behaviors on the road; there is very little research on what mechanisms and messages will most effectively change attitudes to road safety and encourage safe practice on the road. The logistic activity most visible to the general population is the presence of trucks transporting goods across the nation's highways. Transportation also represents the largest portion of total logistic costs and a large percentage of the problems. Saleemi (1997) stated that for a successful safety programme, safety education and training are necessary for personnel in the factory as well as in the whole organization. Safety education develops safety consciousness among employees and results in safety when handling of equipment.

It also ensures safety work performance on part of every employee by developing his skills in the use and operating safe equipment. During training, employees are taught the principles of first aid, how to wisely use the tools and machines, how to take precautions to prevent fire accidents, road accidents, how to use hand tools properly and how to protect their eyes and other parts of the body. Every organization displays safety posters to promote safety publicity. Employees in the organization may also be shown videos regarding safety and are asked to suggest some safety schemes. Armstrong (2004) revealed that training in health and safety is the key factor in prevention of road accidents.

The training programme may start with induction courses. It should also take place following a transfer to a new job or a change in working methods. Safety training spells out rules and provides information on potential hazards and how to avoid them. Further refresher training should be provided and special courses taken to deal with new aspects of health and safety or areas in which safety problems have emerged. Research findings by Moore (2005) revealed that for the logistics community, the most visible aspect in their activities is the presence of trucks transporting goods across the highways and by ways of land. How motorists view trucks form part of the general public's overall attitude towards the transportation industry and logistics community in general.

More importantly, how motorists perceive trucks is likely to affect their behaviour near trucks on the highways. Understanding these perceptions may save lives and reduce logistics costs from property damage and insurance premiums. Of these costs, insurance premiums have seen increase of over 150 percent during the past few years primarily because of increase in claims against trucking firms. In specific response to highway safety concerns, the trucking industry and federal agencies in North America have instituted safety Campaigns aimed at truckers and the general public.

Safety programs directed at the general public have been in the form of education programs, such as the “Share the road campaigns” which inform motorists about certain areas around a truck where the truck driver cannot see motorists. Though these programs can help direct the behavior of motorists around trucks in traffic, they are not designed to influence motorist’s perceptions and beliefs about trucks. Perceptions and beliefs about trucks on the highways are likely to be formed by motorist’s experience and personal characteristics such as sensation seeking and risk taking propensity. To educate and train motorists effectively so as to drive safely around trucks, motorist’s perceptions and driving experience must be understood.

2.2.16 Benefits of Managing Work-Related Road Safety

The true costs of accidents to organizations are nearly always higher than just the costs of repairs and insurance claims (Brake, 2000). The consequences of an accident on the self-employed and small businesses are likely to be proportionately greater than on a larger business with greater resources. The benefits to you from managing work-related road safety can be considerable, no matter the size of your business. It allows you to exercise better control over costs such as wear and tear, fuel, insurance premiums, legal fees and claims from employees and third parties. It also allows you to make informed decisions about matters such as driver training and vehicle purchase and also helps you to identify where health and safety improvements can be made.

Brake (2000) indicated that benefits from managing work-related road safety and reducing crashes include fewer days lost due to injury, reduced risk of work-related ill health, reduced stress and improved morale. Risk assessments for any work-related driving activity should follow the same principles as risk assessments for any other work activity. Failure to properly manage work-related road safety is more likely to endanger other people than a failure to properly manage risks in the workplace. A risk assessment is nothing more than a careful examination of what at work activities can cause harm to people.

It helps to weigh up whether one has done enough to ensure safe working practices or should do more to prevent harm. The risk assessment should be appropriate to the circumstances of the organization and does not have to be over complex or technical. It should be carried out by a competent person with a practical knowledge of the work activities being assessed. For most small businesses and the self-employed, the hazards will be easy to identify. Employers who employ less than five people do not have to record their findings but they may find it helpful to make some notes. The aim is to make the risk of someone being injured or killed as low as possible.

2.2.17 Tracking Accident Cases

Moore (2005) revealed that understanding motorist's perceptions or attitudes is an important consideration when developing safety programs.

A recent report that evaluated the effectiveness of splash and spray suppression devices found that these devices did not significantly reduce spray for newer or older trucks at speeds of 88 Kilometers per hour and 104 Kilometers per hour. The study does suggest that improvements in aerodynamics can reduce spray however, this comes as a cost to the trucking firm. Specific education or mass media campaign can be implemented when these individuals are mostly likely to travel more Kilometres and more often i.e. before the holiday season, summer vacation travels and in tourist destination areas.

It was also found that engagement in risky driving behavior is associated with less negative perceptions of truck drivers. These findings are useful in the jury selection process for tracking accident cases. This study suggests that certain drivers or motorists may have definite opinions about truck drivers, either predominantly negative or positive. The trucking industry as a whole should be interested in understanding why the general motorist population supports or doesn't support measures concerning their industry and the elements that contribute to those perceptions. The overall pattern of significant estimators flow from much of the established accident analysis literature.

From this study, a dichotomy in beliefs is observed: Either, motorists view trucks negatively and behave accordingly by using safety measures such as increased seat belt usage and subsequently supporting stricter speed regulations of trucks or they do not perceive trucks as dangerous and do not support stricter speed limit. Research has shown that this type of driver behaviour is associated with accidents and noted to be a reason why truck drivers believe accidents occur. It was also found that support of stricter regulations was strongly predicted by perceptions. This offers a strong motivation for distribution firms to understand and change perceptions of their industry. Often, in terms of truck regulation, an “Us Vs Them” attitude emerges with trucking firms blaming motorists and motorists citing risky truck behavior.

Among the top causes of the accidents were illegal behaviors of motorists such as over speeding, tailgating and finally motorist’s distractions such as talking on the phone, reading, etc. In addition to the above, the findings attempted to determine why motorists engaged in these behaviours. Truck driver’s experts perceived that the reasons for the motorist’s behaviour included aggression, inattentiveness, incompetence and ignorance. Direct examinations concerning the reasons why drivers behave as they do on the roadways has been explored extensively in safety and accident analysis.

Moore (2005) revealed that young male drivers compared to older male drivers are more involved in accidents because they do not perceive specific driving situations as risky. It was also found that young males (as opposed to young females) overestimated their driving competence and perceived dangerous driving conditions as less risky. In support of a gender factor in accident analysis, men score higher on driver aggression behaviour than women and that the aggression score decreased significantly with age. Additionally, the findings also showed that senior drivers who were more venturesome that is, they drove more frequently were less likely to be involved in accidents.

2.2.18 Past Studies done in Kenya as Regards to Road Safety

According to Odera (2003), the initial capital to invest in transport business in Kenya is large and hence difficult to raise. Most of the investors in this business finance their purchase through own savings as well as work and pay system. Many vehicle owners are aware that locally assembled vehicles are strong and durable but because of their prohibitive purchase costs, they buy used vehicles (on average 8 years old) locally from motor dealers. This encourages the presence of old and sometimes unsafe vehicles on the roads. The Kenya police records from 1977 to 1996 identified two common causes of road transport accidents which are driver error and pedestrians.

Passengers, pedal cyclists, and vehicle defects accounted for a small number of road traffic accidents. In Kenya, one drives on the left side of the road which can be very disorienting to those not accustomed to it (Obudho, 2007). Excessive speed, unpredictable local driving habits, poor vehicle maintenance, bumpy, potholed and unpaved roads and the lack of basic safety equipment on many vehicles are daily hazards on Kenyan roads. When there is a heavy traffic jam, either due to rush hour or because of an accident, drivers will drive across the median strip and drive directly toward oncoming traffic.

During the rainy season, some unpaved roads are impassable even with four-wheel drive vehicles with high clearance. Travelers are urged to consult with local officials regarding road conditions. Traveling by a passenger train in Kenya is considered unsafe particularly during rainy seasons because of lack of routine maintenance and safety checks. Over the past several years there have been accidents including a passenger train derailment between Nairobi and Mombasa which resulted in the deaths of 32 people including one foreign tourist. Several trains derailed in 2000. The Kenya Railway service has been reduced from seven days to three days per week. The service from Nairobi to Malaba is now only a cargo service and is no longer a passenger service.

Langat and Manyala (2005) observed that driver error was the common cause of road accidents accounting to 41% of the accidents on record. Most causes of road accidents in Kenya can be attributed to motor vehicle defects, road conditions, weather, traffic signs and the driver behavior. A motor vehicle has to be mechanically sound and roadworthy for optimal functioning. From 1977 to 1996, records showed that there was a substantial upward trend in the number of road accidents in Kenya together with the associated fatalities and injuries. In that policy report, the total number of road traffic accidents for the ten years period (1987-1996) was 114 741. These accidents resulted in 23124 deaths and 125907 injuries and high costs of running the sector.

2.3 Summary of the Review and Gaps to be filled

The essence of using a road safety systems approach is to consider not only the underlying factors, but also the role of different agencies and actors in prevention efforts. Road traffic injuries are a multidimensional problem that requires a comprehensive view when examining the determinants, consequences and solutions. Any road traffic system is highly complex and can be hazardous to human health. Elements of the system include motor vehicles, roads and road users along with their physical, social and economic environments. The speed of motor vehicles is at the core of the road traffic injury problem. Speed influences both crash risk and crash consequence.

The use of hand-held mobile telephones can adversely affect driver behavior as regards to physical tasks as well as perception and decision making. The process of dialing influences a driver's ability to keep to the course on the road. Fatigue or sleepiness is associated with a range of factors. Some of these factors with relevance to road traffic are long-distance driving, sleep deprivation and the disruption of circadian rhythms. Adequate research has been done as regards to systems approach to road safety, factors influencing crash involvement, low-cost road safety interventions and the effect of speed, anger and aggression on driver performance on the road.

A number of key areas relating to road safety research remain a challenge and there is need for research to be more comprehensive. Likewise, with the need to change people's attitudes and behaviors on the road, there is very little research done on what mechanisms and messages will most effectively change attitudes to road safety and encourage safe practice on the road. The intention of this research work was to investigate the impact of integrating road safety measures in trucking industry and also to examine how road safety programs are organized and managed in trucking industry

2.4 Statement of the Problem

The cost of a fleet of vehicles is a staggering investment and a major cash outlay in trucking industry. Apart from the direct costs to the transporters involved in the accident, additional costs are inflicted on non-involved transporters time, fuel and labour as vehicles negotiate delays, detours and congestion. The global economic impact is huge economic losses caused by truck accidents amounting to US\$ 518 billion worldwide. These huge economic losses inhibit economic development and perpetuate poverty. Besides, there is very little research on what messages and mechanisms will most effectively change driver's attitude towards road safety and hence a safe driving practice on the road. According to accident's records from Multiple Hauliers (E.A.), Paddy Distributors and Trailink Transporters, it is evident that highway truck accidents have been gradually increasing overtime at an average rate of 33% (Langat and Manyala, 2005). The intention of this research work was to investigate the impact of integrating road safety measures in trucking industry and get findings which were aimed at providing possible solution to the stated problem.

2.5 Rationale and Justification

Truck accidents cause emotional, physical and economic harm. There is a moral imperative to minimize such losses. On economic grounds, truck accidents consume massive financial resources that countries can ill afford to lose. This study will be significant to the trucking companies and other stakeholders in the industry on the benefit of integrating road safety measures in the sector. Specifically, some of the beneficiaries of this research work include truck drivers. By integrating road safety measures in the industry, the number of truck accidents is expected to decrease saving the lives of truck drivers. Secondly, this study will be significant to the investors in the industry as it recommends adoption of road safety best practice in order to improve the road safety management and culture. Thirdly, embracing road safety measures in the industry will translate into few claims for compensation and finally the future researchers will use the research findings as a reference point and as a base for further studies as regards safety in trucking industry.

2.6 Research Questions

1. What is the impact of integrating road safety measures in trucking companies?
2. How are road safety programs organized and managed in trucking companies?
3. What is the effect of driver training and testing on truck accidents?
4. What is the impact of road safety awareness on truck accidents?

2.7 Objectives

2.7.1 Main Objective

The main objective of this study was to investigate the impact of integrating road safety measures in trucking industry.

2.7.2 Specific Objectives

1. To examine the organization and management of road safety in trucking companies,
2. To assess the impact of driver training and testing in trucking companies,
3. To investigate the impact of road safety awareness in trucking companies.

CHAPTER THREE

3.0 MATERIALS AND METHODOLOGY

3.1 Materials

The materials utilized during this research work included a printer, a photocopier, flashdisks, computer software (Ms Word and Ms Excel) and stationery.

3.2 Scope and Study Site

This study was based on “impact of integrating road safety measures in trucking industry”. It was confined to the employees (truck drivers, safety and maintenance managers) of Multiple Hauliers (E.A.), Paddy Transporters and Trailink Transporters. The three trucking companies are based in Nairobi Metropolitan City and their operations cover the whole of East Africa. The choice of the study sites was guided by the fact that truck accidents have been occurring both in small and large trucking companies. The researcher therefore chose to act on both larger and smaller trucking companies. Multiple Hauliers is a very big trucking company as compared to Paddy and Trailink companies.

Also, the trucking operations of the above mentioned companies extend beyond the Kenyan boundaries and hence provided adequate data for analysis. Figures 3, 4 and 5 are maps showing the location of Paddy Distributors, Trailink Transporters and Multiple Hauliers respectively.

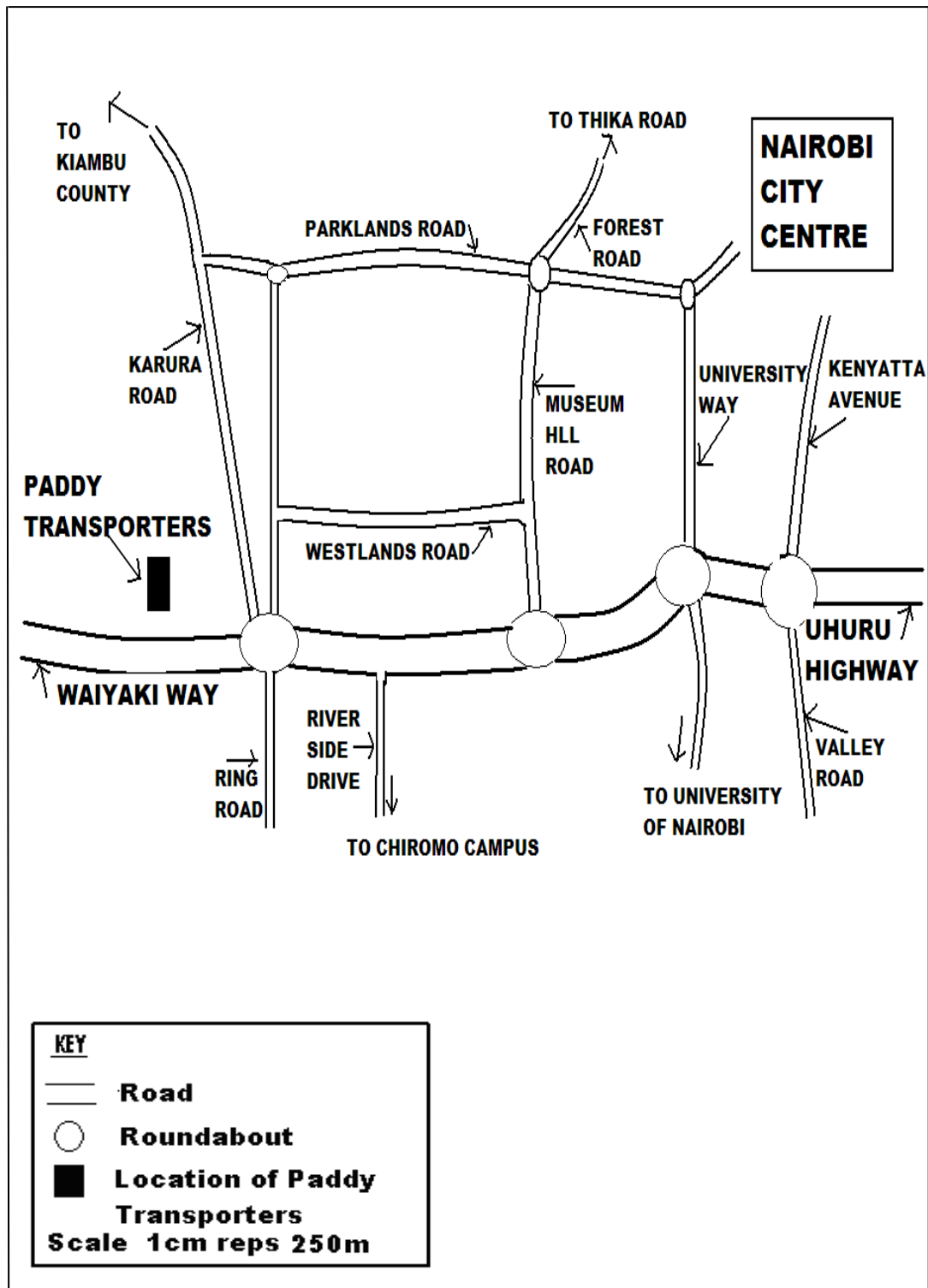


Figure 3 A map showing the location of Paddy Transporters Limited

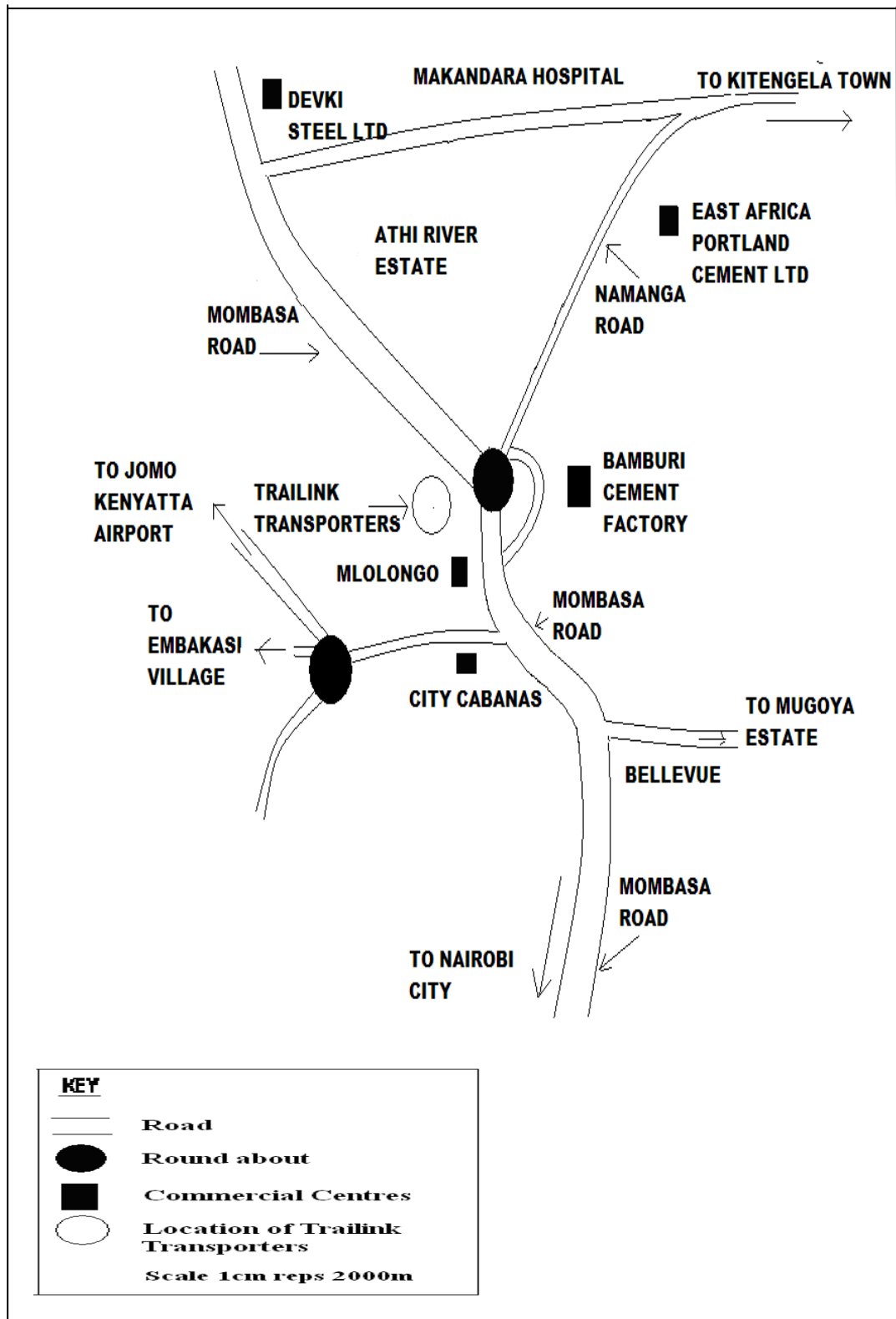


Figure 4 A map showing the location of Trailink Transporters

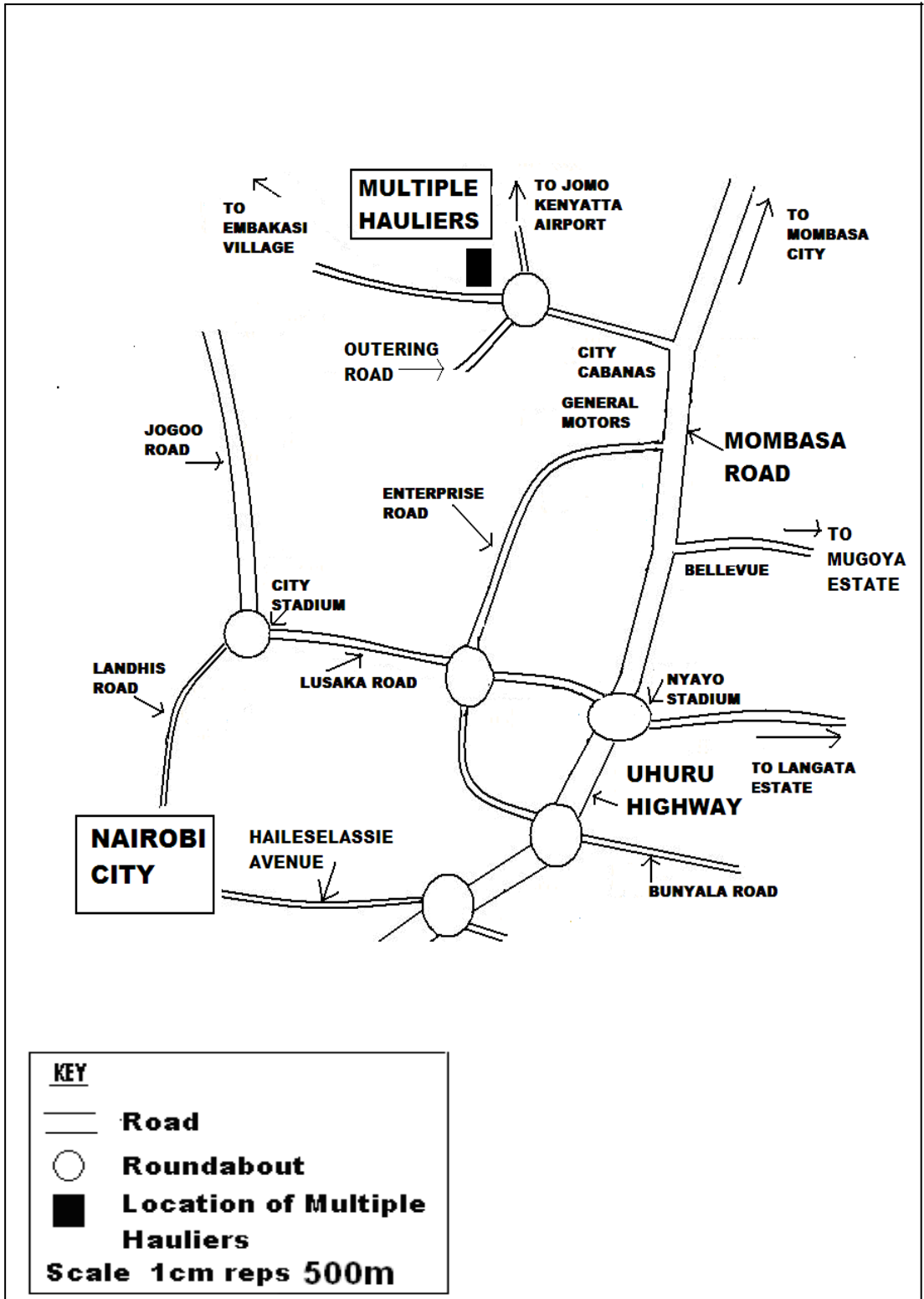


Figure 5 A map showing the location of Multiple Hauliers (E.A)

3.3 Road Safety Management Structure

Road safety management is the process which effectively implements road safety policies, including organization, coordination and management of road safety interventions meant to reduce fatalities and injuries in traffic. Successful safety policies are determined by how well an integrated approach is organized. They are essentially a matter of transport safety organization. Road safety management should adopt a systems approach to road safety. Therefore, a road safety strategy and a road safety plan are crucial elements in road safety management. These should be produced with involvement of all parties responsible for their execution. A road safety plan is a set of actions to implement the strategy through countermeasures involving traffic laws and their enforcement, roads, vehicles, behavior and organization.

A road safety strategy is a long term philosophy on tackling the road safety problem. Road safety management structure is a framework of experts charged with the responsibility of effectively formulating and implementing road safety policies, including organization, coordination and management of road safety interventions meant to reduce fatalities and injuries. A good road safety management structure has a major impact on the way business develops.

It typically leads to an improved road safety culture within a company, better truck safety, better driver recruitment policies and more rigorous driver training. Figures 6, 7 and 8 are management structures of Paddy Distributors, Trailink Transporters and Multiple Hauliers respectively.

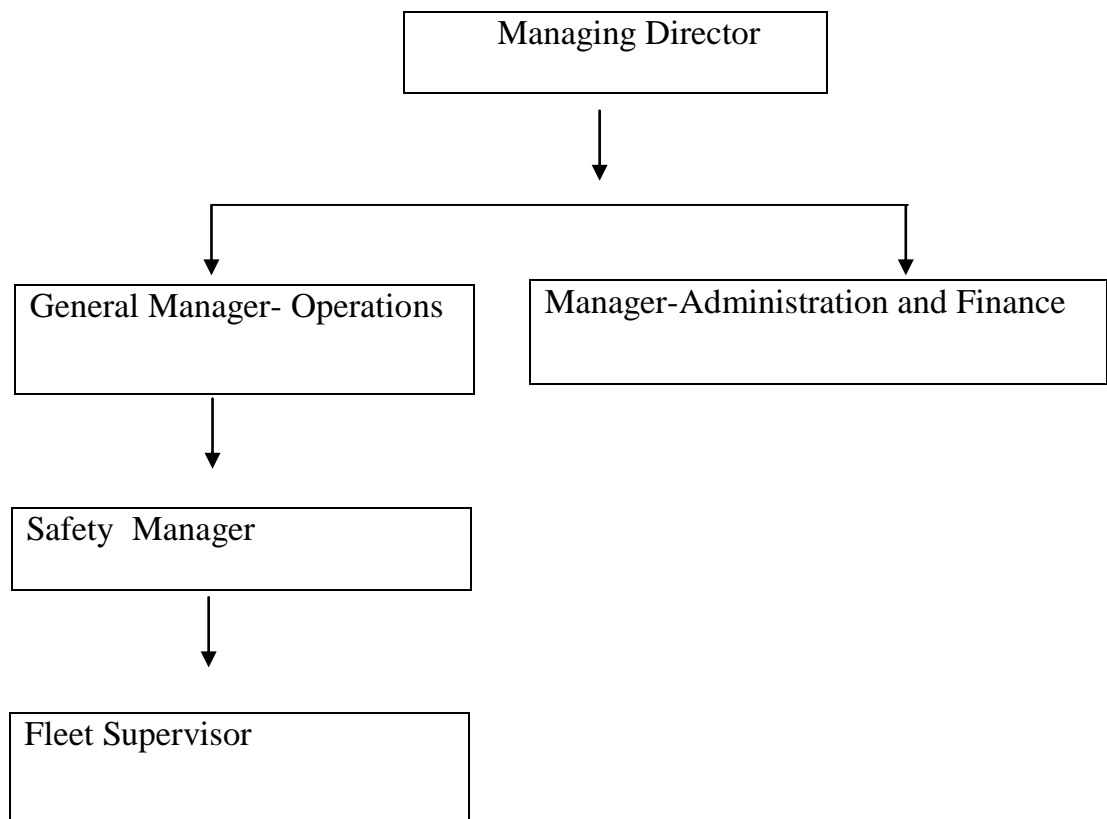


Figure 6 Road Safety Management Structure of Paddy Transporters

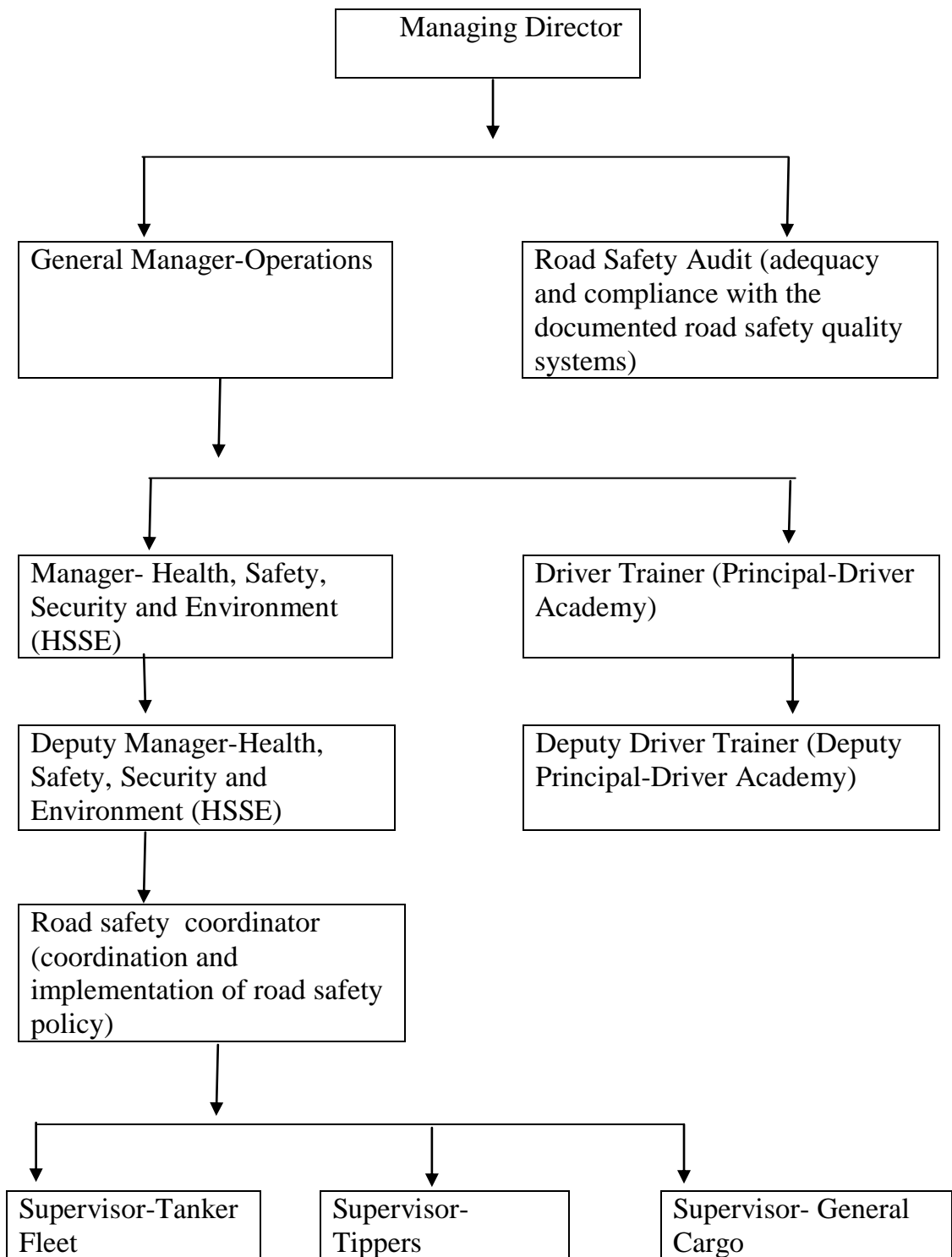


Figure 7 Road Safety Management Structure of Multiple Hauliers (E.A.)

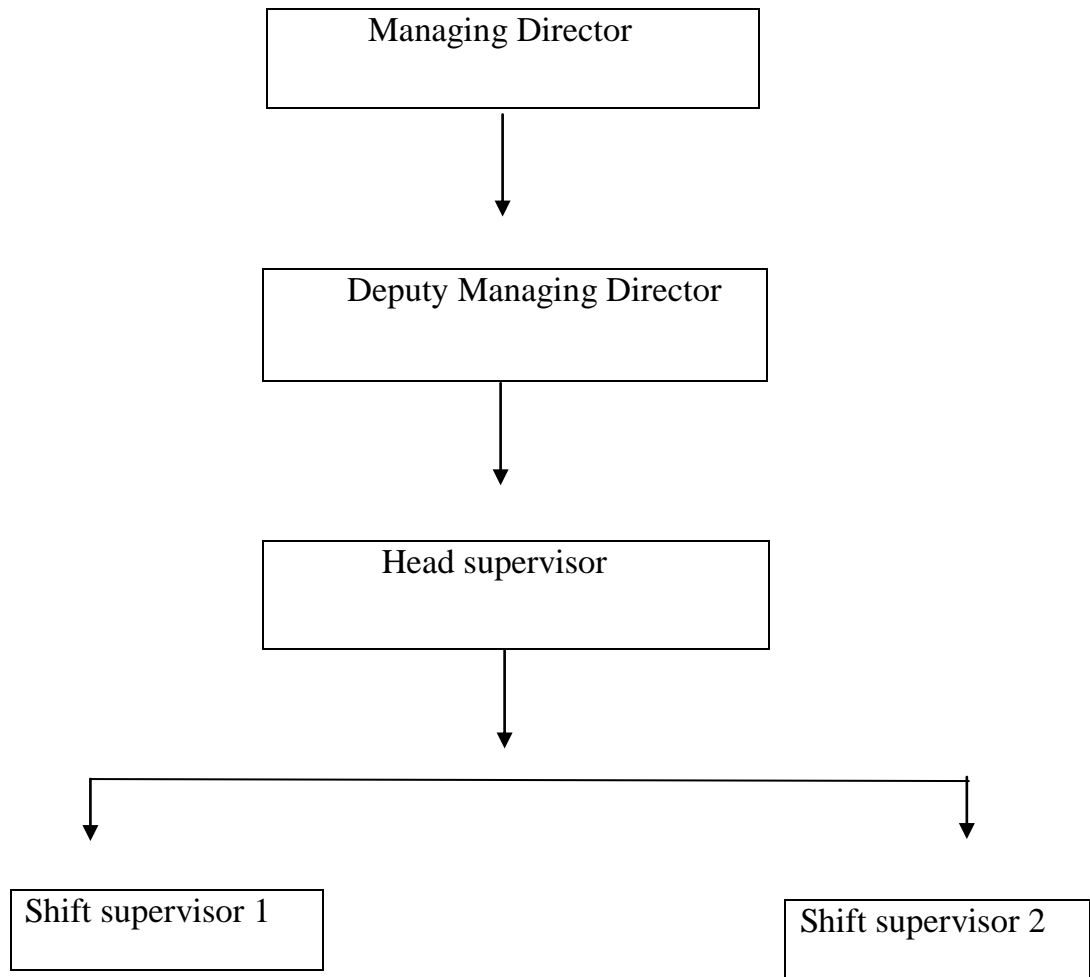


Figure 8 Road Safety Management Structure of Trailink Transporters

3.4 The Conceptual Framework

This study was based on impact of integrating road safety in trucking Industry. Most traffic accidents are caused by a multiplicity of factors which may be a combination of human failures, poor road safety awareness, adverse weather conditions, poor road standards/conditions and vehicles defects. These variables amongst many others are the independent variables (input) that can be manipulated to influence the dependent variable which is road safety. Figure 9 shows a conceptual framework.

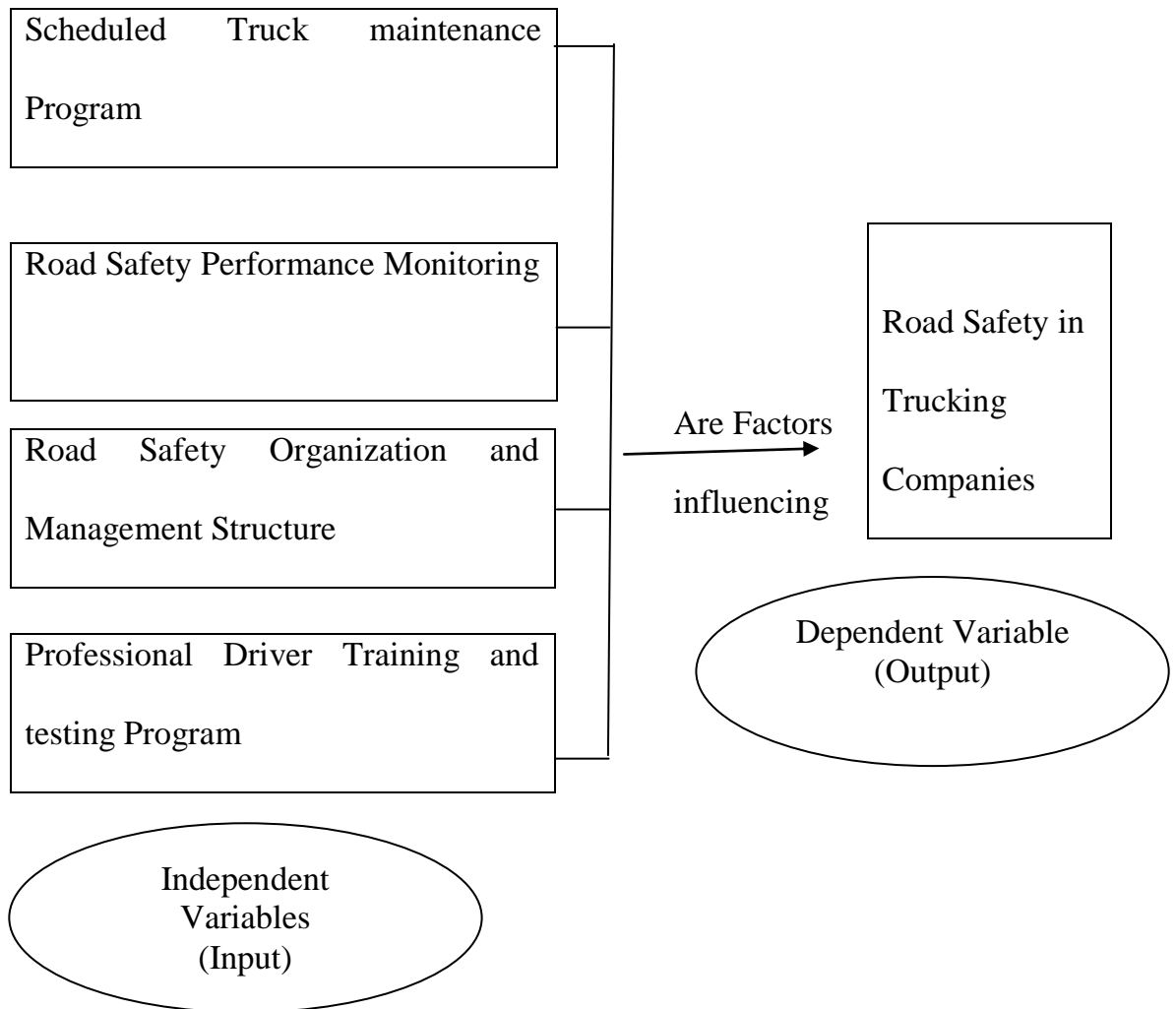


Figure 9 The conceptual framework illustrating how the independent variables (Input) can be manipulated to influence the dependent variable (Output).

3.5 Research Study Design

This mainly covered experiments, interviews, observations and the analysis of records. A descriptive research in this study was undertaken. It was undertaken through questionnaires and interviews to get the major independent variable contributions to the problem. Appendices I-III show an official introductory letter, a copy of a sample questionnaire for truck drivers and a questionnaire for managers respectively.

3.6 Target Study Population

Target Population is defined as a complete set of individual cases or objects with common observable characteristics. A population has some characteristics that differentiate it from other populations. It is that population to which a researcher wants to generalize the results of the study. The target population of this study comprised of truck drivers, safety managers and maintenance managers of Multiple Hauliers, Paddy Transporters and Trailink Transporters. The target population for this study consisted of 209 employees (180 truck drivers and 29 managers) from the above trucking companies. Tables 1 and 2 show the distribution of truck drivers and managers from the three trucking companies.

Table 1 Distribution of Truck Drivers

Trucking company	Target Population	Population Percentage
Multiple Hauliers (E.A.)	81	45%
Paddy Distributors	63	35%
Trailink Transporters	36	20%
Total	180	100%

Table 1 shows the percentage distribution of the target population of truck drivers. Out of 180 drivers, 81 representing 45% were drawn from Multiple Hauliers, 63 representing 35% were drawn from Paddy Distributors and finally 36 representing 20% were drawn from Trailink Transporters. This percentage distribution of truck drivers is in accordance with the size of the trucking companies chosen for this study.

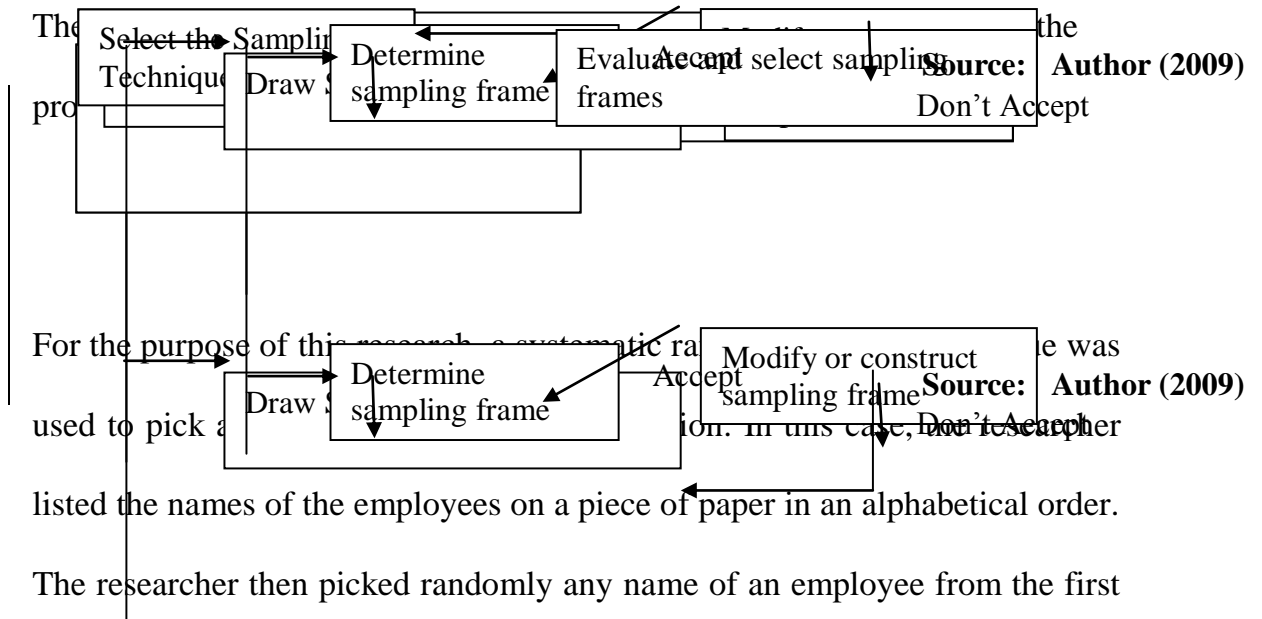
Table 2 Distribution of Managers

Trucking company	Target Population	Population Percentage
Multiple Hauliers (E.A.)	13	45%
Paddy Distributors	10	35%
Trailink Transporters	6	20%
Total	29	100%

Table 2 shows the percentage distribution of the target population of managers. Out of 29 managers, 13 representing 45% were drawn from Multiple Hauliers, 10 representing 35% were drawn from Paddy Distributors and finally 6 representing 20% were drawn from Trailink Transporters. This percentage distribution of managers is in accordance with the size of the trucking companies chosen for this study.

3.7 Sample Size Determination

The process of sampling involves the selection of a group of individuals or elements from a target population. That group or sample can then stand for the whole population. The first step in sampling as in all research activities is to clearly articulate the intent of the research. It is therefore, necessary that the sample represents the population on the characteristics under study.



For the purpose of this research a systematic random sampling method was used to pick a sample. In this case, the researcher listed the names of the employees on a piece of paper in an alphabetical order. The researcher then picked randomly any name of an employee from the first three names. Then after that, another name of an employee was picked randomly from the next three names of employees. This process was continued until a convenient sample size was picked. The method ensured that all the individuals in the target population had an equal chance of being selected. This helped to remove the biasness as it is a probability sampling which is based on the concept of random selection. Each member does not have a known non-zero chance of being included. Only probability samples provide estimates of precision.

3.8 Data Collection Tools

This being a survey, the questionnaires and interviews were used to collect data. The questionnaires and interviews contained both open ended and closed ended questions covering issues on road safety in trucking companies.

3.9 Data Collection Methods and Procedures

A research permit or introductory letter from Jomo Kenyatta University of Agriculture and Technology was obtained. This letter officially enabled the researcher to get access to the research locations. The study made use of primary data sources. This data was collected using self-administered questionnaires which were administered to the employees of Multiple Hauliers (E.A), Paddy Distributors and Trailink Transporters. The researcher employed a field study method in order to collect primary data.

The respondents were requested to complete questionnaires in their own natural set up and without manipulation of the environment. The researcher re-assured the respondents about the confidentiality of their feedback. This encouraged the respondents to be honest. The data was collected through personal visitation. Pre-arrangements with the prospective respondents were made by booking of appointment. During one of the field visitations at Multiple Hauliers Company to collect data from the managers, Prof. Joseph Keriko teamed up with the researcher and two of the Multiple Haulier's managers as illustrated on plate 1.



Plate 1: A photograph taken during one of the field visitations at Multiple Hauliers. Left to right (clockwise): Isaac K. Makau (Researcher), Prof. Joseph M. Keriko (Research Supervisor), Solomon N. Ndonye (Human Resources Manager) and Ndusa Kavulunze (Health, Safety, Security and Environment Manager)

3.10 Pilot Test

A pilot survey of 15 respondents from each trucking company was conducted in pre-testing the questionnaires for understanding by the respondents. The lessons for the pre-testing formed a basis for the review of the questionnaire administration for the main survey. This was to ensure that the final questionnaire was able to capture the most valuable data possible. To ensure quality of the responses, the respondents were urged to be as honest as possible in filling the questionnaires.

3.11 Data Analysis Methods

Qualitative research is defined as any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification. Where quantitative researchers seek causal determination, prediction and generalization of findings. Qualitative researchers seek illumination understanding and extrapolation to similar situations. Qualitative analysis results in different types of knowledge than does quantitative inquiry. Qualitative methods can be used to better understand any phenomenon about which little is yet known. They can also be used to gain new perspectives on things about which much is already known or to gain more in-depth information that may be difficult to convey quantitatively.

Thus, qualitative methods are appropriate in situations where one needs to first identify the variables that might later be tested quantitatively or where the researcher has determined that quantitative measures cannot adequately describe or interpret a situation. Research problems tend to be framed as open-ended questions that will support discovery of new information. The quickest way for people to draw conclusions from data analysis is by clear, thoughtfully constructed graphs and charts. Data analysis graphs are used for such things as determining whether meaningful relationship exists between various data, how the data are distributed, whether or not differences are significant and so forth.

Data analysis graphs become presentation graphs when they acquire emphasis on aesthetics, ease of understanding and communication of a focused message. Visual graphs and charts are so extremely flexible that they can be made to suit almost any business, technical or financial analysis need, without any additional programming. When the questionnaires for this study were returned, the researcher scanned them and corrected the data for errors and omissions. The data was then analyzed using both quantitative and qualitative techniques. Descriptive statistics was employed. The responses from the respondents were converted into percentages for easy presentation.

Frequency distribution for responses, percentages, tables, and bar charts were used to present quantitative data with brief descriptions also provided as derived from the responses. The purpose of the analysis of this data collected from the respondents by the researcher was to draw conclusions and make recommendations on “the impact of integrating road safety in trucking industry”.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Results

4.1 1 Introduction

This chapter presents findings and interpretation of the study carried out to assess the impact of integrating road safety in trucking industry. Most quantitative analysis is concerned with symbolic models where real properties are represented by some kind of symbol. A symbolic model in business or research work may be a graph or chart, but is more likely to consist of numerical expressions. It is simply a useful notation which describes a given situation accurately and concisely. The main purpose of a model is to allow experiments without changing the real system. Frequency distribution for responses, percentages, tables and bar charts were used to present quantitative data with brief descriptions also provided as derived from the responses. The presentation of the findings follows the sequence of the questionnaire. Summaries were developed for qualitative data, the patterns and trends identified and categorized according to themes.

4.1.2 Quantitative Analysis of Data from Truck Drivers

4.1.2.1 Sample Design Distribution and the Responses from Truck Drivers

Responses from Multiple Hauliers indicated that out of 57 respondents to whom the questionnaires were administered, 45 of them responded with their forms wholly completed. This represented 79% of the required sample size. Responses from Paddy Transporters showed that out of 44 respondents to whom the questionnaires were administered, 34 of them responded with their forms wholly completed. This represented 77% of the required sample size. Finally, responses from Trailink Transporters indicated that all the 25 respondents to whom the questionnaires were administered responded with their forms wholly completed. This represented 100% of the required sample size. Table 3 shows the Sample Design Distribution and the Response of Questionnaires administered to the Truck Drivers

Table 3 Sample Design Distribution and the Responses from Truck Drivers

Trucking Company	Target Population	Sample Percentage	Ratio	Number of Respondents	Received Responses
Multiple Hauliers	81	45%	0.7	57	45
Paddy Transporters	63	35%	0.7	44	34
Trailink Transporters	36	20%	0.7	25	25
Total	180	100%	0.7	126	104

4.1.2.2 Response Regarding the Gender of the Truck Drivers

Respondents were asked to state their gender. Response from Multiple Hauliers indicated that out of 45 respondents, 43 representing 96% were males whereas the remaining 2 representing 4% were females. The two female truck drivers in Multiple Hauliers is an indication that women are penetrating into male dominated workforce. One of the female truck drivers indicated that she is married while the other one indicated that she was widowed.

All the respondents (100%) from both Paddy and Trailink companies were males. The above findings indicate a male dominated workforce, perhaps due to the nature of work which is more of masculine than feminine. Table 4 shows a summary of the responses collected.

Table 4 Response Regarding the Gender of the Truck Drivers

Company	Gender	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Male	43	96%	96%
	Female	2	4%	100%
	Total	45	100%	
Paddy Distributors	Male	34	100%	100%
	Female	0	0%	100%
	Total	34	100%	
Trailink Transporters	Male	25	100%	100%
	Female	0	0%	100%
	Total	25	100%	

4.1.2.3 Response Regarding Marital Status of the Truck Drivers

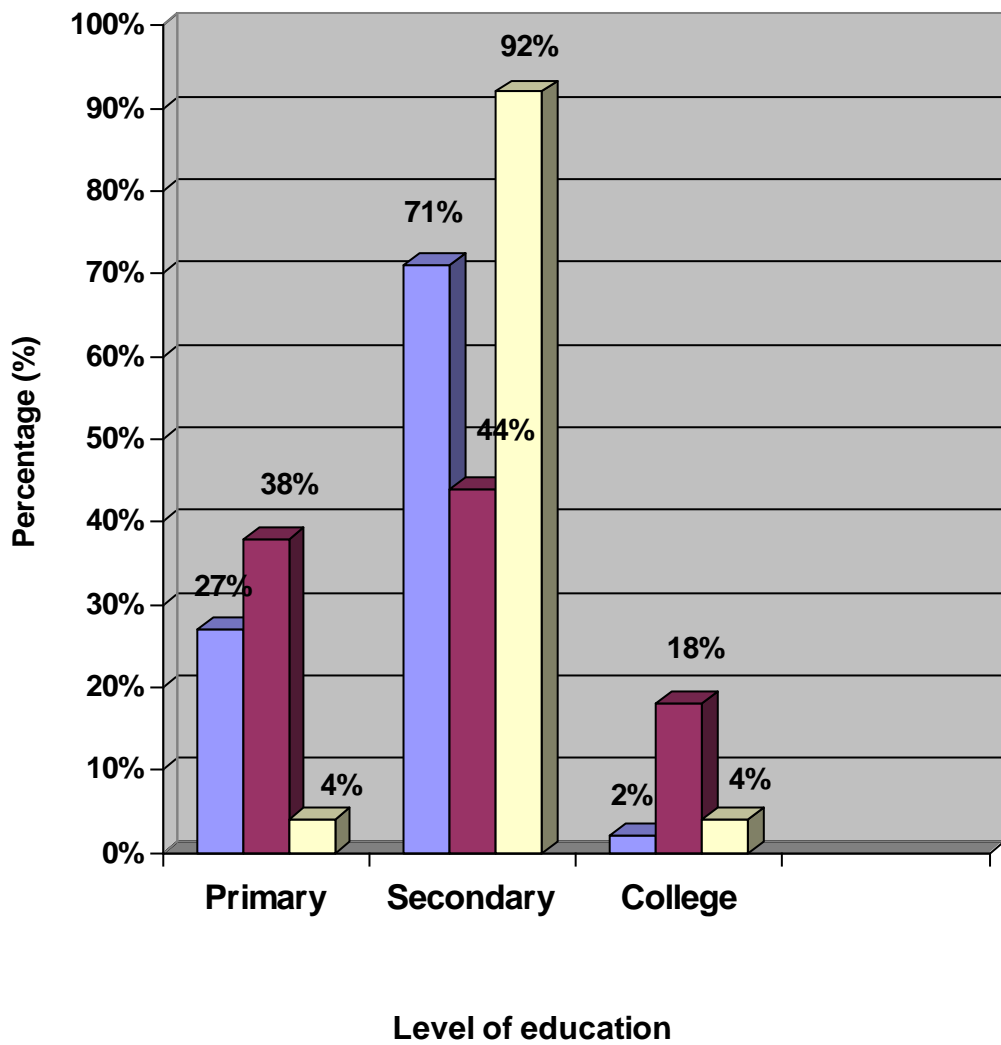
Respondents were asked to state their marital status. Responses from Multiple Hauliers indicated that out of 45 respondents, 43 representing 96% indicated that they are married whereas the remaining 2 respondents (4%) indicated that they are widowed. None of the respondents indicated single or divorced marital status. Responses from Paddy Transporters showed that out of 34 respondents, 32 representing 94% indicated that they are married whereas the remaining 2 respondents (6%) indicated that they are divorced. None of the respondents indicated single or widowed marital status. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 20 representing 80% indicated that they are married whereas the remaining 5 respondents (20%) indicated that they are divorced. Table 5 shows a summary of the responses.

Table 5 Response Regarding Marital Status of the Truck Drivers

Company	Marital status	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Single	0	0%	0%
	Married	43	96%	96%
	Widowed	2	4%	100%
	Divorced	0	0%	100%
	Total	45	100%%	
Paddy Distributors	Single	0	0%	0%
	Married	32	94%	94%
	Widowed	0	0%	94%
	Divorced	2	6%	100%
	Total	34	100%	
Trailink Transporters	Single	0	0%	0%
	Married	20	80%	80%
	Widowed	0	0%	80%
	Divorced	5	20%	100%
	Total		100%	

4.1.2.4 Response Regarding Education Level of the Truck Drivers

Respondents were asked to state their highest level of education completed. Responses from Multiple Hauliers indicated that out of 45 respondents, 32 representing 71%, 12 representing 27% and 1 representing 2% had acquired secondary level, primary level and diploma level of education respectively. No respondent had acquired university level of education. Responses from Paddy Transporters showed that out of 34 respondents, 15 representing 44%, 13 representing 38% and 6 representing 18% had acquired secondary level, primary level and diploma level of education respectively. No respondent had acquired university level of education. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 23 representing 92%, 1 representing 4% and 1 more respondent (4%) had acquired secondary level, primary level and diploma level of education respectively. No respondent had acquired university level of education. Figure 10 shows a summary of the responses.



■ Multiple Hauliers ■ Paddy Distributors ■ Trailink Transporters

Figure 10 Response regarding the level of Education of the Truck Drivers

4.1.2.5 Response Regarding the Length of Professional Experience in Truck Driving

Respondents were asked to state how long they had worked in the company as truck drivers (professional experience in truck driving). Responses from Multiple Hauliers indicated that out of 45 respondents, 25 representing 56%, 11 representing 24%, 4 representing 9% and 5 representing 11% indicated that they had worked in the company for a period of less than three years, between three to five years, between five to seven years and over seven years respectively. Responses from Paddy Transporters showed that out of 34 respondents, 26 representing 76%, 6 representing 18% and 2 representing 6% indicated that they had worked in the company for a period of less than three years, between five to seven years and between three to five years respectively. None of the respondents had worked in the company for a period exceeding seven years. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 14 representing 56%, 9 representing 36% and 2 representing 8% indicated that they had worked in the company for a period of between five to seven years, between three to five years, and over seven years respectively. None of the respondents had worked in the company for a period of less than three years. Figure 11 shows a summary of the responses.

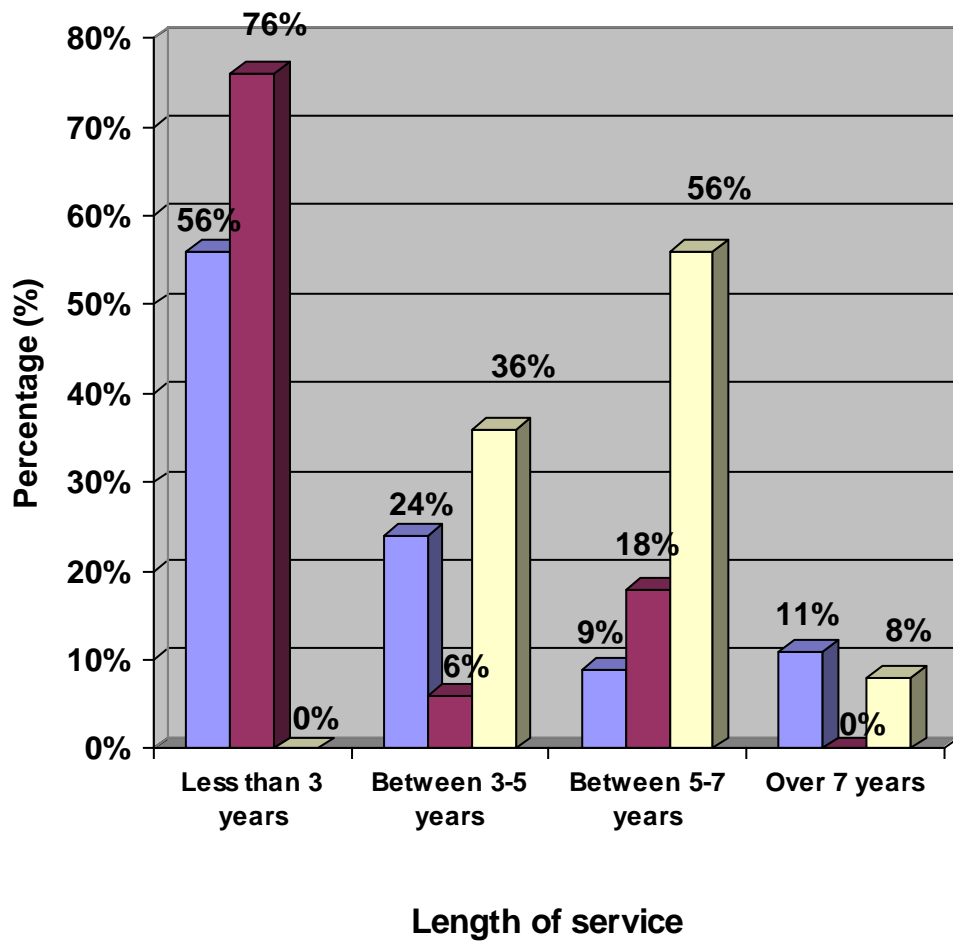


Figure 11 Response Regarding the Length of Professional Experience in Truck Driving

4.1.2.6 Driver Training and Testing

Respondents were asked whether the nature of driver recruitment in the company as to whether it is pegged on truck driving experience or not. Responses from Multiple Hauliers showed that all the 45 respondents (100%) indicated that the driver recruitment is pegged on truck driving experience. Responses from Paddy Transporters showed that out of 34 respondents, 30 representing 88% indicated that the driver recruitment is pegged on truck driving experience whereas the remaining 4 respondents (12%) indicated otherwise. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 18 representing 72% indicated that the driver recruitment is pegged on truck driving experience whereas the remaining 7 respondents (28%) indicated otherwise. Table 6 shows a summary of the responses.

Table 6 Response on Whether Driver Recruitment in the Company is Pegged on Truck Driving Experience or Not

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	45	100%	100%
	No	0	0%	100%
	Total	45	100%	
Paddy Distributors	Yes	30	88%	88%
	No	4	12%	100%
	Total	34	100%	
Trailink Transporters	Yes	18	72%	72%
	No	7	28%	100%
	Total	25	100%	

4.1.2.7 Orientation Course on Joining the Company

Respondents were asked to state whether or not they were taken through an orientation course on joining the company. Responses from Multiple Hauliers showed that out of 45 respondents, 42 representing 93% indicated that they were taken through an orientation course whereas the remaining 3 respondents (7%) were not.

Responses from Paddy Transporters showed that out of 34 respondents, 19 representing 56% indicated that they were taken through an orientation course whereas the remaining 15 respondents (44%) indicated otherwise. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 21 representing 84% indicated that they were taken through an orientation course whereas the remaining 4 respondents (16%) indicated otherwise. Table 7 shows a summary of the responses.

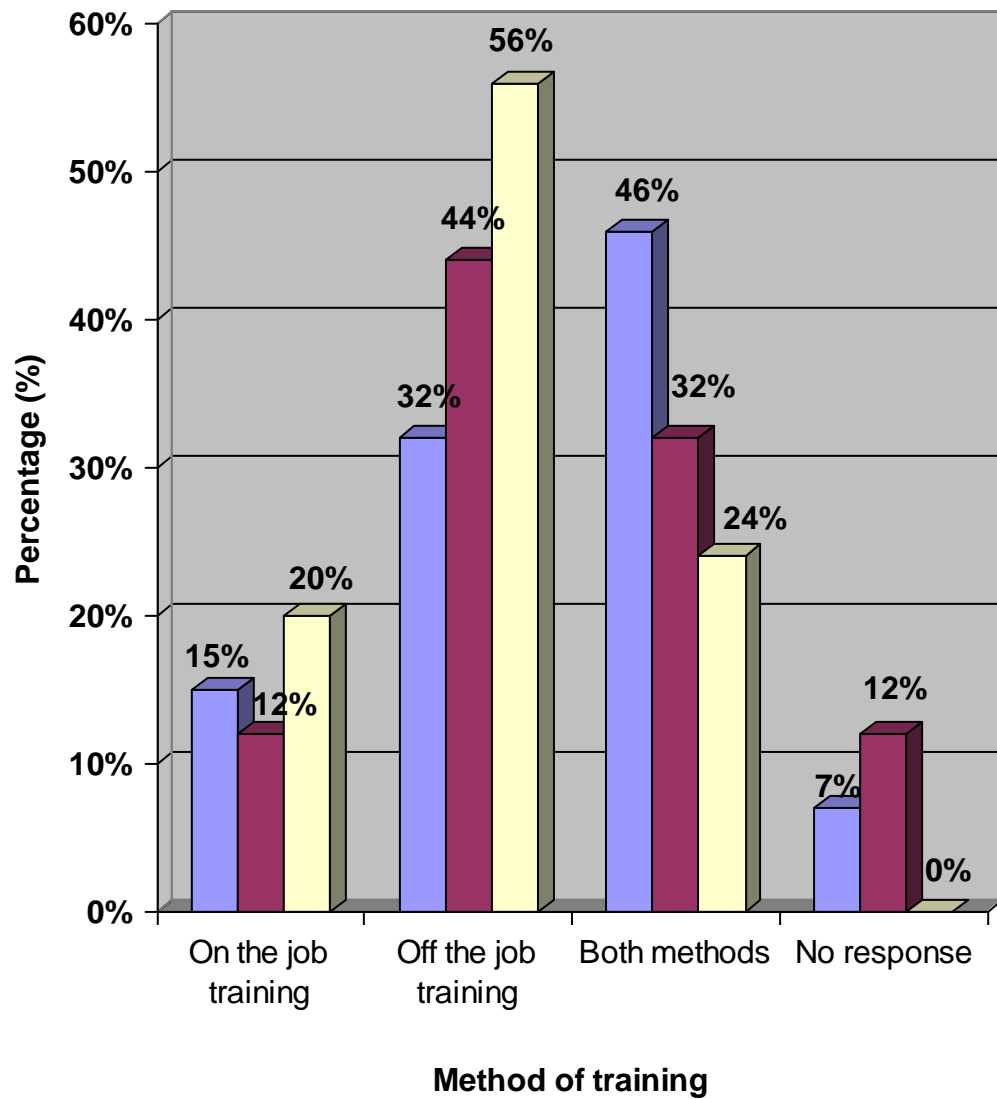
Table 7 Response Regarding Orientation Course to Truck Drivers on Joining the Company

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	42	93%	93%
	No	3	7%	100%
	Total	45	100%	
Paddy Distributors	Yes	19	56%	56%
	No	15	44%	100%
	Total	34	100%	
Trailink Transporters	Yes	21	84%	84%
	No	4	16%	100%
	Total	25	100%	

4.1.2.8 Training Method used During the Orientation Course

Respondents were asked to state the type of training method that was used during the orientation. Responses from Multiple Hauliers showed that out of 45 respondents, 21 representing 46% indicated that both methods of training were used. 14 representing 32% indicated that off-the job training method (classroom) was used and 7 representing 15% indicated that on-the job training method (illustrative) was used. The remaining 3 respondents (7%) did not respond. Responses from Paddy Transporters showed that out of 34 respondents, 15 representing 44% indicated that off-the job training method (Classroom) was used. 11 representing 32% indicated that both methods of training were used. 4 representing 12% indicated that on-the job training method (illustrative) was used. The remaining 4 respondents (12%) did not respond. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 14 representing 56% indicated that off-the job training method (classroom) was used. 6 representing 24% indicated that both methods of training were used. The remaining 5 respondents (20%) indicated that on-the job training method (illustrative) was used. The above findings show that the most common method used by trucking companies to train new drivers during the orientation course is off-the job training method. However, some respondents indicated that both methods of training were used.

Figure 12 shows a summary of the responses.



■ Multiple Hauliers ■ Paddy Distributors ■ Trailink Transporters

Figure 12 Response Regarding the Method of Training used During the Orientation Course

4.1.2.9 Duration of the Orientation Course

Respondents were asked to state how long the orientation course took. Responses from Multiple Hauliers showed that out of 45 respondents, 15 representing 33%, 12 representing 26%, 10 representing 23% and 5 representing 11% stated that the orientation course took one week, one month, one day and over one month respectively. The remaining 3 respondents (7%) did not respond. Responses from Paddy Transporters showed that out of 34 respondents, 14 representing 41%, 10 representing 30% and 6 representing 17% indicated that the orientation course took one day, one week and one month respectively. The remaining 4 respondents (12%) did not respond. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 21 representing 84% indicated that the orientation course took one day. The remaining 4 respondents (16%) did not respond to the question. Figure 13 shows a summary of the responses.

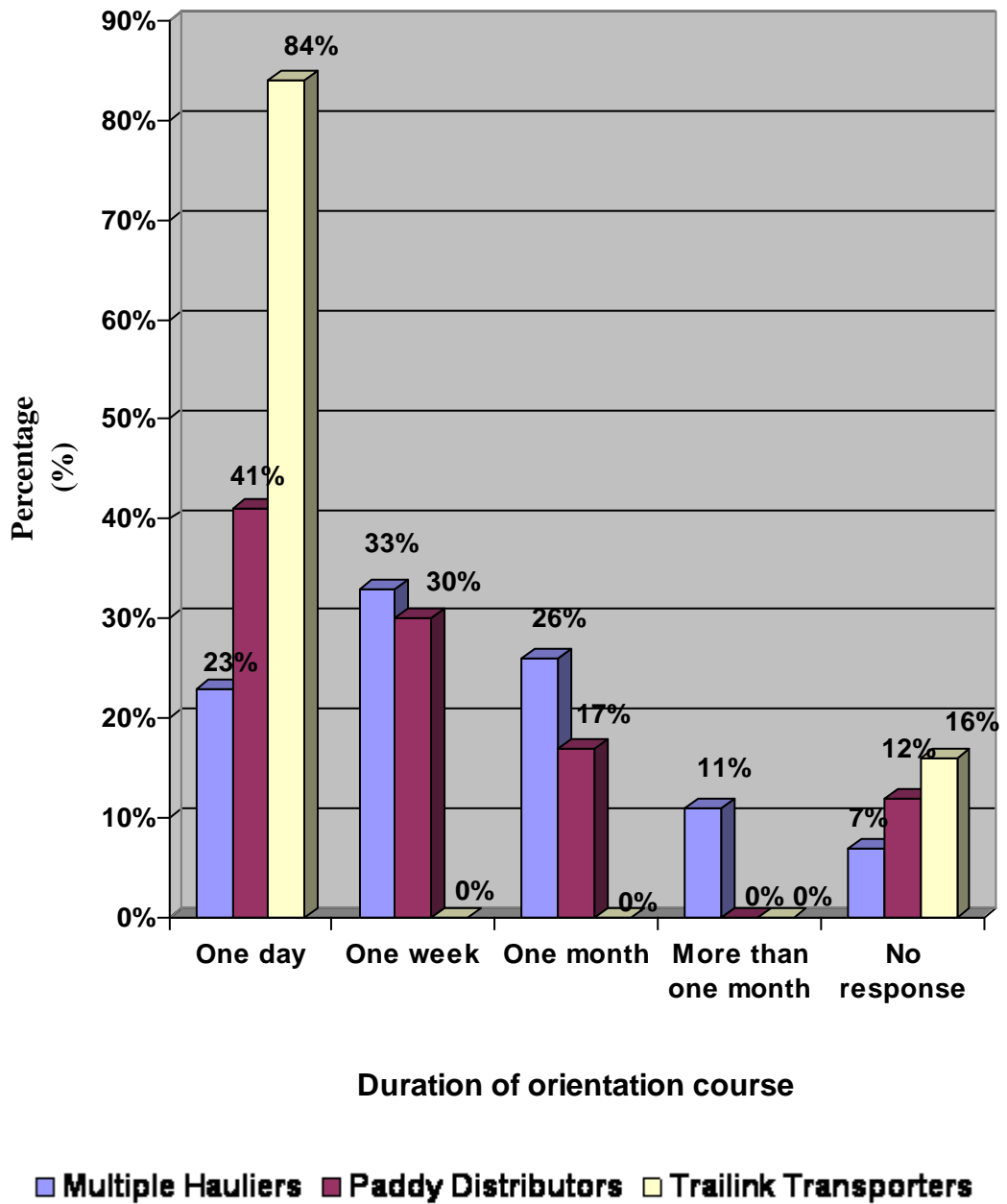


Figure 13 Response Regarding the Duration of Orientation Course

4.1.2.10 Driver Assessment Regarding Driving Competence by an Independent/External Trainer after the Orientation Course

Respondents were asked whether they were subjected to an assessment for driving competence by an independent trainer immediately after the orientation course. Responses from Multiple Hauliers showed that out of 45 respondents, 34 representing 75% stated that they were not subjected to an assessment (testing) for driving competence whereas 8 respondents (18%) stated that they were subjected to an assessment (testing) for driving competence. The remaining 3 respondents (7%) did not respond. Responses from Paddy Transporters showed that out of 34 respondents, 24 representing 70% indicated that they were not subjected to an assessment (testing) for driving competence whereas 6 respondents (18%) indicated that they were subjected to an assessment (testing) for driving competence. The remaining 4 respondents (12%) did not respond. Finally, responses from Trailink Transporters indicated that all the 25 respondents (100%) indicated that they were not subjected to an assessment (testing) for driving competence by an independent trainer after the orientation course. Table 8 shows a summary of the responses.

**Table 8 Response Regarding Driver Assessment for Driving Competence
by an Independent Trainer immediately after the orientation course**

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	8	18%	18%
	No	34	75%	93%
	No response	3	7%	100%
	Total	45	100%	
Paddy Distributors	Yes	6	18%	18%
	No	24	70%	88%
	No response	4	12%	100%
	Total	34	100%	
Trailink Transporters	Yes	0	0%	0%
	No	25	100%	100%
	No response	0	0%	100%
	Total	25	100%	

4.1.2.11 Driver's Willingness to Attend Future Training Programs Geared Towards Achieving Driving Competence

Respondents were asked to state if they would be willing to attend future training programs for driving competence and fitness. Responses from Multiple Hauliers showed that all the 45 respondents (100%) indicated that they are willing to attend future training programs geared towards driving competence. Responses from Paddy Transporters showed that all the 34 respondents (100%) indicated that they are willing to attend future training programs for driving competence. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 21 representing 84% indicated that they are willing to attend future training programs for driving competence whereas the remaining 4 respondents (16%) indicated otherwise. Table 9 shows a summary of the responses.

Table 9 Response Regarding Driver’s Willingness to Attend Future Training Programs Geared towards Achieving Driving Competence

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	45	100%	100%
	No	0	0%	100%
	Total	45	100%	
Paddy Distributors	Yes	34	100%	100%
	No	0	0%	100%
	Total	34	100%	
Trailink Transporters	Yes	21	84%	84%
	No	4	16%	100%
	Total	25	100%	

4.1.2.12 Further Training after the Orientation Course

Respondents were asked to indicate whether they were taken for further training in driving after the orientation course and what this further training involved. Responses from Multiple Hauliers showed that out of 45 respondents, 42 representing 93% indicated that they had been taken for further training in driving whereas the remaining 3 respondents (7%) had not been taken for further training in driving.

Responses from Paddy Transporters showed that out of 34 respondents, 28 representing 82% indicated that they had been taken for further training in driving whereas the remaining 6 respondents (18%) had not been taken for further training in driving. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 19 representing 76% indicated that they had been taken for further training in driving whereas the remaining 6 respondents (24%) had not been taken for further training in driving. Table 10 shows a summary of the responses.

Table 10 Response Regarding Further Training in Driving after the Orientation Course

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	42	93%	93%
	No	3	7%	100%
	Total	45	100%	
Paddy Distributors	Yes	28	82%	82%
	No	6	18%	100%
	Total	34	100%	
Trailink Transporters	Yes	19	76%	76%
	No	6	24%	24%
	Total	25	100%	

4.1.2.13 Impact of the Training Offered After the Orientation Course

Respondents were asked to state if the training offered after the orientation course had positive impact on their driving performance in terms of reduced road incidents/accidents. Responses from Multiple Hauliers showed that out of 45 respondents, 20 representing 45% indicated that they did not experience positive impact on their driving performance after the training whereas 15 respondents (33%) indicated that the training had positively impacted on their driving performance.

The remaining 10 respondents (22%) did not respond. Responses from Paddy Transporters showed that out of 34 respondents, 19 representing 56% indicated that they did not experience positive impact on their driving performance after the training whereas 9 respondents (26%) indicated that the training had positively impacted on their driving performance. The remaining 6 respondents (18%) did not respond. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 10 representing 40% indicated that they did not experience any positive impact on their driving performance after the training whereas 7 respondents (28%) indicated that the training had positively impacted on their driving performance. The remaining 8 respondents (32%) did not respond. It is clear from the above findings that the training offered did not address adequately the driving skills and needs of the truck drivers as the majority of the respondents did not experience positive impact on their driving performance. Table 11 shows a summary of the responses.

Table 11 Response Regarding Positive Impact of the Training on the Driving Performance

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	15	33%	33%
	No	20	45%	78%
	No response	10	22%	100%
	Total	45	100%	
Paddy Distributors	Yes	9	26%	26%
	No	19	56%	82%
	No response	6	18%	100%
	Total	34	100%	
Trailink Transporters	Yes	7	28%	28%
	No	10	40%	68%
	No response	8	32%	100%
	Total	25	100%	

4.1.2.14 Road Safety Awareness Education Policy

Respondents were asked to state whether or not the company has a road safety awareness policy. Responses from Multiple Hauliers showed that all the 45 respondents (100%) indicated that the company has a road safety awareness policy. Responses from Paddy Transporters showed that out of 34 respondents, 23 representing 68% indicated that the company has a road safety awareness policy whereas the remaining 11 respondents (32%) indicated otherwise. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 18 representing 72% indicated that the company has a road safety awareness policy whereas the remaining 7 respondents (28%) indicated otherwise. Table 12 shows a summary of the responses.

Table 12 Response on Whether the Company has a Road Safety Awareness Education Policy or Not

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	45	100%	100%
	No	0	0%	100%
	Total	45	100%	
Paddy Distributors	Yes	23	68%	68%
	No	11	32%	100
	Total	34	100%	
Trailink Transporters	Yes	18	72% %	72% %
	No	7	28%	100%
	Total	25	100%	

4.1.2.15 Response Regarding Truck Driver’s Accessibility to the Policy on Road Safety Awareness Education

Respondents were asked to comment on their accessibility to the company’s policy on road safety awareness education through road safety manuals, workshops and safety posters at strategic places in the workplace. Responses from Multiple Hauliers showed that out of 45 respondents, 24 representing 53% indicated that they do have access to the policy on road safety awareness education whereas the remaining 21 respondents (47%) indicated otherwise.

Responses from Paddy Transporters showed that out of 34 respondents, 14 representing 41% indicated that they do have access to the policy on road safety awareness education whereas 9 respondents (27%) indicated otherwise. The remaining 11 respondents (32%) did not respond. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 13 representing 52% indicated that they do not have access to the policy on road safety awareness education whereas 9 respondents (36%) indicated that they do have access to the policy on road safety awareness education. The remaining 3 respondents (12%) did not respond. Table 13 shows a summary of the responses.

Table 13 Response Regarding Truck Driver’s Accessibility to the Policy on Road Safety Awareness Education

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	24	53%	53%
	No	21	47%	100%
	No response	0	0%	100%
	Total	45	100%	
Paddy Distributors	Yes	8	23%	23%
	No	21	62%	85%
	No response	5	15%	100%
	Total	34	100%	
Trailink Transporters	Yes	9	36%	36%
	No	13	52%	88%
	No response	3	12%	100%
	Total	25	100%	

4.1.2.16 Response Regarding Truck Driver's Participation in a Government Sponsored Road Safety Awareness Education Seminar/Workshop

Respondents were asked whether they participated in a Government sponsored road safety awareness education seminar/workshop. Responses from Multiple Hauliers showed that out of 45 respondents, 36 representing 80% had not participated in a Government sponsored road safety awareness seminar whereas the remaining 9 respondents (20%) indicated that they had participated in a Government sponsored road safety awareness seminar. Responses from Paddy Transporters showed that out of 34 respondents, 21 representing 62% indicated that they had not participated in a Government sponsored road safety awareness seminar whereas the remaining 13 respondents (38%) indicated that they had participated in a Government sponsored road safety awareness seminar. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 14 representing 56% indicated that they had not participated in a Government sponsored road safety awareness seminar whereas the remaining 11 respondents (44%) indicated that they had participated in a Government sponsored road safety awareness seminar. Table 14 shows a summary of the responses.

Table 14 Response Regarding Truck Driver’s Participation in a Government Sponsored Road Safety Awareness Education Seminar/workshop

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	9	20%	20%
	No	36	80%	100%
	Total	45	100%	
Paddy Distributors	Yes	13	38%	38%
	No	21	62%	100%
	Total	34	100%	
Trailink Transporters	Yes	11	44%	44%
	No	14	56%	100%
	Total	25	100%	

4.1.2.17 Response Regarding Truck Driver's Rating of Government's Contribution to Road Safety Awareness in the country

Respondents were asked to rate the Government's contribution to road safety awareness in the country. Responses from Multiple Hauliers showed that out of 45 respondents, 22 representing 49%, 10 representing 22%, 9 representing 20% and 4 respondents (9%) indicated that the Government's current contribution to road safety awareness is fair, good, poor and very good respectively. Responses from Paddy Transporters showed that out of 34 respondents, 15 representing 44%, 9 representing 26%, 8 representing 24% and 2 representing 6% indicated that the Government's current contribution to road safety awareness is poor, good, fair and very good respectively. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 17 representing 68%, 5 representing 20% and 3 representing 12% indicated that the Government's current contribution to road safety awareness is fair, good and poor respectively. Table 15 shows a summary of the responses.

Table 15 Response Regarding Truck Driver's Rating of the Government's Contribution to Road Safety Awareness in the Country

Company	Rating	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Very good	4	9%	9%
	Good	10	22%	31%
	Fair	22	49%	80%
	Poor	9	20%	100%
	Total	45	100%	
Paddy Distributors	Very good	2	6%	6%
	Good	9	26%	32%
	Fair	8	24%	56%
	Poor	15	44%	100%
	Total	34	100%	
Trailink Transporters	Very good	0	0%	0%
	Good	5	20%	20%
	Fair	17	68%	88%
	Poor	3	12%	100%
	Total	25	100%	

4.1.2.18 Response Regarding Truck Driver's Rating of the Current Level of Road Safety Awareness in the Country

Respondents were asked to rate the current level of road safety awareness in the country. Responses from Multiple Hauliers showed that out of 45 respondents, 28 representing 62%, 14 representing 31% and 3 representing 7% indicated that the current level of road safety awareness in the country is unsatisfactory, fair and satisfactory respectively. Responses from Paddy Transporters showed that out of 34 respondents, 13 representing 38%, another 13 also representing 38% and finally 8 respondents (24%) indicated that the current level of road safety awareness in the country is fair, unsatisfactory and satisfactory respectively. Finally, responses from Trailink Transporters indicated that out of 25 respondents, 19 representing 76%, 2 representing 8% and 4 representing 16% indicated that the current level of road safety awareness in the country is fair, satisfactory and unsatisfactory respectively. Table 16 shows a summary of the responses.

Table 16 Response Regarding Truck Driver’s Rating of the Current Level of Road Safety Awareness in the Country

Company	Rating	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Satisfactory	3	7%	7%
	Fair	14	31%	38%
	Unsatisfactory	28	62%	100%
	Total	45	100%	
Paddy Distributors	Satisfactory	8	24%	24%
	Fair	13	38%	62%
	Unsatisfactory	13	38%	100%
	Total	34	100%	
Trailink Transporters	Satisfactory	2	8%	8%
	Fair	19	76%	84%
	Unsatisfactory	4	16%	100%
	Total	25	100%	

4.1.3 Quantitative Analysis of Data from Managers Responsible for Road Safety Management

4.1.3.1 Sample Design Distribution and Responses from Managers

Responses from Multiple Hauliers showed that out of nine respondents to whom the questionnaires were administered, six of them responded with their forms wholly completed. This represented 67% of the required sample size. Responses from Paddy Transporters showed that out of seven respondents to whom the questionnaires were administered, four of them responded with their forms wholly completed. This represented 57% of the required sample size. Finally, responses from Trailink Transporters indicated that all the four respondents to whom the questionnaires were administered responded with their forms wholly completed. This represented 100% of the required sample size. Table 17 shows a summary of the responses.

Table 17 Sample Design Distribution and Responses from Managers

Trucking Company	Target Population	Sample Percentage	Ratio	Number of Respondents	Responses Received
Multiple Hauliers	13	45%	0.7	9	6
Paddy Transporters	10	35%	0.7	7	4
Trailink Transporters	6	20%	0.7	4	4
Total	29	100%	0.7	20	14

4.1.3.2 Response Regarding the Length of Professional Experience in Road Safety Management

Respondents were asked to state the length of their professional experience in road safety management. Responses from Multiple Hauliers showed that out of six respondents, one representing 17% and another one respondent (17%) indicated that they have less than two year's and between two-four year's professional experience in road safety management respectively. The remaining four respondents (66%) indicated that they have between four-six year's professional experience in road safety management.

Responses from Paddy Transporters showed that out of four respondents, two representing 50% indicated that they have less than two year's professional experience in road safety management whereas the remaining two respondents (50%) indicated that they have between two-four year's professional experience in road safety management. None of the respondents indicated a professional experience in road safety management of more than four years. Finally, responses from Trailink Transporters indicated that out of four respondents, two representing 50% indicated that they have over six year's professional experience in road safety management. One respondent (25%) and another one respondent (25%) indicated that they have between two-four year's and between four-six year's professional experience in road safety management respectively. Figure 14 shows a summary of the responses.

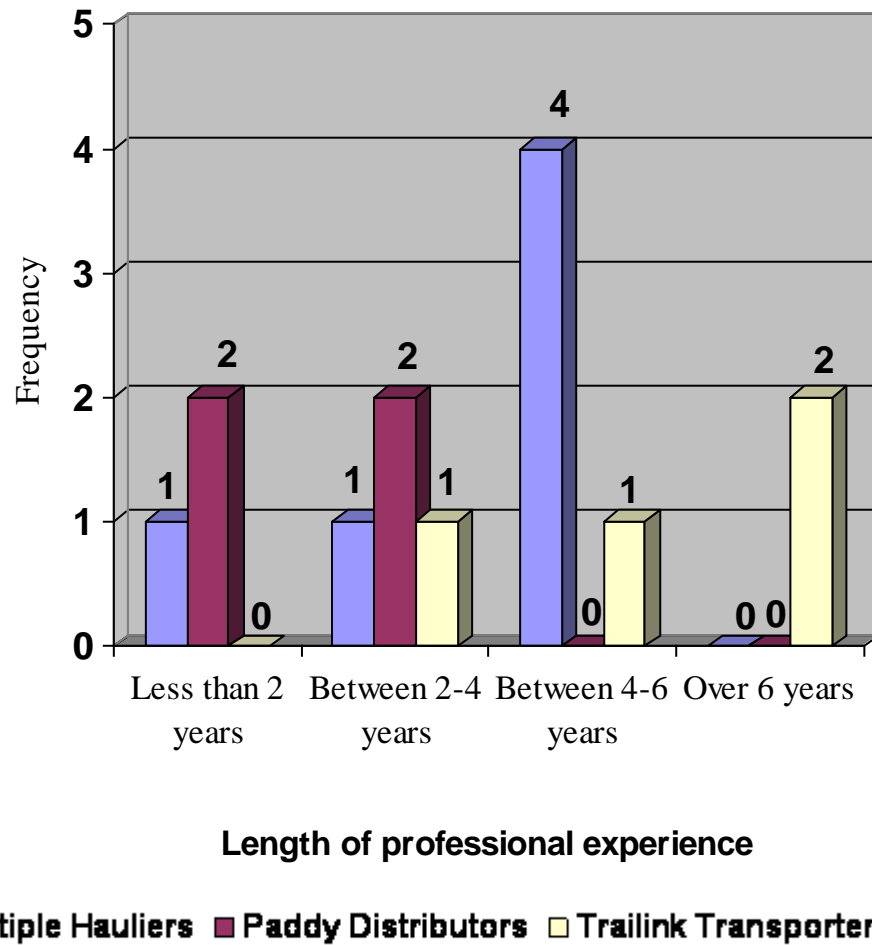


Figure 14 Response Regarding the Length of Professional Experience in Road Safety Management

4.1.3.3 Response Regarding the Number of Truck Accidents the Companies had registered for the last one year

Respondents were asked to state the number of truck accidents the company had registered for the last one year.

Responses from Multiple Hauliers showed that out of six respondents, three representing 50%, two representing 33% and finally one representing 17% indicated that the company had registered between five-ten accidents, less than five accidents and over ten accidents respectively. Responses from Paddy Transporters showed that out of four respondents, two representing 50%, one representing 25% and finally another one respondent (25%) indicated that the company had registered over ten accidents, between five-ten accidents and finally less than five accidents respectively. Finally, responses from Trailink Transporters indicated that out of four respondents, three representing 75% indicated that the company had registered over ten accidents whereas the remaining one respondent (25%) indicated that the company had registered between one-five accidents. Figure 15 shows a summary of the responses.

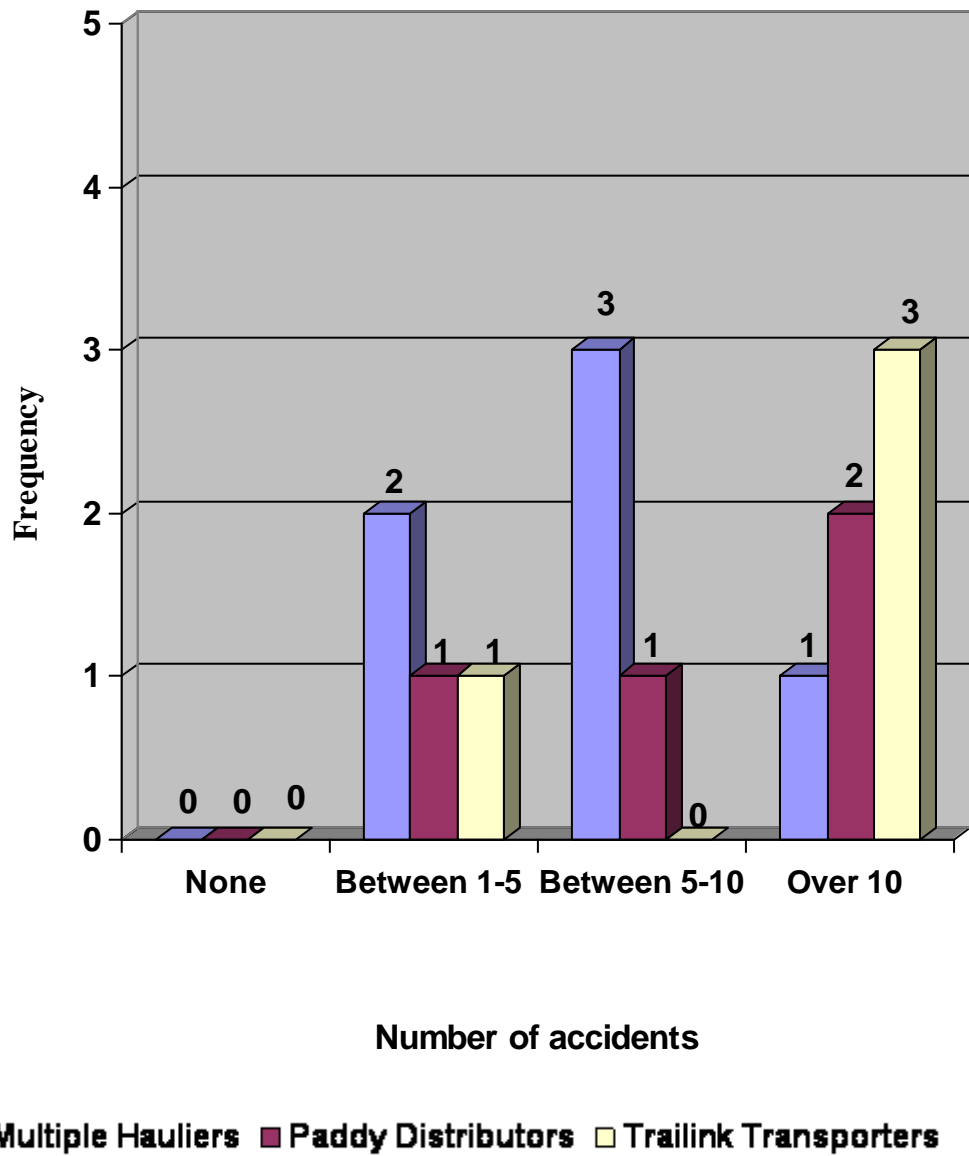


Figure 15 Response Regarding the Number of Accidents the Companies had registered for the last one year

Plates 2, 3 and 4 show some typical examples of truck accidents captured along Kenyan roads.



Plate 2 A truck that overturned on its side with cargo along Mombasa road after the driver lost control



Plate 3 A truck that overturned on its side with cargo along Nairobi-Nakuru road after the driver lost control



Plate 4 A fatal head-on collision between a truck and a Nissan patrol car along Mombasa road

4.1.3.4 Response Regarding a Scheduled Maintenance for each Truck in the Company

Respondents were asked to comment on a Scheduled Maintenance and Maintenance Record for each Truck. Responses from Multiple Hauliers showed that out of six respondents, three representing 50% indicated that the company maintains a scheduled maintenance and maintenance record for each truck. The remaining three respondents (50%) indicated that the company does not maintain a scheduled maintenance and maintenance record for each truck.

Responses from Paddy Transporters showed that out of four respondents, three representing 75% indicated that the company does not maintain a scheduled maintenance and maintenance record for each truck whereas the remaining one respondent (25%) indicated that the company maintains a scheduled maintenance and maintenance record for each truck. Finally, responses from Trailink Transporters indicated that all the four respondents representing 100% indicated that the company does not maintain a scheduled maintenance and maintenance record for each truck. Table 18 shows a summary of the responses.

Table 18 Response Regarding a Scheduled Maintenance for each Truck in the Company

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	3	50%	50%
	No	3	50%	100%
	Total	6	100%	
Paddy Distributors	Yes	1	25%	25%
	No	3	75%	100%
	Total	4	100%	
Trailink Transporters	Yes	0	0%	0%
	No	4	100%	100%
	Total	4	100%	

4.1.3.5 Response Regarding Truck Driving Performance Evaluation Method of Individual Truck Drivers

Respondents were asked to state the truck driving performance evaluation method applied to individual truck drivers. Responses from Multiple Hauliers showed that out of six respondents, three representing 50%, two representing 33% and finally one respondent (17%) indicated that top-down performance evaluation method (supervisor’s feed-back), 360-degree performance reviews (consultative) and peer-to-peer evaluation method (driver-to-driver feedback)

is used to evaluate individual truck driver's performance respectively. Responses from Paddy Transporters showed that out of four respondents, three representing 75% indicated that top-down performance evaluation method (supervisor's feed-back) is used to evaluate individual truck driver's performance whereas the remaining one respondent (25%) indicated that the 360-degree method is used. None of the respondents indicated peer-to-peer and self-assessment evaluation methods. Finally, responses from Trailink Transporters indicated that out of four respondents, two representing 50% indicated that top-down performance evaluation method (supervisor's feed-back) is used to evaluate individual truck driver's performance whereas the remaining two respondents (50%) indicated that the 360-degree method is used. None of the respondents indicated peer-to-peer and self-assessment evaluation methods. Figure 16 shows a summary of the responses.

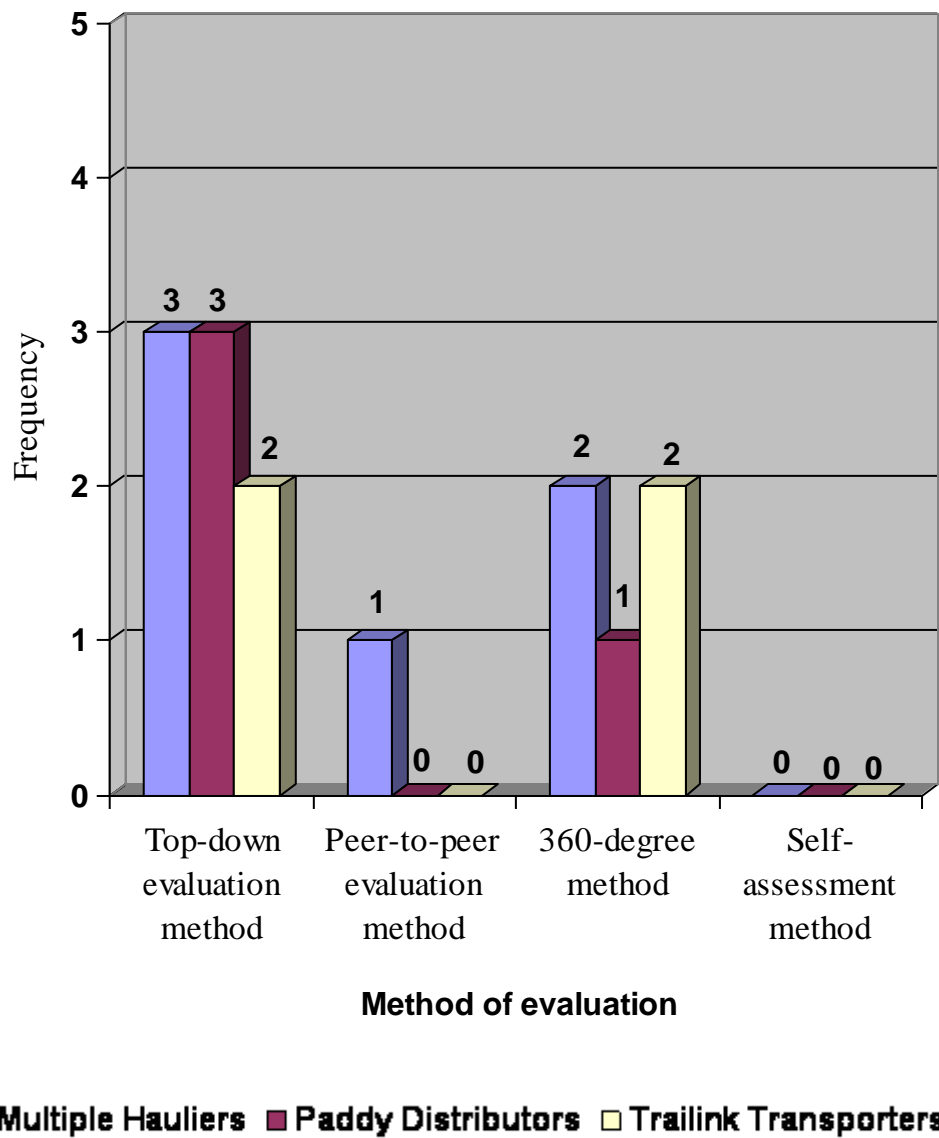
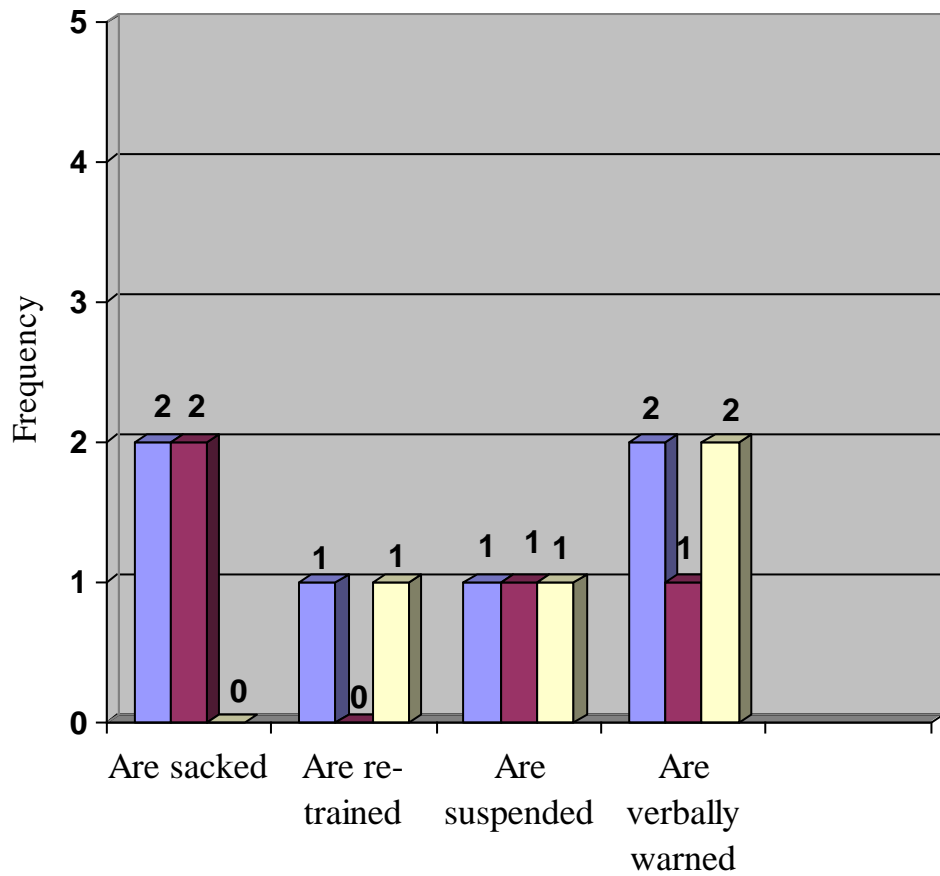


Figure 16 Response Regarding Truck Driving Performance Evaluation Method of Individual drivers

4.1.3.6 Response Regarding the Organization's Method of Dealing with Truck Drivers who violate Road Safety Rules

Respondents were asked to state the method used by the organization to deal with truck drivers who violate the road safety rules. Responses from Multiple Hauliers showed that out of six respondents, two representing 33%, two other respondents (33%), one respondent (17%) and finally one more respondent (17%) indicated that the truck drivers who violate the road safety rules are sacked, verbally reprimanded and warned, re-trained and suspended respectively. None of the respondents indicated that the drivers are surcharged. Responses from Paddy Transporters showed that out of four respondents, two representing 50%, one representing 25% and finally one more respondent (25%) indicated that the truck drivers who violate the road safety rules are sacked, suspended and verbally reprimanded and warned respectively. Finally, responses from Trailink Transporters indicated that out of four respondents, two representing 50%, one representing 25% and one more respondent (25%) indicated that the truck drivers who violate the road safety rules are verbally reprimanded and warned, re-trained and suspended respectively. Figure 17 shows a summary of the responses.



Method of dealing with drivers who violate rules

■ Multiple Hauliers ■ Paddy Distributors ■ Trailink Transporters

Figure 17 Response Regarding the Organization’s Method of Dealing with Truck Drivers Who Violate Road Safety Rules

4.1.3.7 Response Regarding Road Safety Training Program in the Organization

Respondents were asked whether there was a road safety training program in the organization. They were asked to indicate whether the organization has a road safety training program or not.

Responses from Multiple Hauliers showed that all the six respondents (100%) indicated that the company has a road safety training program. Responses from Paddy Transporters showed that out of four respondents, three representing 75% indicated that the company has a road safety training program whereas the remaining one respondent (25%) indicated that the company does not have a road safety training program. Finally, responses from Trailink Transporters indicated that out of four respondents, three representing 75% indicated that the company has a road safety training program whereas the remaining one respondent (25%) indicated that the company does not have a road safety training program. Table 19 shows a summary of the responses.

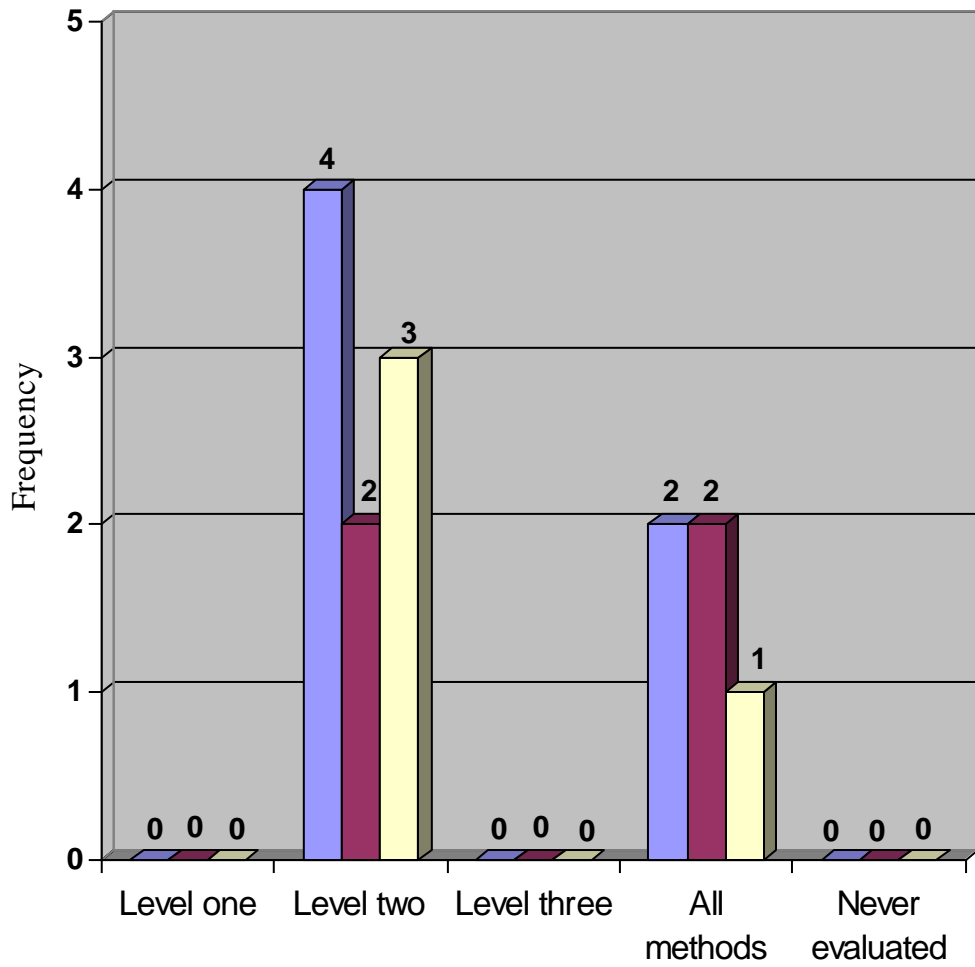
Table 19 Response Regarding Road Safety Training Program in the Organization

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	6	100%	100%
	No	0	0%	100%
	Total	6	100%	
Paddy Distributors	Yes	3	75%	75%
	No	1	25%	100%
	Total	4	100%	
Trailink Transporters	Yes	3	75%	75%
	No	1	25%	100%
	Total	4	100%	

4.1.3.8 Response Regarding Evaluation of Road Safety Training Activities

Respondents were asked to indicate the method the organization uses to evaluate the road safety training activities. Responses from Multiple Hauliers showed that out of six respondents, four representing 67% indicated that the company uses level-two evaluation method (trainees given a quiz at the end of the training) whereas the remaining two respondents (33%) indicated that the company uses all the three evaluation methods.

None of the respondents indicated level-one evaluation (reaction survey at the end of training) or level-three evaluation (driver performance appraisal) methods. Responses from Paddy Transporters showed that out of four respondents, two representing 50% indicated that the company uses level-two evaluation method (trainees given a quiz at the end of the training) whereas the remaining two respondents (50%) indicated that the company uses all the three evaluation methods. None of the respondent stated level-one or level three- evaluation methods. Finally, responses from Trailink Transporters indicated that out of four respondents, three representing 75% indicated that the company uses level-two evaluation method (trainees given a quiz at the end of the training) whereas the remaining one respondent (25%) indicated that the company uses all the three evaluation methods. None of the respondent stated level-one or level three- evaluation methods. Figure 18 shows a summary of the responses.



Method of evaluating road safety training activities

■ Multiple Hauliers ■ Paddy Distributors ■ Trailink Transporters

Figure 18 Response Regarding Evaluation of Road Safety Training Activities

4.1.3.9 Response Regarding Participation in a Government Sponsored Road Safety Awareness Seminar or Workshop

Respondents were asked to comment on participation in a Government Sponsored Road Safety Awareness Seminar/workshop.

Responses from Multiple Hauliers showed that out of six respondents, four representing 67% indicated that they had not participated in a Government sponsored road safety awareness seminar/workshop whereas the remaining two respondents ((33%) indicated that they had participated. Responses from Paddy Transporters showed that out of four respondents, three representing 75% indicated that they had not participated in a Government sponsored road safety awareness seminar/workshop whereas the remaining one respondent (25%) indicated that they had participated. Finally, responses from Trailink Transporters indicated that out of four respondents, three representing 75% indicated that they had not participated in a Government sponsored road safety awareness seminar/workshop whereas the remaining one respondent (25%) indicated that they had participated. Table 20 shows a summary of the responses.

Table 20 Response Regarding Participation in a Government Sponsored Road Safety Awareness Seminar or Workshop

Company	Response	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Yes	2	33%	33%
	No	4	67%	100%
	Total	6	100%	
Paddy Distributors	Yes	1	25%	25%
	No	3	75%	100%
	Total	4	100%	
Trailink Transporters	Yes	1	25%	25%
	No	3	75%	100%
	Total	4	100	

4.1.3.10 Response Regarding Manager’s Rating of Government’s Contribution to Road Safety Awareness in the Country

Respondents were asked to rate the Government’s current contribution to road safety awareness in the country. Responses from Multiple Hauliers showed that out of six respondents, four representing 67% indicated that the Government’s current contribution to road safety awareness in the country is poor whereas the remaining two respondents (33%) indicated that the Government’s current contribution to road safety awareness in the country is

fair. None of the respondents rated the Government's current contribution to road safety awareness in the country very good or good. Responses from Paddy Transporters showed that out of four respondents, three representing 75% indicated that the Government's current contribution to road safety awareness in the country is fair whereas the remaining one respondent (25%) indicated that the Government's current contribution to road safety awareness in the country is poor. None of the respondents rated the Government's current contribution to road safety awareness in the country very good or good. Finally, responses from Trailink Transporters indicated that out of four respondents, two representing 50%, one respondent (25%) and finally one more respondent (25%) indicated that the Government's current contribution to road safety awareness in the country is fair, poor and good respectively. None of the respondents rated the Government's current contribution to road safety awareness in the country very good. Table 21 shows a summary of the responses.

Table 21 Response Regarding Manager’s Rating of the Government’s Contribution to Road Safety Awareness in the Country.

Company	Rating	Frequency	Percentage	Cumulative Percentage
Multiple Hauliers	Very good	0	0%	0%
	Good	0	0%	0%
	Fair	2	33%	33%
	Poor	4	67%	100%
	Total	6	100%	
Paddy Distributors	Very good	0	0%	0%
	Good	0	0%	0%
	Fair	3	75%	75%
	Poor	1	25%	100%
	Total	4	100%	
Trailink Transporters	Very good	0	0%	0%
	Good	1	25%	25%
	Fair	2	50%	75%
	Poor	1	25%	100%
	Total	4	100%	

4.1.4 Qualitative Analysis of Data

4.1.4.1 Pre-Travel and Post-Trip Inspection Reports

In order to ensure that a truck is in a safe operating condition while driven, the driver should conduct pre-travel and post-trip inspections on the whole truck carefully. Reports on pre-travel and post-travel inspections should then be prepared and handed over to the maintenance shop for scrutiny. These pre-travel and post-trip inspection reports are an important part of a preventive maintenance program. From the data collected, most of the respondents interviewed indicated that trucking companies do not have a defined standard program to address the need for pre-travel and post-trip inspections. So inspection reports are rarely prepared on regular basis. Failure to institute such programs appears to be a leading cause of truck accidents. As a best practice, if these inspections are conducted, the driver is in a position to detect vehicle deficiencies and refer them to maintenance shop for repairs.

4.1.4.2 Driver Sanctions

Truck drivers operate independently and away from their employers. Today, employers are able to get information about truck driver's behavior when they are on the road. Through a management style called journey management, the employers have been able to get information about driver's behavior. In this case, truck drivers are issued with forms in which case they are required to provide information about other driver's conduct on the road.

The fully filled forms are finally deposited in the company's suggestion box. The second method is through periodic meetings with the drivers. During such meetings, some drivers get an opportunity to report irregular conduct of their fellow drivers. The final method is done through satellite truck tracking (also known as global position system). A special location tracking device also known as tracker is installed on a truck and automatically determines the truck's position in real time and sends it to a remote computer database for visualizing and analysis. From the data collected, most of the respondents interviewed indicated that trucking companies do not have proper programs in place for dealing with errant truck drivers who continuously violate safety regulations or do not maintain a system of corrective action. The respondents indicated that such drivers are either sacked unprocedurally or suspended and finally sacked. Respondents expressed the view that the above lack of proper disciplinary procedure has led to frequent cases of frustration of the drivers

4.1.4.3 Road Safety Partnership

Partnership between business, civil society and Governmental organizations is vital in improving road safety awareness. Engagement by different actors along different parts of the road safety system may create the best results by leveraging the full range of expertise and resources along a continuum.

From the findings, the respondents expressed the view that the trucking companies have never had an opportunity to partner with other stakeholders in addressing the problem of road accidents, deaths and injuries. Partnerships are vital as they encourage community participation, thus promoting road safety awareness.

4.1.4.4 Data Crash Reports

It is essential to produce data crash reports with various analyses as such reports automatically give an evaluation and comparison with previous years. From the data collected, it is evident that trucking companies do not maintain proper crash database management systems. Crash data play an important role for analyzing crash causes and countermeasures, as well as for evaluation of measures taken. Analyses, evaluation and comparison of truck accidents with previous years become very difficult. Most of the respondents interviewed indicated that the data crash reports are usually prepared after several years. A United Kingdom review of local road safety plans (Oscar Faber TPA, 1993) recommended that there should be an effective monitoring process, often embodied in a system of quarterly reports and annual reviews. This is only possible if these companies maintain proper crash database systems.

4.2 Discussion

4.2.1 Summary of Major Findings

The findings show that truck drivers are taken through orientation courses which take very short time. An orientation course for truck driving taking one day or one week is inadequate in equipping drivers with proper skills and knowledge to ensure that they meet commercial driver standards. Such orientation courses which should involve both off-the job and on-the job training require about a month or more. Secondly, truck drivers are never subjected to supervised driving test or hands-on supervised operational driving test by an independent professional trainer immediately after the orientation course to determine their driving competence.

Failure to institute road safety best practice appears to be a leading cause of truck accidents. There are no effective driver training programs in place in trucking companies. The training programs already in place do not address adequately deficiencies in driver's skills and knowledge. Such programs are supposed to include record keeping, accident and incident reporting and even defensive driving. The study has established that road safety awareness education policies have not been effectively communicated to the drivers and this has made it difficult to implement them. A company should clearly state and communicate its policy regarding road safety and delineate what is expected to transpire as a result of its program.

The Government's current contribution to road safety awareness in the country has been rated fair by the truck drivers and the safety managers of trucking companies. Road safety awareness campaigns work best when combined with other interventions such as enforcement of traffic laws and regulations or provision of other safety services and products or public relations. From the study, it is evident that trucking companies use level-two evaluation method (quiz method) in order to evaluate the road safety training activities. The road safety best practice recommends adoption of all the three evaluation methods. The study has revealed that trucking companies use top-down evaluation method (only supervisor's feedback) when evaluating road safety performance of individual drivers.

The road safety best practice recommends adoption of the 360-degree evaluation method (consultative). Trucking companies have not partnered well with other stakeholders (such as the civil society or Non-Governmental Organizations) in addressing the problem of road accidents, deaths and injuries. Partnerships are vital as they encourage community participation, thus promoting road safety awareness. More findings from the study indicate that trucking companies do not have proper programs in place to address the need of pre-travel and post-trip inspections. So, inspection reports are never prepared on regular basis. Failure to institute such programs appears to be a leading cause of truck accidents.

Finally, trucking companies do not maintain proper programs of dealing with errant truck drivers who continuously violate road safety regulations or do not maintain a system of corrective action. Such drivers are either sacked unceremoniously or suspended and finally sacked.

4.2.2 Answers to Research Questions

4.2.2.1 What is the Impact of Integrating Road Safety Measures in Trucking Companies?

The impact of integrating road safety measures in trucking companies include improved road safety culture, better truck safety, better driver recruitment policies, more effective driver training programs, improved driver's morale, positive company image, decreased truck accidents and eventually decreased cost of running the transport business.

4.2.2.2 How are Road Safety Programs Organized and Managed in Trucking Companies?

There exists different road safety management structures in the trucking companies. This implies that there is no defined standard to reflect the way road safety programs should be structured and managed in trucking companies. Some trucking companies have unduly bureaucratic type of management structures with many layers prompting slow movement of information.

Management becomes more complex when there are so many split responsibilities for policy and delivery between the top and the bottom layers of management. Other trucking companies have very simple management structures missing out very key road safety personnel. This implies poor road safety organization. This has impacted negatively on the performance of road safety management.

4.2.2.3 What is the Effect of Driver Training and Testing on Truck Accidents?

The researcher established that driver training and testing is a factor affecting road safety Performance in trucking companies. It is clear from the findings that the quality of training offered to truck drivers has not met the desired driver skills and knowledge. The truck drivers are never subjected to a supervised driving test or hands-on supervised operational driving test by an independent professional trainer immediately after the orientation course. This has translated into more truck accidents. Effective training programs need to be in place which must involve identifying deficiencies in driver's skills and knowledge and a procedure for remedial training. Such programs should also include record keeping, accident and incident reporting and even defensive driving.

4.2.2.4 What is the Impact of Road Safety Awareness on Truck Accidents?

There exists a strong correlation between the level of road safety awareness and the frequency of truck accidents. It is evident from the findings that the level of road safety awareness campaign has been very low. A road safety awareness campaign is a part of a set of activities that aim to promote safe road use. However, to be effective, this must be combined with visible Government support, particularly law enforcement. Road safety awareness campaigns work best when combined with other interventions such as enforcement of traffic laws and regulations. From the findings, there has been poor Government involvement in promoting road safety awareness campaigns. This has impacted negatively on the road safety performance in trucking companies leading to increased truck accidents.

4.3 Limitations of the study

The study limitations included:

1. The respondent's busy schedules which meant that the researcher had to make constant re-visits to meet them and collect data.
2. Lack of sufficient time as the researcher was on full time employment. However, this was overcome by utilizing time over weekends and public holidays to complete the research work.
3. Financial constraints restricted the number of research assistants who could be hired to assist in data collection and this forced the researcher to utilize time over weekends and public holidays to mitigate the above problem.
4. The physical spread of the trucking companies in Kenya and so the study was confined in Nairobi Metropolitan City.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The objective of this research work was to investigate the impact of integrating road safety measures in trucking companies. The researcher examined the critical role of data collection and analysis in the development of an improved road safety culture within a trucking company which translates into better vehicle safety, better driver recruitment policies and effective driver training programs. A number of conclusions were drawn from the study which included the following: Firstly, trucking companies have not partnered well with other stakeholders in promoting road safety awareness. Secondly, such companies do not have proper programs in place to address the need of pre-travel and post-trip inspections.

Thirdly, truck drivers are never subjected to a supervised driving test or hands-on supervised operational driving test by an independent professional trainer immediately after the orientation course. Fourthly, the Government's current contribution to road safety awareness in the country has been rated fair by the truck drivers and the safety managers. Also, trucking companies do not maintain proper programs of dealing with errant truck drivers.

Finally, failure by the trucking companies to institute road safety best practice has been the root cause of truck accidents. The solution or answers to the above areas can be extended almost indefinitely to assist other small and upcoming trucking companies on how to develop an improved road safety culture which leads to better vehicle safety, better driver recruitment policies and effective driver training programs.

5.2 Recommendations

To overcome the weaknesses identified and find ways and means of improving the road safety culture in trucking companies, the following recommendations should be adopted:

5.2.1 Scheduled Maintenance for Each Truck

To ensure that a good accident prevention culture is adopted, trucking companies must have an accident prevention maintenance program in place which includes regularly scheduled maintenance, follow-up to driver complaints and daily pre-shift inspections of trucks. A properly maintained truck is safe to drive. The degree of pride for having a safe truck to drive will transfer to the workers in form of better morale and respect for the truck. A well maintained truck sends a strong message regarding safe driving practice of the truck.

If employers allow drivers to drive trucks that are unsafe or in poor driving condition, they are sending a negative message which says “we do not value our trucks and workforce”.

5.2.2 Pre-travel and Post-trip Inspection Reports

In order to ensure that a truck is in a safe operating condition while driven, a driver should carry out pre-travel and post-trip inspections on the whole truck carefully. After the inspections, the driver should prepare a report and hand over to the manager in charge of repair and maintenance. These pre-travel and post-trip inspections reports are an important part of a preventive maintenance program. If something seems to be wrong with the truck, the driver should be in a position to detect deficiencies and refer them to maintenance shop for repairs. The driver should not operate a faulty truck

5.2.3 Procedure for Sanctioning or Handling Errant Truck Drivers

Truck drivers who clearly demonstrate that they either do not understand or simply refuse to comply with vital safety regulations should be subjected to a standard program of sanctions, but not necessarily be sacked or suspended unprocedurally.

5.2.4 Professional Driver Training Program

The National Safety Code advocates to pilot test an entry-level driver training program that is based on the National Occupational Standards for entry –level drivers. The program includes pre-qualifying trainees to ensure that they meet commercial driver competence standards and possess minimum literacy and numerical skills. Successful applicants would then undertake 8 weeks of classroom training, followed by the licensing test and a 4- week on-the job training component paired with a qualified, trained and experienced professional driver. Trainees would then receive certification only after at least 1000 hours of professional driving experience.

5.2.5 National Road Victim Organization

The Government should establish a National Road Victim Organization having members with specific accident experience that can illustrate stories in a road safety awareness campaign.

5.2.6 National Road Safety Council (NRSC)

There is need to urgently re-establish the National Road Safety Council with a full time secretariat to be the lead agency to coordinate and implement the national Road Safety Action Plan.

5.2.7 Data Crash Annual Reports

A software package for crash database management and analysis should be in place which has key software facilities. The key software facilities usually includes data entry, data management and validation checks. The software package enables electronic file management and provides standard logical checks. Also produces stick diagrams which provide simple visual tool for searching crash patterns at selected sites and areas. A United Kingdom review of local road safety plans recommended that there should be an effective monitoring process, often embodied in a system of quarterly reports and annual reviews (Oscar Faber TPA, 1993).

5.2.8 Road Safety Campaign and Enforcement

A road safety campaign is a set of activities that aim to promote safe road use. In order to increase the current level of road safety awareness, trucking companies should adopt strategies such as partnering well with other stakeholders such as the civil society and the Non-Governmental Organizations. Secondly, they should also adopt mass media awareness campaign and road shows in order to promote safe road use. However, to be effective, this must be combined with visible Government and/or community support particularly law enforcement.

5.2.9 Road Safety Monitoring Performance

Effective road safety strategies and action plans need to be in place which should include behaviour performance indicators in addition to casualty reduction targets. There should be a formal program for monitoring driver's performance.

5.3 Recommendation for Further Study in Road Safety

Based on this research, a number of recommendations regarding areas of future research in road safety can be made. These recommendations include the following:

1. Impact of advanced driver support systems on the safety benefit for impaired/drowsy drivers.
2. The extent to which different types of driver distractions influence inattention at road intersections.
3. An investigation on the driver performance as a function of road design and traffic conditions.
4. Effect of eye disruption movement by alcohol intoxication on the perception of depth from motion parallax.

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APPENDICES

Appendix 1: An Official Introductory Letter

Jomo Kenyatta University of Agriculture and Technology,

P.O. BOX 62000,

NAIROBI.

Dear Respondent,

Ref: A questionnaire on the Impact of Integrating Road Safety Measures in Trucking Industry

I am a Master of Science degree Student at Jomo Kenyatta University of Agriculture and Technology (JKUAT). This study is carried out as partial fulfillment for the award of Master of Science Degree in Occupational Safety and Health. The questionnaire is one of the data collection tools I wish to use for collecting data to enable me carry out an investigation on **“Impact of Integrating Road Safety in trucking industry”**. I will be quite grateful if you will provide the information sought by the questionnaire provided and please note that honest answers will be valuable to this study. Thank you.

Yours truly,

Signature:.....

Isaac K. Makau (Researcher)

Appendix II: A Sample Questionnaire for Truck Drivers

Kindly answer the following questions.

1). a) Biodata

A. Male	
B. Female	

b) Marital Status

Single	
Married	
Widowed	
Divorced	

2). Level of education

Primary	
Secondary	
Tertiary/College	
University	

3). How long have you worked in this company?

Between 0 -3 Years	
Between 3- 5 Years	
Between 5-7 Years	
Over 7 Years	

4). Is recruitment of drivers in this company based on adequate driving experience and competence?

Yes No

5). Were you given an induction (orientation) course on joining this organization?

Yes No

6). If your answer to 5) above is yes, which method was used during the training?

On the job training (illustrative)

Off the job training (classroom)

Both methods

7). How long did the course take?

1 day

1 week

1 month

Longer, please specify period.....

8). After the training, were you taken through an assessment (testing) for driver fitness and competence by an Independent trainer?

Yes No

9). Would you like to attend future training programs of a similar nature?

Yes

10). After the initial induction (orientation) training, has any other training (such as defensive training) been done?

Yes No

11). If your answer to 10) above is yes, has the training impacted positively on your driving performance?

Yes No

12). Is there any road safety awareness education policy in this organization?

Yes No

13). If your answer to 12) above is yes, do you have access to this policy?

Yes No

14). Have you ever participated in a Government Sponsored Road Safety Awareness Education Seminar/Workshop?

Yes No

15). How would you rate the current level of road safety awareness in the country?

Very good

Good

Fair

Poor

16). How would you rate the Government's current contribution to road safety awareness in the country through awareness education?

Satisfactory	
Fair	
Unsatisfactory	

Appendix III: A Sample Questionnaire for Managers

1). Please indicate the length of your professional experience in road safety management by ticking in the box below

Between 0 – 2 years	<input type="checkbox"/>
Between 2 – 4 years	<input type="checkbox"/>
Between 4 – 6 years	<input type="checkbox"/>
Over 6 years	<input type="checkbox"/>

2). How many truck accidents has your organization registered for the last one year?

None	<input type="checkbox"/>
Between 1 – 5 accidents	<input type="checkbox"/>
Between 5 – 10 accidents	<input type="checkbox"/>
Over 10 accidents	<input type="checkbox"/>

3). Indicate **three** major causes of truck accidents in this organization by ticking in the box below

Truck driver fatigue	<input type="checkbox"/>
High speed	<input type="checkbox"/>
Aggressive driving behavior	<input type="checkbox"/>
Influence of drug (alcohol)	<input type="checkbox"/>
Defective, hazardous and dangerous roads	<input type="checkbox"/>
Brake system failure	<input type="checkbox"/>

4). Is there a scheduled maintenance and maintenance record for each truck in this company?

Yes

No

5). How is truck driving performance of individual truck drivers evaluated in this organization?

Top-down performance evaluation method (supervisor's feed-back)	<input type="checkbox"/>
Peer-to-peer evaluation method (driver-to-driver feedback)	<input type="checkbox"/>
360-degree performance Reviews (consultative)	<input type="checkbox"/>
Self-assessment performance reviews (drivers rate themselves)	<input type="checkbox"/>

6). How does your organization deal with truck drivers who violate road safety rules?

Are sacked	
Are surcharged (fined)	
Are re-trained	
Are suspended from work	
Are reprimanded and verbally warned	

7). Do you have a road safety training program in this organization?

Yes No

8). If your answer to 7) above is yes, how are the road safety training activities evaluated?

Using level-one evaluation (reaction survey at the end of the training)	
Using level-two evaluation (trainees given a quiz at the end of the training)	
Using level-three evaluation (driver performance appraisal method)	
Using all the above three evaluation methods	
Never evaluated	

9). Have you ever participated in a Government sponsored road safety awareness seminar or workshop?

Yes No

10). In your opinion, how would you rate the Government's current contribution to road safety awareness in the country through awareness education?

Very good
Good
Fair
Poor

11). Do you have a 'homegrown' road safety initiative / program?

Yes No

12). If your answer to 11) above is yes, mention the key elements in your organization's road safety initiative / program.