THE IMPACT OF PROFESSIONAL TRAINING ON COMMERCIAL/FREIGHT DRIVERS IN THE ARAB REGION

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INTRODUCTION

Road safety is a key priority for the International Road Transport Union (IRU). Numerous studies have analysed the causes of road traffic accidents around the world. However, fewer studies have addressed accidents specifically involving heavy vehicles, and only a handful have attempted to analyse how these might have been affected by training for professional drivers, as well as their overall levels of qualification.

In the Arab region, some data on accident causation is available at the national level, but no comprehensive research project has ever attempted to analyse the impact of professional training on commercial road freight transport operations.

IRU therefore commissioned Jadarah to carry out a research study to address this gap in knowledge. The study aims to provide the public and the private sectors with the comprehensive information that will help them establish the appropriate policies to address commercial road transport safety and efficiency. This study serves three main purposes:

1. To provide evidence about the main causes of accidents in commercial road transport operations and their impacts on the industry and national economies;
2. To highlight how professional training could contribute to mitigating the number of accidents and improving efficiency in road transport operations;
3. To provide policy-makers and company managers in the road transport sector with data to support their decisions on road safety and driver education.

EXECUTIVE SUMMARY

Project Objectives

This study aims to determine the degree to which training for professional drivers could contribute to improving road safety. It also aims to measure the extent to which that training might contribute to the overall efficiency of commercial road transport by reducing fuel consumption, minimising damage to transported cargoes, mitigating vehicle wear and tear, and improving the overall quality of service delivery. IRU commissioned this study as part of its contribution to the UN Decade of Action for Road Safety and its ongoing efforts to improve road transport safety and efficiency in the Arab region. It is structured around a thorough literature review and combines this with a statistical analysis of data collected from thirty-two key commercial freight transport companies operating in six different Arab countries[1].

[1] The Kingdom of Saudi Arabia, the United Arab Emirates, Jordan, Bahrain, Qatar and Egypt.

Literature review

Current statistics[2] for some Arab countries suggest that commercial truck accidents cause significant losses of life and property; they result in more deaths and injuries per accident than those caused by other vehicle types. In Saudi Arabia, for example, there were 0.14 deaths per commercial truck accident, whereas other vehicle types caused 0.01 deaths per accident reported. Similar trends to Saudi Arabia's have been observed in other member countries of the Cooperation Council for the Arab States of the Gulf (GCC)[3]. Although several studies[4,5], have demonstrated that commercial road users are not the main originators of road accidents, those same studies have repeatedly shown that human factors are by far the main cause: the European Truck Accident Causation (ETAC) study indicated that more than 85% of accidents were linked to human error. However, only 25% of the accidents linked to human error were caused by truck drivers. Similarly, the Large-Truck Crash Causation Study (LTCCS) showed that the main cause of accidents involving large trucks was truck driver error. These accidents were mainly attributed to poor driving practices resulting from truck drivers' lack of knowledge about good driving practices, distractions, low general skill levels and/or inadequate driving behaviours. This situation continues to raise major concerns, particularly because the victims are often more vulnerable road users.

Commercial road traffic accidents very often put greater real financial burdens on carriers than those actually reported. In addition to the pain and sadness due to injuries, or perhaps fatalities, accidents involving a commercial vehicle inevitably also result in a loss of orders, reductions in customer trust and company reputation, a vehicle right-off or significant time off the road for repair, suspension of key drivers, lost working days due to driver injuries, work rescheduling costs, and investigation, insurance and paperwork costs[6]. However, the cost of a truck accident is controllable and one that directly affects a company's bottom line. The ability to mitigate accidents is extremely important in all circumstances. The value of driver safety initiatives lies in the fact that they yield tangible reductions in accident and injury costs, and thus result in substantial savings on the company's bottom line[7].

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[2]Issa. Y, Ratrout. N, (2014). Traffic Safety of the trucking industry in Saudi Arabia, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE), Vol. 11, No. 2, pp. 49-55.

[3]Al-Saif, A. (2012). Estimation of traffic accidents in the GCC countries and ways to address them in Saudi Arabia, The first forum for traffic safety, "the Saudi Society for Traffic Safety, Dammam, Saudi Arabia".

[4]ETAC, (2007). European Truck Accident Causation Study: Available from: https://previouswww.iru.org/cms-filesystem-action?file=mix-publications/2007_ETACstudy.pdf

[5]LTCCS, Large-Truck Crash Causation Study: An initial Overview: Available from: http://www-nrd.nhtsa.dot.gov/Pubs/810646.pdf

[6]Jeff Ross, (2015). "How Much Does a Truck Accident Cost a Company?" Available from: www.cashort.com/blog/transportation-how-much-does-a-truck-accident-cost.

[7]Christina Thompson, (2015). "What Will a Commercial Truck Accident Really Cost You?" Available from: <www.aatruckinsurance.com/2015/07/02/what-will-a-commercial-truck-accident-really-cost-you/>.

Concurrently, the issue of road safety has become of increasing concern to civil society and governments across the Arab region. Nevertheless, the data available show that road casualties, in terms of both injuries and fatalities, continue to have very severe impacts in Arab countries.

Research Results

This study shows that commercial truck driver errors and their improper driving behaviours were responsible for about 77% of all accidents involving commercial trucks in the Arab region. It demonstrates that there is currently an absence of mandatory road transport qualification frameworks in the Arab region, and this absence weighs on commercial road transport safety standards and efficiency. In response to this, the study highlights the cost of maintaining the status quo (i.e. the cost of maintaining the status quo as measured by deaths and injuries caused by road traffic accidents and their effect on national GDPs, plus an absence of efficiency gains which would benefit transport companies). Results indicate that the Value of a Statistical Life (VSL) and the cost of injuries resulting from road crashes add up to a significant cause of loss of wealth for the countries targeted in this study. Available data suggests that GDP losses have reached 6.77% in Sudan, 6.45% in Iraq, and 6.08% in Djibouti. Losses are also significant in Yemen, Jordan, Libya and Lebanon (6.02%, 5.59%, 5.19% and 4.75%, respectively).

The study found that the 32 Case Study Companies implemented two types of measures, policies and internal practices to prevent or minimize road accidents. Firstly, measures relating to professional training were indeed being implemented: 76% of case study companies had regular Tool Box safety talks for their drivers; 62% used induction, refresher and advanced training programmes and tests; and 43% communicated the causes and effects of road traffic accidents to other commercial drivers. Secondly, case study companies were observed to be using performance monitoring measures: 57% of them collected and used comments from the public as indicators of the safety-critical behaviours of their commercial truck drivers; 52% used periodic driver skills assessments or checks, In-Vehicle Monitoring System (IVMS) technologies, or ride-along monitoring to observe drivers' safety-critical behaviours. Calculations of the Pearson correlation coefficient revealed that there was an emerging association between the increased professional training and performance monitoring measures carried out by case study companies and a lower average number of reported accidents per 1 million kilometres.

The surveys and interviews carried out in this study showed that commercial transport companies in the Arab region undertook two main types of external training on a voluntary basis: (1) general purpose training, and (2) specific road safety training. These programmes have different characteristics:

- General purpose training covers a variety of topics, including first aid (82% of cases), coupling/uncoupling procedures for combination vehicles (75%), vehicle restraint systems and safety equipment (70%), and customer service (47%);

- Specific road safety training normally covers defensive driving (64% of cases) and occasionally the transport of dangerous goods (20%).

The present study demonstrates that internal measures, policies and practices, as well as access to external training programmes for truck drivers, can have a broad impact on a company's overall performance. The key performance indicators (KPIs) listed below show the changes that occurred after training was introduced:

- An average 46% reduction in the number of accidents reported per 1 million kilometres;
- An average 30% reduction in the annual cost of medical care (in cases exceeding insurance cover);
- A 25% reduction in man-days lost per year as a result of drivers' injuries;
- An average 48% reduction in the annual revenues lost due to truck downtime caused by accidents;
- An average 17% reduction in the annual cost of fleet repairs due to accidents (in cases exceeding insurance cover);
- A 51% reduction in the annual number of damaged deliveries due to accidents;
- An average 55% reduction in the annual costs of hiring and training new drivers as replacements for injured/absent drivers as a result of accidents.

Training's impact on transport efficiency was also demonstrated as follows:

- Average annual IVMS violations were reduced by 58%;
- Average fuel consumption per kilometre was reduced by 14%;
- Average annual savings on tyre costs were reduced by 8%;
- Average annual maintenance and repair costs per truck were reduced by 20%;
- Average annual number of near-miss reports increased by 112%, reflecting an improvement in a culture of safety;
- Average annual number of customer complaints reduced by 52%;
- Average annual number of customer claims reduced by 58%;
- Average annual ratio of damaged deliveries to the total number of deliveries reduced by 42%.

Every USD 1 spent on commercial driver training gave the case study companies a return on investment (ROI) of slightly more than USD 17.

Recommendations

In order to improve commercial road freight transport operations in the Arab region, the present study highly recommends the implementation of the following key measures:

- Make road safety a key priority by adopting appropriate legislation and ensuring strict enforcement of the regulations.
- Introduce criteria for recruitment in the road transport professions, including minimum training qualifications, with a particular focus on safe and efficient driving. The study's findings suggest that training on these issues is a necessity. It is also critical that such training (and related examinations) meets internationally recognised standards of quality.
- Require a minimum educational level for commercial truck drivers, in order to make sure that they are able to complete paperwork and trip records properly, comply with traffic laws and successfully undertake professional training programmes.
- Support and facilitate the establishment of institutions to train professional commercial drivers with the aim of establishing training programmes in which the goals of safe and efficient commercial transport operations are prominent.
- Introduce road safety awareness programmes into the educational curricula of schools and universities in order to promote a culture of road safety among all road users, including specific initiatives targeting the commercial transport industry.
- Make driving improvement courses mandatory for repeat violators of traffic laws and persons committing serious driving offences.
- Introduce frameworks for professional qualifications for commercial drivers, in a harmonised manner throughout the Arab region, for example, by adopting and recognising the international certificates issued by the IRU Academy.
- Commission in-depth, country-specific studies to further analyse options for the introduction of professional qualification frameworks and their impacts on road safety and transport efficiency.
- Establish high quality professional training programmes, backed by international industry standards, particularly in the field of road safety.
- Ensure that programme instructors have been trained to deliver the very best in-class training and are certified by an international body as qualified road transport training instructors.
- Improve companies' abilities to track KPIs in order to help them identify weaknesses, thus improving the efficiency of training and associated measures.
- Systematically ensure that transport companies' workforces, particularly their professional drivers, undertake appropriate training and retraining and obtain certificates to attest to their professional competence.

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LIST OF ABBREVIATIONS

ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
BA	Bachelor of Arts
BSc	Bachelor of Science
DOT	United States Department of Transportation
EC	European Commission
ETAC	European Truck Accident Causation
EU	European Union
FMCSA	Federal Motor Carrier Safety Administration
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GNP	Gross National Product
GPS	Global Positioning System
HGV	Heavy Goods Vehicle
iRAP	International Road Assessment Program
IRU	International Road Transport Union
IVMS	In-Vehicle Monitoring System
KPI	Key Performance Indicator
KSA	Kingdom of Saudi Arabia
LASTAC	League of Arab States Truck Accident Causation
LGV	Light Goods Vehicles
LTCCS	Large-Truck Crash Causation Study
MBA	Master of Business Administration
MENA	Middle East and North Africa
NAFMP	North America Fatigue Management Program
NAFTA	North American Free Trade Agreement
NASS	National Analysis Sampling System
NGO	Non-Governmental Organization
NHTSA	National Highway Traffic Safety Administration
PNA	Palestinian National Authority
ROI	Return on Investment
RTC	Road Traffic Collision
SPSS	Statistical Package for the Social Sciences
TRB	Transportation Research Board
TRL	Transport Research Laboratory
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
US	United States
VSL	Value of a Statistical Life
WHO	World Health Organization

CHAPTER 1

1. PROJECT SUMMARY

1.1 Research Objectives/Outcomes

This study evaluates the impact of professional training on commercial road transport drivers. An analysis of the current performance of training was conducted in six countries in the Arab region. It mainly focused on improvements to road safety and the enhancement of professional drivers' competences, contributions to gains in efficiency for commercial carriers, and enhancements to the overall quality of service delivery. The research placed a great emphasis on the costs of no training as measured by the deaths and injuries caused by road accidents. Furthermore, it looked at the potential effects on the GDPs of the countries studied if current road safety measures and policies continue to be used in the future.

Accordingly, this study aims to:

1. Highlight the costs incurred when commercial drivers receive no professional training;
2. Determine whether the introduction of professional training for commercial transport drivers significantly reduces the number of accidents experienced by transport companies;
3. Identify current best practices and areas of weakness in commercial road transport which have direct impacts on overall commercial operational excellence;
4. Assess the value of training for professional truck drivers in terms of overall efficiency gains and cost effectiveness.

The study's outcomes lead to an identification of the benefits of road safety training for commercial transport drivers in relation to road safety itself, ROI and efficiency gains for carriers in the Arab region.

1.2 Research Methodology

Besides extensively reviewing related literature, the researchers collected a mixture of quantitative and qualitative data through face-to-face meetings using two different survey instruments. A specially designed questionnaire was used to assess drivers' perceptions, and a semi-structured interview tool was used to collect data from transport managers. All the respondents had experience working for leading road transport operators in one of six countries in the Arab region. These service providers have established good reputations for themselves by being pro-active about implementing strong safety procedures, including training for their drivers. The protocols used for both the questionnaire and the interviews

included the possibility of using Arabic and English as the medium of communication and providing translation whenever this was needed.

The qualitative methodology used a snowball sampling technique for interviews in each case study company selected. The researchers asked the main contact person for each company – people who had overseen the implementation of driver training schemes – to recommend transport managers for an interview. This technique, beginning with a few people, gradually increased the number of respondents by using referrals to sustain a network of knowledgeable participants from case study companies. Details about the total number of interviews conducted are provided in the data analysis and results sections of this report.

Quantitative data was collected from commercial truck drivers who were receiving professional training during researchers' visits to case study companies' premises. This was deemed a satisfactory collection method as a viable number of commercial transport truck drivers was readily present. However, it is important to note that studying the whole population was statistically impossible since the majority of drivers were delivering goods or travelling during most of the data collection period. Sampling techniques were therefore used to construct a subset of the study population. Details of the total numbers of questionnaires distributed and valid responses received are provided in the data analysis and results sections of the report.

1.3 Selection of Case Study Companies and Sampling Techniques

The sampling technique chosen for this research project was important because understanding the sample's properties is vital for generalising findings to all the commercial transport companies in the Arab region. A multi-case study technique was therefore adopted for selecting case study companies based on pre-set criteria. The case study companies were selected based on them having professional training policies/programmes for their truck drivers in addition to the criteria shown in Table 1, below.

Table 1: Selection Criteria for Case Study Companies

Criterion	Criterion Weight
Experience	30%
Logistical Services Coverage	30%
Financial Situation	20%
Size	20%
Total	**100%**

Companies were chosen based on their size in terms of the number of full-time commercial drivers employed – no less than 30 commercial drivers at the time of the study. They also had to be trans-national, i.e. working across the Arab states, or, at a minimum, have a nationwide logistical services coverage with an average operational experience in commercial/freight transportation and logistics of no less than 15 years. Finally, companies selected were required to have officially published annual reports on their financial situation. The sample size for the qualitative part of the study was smaller than that of the quantitative part. Table 2, below, lists the sample of 32 commercial transport companies operating in six Arab region countries that were selected based on the criteria in Table 1, above.

Table 2: Details of the Case Study Companies selected

Country	Company Name		Work Nature of Business	Number of Commercial Drivers
United Arab Emirates	(1)	ARABTEC CONSTRUCTION LLC	Construction	46
	(2)	EMARAT (Emirates General Petroleum Corporation)	Oil & Gas Operations, Petroleum Products & Logistics	54
	(3)	ASCON ROAD CONSTRUCTION LLC	Infrastructure	200
	(4)	FUJAIRAH FEED FACTORY	Animal Feed Products	40
	(5)	ENOC/EPPCO (Emirates National Oil Company)	Oil & Gas Operations, Petroleum Products	260
	(6)	KHYBER LAND Transport by Heavy and Light Trucks LLC	Heavy Transports & Logistics	120
Saudi Arabia	(7)	Almajdouie Transport	Land Transportation & Logistics	1,480
	(8)	Waraq (Arab Paper Mfg. Co.)	Manufacturing - Fleet	115
	(9)	Al Rajhi Transport	Land Transportation & Logistics	673
	(10)	GASCO	Gas Distribution & Transportation	1,200
	(11)	Al Marai	Dairy Products Distribution	1,600
	(12)	Al Saif Transport	Land Transportation & Logistics	900
	(13)	Al Dawaa Pharmacies Ltd.	Medical Supplies Distribution	128

	(14)	Bakhashab Transport	Land Transportation & Logistics	509
	(15)	Almajdouie De Rijke (MDR)	Transportation & Logistics Company	580
	(16)	AlRajhi Logistics	Transportation & Logistics Company	1,000
	(17)	Al Shammari Transportation	Transportation & Logistics Company	750
	(18)	Solayhem Al Hajiri Transportation	Transportation & Logistics Company	350
Qatar	(19)	Bin Omran Trading & Contracting	Construction/Civil Engineering	200
	(20)	Midmac Trading & Contracting	Construction/General Contracting	150
	(21)	Redco Intl. WLL	Construction/General Contracting	1,390
	(22)	TEKFEN Constructions	Contracting/ Engineering	150
	(23)	AAMAL Contracting	Property/Trading & Distribution/ Industrial Mfg./ Managed Services	125
Bahrain	(24)	Al Arrayed Logistics WLL	Land Transportation & Logistics	50
	(25)	Al Wardi Transport	Land Transportation & Logistics	480
	(26)	Al Faisal Logistics & Transport WLL	Land Transportation & Logistics	105
Egypt	(27)	BOSLA Logistics	Logistics services , especially heavy trucking	78
	(28)	Egyptian Drilling Company	Oil & gas rigs moved between oil fields using heavy trucks	50
	(29)	Exxon Mobil Egypt	Distribution of bulk fluids to gas stations	122

	(30)	Gulf Cryo Egypt	Liquefied gases production and distribution	30
	(31)	Road Master	Heavy trucking	84
Jordan	(32)	Transport & Investment Barter Company	Transportation company	169
Total	**32**	**-**	**13,188**	

1.4 Data Analysis Approach

Data from both the qualitative and quantitative parts of this research project were collected simultaneously from selected commercial transport companies, as presented in Table 2, above. The data analysis approach is explained below.

1.4.1 Qualitative Data Analysis Method

Each interview was transcribed and collected company documents were reviewed. The ensuing thematic analysis was done by strictly following the stages below:

1. In order to generate a valid coding framework for the interview transcripts, common theoretical topics were identified by reading those transcripts, analysing collected documents and revising the research objectives. These topics were carefully selected to reflect interviewees' statements.
2. After generating the coding framework, interview transcripts were divided into meaningful components, and every component was assigned its relevant code belonging to a pre-defined topic.
3. Next, interview transcripts were reviewed to find codes that fitted into similar topics. Similar topics were clustered around larger central themes which were later used for interpretation.

1.4.2 Quantitative Data Analysis Method

The quantitative data collected via questionnaires were prepared for statistical analysis using the following four stages:

1. Data were scored by assigning a numerical value to each response.
2. The response scores were fed into the SPSS (Statistical Package for the Social Sciences) software.
3. Data were checked for errors or missing values before analysis. The software allowed an examination of improvements in road safety skills and company performance.
4. Where appropriate, descriptive statistics and mathematical tests from the SPSS software – means and standard deviations – were calculated. A final overall mean for all the participants was reached and used to indicate the tendency for each attribute.

CHAPTER 2

2. LITERATURE REVIEW

2.1 Introduction

Efficient road transportation has been found to have a strong correlation with economic growth. It is essential for the operation of a market economy in terms of efficiently moving goods and people from one place to another. Road transportation will therefore always have a significant role to play in shaping developmental and environmental trends. The available literature provides many insights about the effects of road transportation on where people live and work, where businesses can be expected to grow, the effects on natural resource consumption, land usage patterns and, potentially, where businesses will locate in the future. However, the general trend is for road transport volumes to increase faster than national economies. This traffic intensity raises concerns about the economic and environmental costs of such significant road traffic growth[8].

Deaths caused by road traffic accidents have increased considerably worldwide[9]. Current statistics suggest that road traffic accidents will be the sixth leading cause of deaths worldwide by 2020[10], and the fifth leading cause of deaths by 2030[11]. It has also been calculated that road traffic accidents will be the second leading cause of disability-adjusted life-years lost in developing countries by 2020[12].

The Arab region is no exception. Arab region countries have been found to have higher numbers of road accidents, and higher fatality and risk rates (10-25 fatalities/100,000 pop and 3-5 fatalities/10,000 motor vehicles) than many of the best-performing western countries (6 fatalities/100,000 pop and 1 fatality/10,000 motor vehicles)[13].

[8]UN Road Safety Collaboration, (2014). Improving global road safety. Available from: http://www.who.int/roadsafety/about/resolutions/download/en/.

[9]Eberts, Randall, (2007). Understanding the Impact of Transportation on Economic Development. Available from: www.trb.org/publications/millennium/00138.pdf.

[10]Road Safety Annual Report, (2013). Available from: http://www.internationaltransportforum.org/pub/pdf/13IrtadReport.pdf

[11]Murray, C., Lopez, A. (Eds.), (1996). The Global Burden of Disease. Harvard Press, Cambridge, MA.

[12]Global Burden of Disease, (2008). Geneva, World Health Organization, Available from: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf

[13]Jacobs, G. and Aeron-Thomas, A., (2000). A Review of Global Road Accident Fatalities. In: TRL Annual Research Review 1999 (published). pp. 15-25. Crowthorne: TRL.

Due to these alarming figures, road safety is today gaining more and more attention. Indeed, it has become one of the most important topics on the agenda, not only in developed countries but also in the majority of developing countries, including the Arab region[14]. A number of countries have attempted to develop strategies to reduce deaths caused by road traffic accidents. Although the death tolls have been reduced successfully in some countries, there has been no global reduction in the number of casualties resulting from road accidents. That number remains an unacceptably high 1.24 million deaths per year[15]. In response to this, the United Nations (UN) General Assembly voted resolution 64/255, better known as the Decade of Action for Road Safety for the years 2011-2020. This resolution is a call to save the 5 million lives which could be lost on the world's roads during that period if nothing is done to reduce road traffic crashes.

Figure 1, below, shows the projected global increase in road crash deaths if no action is taken versus the projected global reduction in road crash deaths if proper actions and measures are implemented. According to the 2013 Global Status Report on Road Safety, published by the World Health Organization (WHO)[16], the current global road safety challenges are the following:

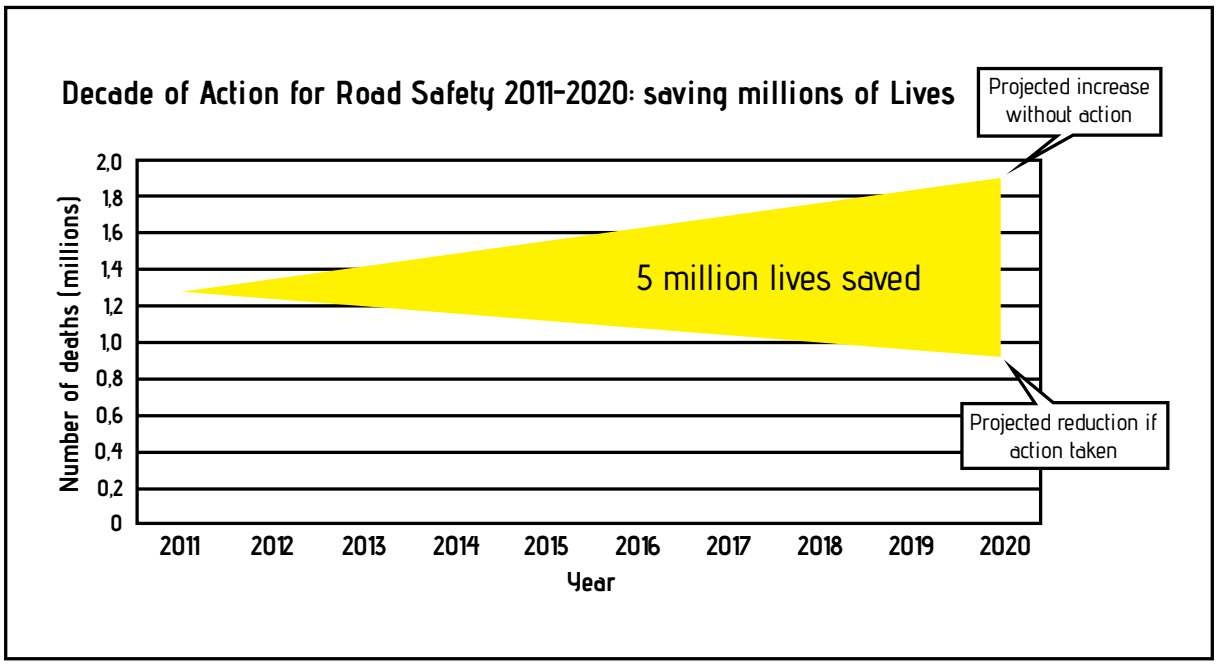
1. Whereas 88 countries successfully reduced their road accident death rates between 2007-2010, 87 saw increased rates during the same period.
2. Middle-income countries have the highest road accident death rates in the world.
3. Only 28 countries have adequate laws in place to address road risk factors.
4. Fewer than 35% of low- and middle-income countries have policies in place to protect road users.
5. Road traffic injury rates in low- and middle-income countries are twice those found in high-income countries.

[14]Borsos A, Koren CS, Ivan JN, et al. (2012). Long-term safety trends related to vehicle ownership in 26 countries. Paper presented at: Annual Meeting of the Transportation Research Board; Washington, DC, USA, January 22-26, 2012.

[15]Global Status Report on Road Safety, (2013). Supporting a Decade of Action. WHO.

[16]WHO, (2004). "World report on road traffic injury prevention".

Figure 1: Decade of Action for Road Safety for the years 2011-2020[15]



Road traffic crashes account for a substantial fraction of morbidity and mortality and are responsible for more years of life lost than most human diseases. The WHO reported that road traffic injuries are the leading cause of death by injury, the eleventh leading cause of all deaths and the ninth leading contributor to the burden of disease worldwide. Hundreds of thousands more are non-fatally injured on the world's roads, some of whom are permanently disabled[17].

In 2010, more than one million people were killed on the world's roads. This is unacceptably high: road traffic injuries take an enormous toll on individuals, people and communities, as well as on national economies. If present trends continue, road traffic injuries are predicted to be the third leading contributor to the global burden of disease and injury by 2020[18]. According to the Global Status Report on Road Safety 2015[19], road traffic crashes are a leading cause of death among young people, and the main cause of death among those aged 15-21 years old.

Based on an extrapolation of past trends, projections by the World Bank indicate that between 2000 and 2020, road traffic deaths may decline by about a further 30% in high-income countries, whereas they may still substantially increase in low- and middle-income countries if no additional road safety counter-measures are put in place.

[17]FEPS, Cairo University (2011), Available from: http://www.feps.edu.eg/en/departments/statistics/graduation/20111/traffic.pdf

[18]Health at a Glance (2009), OECD Indicators. Available from: www.oecd-ilibrary.org/sites/health_glance-2009-en/01/06/index.html?contentType=&itemId=%2Fcontent%2Fchapter%2Fhealth_glance-2009-8-en&mimeType=text%2F

[19]WHO, (2015). "Global status report on road safety 2015".

The Arab region represents about 83% of the population of the Middle East and North Africa region (MENA), where road traffic accidents are the fourth leading cause of death. The toll of victims reached 82,000 people in 2010. Current statistics clearly indicate that commercial truck accidents in the Arab region are the worst type, causing more deaths and injuries than all the accidents caused by other vehicle types. This situation raises major concerns, particularly because the victims are often more vulnerable road users. As MENA countries witness increased motorisation rates and expanding road infrastructure networks, traffic accidents have taken a growing toll of deaths and related injuries. The WHO named the Middle East as the region with the highest rates of road traffic deaths and injuries among young people; it has even issued warnings that if comprehensive action is not taken to reverse this trend, the number of deaths and injuries is likely to increase significantly[20].

The WHO's 2014[21] rates for road traffic deaths per 100,000 population in the Arab region are presented in descending order in Table 3, below.

Table 3: Rates of Road Traffic Deaths per 100,000 people in the Arab Region

Country	Rate	Country	Rate	Country	Rate
Iraq	41.41	Jordan	25.00	Lebanon	17.20
Libya	38.61	Syria	23.08	Egypt	15.34
Oman	33.84	Djibouti	21.83	Bahrain	14.92
Mauritania	33.75	South Sudan	21.80	Kuwait	14.43
Comoros	32.52	Somalia	21.65	Qatar	13.33
Yemen	31.63	Morocco	19.98	United Arab Emirates	11.70
Sudan	31.13	Algeria	19.11		
Saudi Arabia	25.33	Tunisia	18.61		

In view of the above accident rates and the expected future challenges facing the Arab region, these countries are some way behind the countries with the safest roads, such as Sweden and the UK, where a tremendous amount of work has been done since the UN launched its road safety campaign in 2010. Clearly, further action to improve road safety conditions in the Arab region is necessary.

[20]Said Dahdah , Dipan Bose (World Bank) (2013). Road traffic injuries: A public health crises in MENA, Available from: www.siteresources.worldbank.org/INTMENA/Resources/QN111.pdf

[21]World Life Expectancy, (2014). Available from: www.worldlifeexpectancy.com/cause-of-death/road-traffic-accidents/by-country/

As mentioned earlier, commercial truck accidents are often the worst and result in more deaths and injuries than accidents involving other vehicle types. Truck drivers differ from non-professional drivers in many ways including far higher annual mileage and more demanding driving tasks. They are often exposed to traffic for long periods, a factor which may cause them to show more fatigue or aggression. However, after many years of professional driving, they also develop greater skills in both vehicle and road use, but an overestimation of those skills may encourage them to take more risks and thus be more likely to be involved traffic accidents.

In response to these alarming facts and figures, the present study focuses on the impact of professional training on improving commercial/freight drivers' performance. It is thus anticipated that its findings will help to improve road traffic safety and provide efficiency gains to transport companies.

2.2 International Studies

2.2.1 The Socio-Economic Cost of Road Traffic Accidents

Road crashes impose intangible financial and economic costs on society. These costs often include reduced quality of life, reduced productivity, and medical and other resource costs.

The annual cost of crashes around the world is estimated at USD 518 billion or between 1% and 3% of GDP, depending on the country, which is an enormous loss to society as a whole. The losses in developing countries represent up to USD 65 billion, or more than the total aid they receive from bilateral and multilateral donors. Crashes are not only a massive drain on countries' financial resources but they also cause socio-economic problems too[22]. The following examples illustrate this:

a) The societal cost of road traffic crashes could well be around 3% of GDP in Asian countries, including India[23].

b) The European Commission (2010) estimated the socio-economic cost of fatal, serious and minor injuries (taking into account intangible elements) to be about 2% of the EU's GDP or EUR 180 billion – twice the EU's annual budget[24].

[22]White paper (2011) "Making the business case for road safety investment to achieve sustainable road mobility." Available from: http://docplayer.net/9320377-White-paper-making-the-business-case-for-road-safety-investment-to-achieve-sustainable-road-mobility.html

[23]United Nations, Centre For Regional Development (2014). Impact of Road Traffic Crashes in Asia: A Human and Economic Assessment. Available from: www.uncrd.or.jp/content/documents/21588EST-P4-BGP_Mohan.pdf

[24]European Commission, (2010). Socio-economic costs and the value of prevention. Available from: www.ec.europa.eu/transport/road_safety/specialist/knowledge/postimpact/the_problem_road_traffic_injury_consequences/socio_economic_costs_and_the_value_of_prevention.htm

c) The social cost of road crashes in Australia[25] was estimated at AUD 17.85 billion in 2006 (1.7% of GDP). Human losses represented 61.5% of the cost of crashes. Fatal crashes were estimated to have cost AUD 3.87 billion, injurious crashes AUD 9.61 billion and property damage AUD 4.36 billion. The largest individual costs were workplace and household losses (AUD 5.69 billion), vehicle repair costs (AUD 4.23 billion), non-pecuniary costs (AUD 1.86 billion) and disability-related costs (AUD 1.77 billion).

d) The US National Highway Traffic Safety Administration (NHTSA) report[26] estimated the economic costs of road traffic crashes to be USD 242 billion in 2010. This represented nearly USD 784 for each of the 308.7 million people living in the US, or 1.6% of GDP.

e) In March 2016, New Zealand's Ministry of Transport published a study[27] estimating the social cost of road crashes and injuries during 2015. This estimated the average social cost at NZD 4,709,000 per fatal crash, NZD 900,000 per reported serious crash and NZD 95,000 per reported minor crash. The total social cost of motor vehicle injury crashes in 2014 was estimated at NZD 3.47 billion, at June 2015 prices.

2.2.2 Social Costs Attributable to Truck Crashes Caused by Truck Drivers

The University of Michigan Transportation Research Institute – a leading institute in truck-related crash research – reports that the American Trucking Associations (ATA) studied 8,309 fatal car-truck crashes in an attempt to determine their causes. Car drivers were found to be at fault 81% of the time, compared to 27% for truck drivers[28].

In March 2013, the US Department of Transportation published a repor[29] which showed that the estimated average cost of commercial motor vehicle crashes between 2009 and 2011 was USD 37 billion for fatal crashes, USD 29.7 billion for injurious crashes and USD 16.7 billion for crashes involving property damage only.

[25]Tim Risbey , Mark Cregan, and Hema De Silva, (2010). "Social Cost of Road Crashes". Available from: www.atrf.info/papers/2010/2010_Risbey_Cregan_deSilva.pdf

[26]The US National Highway Traffic Safety Administration (NHTSA), (2015). The Economic and Societal Impact Of Motor Vehicle Crashes, 2010 (Revised). Available from: www-nrd.nhtsa.dot.gov/pubs/812013.pdf

[27]Ministry of Transport (New Zealand), March 2016, Social Cost of Road Crashes and Injuries 2015 update.

[28]CCJ, (2013). 80 percent of car-truck crashes caused by car drivers, ATA report says. Available from: www.ccjdigital.com/80-percent-of-car-truck-crashes-caused-by-car-drivers-ata-report-says/

[29]US Department of Transportation, (2013). Commercial Motor Vehicle Facts. Available from: www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/Commercial_Motor_Vechicle_Facts_March_2013.pdf

2.2.3 The Cost of Crashes for Carriers

Despite its paramount importance to most of the economies in the world, commercial road transport faces the major twin challenges of shortages in skilled, well-trained drivers and a lack of proper measures to improve road safety[30]. Shortages of skilled, well-trained drivers have tremendous limiting effects on this vital sector's economic growth; they also impose challenges on commercial road transport carriers hiring new drivers as, in many cases, they will have to settle for low-skilled drivers for transport and delivery purposes. This situation has direct implications on road safety and countries' economic performance[31]. These reasons have often been directly linked to the significant proportion of road crashes attributed to commercial trucks in different parts of the world.

Commercial road accidents often impose greater financial burdens on businesses (carriers) than those habitually reported. A commercial vehicle accident may result in lost orders, a drop in customer trust, a vehicle destroyed or off the road for repairs, suspension of key drivers, a damaged company reputation, working days lost to driver injuries, and work rescheduling, investigation and administrative costs . Costs can be classified into visible and hidden costs[32] The visible costs of a truck accident are:

- Cargo damage
- Vehicle damage
- Medical costs
- Salaries paid to injured drivers involved in an accident
- Lost revenues
- Administrative costs
- Costs of hiring or training replacement drivers
- Insurance premium increases
- Towing costs
- Storage for damaged vehicles

[30]Global Insight, Inc., (2005). The U.S. Truck Driver Shortage: Analysis and Forecasts. Prepared for the American Trucking Associations, May 2005.

[31]European Agency for Safety and Health at work (2011). Managing risks to drivers in road transport. Available from: www.osha.europa.eu/en/tools-and-publications/publications/reports/managing-risks-drivers_TEWE11002ENN

[32]European Agency for Safety and Health at work (2010). A review of accidents and injuries to road transport drivers.

The hidden costs of a truck accident are:

- Lost clients or customers
- Lost working time
- Downtime of the damaged vehicle
- Accelerated depreciation of a damaged vehicle
- Increased public relations costs

A recent article posted by Jeff Ross[33] explained that for a carrier to pay off the cost of an average truck accident, estimated at USD 148,279 by the Federal Motor Carrier Safety Administration, and takes additional revenue of USD $7,413,950, assuming an average 2% profit margin. The revenue required to pay off the costs varies inversely to the profit margin. Furthermore, the cost of a truck accident involving a fatality is considerably higher and may reach up to USD 7,633,600.

The cost of a truck accident remains a manageable cost, but it can directly affect the company's bottom line. When competition becomes intense and profit margins are tight, the ability to manage accident costs becomes extremely important. The value of driver safety initiatives lies in the fact that they yield tangible reductions in accident and injury costs, resulting in substantial savings for a company's bottom line[34].

Many carrier businesses do not consider these facts when evaluating accidents involving commercial vehicles. However, these costs can push a carrier to declare bankruptcy if an accident was caused by one of its own drivers.

2.2.4 Causes of Truck Crashes

2.2.4.1 The Proportion of Crashes Attributable to Human Error

Studies have shown that human error is the main cause of accidents involving trucks. The literature reports that the human factor – including both driving behaviour and impairment of drivers' skills – is the most prevalent critical factor in road traffic accidents.

The findings of key studies in this field are summarised in Table 4, below.

[33]Jeff Ross, (2015). "How Much Does a Truck Accident Cost a Company?" Available from: www.cashort.com/blog/transportation-how-much-does-a-truck-accident-cost

[34]Christina Thompson, (2015). "What Will a Commercial Truck Accident Really Cost You?" Available from: www.aatruckinsurance.com/2015/07/02/what-will-a-commercial-truck-accident-really-cost-you/

Table 4: Findings from Key Studies on the Main Causes of Commercial Vehicle Accidents

Study Title	Findings
Human error as a cause of vehicle crashes[35]	✓ Human errors and deficiencies were classed as the definite or probable causes of 90%-93% of motor vehicle accidents. ✓ This 2001 US study reported that driver behavioural error caused up to 99% of the accidents investigated.
The Domain of Truck and Bus Safety Research[36]	✓ Most truck-car accidents are caused by the same driver mistakes and misbehaviours that cause accidents in general. ✓ Unsafe driving actions that lead to fatal car-truck accidents are equally likely to lead to fatal car-car accidents.
The Large Truck Crash Causation Study (LTCCS)[5]	✓ 87% of the road accidents caused by commercial drivers involved failure to evaluate the situation correctly or poor driving decisions.
The European Truck Accident Causation (ETAC) Study[4]	✓ The main cause of accidents was linked to human error in 85.2% of the cases investigated.

Traffic accidents occur for various reasons, but they are mainly caused by drivers' failures to abide by road regulations, consider pedestrians and recognise their own dangerous behaviours. This may be due to insufficient driver knowledge, as most drivers acquire their knowledge through experience. Thus any new situations that drivers are exposed to may lead to accidents. Additionally, a driver's failure to recognise danger, wrong ideas and/or bad driving habits can all increase the likelihood of fatal accidents. Commercial driver error can include anything that prevents a driver from properly estimating, reacting to or judging a situation. It could include talking on a cell phone, texting, speeding, poor visibility, blind spots, driving while intoxicated or under medication, driving while sleep deprived, etc. All these actions can lead to disastrous results.

[35]Bryant Walker Smith, (2013). "Human error as a cause of vehicle crashes." Available from: http://cyberlaw.stanford.edu/blog/2013/12/human-error-cause-vehicle-crashes

[36]Transportation Research Board (TRB) (2007). (Truck and Bus Safety Committee):The Domain of Truck and Bus Safety Research", May 2007.

2.2.4.2 The Proportion of Truck Crashes Attributable to Truck Drivers

Within the context of commercial transport, several studies have shown that a large proportion of road accident deaths reported in different parts of the world involved people who were driving for work and to work. For example, a study conducted by the European Transport Safety Council[37] concluded that more than one third of road deaths in Europe involved drivers going to or from work; similar figures were reported in the United States[38].

In the UK, the majority of the freight industry vehicles are owned by commercial organisations. Drivers of these vehicles make up an important proportion of the country's driving population, and are believed to be significant contributors to the number of deaths due to road accidents. A survey by Lynn and Lockwood[39], on the drivers of vehicles owned by commercial organisations, reported that they were liable for more accidents than other everyday drivers. At a subtler level, Downs et al.[40] asserted that commercial vehicle drivers were responsible for more accidents, even when mileage and demographics are taken into account: these drivers were 29% more likely to be liable for an accident than ordinary drivers.

The above finding is congruent with those reported by a US Transportation Research Board circular[37] which stated that large trucks were associated with a significant proportion of fatal traffic crashes: 11.7% in 2003 alone. The circular also reported that commercial drivers in the US experienced more job-related deaths than any other profession.

Furthermore, the ETAC[4] study concluded that 25% of RTCs due to human error were attributable to truck drivers' errors.

2.2.4.3 Top Causes of Truck Crashes Caused by Truck Drivers

The findings of the above mentioned studies on the causes of truck crashes caused by truck drivers are summarised in Table 5, below.

[37]European Transport Safety, (2010). Reducing road safety risk driving for work and to work in the EU. ETSC Position Paper, February 2010. ETSC, 2010.

[38]Murray W., (2007). World wide Occupational Road Safety (WORS) Review Project. National Institute for Occupational Safety and Health.

[39]Lynn P and Lockwood C, (1998). The accident liability of company car drivers. TRL Report 317. Transport Research Laboratory.

[40]Downs C G, Keigan M, Maycock G and Grayson G B, (1999). The safety of fleet car drivers: a review. TRL Report 390. Transport Research Laboratory.

Table 5: Findings from Key Studies on the Causes of Truck Crashes caused by Truck Drivers

Study Title	Findings
The Domain of Truck and Bus Safety Research[37]	The five driver-errors accounting for about 65% of fatal car-car and car-truck accidents were: ✓ failing to keep in lane ✓ failing to yield right-of-way ✓ driving too fast for the conditions or in excess of posted speed limits ✓ failing to obey traffic control devices and laws ✓ inattention
The Large Truck Crash Causation Study (LTCCS)[5]	The study assigned three major types of critical events to large trucks, as follows: ✓ 32%: failing to keep in lane ✓ 29%:loss of control of the vehicle ✓ 22%: colliding with the rear of another vehicle The main factor in crashes involving large trucks was truck driver error in 48% of all investigated crashes. Of this 48%, driver errors were classified as follows: ✓ 16%: recognition errors ✓ 21%: decisional errors ✓ 5%: performance errors ✓ 6%: driver non-performance
The European Truck Accident Causation (ETAC) study[4]	The top causes of accidents between commercial trucks and other road users were: ✓ speed unadapted to the situation ✓ failure to observe intersection rules ✓ improper manoeuvres when changing lanes
Characteristics and contributory causes related to large-truck crashes (Phase 1) - Fatal crashes[41]	The top five driver errors in the investigated truck crashes were: ✓ following improperly ✓ cellular telephone use while driving ✓ erratic lane changing ✓ vehicle stopped or unattended ✓ overtaking with insufficient or inadequate distance

[41]Sunanda Dissanayake and Nishitha Bezwada, (2010). "Characteristics and contributory causes related to large-truck crashes (Phase 1) - Fatal crashes", Mid-America Transportation Centre & University of Nebraska-Lincoln, June 2010.

2.2.5 Truck Driver Training

2.2.5.1 The Impact of Training on Safety Performance

Driver training has proved to be one of the most contentious road safety topics for well over half a century. A 1996 study of drivers from the Swedish telephone company Televerket concluded that there was no evidence that pre-licence training had any measurable effect on crash risk, and many of the reports on the effectiveness of post-licence training are largely anecdotal. In one experiment, however, four interventions (driver training, group discussions, awareness campaigns and bonuses for accident-free driving) were carried out. Accident rates and costs were compared for a two-year period, both pre- and post-intervention. The results for the driver training group showed a statistically significant 40% reduction in the accident rate after training[42].

In 2004, the US Transportation Research Board, the National Research Council and the Federal Motor Carrier Safety Administration published a synthesis report about the training of commercial motor vehicle drivers based on available literature and on a survey of relevant organisations. It reported the following findings:

- An evaluation of crashes between 1981 and 1985, using the National Analysis Sampling System (NASS), found that only 42% of truck drivers involved in crashes had received training.
- A 1987 survey, only 23% of 1,762 drivers of trucks had had any formal training before becoming professional drivers.
- The Office of Technology Assessment found that untrained drivers were involved in more fatal crashes; 42% of large-truck drivers involved in all truck crashes had received training and only 26% of drivers involved in fatal crashes had received training.
- Training programmes that included periodic re-examinations and refresher courses were effective in reducing crash rates. The UPS company's practice of periodic retraining was a good example. UPS trainers accompany their drivers four times each year, using a 120-item checklist to determine whether a driver has developed bad habits. Retraining is provided for drivers based on the checklist. Retraining is also mandatory if a driver is involved in an avoidable crash. In 1986, the UPS crash rate was barely one-tenth of that of the motor carrier industry as a whole within the USA[43].

[42]Graham B Grayson and Shaun Helman, (2011). "Work-related road safety- A systematic review of the literature on the effectiveness of interventions", IOSH, Sep 2011.

[43]Transportation Research Board, (2004). "Training of commercial motor vehicle drivers", Synthesis 5. Available from: www.onlinepubs.trb.org/onlinepubs/ctbssp/ctbssp_syn_5.pdf

A European Chemical Transport Association document from 2013[44] claimed that freight driver training was the main factor in helping to reduce the number of road freight vehicle accidents through the wider implementation of Behaviour Based Safety (BBS) programmes. The authors went on to argue that training lead to fewer accidents, incidents and fines and to lower fuel consumption, emissions, maintenance costs and insurance premiums. These guidelines recommended that the frequency of training should be once every 1 to 5 years, depending on each individual driver's annual performance reviews.

The role of driver fatigue in driving safety is a complex one, especially in the commercial road transport sector. A study evaluating the impact of driver training as a fatigue countermeasure measured the results of training of 70 heavy-vehicle drivers and solicited their views on the usefulness of that training 1-26 months afterwards. Indeed, 47% of the participating drivers reported changing their driving strategies to do with fatigue in their private lives and 49% reported changing the strategies they practiced when working. Driver training seemed to have proved useful for developing a culture of fatigue management at the organisational level[45]. In this context, the North America Fatigue Management Program-NAFMP offers an interactive, web-based, educational and training programme developed to teach drivers about the factors contributing to fatigue and its impact on performance. The material is designed for use by carriers of all sizes in North America[46].

In 2009, as an initiative to improve highway safety, the U.S Federal Motor Carrier Safety Administration (FMCSA)[47] produced a guide which provides educational and technical assistance to the motor carrier industry and gives basic guidance on the Federal Motor Carrier Safety Regulations. The guide highlights driver training requirements, especially for drivers wishing to qualify for a commercial driver's licence.

PRAISE[48] – a project co-funded by the European Commission and implemented by the European Transport Safety Council – focused on preventing road accidents and

[44]ECTA & Cefic, (2008). "Behaviour Based Safety guidelines of training of drivers and safe driving of road freight vehicles" Nov 2013.

[45]Philippa H. Gander et al, (2005). "An evaluation of driver training as a fatigue countermeasure", Transportation Research Part volume 8 issue 1, January 2005 pp 47-58: Available from: www.sciencedirect.com/science/article/pii/S1369847805000033

[46]U.S Department of Transportation, (2014). "North American Fatigue Management program-NAFMP". Available from: www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/North%20American%20Fatigue%20Management%20Program%20%28NAFMP%29.pdf

[47]Federal Motor Carrier Safety Administration, (2009). "A Motor Carrier's Guide to Improving Highway Safety", Dec 2009.

[48]PRAISE, (2009). "Preventing Road Accidents and Injuries for the Safety of Employees", Feb 2010 Available from: www.etsc.eu/wp-content/uploads/PRAISE-Report-2.pdf,

injuries from an employee safety viewpoint. One section in the report, published in February 2010, presented how driver risk assessment and training could improve work-related road safety.

An October 2014 study[49], exploring the impact of the EU legislative framework on training for professional drivers, reached the following conclusions:

1) Human error is the main cause of traffic accidents and minimal training (danger recognition) could have potentially positive effects on road safety.
2) Potential benefits from EUR 7,424 million to EUR 10,740 million per year, in the form of reduced traffic accidents costs and reduced fuel use and emissions, would certainly outweigh the costs related to implementing the Directives (e.g. 2003/59/EC, 2005/ 36/ EC).

Simulators provide carriers with the ability to offer a wide variety of training exercises to truck drivers. The American Transportation Research Institute released a research paper[50] examining the safety impacts of simulator training and initial results at 6 months post-training suggested that drivers who had received simulator training had fewer safety incidents.

2.2.5.2 Impact of Training on Company Performance

- ✓ PRAISE[48] cited the example of the Hamburger Wasser Werke (a water supply company), where fuel consumption decreased by 6.2%, third party liability claims dropped by 21.7% and own damage claims declined by 34% after the company conducted professional training programmes for its drivers. At the carrier level, potential savings are limited to fuel, insurance and maintenance (because of fewer accidents). Savings on fuel consumption were estimated at EUR 1,119 to EUR 1,905 per driver per year.
- ✓ As in the American Transportation Research Institute paper[51], a study conducted by the European Commission found that a one-day driver training course could result in a fuel efficiency increase of 5%. In addition, Canadian researchers found that a combination of truck driver training and monitoring could result in a 10% increase in fuel efficiency.
- ✓ Fleets with lower incident and accident rates boost overall corporate image. Fewer incidents and a better image can lead to better levels of client service

[49]Panteia, (2014)."Ex-post evaluation study report Study on the effectiveness and improvement of the EU legislative framework on training of professional drivers", Oct 2014.

[50]American Transportation Research institute, (2014). ATRI Research Examines Safety Impacts of Driver Simulator Training. Available from: www.atri-online.org/2014/02/12/atri-research-examines-safety-impacts-of-driver-simulator-training/

[51]American Transportation Research institute, (2014). The Role of Truck Drivers in Sustainability. Available from: www.atri-online.org/sustainable-driving-practices/

and customer satisfaction – clients prefer to do business with motor carriers that boast better safety records[52].

2.2.5.3 Recommendations on Implementing Training

Directive 2003/59/EC aimed to raise the standard of new drivers recruited and maintain and enhance the professionalism of existing truck and bus drivers throughout the EU by continuously updating their capacities. This came as part of a general effort to increase safety on European roads and to define qualification and training requirements for professional drivers.

Another major recommendation of the ETAC study[4] on truck drivers was to increase driving experience by providing refresher courses (to break with old, bad habits).

Similarly, Advanced[53], a European Commission-supported study, emphasised the importance of having an ideal driver-training format addressing behaviour, knowledge and skills, factors that increase risks and new ways for drivers to think about themselves (self-evaluation). This should happen via the introduction of a more official quality training scheme for post-licence training.

2.3 Regional Studies

2.3.1 Estimations of the Socio-Economic Cost of Road Traffic Accidents in the Arab Region

2.3.1.1 Cost of road traffic accident in some Arab countries

Ismail and Samar[54] estimated the cost of road traffic accidents in Egypt in 2008 to be approximately EGP 10 billion (about USD 1.8 billion). They expected this to rise to EGP 11.8 billion in 2009 (about USD 2.1 billion). Furthermore, the estimated cost of road accidents in Saudi Arabia has now reached approximately SAR 50 billion annually (about USD 13.7 billion)[55] .

2.3.1.2 Estimation of Total GDP Losses due to Road Crashes in the Arab Region

There is much discussion in the economics literature on the need to evaluate GDP losses due to road crash deaths and injuries. Such an evaluation would, in essence, amount to an attempt to measure the value of increasing safety or reducing risk. The

[52]The Center for Internet and Society, (2013). Human error as a cause of vehicle crashes. Available from: www.vehicleservicepros.com/article/12126520/five-ways-newer-trucks-can-impactsafety-and-improve-the-bottom-line

[53]The EU ADVANCED Project, (2002). "Description and Analysis of Post-licence Driver and Rider Training", September 2002.

[54]Mohamed A. Ismail and Samar M. M. Abdelmageed, (2010). Cost of Road Traffic Accidents in Egypt. International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering Vol:4, No:6, 2010

[55]Emirates News Agency, (2015). Road accidents cost Saudi Arabia SAR50 billion annually. Available from: www.wam.ae/en/news/arab/1395288262159.html

literature mentions three main methods for valuing the benefits of preventing road crash fatalities or injuries. These may be broadly outlined as follows:

(1) The Gross Output or Human Capital Method:
This method deals with the discounted present value of the victim's future output lost due to his/her death. This also includes market costs, such as the costs of medical treatment, administration, property damage and/or loss. However, this approach fails to include the value of lost lives and therefore underestimates the true value of preventing road crashes. Although a suffering and pain component is sometimes added as a human cost to rectify this, the human cost component is usually determined arbitrarily[56].

(2) The Willingness to Pay Method:
This method consists of estimating the amount of money that individuals are willing to pay for reducing the risk of loss of life. It is based on the need to conduct risk assessments before committing resources to reduce risks to acceptable levels. This trade-off approach between risk and economic resources fits well with the social cost-benefit analysis principle. However, despite the fact that this method is complex, it is generally accepted as the most reliable for the assessment of the value of preventing road risks[57].

(3) The Cost of Restitution Method:
Elvik[58] mentioned this method which is often understood to mean the direct costs of a crash alone. This method neglects lives forgone or pain incurred due to that crash. It is, therefore, the least favoured method in the literature, as it does not include these vital human cost component factors.

As these definitions showed, the Willingness to Pay method is favoured if the costs are intended to be used in a cost-benefit analysis. However, it is generally only used in high-income, developed countries as it often requires costly assessment work and uses sophisticated survey techniques. For this reason, the Human Capital method is usually used as an alternative to Willingness to Pay in developing countries.

The International Road Assessment Program (iRAP)[57] has devised an alternative approach involving a new method to derive a relatively simple rule of thumb based on the data available from a wide range of countries. This could offset the costly problem of gathering data in the developing countries.

[56]Patrick Philipp, (2015). "Increasing road safety and transport efficiency through improved professional competence", Moscow. Available from: www.slideplayer.com/slide/5986560/

[57]International Road Assessment Program (iRAP), (2008). The True Cost of Road Crashes: Valuing life and the cost of a serious injury. UK.

[58]Elvik, R., (1995). An Analysis of Official Economic Valuations of Traffic Accident Fatalities in 20 Motorized Countries. Accident Analysis & Prevention, 27(2), pp. 237-247.

Data collected from different countries helped in to generate ratios of the Value of a Statistical Life (VSL) to GDP per capita for developing and developed countries. This rule of thumb methodology enabled an estimation of the macroeconomic impact of road crashes in different countries, and also helped to provide feasible estimates of the VSL in developing countries[59].

As Fletcher[60] stated, the method developed by iRAP is very useful for getting an indication of the true costs of road deaths and injuries, especially when rigorous crash and injury cost records for a country are lacking. The iRAP method is therefore considered adequate for estimating the VSL and costs of a serious injury in the Arab region.

Table 6 shows the recommended default economic values for the prevention of fatalities and serious injuries, as percentages of GDP per capita, for use in developing countries.

Table 6: iRAP Economic Appraisal Model Values

Item	Lower	Central	Upper
Value of a fatality	60*GDP/capita	70*GDP/capita	80*GDP/capita
Value of a serious injury	12*GDP/capita (20% VSL)	17*GDP/capita (25% VSL)	24*GDP/capita (30% VSL)
Number of serious injuries per fatality*	8	10	12

*10 is the default ratio; for sensitivity analysis, this ratio varies between 8 and 12.

The iRAP economic appraisal model is a decision-making methodology that can be applied to a project, programme or policy as it takes into account a wide range of costs and benefits, denominated in monetary terms or for which a monetary equivalent can be estimated. Economic appraisal is a key way of achieving value for money and satisfying the requirements for decisional accountability. It is a systematic process for examining alternative uses of resources by focusing on the assessment of needs, objectives, options, costs, benefits, risks, funding, affordability and other factors relevant to decisions. For all these reasons, researchers generally decide to use the central estimate of the VSL iRAP equation (70*GDP/capita).

Table 7 presents calculations for the value of lives lost in road crashes in the Arab region based on 2014 GDP figures. The table highlights the annual costs of doing nothing, as a percentage of GDP, if measures are not enacted to reduce traffic accidents in the Arab region. It is evident that road crashes are a very significant drain on the GDP of these countries.

[59]Journal of Transport Economics and Policy, (1999). Variations between Countries in Values of a Statistical Life. Available from: www.bath.ac.uk/e-journals/jtep/pdf/Volume_34_Part_2_169-188.pdf

[60]Fletcher, J Rapid, (2014). Desk-based study: The economic impact of road traffic accidents and injuries in developing countries. Evidence on Demand, UK (2014) iv +28 pp. Available from: http://dx.doi.org/10.12774/eod_hd.june2014.fletcher

Based on the reported 2014 fatality figures used in Table 10, below, the number of 2014 injuries can be calculated by assuming that there are 10 times as many serious injuries as there are fatalities. This is the iRAP[57] recommended default ratio since these injuries are not likely to be

Table 7: Cost of Road Crash Fatalities/GDP in the Arab Region (Cost of Doing Nothing)

Country	Population[a]	2014 GDP (USD millions)[b]	GDP /Capita (USD)	Cost of one Fatality (USD)	No. of Fatalities/ Year[c]	Cost of Fatalities/ Year (USD millions)	Cost of Fatalities/ GDP (%)
Algeria	38,934,000	213,518	5,484.1	383,887	4,150	1,593.2	0.74
Bahrain	1,362,000	33,851	24,853.8	1,739,772	162	282.4	0.83
Comoros	770,000	624	810.3	56,727	139	7.9	1.26
Djibouti	876,000	1,589	1,813.9	126,974	222	28.2	1.77
Egypt	89,580,000	301,499	3,365.6	235,598	16,094	3,791.8	1.25
Iraq	35,273,000	223,500	6,336.2	443,540	9,494	4,211.3	1.88
Jordan	7,416,000	35,827	4,831	338,172	1,729	585	1.63
Kuwait	3,753,000	163,612	43,594.9	3,051,649	390	1,191.6	0.72
Lebanon	5,612,000	45,731	8,148.7	570,415	1,113	635.3	1.38
Libya	6,259,000	41,143	6,573.4	460,138	1,356	624.3	1.51
Mauritania	3,970,000	5,061	1,274.8	89,236	705	62.9	1.24
Morocco	33,921,000	110,009	3,243	227,016	5,376	1,220.5	1.10
Oman	4,236,000	81,797	19,309.9	1,351,697	356	481.3	0.58
Palestine	4,542,000	12,738	2,804.4	196,314	131	100.3	0.78
Qatar	2,172,000	210,109	96,735.2	6,771,468	168	1,138.8	0.54
KSA	30,887,000	753,832	24,406.1	1,708,428	5,403	9,231.7	1.22
Somalia	10,518,000	5,707	542.5	37,981	1,112	42.2	0.74
Sudan	39,350,000	73,815	1,875.8	131,310	11,121	1,460.4	1.97
Syria[d]	18,772,000	55,800	2,972.5	208,075	2,885	600.4	1.07
Tunisia	11,130,000	48,613	4,367.7	305,742	2,012	615.1	1.26
UAE	9,086,000	399,451	43,963.3	3,077,434	1,244	3,828	0.95
Yemen	26,184,000	35,955	1,373.1	96,121	6,578	632.3	1.75

[a] Population figures from: Total Population – Both Sexes". World Population Prospects 2014. United Nations Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section. http://esa.un.org/unpd/wpp/Download/Standard/Population/

[b] 2014 GDP figures from: World Development Indicators Database: databank.worldbank.org/data/download/GDP.pdf

[c] Fatalities/Year based on WHO 2008 figures (Deaths/100,000). Source: Michael Sivak, M and Schoettle, Mortality from road crashes in 193 countries: A comparison with other leading causes of death, University of Michigan Transport Research Institute (UMTRI) 2014.

[d] Estimated 2014 GDP for Syria from: CIA World Fact Book – Syria's Economy. Cia.gov.

adequately documented in developing countries. Table 8 therefore presents the cost of serious injuries resulting from road crashes, as a percentage of GDP in the Arab region.

Table 8: Cost of Road Crash Serious Injuries/GDP in the Arab Region (Cost of Doing Nothing)

Country	Population[a]	2014 GDP (USD millions)[b]	GDP /Capita (USD)	Cost of One Serious Injury (USD)	No. of Serious Injuries/ Year	Cost of Serious Injuries/ Year (Millions USD)	Cost of Serious Injuries/ GDP (%)
Algeria	38,934,000	213,518	5,484.1	93,229	41,503	3,869.3	1.81
Bahrain	1,362,000	33,851	24,853.8	422,516	1,623	686	2.02
Comoros	770,000	624	810.3	13,776	1,392	19.1	3.07
Djibouti	876,000	1,589	1,813.9	30,836	2,221	68.5	4.31
Egypt	89,580,000	301,499	3,365.6	57,216	160,943	9,208.6	3.05
Iraq	35,273,000	223,500	6,336.2	107,716	94,949	10,227.6	4.57
Jordan	7,416,000	35,827	4,831	82,127	17,299	1,420.7	3.96
Kuwait	3,753,000	163,612	43,594.9	741,114	3,904	2,893.8	1.76
Lebanon	5,612,000	45,731	8,148.7	138,529	11,138	1,542.9	3.37
Libya	6,259,000	41,143	6,573.4	111,748	13,569	1,516.3	3.68
Mauritania	3,970,000	5,061	1,274.8	21,671	7,051	152.8	3.01
Morocco	33,921,000	110,009	3,243	55,132	53,766	2,964.2	2.69
Oman	4,236,000	81,797	19,309.9	328,269	3,561	1,169	1.42
Palestine	4,542,000	12,738	2,804.4	47,676	1,310	62.4	0.49
Qatar	2,172,000	210,109	96,735.2	1,644,499	1,681	2,765.8	1.31
KSA	30,887,000	753,832	24,406.1	414,904	54,036	22,420	2.97
Somalia	10,518,000	5,707	542.5	9,224	11,123	102.6	1.79
Sudan	39,350,000	73,815	1,875.8	31,889	111,218	3,546.7	4.80
Syria[c]	18,772,000	55,800	2,972.5	50,532	28,857	1,458.2	2.61
Tunisia	11,130,000	48,613	4,367.7	74,251	20,119	1,493.8	3.07
UAE	9,086,000	399,451	43,963.3	747,376	12,438	9,296.6	2.32
Yemen	26,184,000	35,955	1,373.1	23,343	65,787	1,535.7	4.27

[a] Population figures from: Total Population – Both Sexes". World Population Prospects 2014. United Nations Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section. http://esa.un.org/unpd/wpp/Download/Standard/Population/

[b] 2014 GDP figures from: World Development Indicators Database: databank.worldbank.org/data/download/GDP.pdf

[c] Estimated GDP 2014 for Syria from: CIA World Fact Book – Syria's Economy. Cia.gov. Following the estimation of the total cost of road crashes as a percentage of GDP for each Arab country, Table 9 provides the total combined GDP loss for each country from road crash fatalities and serious injuries.

Table 9: Total GDP Loss Due to Road Crashes in the Arab Region

Country	Cost of Fatalities/ GDP (%)	Cost of Serious Injuries/GDP (%)	Total GDP Loss (%)
Algeria	0.74	1.81	2.55
Bahrain	0.83	2.02	2.85
Comoros	1.26	3.07	4.33
Djibouti	1.77	4.31	6.08
Egypt	1.25	3.05	4.30
Iraq	1.88	4.57	6.45
Jordan	1.63	3.96	5.59
Kuwait	0.72	1.76	2.48
Lebanon	1.38	3.37	4.75
Libya	1.51	3.68	5.19
Mauritania	1.24	3.01	4.25
Morocco	1.10	2.69	3.79
Oman	0.58	1.42	2.00
Palestine	0.78	0.49	1.27
Qatar	0.54	1.31	1.85
KSA	1.22	2.97	4.19
Somalia	0.74	1.79	2.53
Sudan	1.97	4.80	6.77
Syria	1.07	2.61	3.68
Tunisia	1.26	3.07	4.33
United Arab Emirates	0.95	2.32	3.27
Yemen	1.75	4.27	6.02

The calculations shown above indicate that the VSL and cost of injuries resulting from road crashes cause a significant loss of wealth in the Arab region. The percentage of GDP lost in Sudan is highest, at 6.77%; second highest is Iraq, at 6.45%. The loss is also high in countries such as Djibouti, Yemen, Jordan, Libya and Lebanon, with values of 6.08%, 6.02%, 5.59%, 5.19% and 4.75%, respectively.

2.3.2 Proportion of Crashes Attributable to Human Error in the Arab region

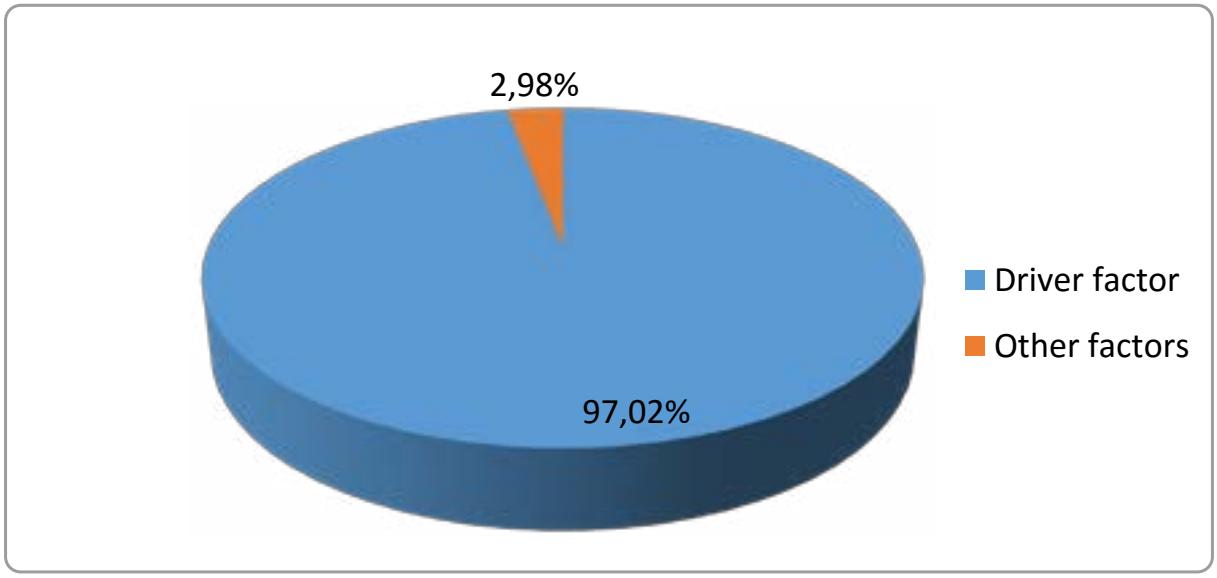
With regard to the root-cause of road traffic accidents everywhere, a report released by the Egyptian government concluded that human error accounted for 62% of road accidents. The main reason cited was a lack of vigilance, followed by excessive speed and errors in overtaking other motorists[61]. The distribution of accidents by cause in Oman, between 2005-2009, is shown in Table 10.

Table 10: Distribution of the Main Causes of Accidents in Oman (2005-2009)[62]

Causes of accidents	2005	2006	2007	2008	2009	Average
Speeding	31.72	53.06	60.62	59.31	51.62	51.27
Carelessness (Distracted)	57.90	36.97	23.80	11.55	8.48	27.74
Loss of Control	1.94	2.66	6.51	13.33	22.60	9.41
Unsafe Distance	4.48	3.55	3.05	4.74	3.31	3.83
Overtaking	1.71	1.67	2.20	5.25	5.16	3.20

An average of over 50% of accidents occurred due to violations of the speed limit. Negligence or careless driving was the second most important cause of accidents, averaging nearly 28%, followed by loss of control by the driver, at over 9%, unsafe distances, at about 3.8%, and overtaking, also over 3%.

Figure 2: Driver vs Other Causes of Accidents in Oman (2005-2009)



[61]Mada Masr, (2014). Official report blames human error for majority of traffic accidents. Available from: www.madamasr.com/news/official-report-blames-human-error-majority-traffic-accidents

[62]Mazharul I. and Ahmed Y. S., (2012). "Increased Motorization and Road Traffic Accidents in Oman"- Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 3(6), 2012, pp 907-914.

Accordingly, as Figure 2 shows, about 97% of road traffic accidents in Oman were related to driver factors. The chart in Figure 3, below, shows the top three reported errors as a percentage of all driver errors causing accidents in Oman (2005-2009).

Figure 3: Top Three Reported Errors as a Percentage of All Driver Errors Causing Accidents in Oman (2005-2009)

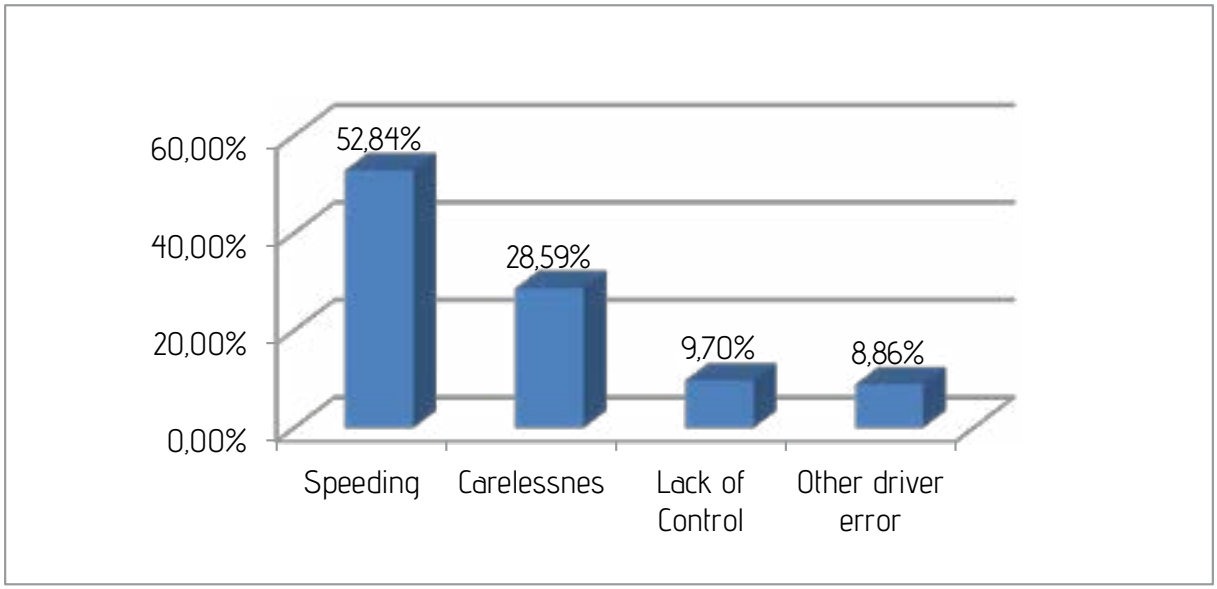


Table 11 shows the distribution of the causes of accidents in the UAE in 2000.

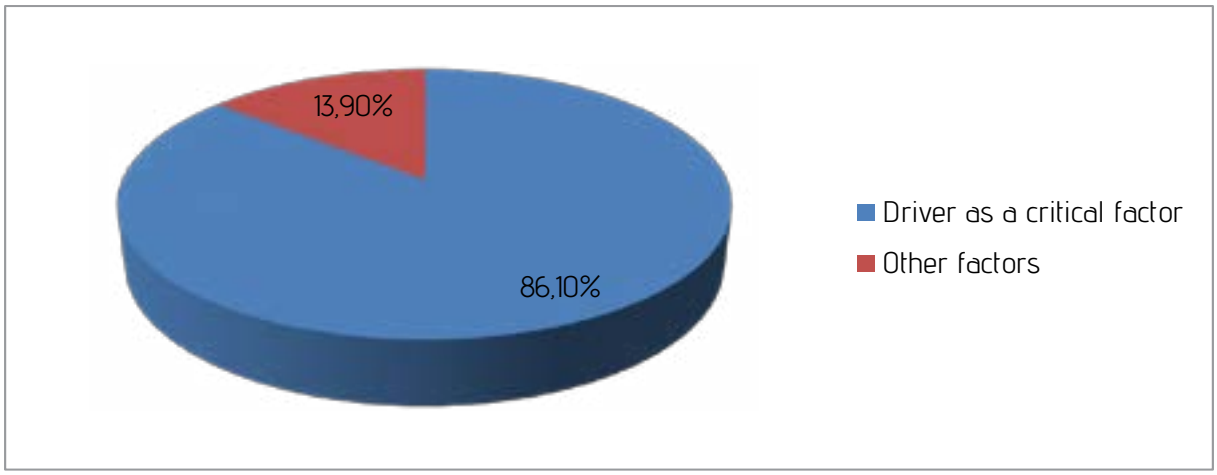
Table 11: Distribution of the Causes of Accidents in the UAE (2000)[63]

Cause of accident	Accidents		Casualties		Fatalities	
	Frequency	%	Frequency	%	Frequency	%
Carelessness (Distracted)	4,224	38.0	3,703	35.0	240	35.6
Excessive speed	1,456	13.1	2,063	19.5	181	26.9
Tailgating	711	6.4	582	5.5	11	1.7
Driving on the wrong side of the road	545	4.9	614	5.8	17	2.5
Incorrect overtaking	522	4.7	614	5.8	38	5.7
Ignoring red traffic lights	467	4.2	307	2.9	15	2.2
Drugs or alcohol	445	4.0	317	3.0	11	1.7
Not giving way to pedestrians	389	3.5	497	4.7	34	5.0
Incorrect reversing	233	2.1	254	2.4	15	2.3
Vehicle condition	211	1.9	307	2.9	34	5.1
Animals	156	1.4	42	0.4	4	0.6
Incorrect cornering	145	1.3	159	1.5	3	0.5
Using incorrect lane	67	0.6	95	0.9	13	2.0
Others	1,545	13.9	1,026	9.7	55	8.2
Total	**11,116**	**100**	**10,580**	**100**	**671**	**100**

These statistics illustrate that the largest single cause of road accidents was careless driving, contributing to more than 35.3% of all casualties and fatalities. Excessive speed ranked second, accounting for 19.5% of casualties and almost 27% of fatalities. Together, these two causes accounted for over 58% of all road traffic fatalities in the UAE.

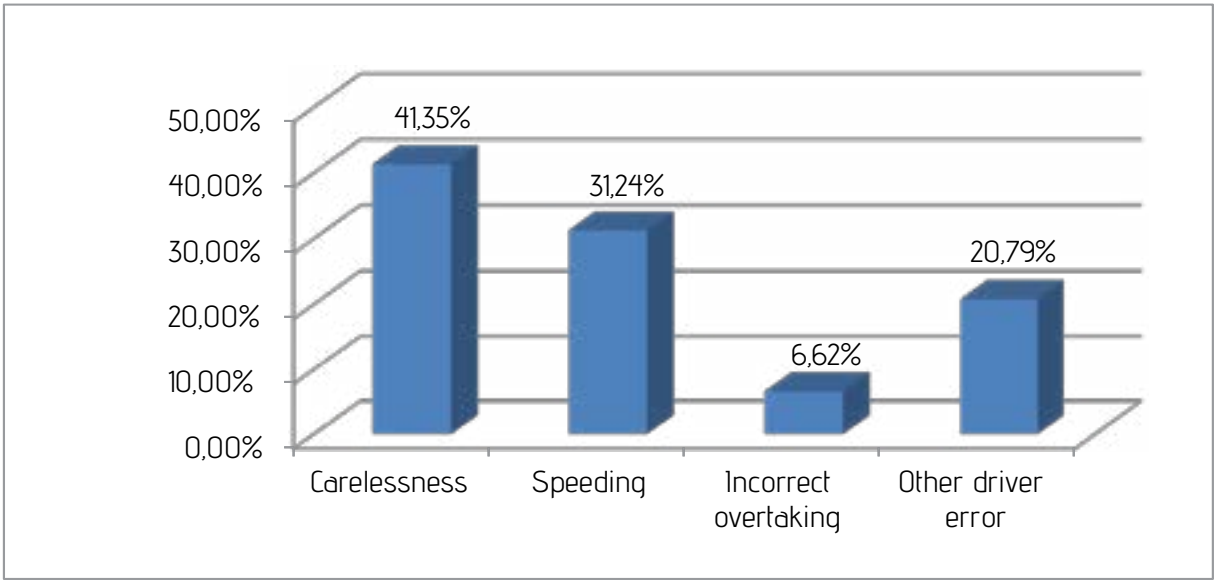
[63]Bener & D. Crundall, (2005). "Road traffic accidents in the United Arab Emirates compared to Western countries", Advances in transportation studies an international journal section A 6, 2005.

Figure 4: Driver vs Other Causes of Accidents in the UAE (2000)



As Figure 4 shows, accidents related to driver error, behaviour and skills represented 86.10% of all accident causes in the UAE in 2000. The chart in Figure 5, below, shows the top three reported errors as a percentage of all the driver errors which caused accidents in the UAE in 2000.

Figure 5: Top Three Reported Errors as a Percentage of All Driver Errors Causing Accidents in the UAE (2000)



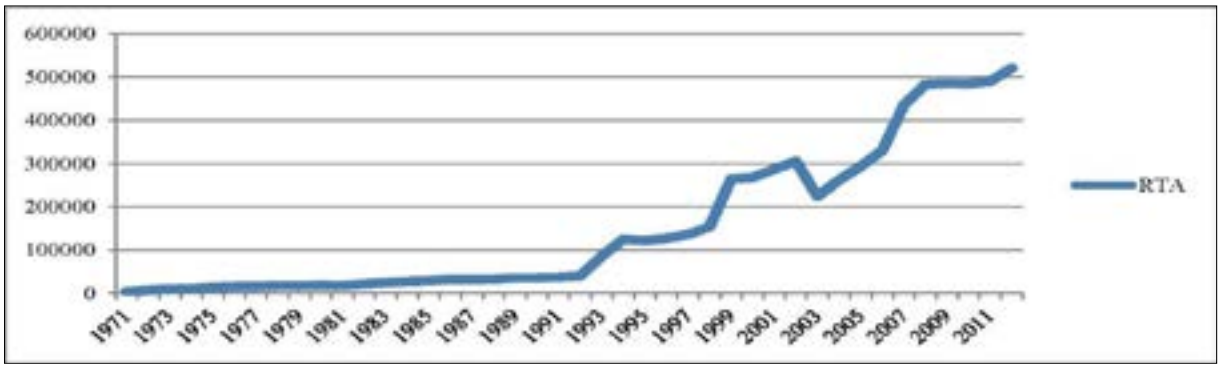
In 2010, the UAE's Department of Economic Development reported 116,487 road traffic accidents in 2009 – an average of 320 accidents per day, or one every 4.5 minutes. Of these, 81.1% were caused by human error, mostly due to drivers handling electronic devices while driving[64]. However, according to statistics published by the Ministry of Interior Affairs, in 2011, only 41% of road traffic crashes in the UAE were related to driver error[65].

[64]Department of Economic Development, (2010). "Causes of high traffic accidents in the Emirate of Abu Dhabi". Available from: www.ded.abudhabi.ae/en/studies-indicators/Studies/The%20Causes%20of%20High%20Traffic%20Accidents%20in%20the%20Emirate%20of%20Abu%20D.pdf

[65]Abdulla Hammoudi et al., (2014). "Road Traffic Accidents among Drivers in Abu Dhabi, United Arab Emirates" – Journal of traffic and logistics engineering Vol. 2, No. 1, March 2014.

This remarkable reduction in the percentage of human errors as a critical factor in causing road traffic accidents was due to the application of tougher measures dealing with licensing.

Figure 6: The Trend in Road Traffic Accident Numbers in Saudi Arabia, 1971-2012[66]



The vast socio-economic improvements and population growth in Saudi Arabia have contributed to high numbers of cars on the roads. This in turn has resulted in a gradual increase in the total number of road traffic accidents causing high numbers of injuries, disabilities and deaths from 1971-2012 in the Kingdom (Figure 6). However, 80% of traffic accidents in Saudi Arabia remain human related, with nearly 70% of accidents attributed to speeding or a failure to obey road traffic signals[66].

A 2009 study investigating road traffic accidents in Jordan[67] highlighted the different causes from 2005-2007. These are listed in Table 12, below.

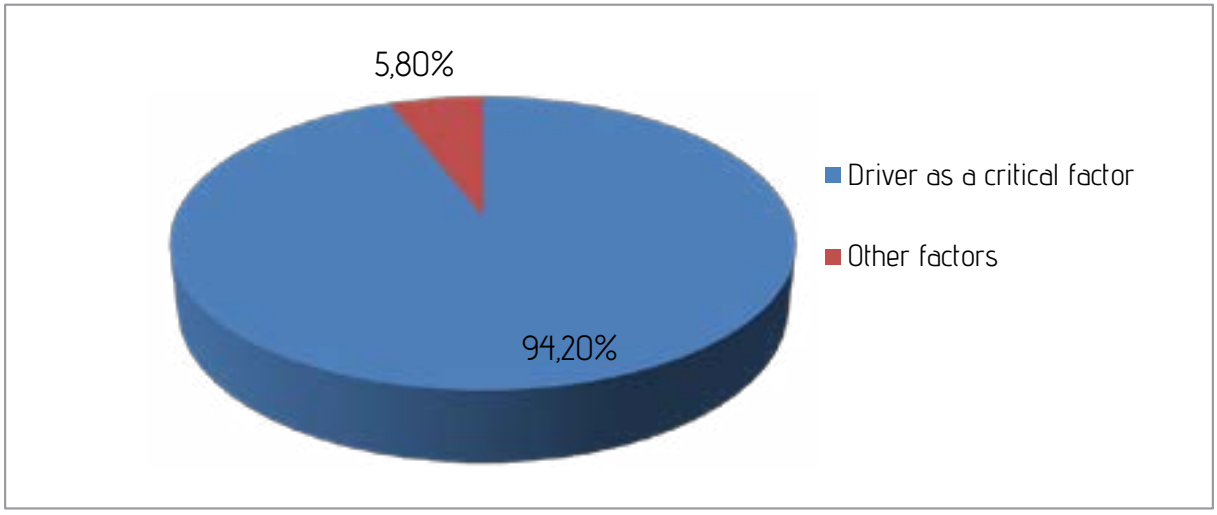
Table 12: Causes of Traffic Accidents in Jordan (2005-2007)

Cause	Percentage
Carelessness (distracted drivers)	22.5%
Following too closely or tailgating	17.0%
Disregarding traffic priority	14.6%
Using incorrect lane	14.1%
Incorrect cornering	10.5%
Incorrect reversing	9.2%
Disregarding traffic signs	2.8%
Excessive speed	1.5%
Not giving way to pedestrians	1.2%
Incorrect overtaking	0.8%
Wrong turn	0.7%
Others	5.1%

[66]Mohammed M. A. & Amal M. Z.: "Road traffic accidents in Saudi Arabia."

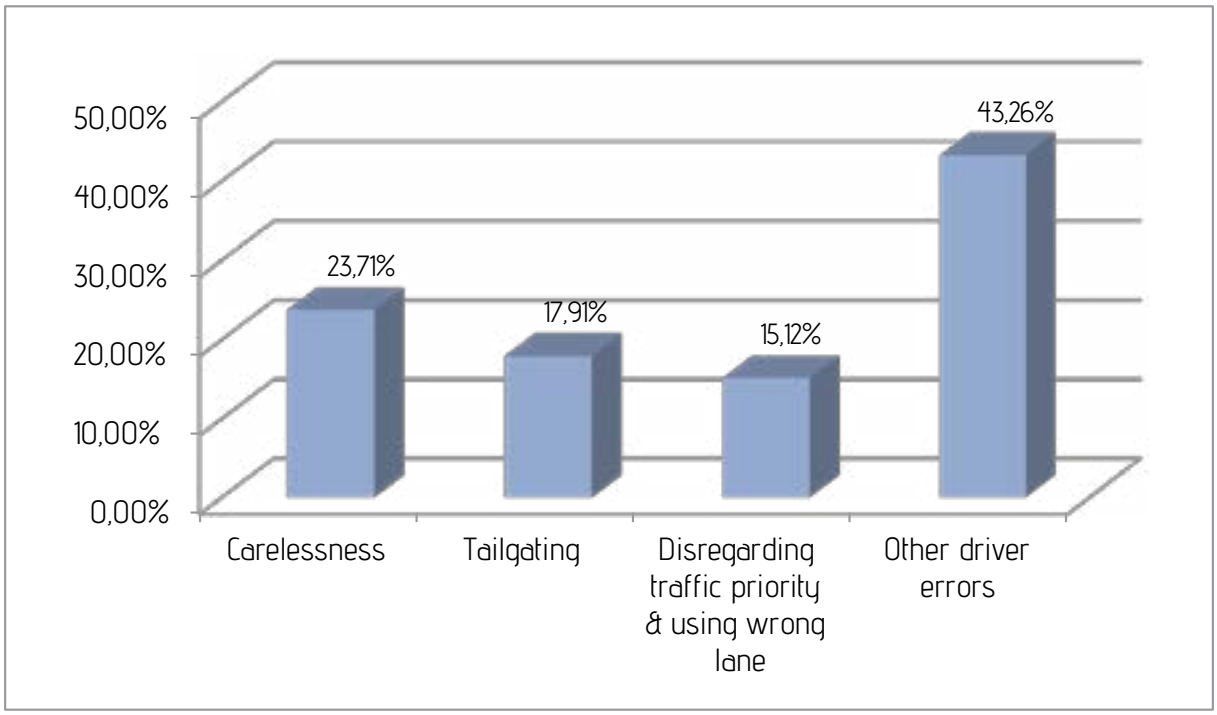
[67]Hashem R. Al-Masaeid, (2009). "Traffic Accidents in Jordan"- Jordan journal of civil engineering, Volume 3, No. 4, 2009.

Figure 7: Driver vs Other Causes of Accidents in Jordan (2005-2007)



As Figure 7 shows, driver errors (bad driving behaviour and poor skills) were the major factors in 94.20% of road traffic accidents in Jordan from 2005-2007. The chart in Figure 8, below, shows the top three reported driver errors as a percentage of all driver errors causing accidents in Jordan (2005-2007).

Figure 8: Top Three Reported Errors as a Percentage of All Driver Errors Causing Accidents in Jordan (2005-2007)



The charts in Figures 2, 4 and 7 lead us to conclude that, in most cases, the driver is the critical factor in causing accidents, well ahead of other factors such as the vehicle, poor roads or the weather.

Driver error accounted for 97.02% of RTCs in Oman (2005-2009), 86.10% in the UAE (2000) and 94.20% in Jordan (2005-2007). The variance between these three countries can mainly be attributed to differences in the requirements for obtaining a driver's licence, as these are the toughest in UAE. Also, the high standard of living in Oman allows young people to drive high-performance cars, whereas unskilled drivers cannot deal with the bad weather conditions of winter in Jordan.

Assuming that there are no drastic differences in the types of driver errors between truck drivers and car drivers[27], Figures 3, 5 and 8 reveal, we could conclude that the top three truck driver errors in Oman (2005-2009) were speeding, carelessness, and loss of control, that in the UAE (2000) they were carelessness, speeding, and incorrect overtaking, and that in Jordan (2005-2009) they were carelessness, tailgating and not giving way and using wrong lane. Clearly driver errors are by far the largest single source of road traffic accidents.

2.3.3 Proportion of Truck Crashes Caused by Truck Drivers

Heavy goods vehicles (HGVs) cause 40% of RTCs in Egypt[68], and 13.8% in Oman (2009-2011)[69]. According to figures released by the WHO in 2013, 9% of road deaths in the UAE were caused by heavy trucks[70], and 11% of all road traffic accidents in Abu Dhabi are caused by heavy vehicles[71].

Furthermore, according to Issa and Ratrout23, commercial truck accidents in Saudi Arabia resulted in 107 deaths in 2009, and the number of accidents affected 73,000 drivers that year. It has also been confirmed that commercial trucks were involved in almost 11% of all accidents in Saudi Arabia over the last decade.

Table 13, below, compares truck accidents against all accidents in Saudi Arabia in terms of severity, as mentioned in the Ministry of the Interior's 2010 Statistical Report for Traffic Accidents. It shows that the number and percentage of deaths and injuries per truck accident are much higher than those caused by all vehicle accidents. This clearly indicates the high risk posed by heavy vehicle accidents and their relevant losses in Saudi Arabia.

[68]Ahramonline,(2014). Lost highway: Death on the road in Egypt. Available from: www.english.ahram.org.eg/NewsContentPrint/1/0/99583/Egypt/0/Lost-highway-Death-on-the-road-in-Egypt.aspx

[69]Islam Al-Bulush et al., (2015). "Heavy Vehicle Crash Characteristics in Oman 2009-2011." Available from: www.ncbi.nlm.nih.gov/pmc/articles/PMC4450781/

[70]Construction Week Online, (2014). Available from: www.constructionweekonline.com/article-29136-road-to-regulation-improving-gcc-highway-safety/

[71]Gulf News, (2016). 11% of all road traffic accidents in Abu Dhabi caused by heavy vehicles. Available from: www.gulfnews.com/news/uae/thick-fog-leads-to-114-vehicle-pile-up-20-hurt-on-abu-dhabi-dubai-road-1.1438511

Table 13: Comparison between Truck Accidents and All Accident in the KSA, in terms of Severity

Accident Severity	Truck Accidents	Accidents Involving all Types of Vehicles
Property damage only	22%	94%
Injuries and deaths	78%	6%

2.3.4 Top Causes of Truck Crashes Caused by Truck Drivers

From research presented earlier in this study, it was shown that the top driver errors within the Arab region were carelessness (distracted driving), speeding, and one or more types of improper driving behaviour, such as tailgating, poor lane discipline or not indicating when overtaking other vehicles.

2.4 Conclusions

1. The estimated socio-economic costs resulting from road crashes cause a significant loss of wealth within the Arab region.
2. Regional studies seem to be consistent with the results of international ones regarding the following issues:
   - Human error is the main cause of RTCs.
   - A significant proportion of truck crashes is attributable to truck drivers.
   - Truck crashes have almost the same top causes as other vehicle crashes.
3. Issa and Ratrout's2 study of traffic safety in the commercial truck industry in Saudi Arabia found the following results:
   - About 19% of truck drivers interviewed were poorly educated: around 29% could read and understand Arabic words, and around 23% could read and understand English words. The study also showed that driver training and education in Saudi Arabia, and in many Gulf region countries, was having a very limited impact on improving driving skills in this vital sector due to inadequate training systems and driving school programmes.
   - Most of the driving schools in the region have not contributed to increasing students' driving knowledge,
   - No special training is given to heavy vehicle drivers.
4. Road safety has become an issue of increasing concern to civil societies and governments in the Arab region, however, available data show that road casualties, whether injuries or fatalities, are still having a dangerously high impact in the Arab region. Further research is therefore required to better understand the major causes of heavy vehicle crashes within the region. Such research is also important to provide further evidence of the impact of professional training on the Arab region's commercial/ freight transport sector.

CHAPTER 3

3. DATA ANALYSIS AND RESULTS

3.1 Case Study Company Profiles

As mentioned in the methodology section, this study adopted a mixed methods technique to collect both quantitative and qualitative data from a sample of 32 case study companies operating in the Arab region. The main data sources were the questionnaires used to collect input from commercial truck drivers and semi-structured interviews used to solicit input from key commercial transport managers. It took our teams five weeks to fill in questionnaires and conduct interviews. The Case Study Companies' names and the data sources are shown in Table 14.

Table 14: Sources of Case Study Data

Country	Company	No. of Interviews	No. of Questionnaires
United Arab Emirates	(1) ARABTEC CONSTRUCTION L.L.C (2) EMARAT (Emirates General Petroleum Corporation) (3) ASCON ROAD CONSTRUCTION L.L.C (4) FUJAIRAH FEED FACTORY (5) ENOC/EPPCO (Emirates National Oil Company) (6) KHYBER LAND Transport by Heavy and Light Trucks LLC	3	21
Saudi Arabia	(7) Almajdouie Transport (8) Waraq (Arab Paper Mfg. Co.) (9) Al Rajhi Transport (10) GASCO (11) Al Marai (12) Al Saif Transport (13) Al Dawaa Pharmacies Ltd. (14) Bakhashab Transport (15) Almajdouie De Rijke (MDR) (16) Al Rajihi Logistics (17) Al Shammari Transportation (18) Solayhem Al Hajiri Transportation	9	50
Qatar	(19) Bin Omran Trading & Contracting (20) Midmac Trading & Contracting (21) Redco Intl. WLL (22) TEKFEN Constructions (23) AAMAL Contracting	1	10

Bahrain	(24) Al Arrayed Logistics WLL (25) Al Wardi Transport (26) Al Faisal Logistics & Transport WLL	2	13
Egypt	(27) BOSLA Logistics (28) Egyptian Drilling Company (29) ExxonMobil Egypt (30) Gulf Cryo Egypt (31) Road Master	5	42
Jordan	(32) Transport & Investment Barter Company	1	10
Total	**32**	**21**	**146**

A questionnaire study alone is not considered sufficient to explain real-life contexts adequately[73]. Given the context of commercial transport operations, the views and experiences of transport managers were vital for providing valid and relevant findings: 21 semi-structured interviews were conducted with experienced transport managers from case study companies. The results of the analysis of the data are presented in the sections below.

a. Size of Operating Fleets

Of the sample of thirty-two case study companies selected, only about 28% (9 companies) had some outsourced commercial vehicles in their fleets; the remaining companies owned all their vehicles. Some 38% had small fleets of 100 commercial vehicles or fewer; 5% had medium-sized fleets (101-300); 14% had relatively large fleets (301-500); 19% had large fleets (501-1,000); and the remaining 24% had very large fleets of more than 1,000 commercial vehicles, as shown in Table 15.

Table 15: Fleet Size Distribution across Case Study Companies

Fleet Size (No. of Commercial Vehicles)	Companies in each size range
More than 1,000	23.80%
501-1000	19.05%
301-500	14.28%
101-300	4.77%
100 or fewer	38.10%
Total	**100%**

[73]Taylor, S. J., and R. Bogdan., (1984). Introduction to Qualitative Research Methods: The Search for Meaning. New York: John Wiley.

Thus, 43% of case study companies were classified as larger-sized commercial transport companies. Larger commercial fleets usually plan to train their drivers and use telematics to reduce operating expenses more directly by cutting down on measurable business expenses. Larger fleets also already have programmes in place to maximise efficient routing, schedule vehicle maintenance and accurately bill payroll, as these issues have to be addressed as a fleet business expands. It is likely that small- and medium-sized commercial companies are less keen on implementing training programmes and investing in advanced technologies to manage their fleets than large fleet companies are.

b. Annual Total Distance Travelled by Fleets

Each case study company's profile was analysed to identify the annual total distance travelled by its fleet. The majority (63%) of the thirty-two companies travelled an annual total distance of 1-10 million km; 20% of truck companies travelled an annual total distance of 51-70 million km; and only 7% of fleets travelled a total distance of more than 70 million km per year. The remaining 10% of companies travelled an annual total distance from 11-50 million km. Table 16 shows the detailed distribution of annual total distances travelled by the case study companies.

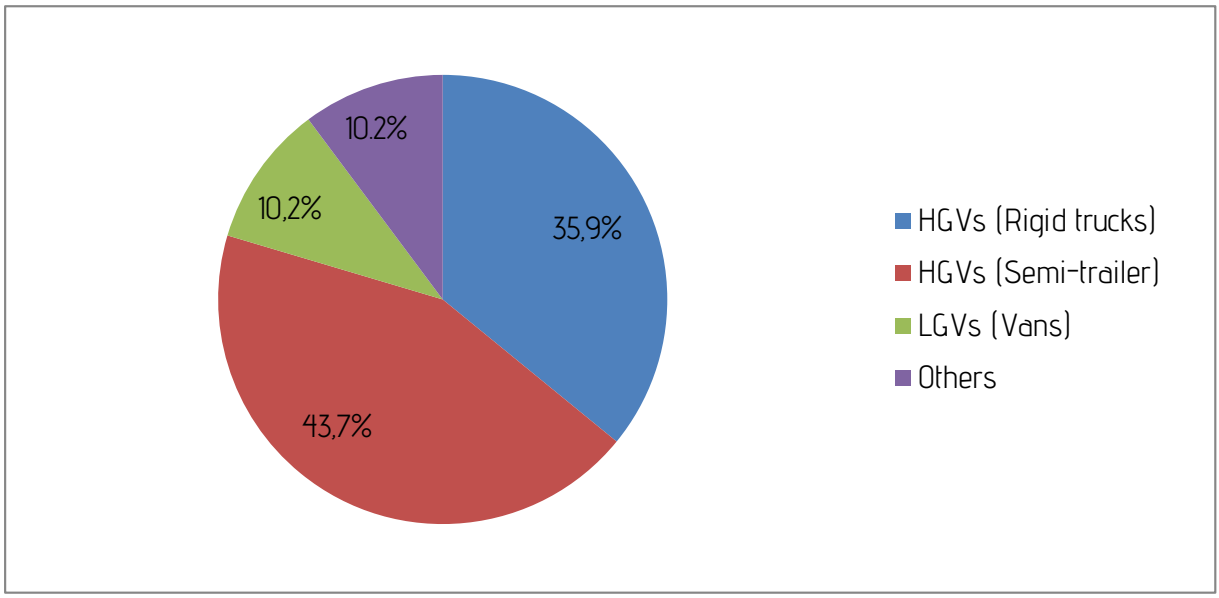
Table 16: Average Annual Total Distance Travelled by Fleets

Table 16: Average Annual Total Distance Travelled by Fleets	Companies in each size range
More than 1,000	23.80%
501-1000	19.05%
301-500	14.28%
101-300	4.77%
100 or fewer	38.10%
Total	**100%**

c. Types of Commercial Vehicles in Fleet Operations

At the time of the study, case study companies were found to be operating three main types of vehicles. These could be categorised as HGV rigid trucks, HGV semi-trailers, and Light Goods Vehicles (LGVs) such as vans. Other types were also reported, such as pickup trucks. Figure 9 shows the distribution of the commercial vehicles types in use.

Figure 9: Distribution of the Commercial Vehicles Types in Operation



HGVs constituted the vast majority (79.6%) of the commercial vehicles used by the case study companies. It is widely accepted that road accidents involving HGVs tend to be more serious than other road accidents because of the large mass and size of these vehicles. Certified professional training programmes allow the acquired right to drive HGVs safely, thus reducing the frequency and impact of road accidents involving HGVs on other more vulnerable road users28.

d. Types of Cargo Transported by Case Study Companies

As Table 17 shows, below, 12.50% of case study companies used their fleets to transport hazardous cargo, 34.38% transported non-hazardous cargo, and 53.12% transport both types.

Table 17: Distribution of Types of Cargo Transported

Type of cargo transported	Frequency	Percentage
Both	17	53.12%
Non-hazardous	11	34.38%
Hazardous	4	12.50%
Total	**32**	**100.0%**

Almost 66% of case study companies transported some hazardous cargo. Commercial drivers of hazardous materials should receive professional training to reduce the likelihood of an accident taking place, to allow them to take all the necessary measures for their own safety and that of the public, and to limit any effects on the environment were an accident to occur. However, as shown in section 3.10.5, below, 30% of the drivers transporting hazardous cargoes had received no related training.

3.2 Vehicle Involvement Rate in Road Accidents

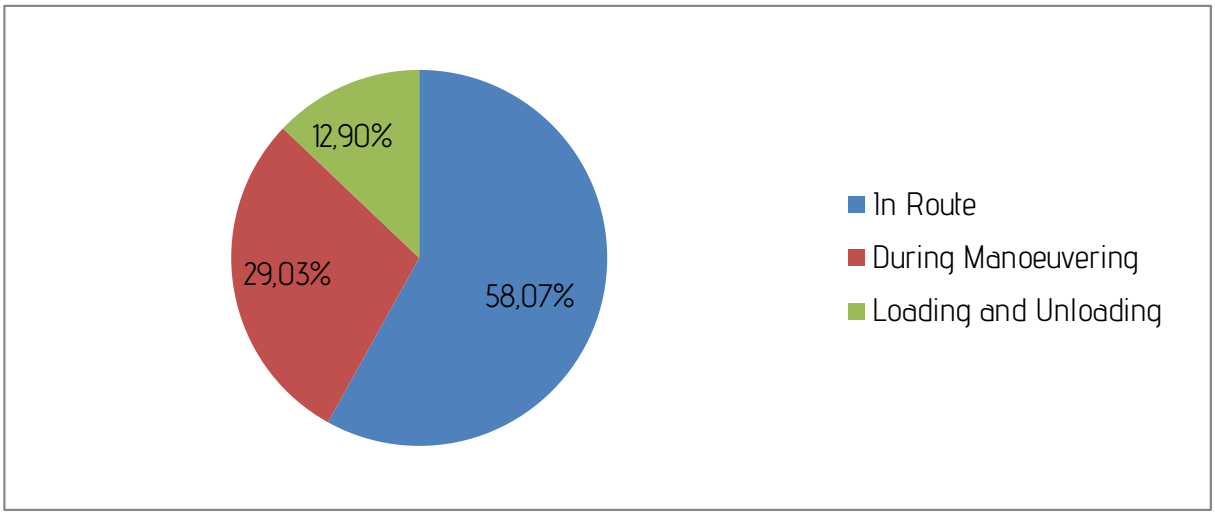
For the purposes of this study and in order to assess the impact of professional training on commercial transport drivers in terms improved road safety, it was important to identify some indicators about road accidents. Only 20 out of the 32 case study companies kept records about their vehicles' road accidents; the other companies maintained none. All 20 companies asserted that they were able to reduce their annual road accident rate, calculated as accidents per 1 million vehicle kilometres, as a result of implementing professional training programmes for their drivers. The definition of road accident used and understood by these companies included any occurrence involving one or more commercial vehicles resulting in an injury, disability or fatality or major damage to a vehicle or the goods transported. This definition also included minor damage involving smashing a mirror, bumpers or tyres while manoeuvring. Additionally, real data on how the number of road accidents had evolved over the last few years were provided as well. Results showed that five out of the 20 companies (25%) had a road accident rate of fewer than 10 accidents per 1 million vehicle kilometres; six companies (30%) had road accident rates in the range of 11-30 accidents; two companies (10%) had road accident rates in the range of 31-60; four companies (20%) had rates in the range of 61-100; and the remaining three companies (15%) had rates over 100. Table 18 illustrates the current ranges of road accident rates in the case study companies which maintained records on their fleets.

Table 18: Road Accident Rates in Case Study Companies Maintaining Records

No. of Accidents (major and minor)/million kilometres	No. of companies	% of companies
1-10	5	25%
11-30	6	30%
31-60	2	10%
61-100	4	20%
More than 100	3	15%
Total	**20**	**100%**

unloading activities (13%). Figure 12, below, shows the main places for commercial road accidents in case study companies maintaining records.

Figure 10: Main Places for Commercial Road Accidents



Speed is among the most prominent en route issues relating to commercial vehicle safety. Excessive speed in curves, or going beyond the road's design speed, is a major cause of vehicle accidents en route[23]. As Figure 9 shows, almost 80% of commercial vehicles owned by case study companies are HGVs. Because of their operational limitations, particularly longer stopping distances, lower en route speeds limits for HGVs may be appropriate to reduce road accident rates.

3.3 Transport Managers' Interview Results

Once data were collected from each case study company, all the interviews were transcribed exactly. Transport managers were asked a diverse set of questions (see Appendix 1) in order to fully explore contextual factors and to conduct an accurate assessment of the impact of professional training on commercial transport drivers in terms of improvements to road safety, enhancement of professional drivers' skills and contributions to company efficiency gains. Interviews were analysed using the thematic analysis approach[74]. This approach has the benefit of maintaining a high level of understanding of the themes/patterns produced, due to the close interaction of researchers with the aggregated data[75]. However, it should be mentioned that it was impossible to conduct interviews with transport managers in all the case study companies due to their unavailability when investigators visited. Annual holidays, geographical considerations and busy schedules meant that not every potential respondent was interviewed. The 21 interviews conducted were deemed an appropriate number as no significant supplementary information was expected from further interviews. The number of interviews used in this study was validated by

[74]Attride-Stirling, J., (2001). "Thematic networks: an analytic tool for qualitative research", Qualitative Research, Vol.1 No.3, pp.385-405.

[75]Easterby-Smith, M., Thorpe, R. & Lowe, A., (2002). Management Research: An introduction, Second Ed., Sage Publications, London.

McCracken[76], who stated that eight interviewees are needed in order to produce perceptive themes from interviews.

3.3.1 Demographics of Transport Managers Interviewed

a) Transport Managers' Experience in Managing Commercial Fleets

Table 19, below, shows that about 29% of transport managers interviewed had fewer than 10 years of experience; 52% had 10-20 years of experience; 14% had 21-30 years of experience; and 5% had over 30 years' experience in supervising and managing commercial fleets.

Table 19: Distribution of Respondents' Years of Experience

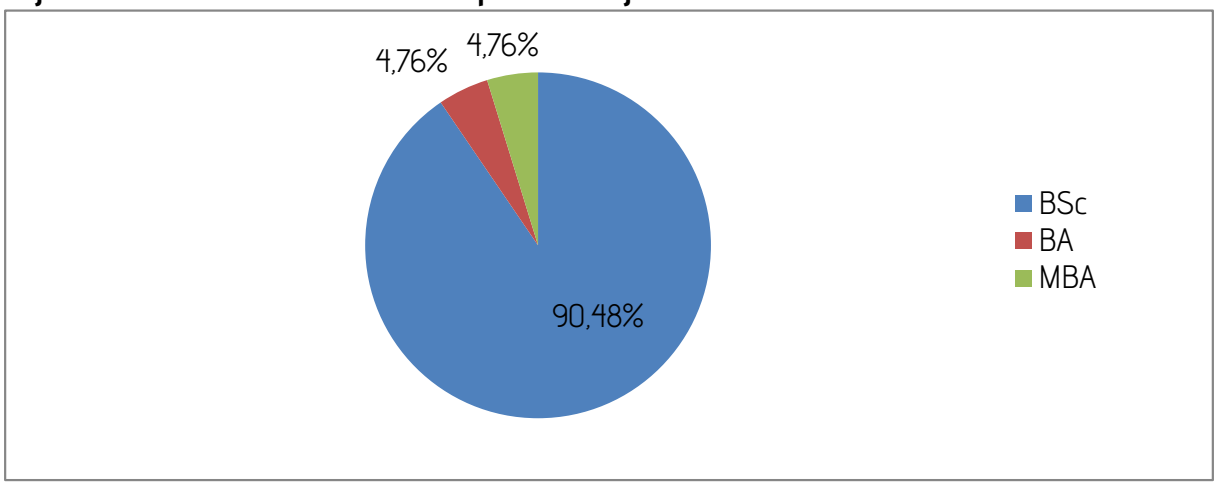
Years of Experience	Percentage	Cumulative Percentage
More than 30	4.76%	4.76%
21-30	14.29%	19.05%
10-20	52.38%	71.43%
Less than 10	28.57%	100.0%
Total	**100.0%**	

Commercial truck operations run by highly experienced transport managers, like those in the case study companies, will be better planned and coordinated. Transport managers also make sure that drivers are properly equipped for getting goods to their destinations safely. Transport managers need to be able to work with people at all levels and meet deadlines.

b) Educational Level of Transport Managers

Figure 11, below, shows the highest educational grade/qualification obtained by the transport managers interviewed in the case study companies: about 90% held a Bachelor of Science (BSc) degree in logistics or related disciplines; 5% held a Bachelor of Arts (BA) degree; and 5% had an MBA.

Figure 11: Educational Level of Transport Managers Interviewed



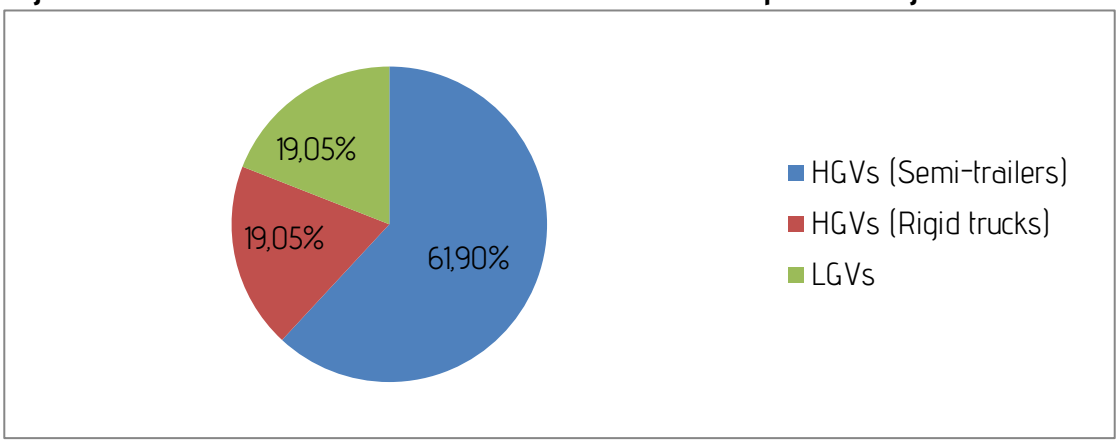
[76]McCracken, G.D., (1988). The Long Interview, Sage Publications, Newbury Park, CA.

These results suggest that the majority of transport managers in case study companies do indeed possess the required level of education. A transport manager's position usually requires a university degree in business administration, transportation administration, engineering or any related field. This type of qualification allows transport managers to plan, organise and manage a transportation department's operations.

c) The Nature of a Transport Manager's Business

Figure 14, below, shows that about 62% of transport managers were involved in managing and supervising operations related to semi-trailer HGVs; 19% managed HGV rigid trucks; and the remaining 19% were involved in working with LGVs.

Figure 12: Distribution of the Nature of Business of Transport Managers



This result was consistent with the types of commercial vehicles used in fleet operations (see section 3.1). Of the transport managers in this study, 80% were involved in managing HGV operations. As mentioned earlier, managing and directing HGVs is a challenge for transport managers due to higher potential impacts of these vehicles on other road users should an accident occur. Qualified drivers must be assigned for driving this type of vehicle. Transport managers have to be able to direct drivers' activities in relation to HGV operations, including dispatching, routing and tracking such vehicles.

d) Seniority in Case Study Companies

The number of years worked by transport managers in the case study companies was significant enough to collect reliable data about current driver training programmes and the systems used in these companies. Table 20 shows that about 38% of managers had been working in case study companies for 1-5 years; 33% for 6-10 years; 9.5% for 11-15 years; 9.5% for 16-20 years; and the remaining 9.5% had been working for 21-25 years.

Table 20: Distribution of years of service at the Case Study Company

Years	Percentage	Cumulative Percentage
21-25	9.52%	9.52%
16-20	9.52%	19.04%
11-15	9.52%	28.56%
6-10	33.34%	61.90%
1-5	38.10%	100.0%
Total	**100%**	

These results suggested that the majority of transport managers had very significant work experience in the companies included in this study. Several years of seniority usually indicated that these managers had extensive experience as fleet managers and logistics analysts.

3.2.2 Top 10 Causes of Accidents Involving Commercial Drivers

The first theme worthy of special attention was the top 10 causes of accidents involving the case study companies' commercial drivers. The data are given in descending order in Table 21, below. Speeding and loss of control in bends, unsafe lane changes and non-observance of traffic rules were the factors contributing most to those road traffic accidents. Distracted driving, drowsiness, reckless driving and improper cargo lashing are also factors which significantly contributed to accidents.

Table 21: Distribution of Accident Causes according to Transport Managers

Order	Accident Causes	Frequency	Percentage
1	Speeding and loss of control in bends	16	12.7%
2	Unsafe lane changes	15	11.9%
3	Non-observance of traffic rules	12	9.5%
4	Distracted driving, cell phone use and texting	11	8.7%
5	Drowsy and reckless driving	10	7.9%
6	Incorrectly secured cargo	10	7.9%
7	Tyre blowouts	8	6.3%
8	Improper signposting of road construction zones	8	6.3%
9	Impatience and tailgating	7	5.6%
10	Poor weather conditions	7	5.6%
11	Defective vehicle parts: brakes, air bags, etc.	7	5.6%
12	Avoiding low gears to slow down	6	4.8%
13	Alcohol and drug-impaired driving	3	2.4%
14	Road construction defects	3	2.4%
15	Other drivers' mistakes, especially young or novice drivers	2	1.6%
16	Animal crossings	1	0.8%
	Total	**126**	**100.0%**

Speeding and loss of control in bends were found to be the most important causes of crashes. This can be explained by the fact that commercial trucks are more difficult to manoeuver than smaller vehicles; at higher speeds, drivers of these vehicles face a higher risk of losing control. This can also be a contributing factor in a higher risk of rollover. Speeding commercial trucks in bends generate lateral acceleration; when critical lateral acceleration levels are reached, the inner wheels lift and a rollover occurs[16]. Unsafe lane changes were the second most important cause of crashes. These are usually caused by commercial drivers not allowing sufficient gaps or clearance between vehicles when changing lane, or not ensuring an adequate field of vision before attempting a lane change.

More importantly, these results show that the driver errors and incorrect driving behaviours were the cause of 76.4% of road traffic accidents concerning commercial drivers.

3.4 Measures, Policies and Practices Implemented by Case Study Companies to Prevent/Minimise Road Accidents

a) Measures Related to Professional Training

Case study companies had implemented a number of internal organisational measures to control road traffic accidents involving their commercial drivers. Table 22, below, shows that about 76% of them had regularly used Tool Box safety talks for their drivers; this was the most common measure used by these companies to raise drivers' safety awareness. Furthermore, induction, refresher and other training programmes and tests were the second most frequent measure, used by about 62% of companies.

A company driver's manual was provided by 47.61% of companies. Finally, 42.85% of case study companies communicated the causes and effects of road traffic accidents to other commercial drivers as part of a lessons-learnt scheme.

Table 22: Distribution of Measures related to Professional Training

Measures related to Professional Training	Percentage
Regular Tool Box safety tips	76.19%
Driver performance through induction, refresher and further training programmes	61.9%
Training tests	61.9%
Provision of the company driver's manual	47.61%
Top-down communication of the causes and effects of accidents	42.89%

Although results showed that regular Tool Box safety talks were the most commonly used professional training measure at case study companies, careful attention should be paid to managing and planning these talks to maintain effectiveness and safety awareness among commercial drivers. Tool Box talks aim to raise commercial drivers' safety consciousness by drawing attention to any current or emerging work-related hazards and risks and thereby bringing about behavioural change in their driving. One problem for transport managers to avoid is repeating routine ideas with ineffective presentation materials: Tool Box talks can become stale. However, the demand for highly skilled truck drivers and the trucking industry's poor driver-retention rate in some industry segments, places increasing significance on the quality of commercial driver training programmes[47]. This also explains the importance of training tests at the commercial transport companies included in this study.

Professional training has been found to be one of the most effective methods for improving driving skills, and this finding is widely accepted by the general public. This implies that the more commercial transport operators invest in measures related to professional training, the better their drivers' safety records become. To test this relationship, the Pearson correlation coefficient (r) was calculated to determine whether there was a causal relationship between the number of measures related to professional training provided by the commercial transport operators in the present study and their respective average numbers of reported accidents per 1 million kilometres. For example, the number of reported accidents per 1 million kilometres for transport operators which only provided one measure related to professional training was averaged, and so on. The number of measures related to professional training was the independent variable (X) and the average number of reported accidents per 1 million kilometres was the dependant variable (Y). Calculations are shown in Table 23, below.

Table 23: Pearson Correlation Coefficient Calculation to Determine Causal Relationships between Professional Training Measures and Commercial Truck Accidents.

Number of measures related to professional training (X)	Average no. of reported accidents per 1 million kilometres (Y)	X - Mx	Y - My	(X - Mx)2	(Y - My)2	(X - Mx)(Y - My)
1	3.16	-2.00	0.480	4.000	0.230	-0.960
2	2.64	-1.00	-0.040	1.000	0.002	-0.040
3	3.77	0.00	1.090	0.000	1.188	0.000
4	1.58	1.00	-1.100	1.000	1.210	-1.100
5	2.25	2.00	-0.430	4.000	0.185	-0.860
		Mx: 3.00	My: 2.68	Sum: 10.0	Sum: 2.815	Sum: -2.880

R Calculation
$r = \sum((X - My)(Y - Mx)) / \sqrt{((SSx)(SSy))}$

$r = -2.88 / \sqrt{((10)(2.815))} = -0.5428$

The resulting Pearson correlation coefficient calculation showed that the value of r was -0.5428. This is a moderate negative correlation, meaning that there was a tendency for higher numbers of measures related to professional training provided by case study companies (X) to go with a lower average number of reported accidents per 1 million kilometres (Y) (and vice versa).

b) Performance Monitoring Measures

Table 24, below, shows that the case study companies employed various kinds of initiatives for monitoring the performance of their commercial drivers. As a best practice, receiving and using comments from the public to observe drivers' safety-critical behaviours was the most commonly used measure, at about 57% of companies. This was followed by periodic driver skills assessments/checks, at 52%. In-Vehicle Monitoring System (IVMS) technologies and ride-along (monitoring) to observe drivers' safety-critical behaviours were used at rates of 52% and 48%, respectively. Formal review programmes for driver qualification and random drug/alcohol tests were also used at 38% and 29% of companies, respectively.

Table 24: Distribution of Performance Monitoring Measures

Professional Training Measures	Percentage
Receiving and using comments from the public to observe drivers' safety-critical behaviours	57.14%
Periodic driver skills assessments/checks	52.38%
In-Vehicle Monitoring Systems (IVMS)	52.38%
Ride-along (monitoring) to observe drivers' safety-critical behaviours	47.62%
Formal review programmes for driver qualification	38.09%
Random drug/alcohol tests	28.57%

Receiving and using comments from the public to observe drivers' unsafe behaviour was and use that to offer drivers positive feedback was an important safety enhancement measure. Data from the public's telephone calls or text messages is integrated into drivers' profiles with data on accidents, traffic violations and other measurements of their behaviour. Transport managers can then target improper driving behaviour, lowering driver risk and reducing accidents and violations. Periodic driver skills assessments are necessary to ensure the safe operation of basic vehicle controls and drivers' hazard perception capabilities. They also form a part of commercial drivers' continuing professional development. Training is conducted throughout the professional commercial driver's career, no matter how frequently they drive. Continuity in the application of different performance monitoring measures at case study companies is expected to boost the positive effects of the culture of safety they are trying to instil. The Pearson correlation coefficient was also used here to measure the strength of the correlation between the number of performance monitoring measures used in case study companies and the average number of reported commercial truck accidents. The number of reported accidents per 1 million kilometres for commercial transport operators who used one, two, three, etc. performance monitoring measures was averaged. The number of performance monitoring measures was the independent variable (X); the average number of reported accidents per 1 million kilometres was the dependant variable (Y). Calculations are shown in Table 25, below.

Table 25: Pearson Correlation Coefficient Calculation to Measure the Strength of Association between Numbers of Performance Monitoring Measures and Commercial Truck Accidents.

Number of performance monitoring measures (X)	Average no. of accidents reported per 1 million kilometres (Y)	X - Mx	Y - My	(X - Mx)2	(Y - My)2	(X - Mx)(Y - My)
1	3.5	2.500	0.817	6.25	0.667	-2.042
2	4.9	-1.5	2.217	2.25	4.914	-3.325
3	1.8	-0.5	-0.883	0.25	0.780	0.442
4	1.3	0.5	-1.383	0.25	1.914	-0.692
5	2.6	1.5	-0.083	2.25	0.007	-0.125
6	2	2.5	-0.683	6.25	0.467	-1.708
		Mx: 3.50	My: 2.68	Sum: 17.50	Sum: 8.74	Sum: -7.45

R Calculation

$r = \sum((X - My)(Y - Mx)) / \sqrt{((SSx)(SSy))}$

$r = -7.45 / \sqrt{((17.5)(8.748))} = -0.6021$

The Pearson correlation coefficient, r, is -0.6021. This is a moderate negative correlation, meaning there was an association between higher numbers of performance monitoring measures used by case study companies (X) and lower average numbers of reported accidents per 1 million kilometres (Y), and vice versa.

3.5 Professionalism among Commercial Drivers: Weaknesses Identified

This section aims to identify the main reasons why transport managers perceive a lack of professionalism among their commercial drivers. Table 26 summarises the coding framework devised for the interviews and transport managers' perceived reasons behind the lack of high levels of professionalism among the commercial drivers in case study companies.

Table 26: Reasons behind the Lack of High Levels of Professionalism among Commercial Drivers

Codes	Reasons identified	Theme
• Education • Training • Background • Culture • Foreign drivers	• Commercial drivers lack adequate educational levels. • Commercial drivers' backgrounds do not encourage a culture of safety compliance. • Commercial drivers' lack of knowledge and awareness about safety. • Commercial drivers come from places with different traffic rules.	Lack of high levels of professionalism among commercial drivers.

Interview results pointed towards a consensus (84%) among transport managers on the importance of education and professional training for raising commercial drivers' professionalism. Transport managers perceive the majority of their commercial drivers to be employees with very low levels of education; this causes them to perform relatively poorly in company training programmes. Furthermore, transport managers believed that having drivers from different parts of the region was a challenge as those drivers come from countries which have completely different traffic rules and systems. However, this caused companies to spend more time and effort on training their drivers to reach the required level of knowledge about local traffic systems and rules. More importantly, transport managers indicated that their drivers came from cultures and backgrounds where safety compliance was not a priority; this requires companies to work harder on raising drivers' awareness about the importance of safety and its role in organisational prosperity. For instance, in some Asian countries, truck drivers do not necessarily hold the requisite class of driving licence. Despite all these factors, transport managers explained that professional training programmes for their drivers showed relative successes in their companies.

3.6 The Importance of a Training Component in the Hiring Process for New Commercial Drivers

In order to understand how important professional training was in the selection and hiring process of new commercial drivers, transport managers were asked for their perceptions. Results showed that about 81% of managers interviewed regarded professional training as very important; the remaining 19% perceived professional training to be of low importance in the hiring process. However, managers who stated that previous professional training was of low importance in the selection and hiring process worked for companies with compulsory internal training arrangements for all newly recruited drivers. Table 27 shows these results.

Table 27: Importance of Professional Training in the Hiring Process for New Drivers

Level of Importance	% of Respondents
High Importance	80.95%
Low Importance	19.05%
Total	**100%**

The results indicated that there is some degree of selectivity in the hiring processes practiced by commercial transport companies in the Arab region. This is done mainly to maximise the chances of hiring candidates with the potential for long-term safe driving performance. The process of hiring new commercial drivers is usually expensive and time consuming, explaining the high importance given to the hiring by the majority of transport managers in this study.

3.6.1 Actual Criteria for Hiring New Commercial Drivers

Although more than 80% of transport managers perceived professional training of commercial drivers to be highly important to the hiring process, there seemed to be a mismatch with the actual selection and hiring criteria used in their companies. The main criteria used in the case study companies are listed in Table 28, below.

Table 28: Main Criteria for Hiring Commercial Drivers

Criterion	% of Respondents
Experience	39.06%
Age	22.80%
Training	20.45%
Driver's licence	13.40%
Other	3.10%
Language	1.19%
Total	**100.0%**

Results showed that professional training was the third most important factor taken into consideration in hiring processes, behind experience and age. This can be explained by the fact that in companies where transport managers' involvement in the hiring process is rather limited, it is solely controlled by the human resources department. Because of the well-documented safety risks associated with inexperienced commercial drivers, most commercial transport companies avoid hiring drivers younger than 25. The majority of transport managers in very safe fleets consider age to be an important selection factor in hiring drivers, explaining why experience and age were ranked as the top criteria for hiring new commercial drivers in the Arab region.

3.6.2 Where and How Companies Hire New Commercial Drivers

Results displayed the range of options available to commercial transport companies in the Arab region for hiring new drivers. The international market was the main source (61%) for hiring new commercial drivers. However, local markets remained a significant secondary source of new drivers (39%). The different means of hiring new commercial drivers are listed in Table 29.

Table 29: Where / How Companies Hire New Commercial Drivers

Hiring Method	% of Respondents
Locally	39.47%
Internationally through a local hiring agency	18.42%
Internationally through a foreign agency	28.95%
Internationally through own network	13.16%
Using Internet job hiring sites	0.0%
TOTAL	**100.0%**

These results reflect the reality of the labour market situation and employment services in the Arab region. They are unique in many respects and reflect the commercial transport sector's position as a growing industry. With strong economic development, particularly in the GCC countries, the resulting requirements for commercial transportation have meant that growth in the pool of truck drivers has been insufficient, resulting in local driver shortages. Commercial transport companies are thus forced to extend their searches to international markets, such as South and Southeast Asia, to hire qualified truck drivers. However, reliance on hiring foreign truck drivers has disadvantages. Language and cultural barriers, for example, have a pervasive impact on business operations. The lack of a common language and the limited cultural and regional awareness of foreign drivers are likely to hamper the development of drivers' skills, when they receive professional training, for example.

3.7 Measuring the Success of Professional Road Transport Training Programmes

a) Key Performance Indicators (KPIs) Related to Road Accidents

Transport managers interviewed indicated that their companies had their own KPI systems related to road accidents, although only nine case study companies agreed to share their KPI data with this study. Table 30 lists the KPIs used and compares their average values before and after commercial driver training.

Table 30: A Comparison of KPIs and Average Costs Related to Road Accidents

	Figures		Percent change
Companies' KPIs	**Before training***	**After training****	
Average annual loss of revenues due to truck downtime	USD 160,913	USD 83,675	-48%
Average annual cost of repairs (in cases exceeding insurance cover)	USD 92,100	USD 75,980	-17%
Average annual number of minor accidents	46	35	-24%
Average annual number of major accidents	1.63	0.91	-44%
Average number of reported accidents per 1 million kilometres.	5 per million kilometres	2.68 per million kilometres	-46%
Average annual cost of medical care (in cases exceeding insurance cover)	USD 52,650	USD 36,700	-30%
Cumulative man-days lost annually as a result of driver injuries	622 days	467 days	-25%
Annual number of damaged deliveries due to accidents	37	18	-51%
Average annual cost of hiring and training new drivers (to replace injured/absent drivers following accidents)	USD 22,500	USD 10,115	-55%

*Average values were calculated for the three years before commercial driver training.
**Average values were calculated for the three years after the commencement of commercial driver training.

The analysis of KPI averages shows that case study companies were able to improve their road safety records after commencing commercial driver training. This suggests that professional road safety training can help truck drivers become safer and more efficient, whether they are novices or experienced; it can help both drivers and their companies in terms of personal safety and organisational economic growth.

The above KPI averages also suggest that the economic impacts of commercial truck crashes can be mitigated and that many expenses, such as medical costs, damaged goods, lost productivity, a monetary valuation of man-days lost and repairs associated with these crashes, can be reduced. It can also be concluded that drivers who have

received safety-related training have a greater knowledge of the appropriate safety behaviour that will result in a better ability to avoid crashes.

b) KPIs Related to Operational Metrics

This section looks at the criteria used by commercial transport companies to evaluate the success of the professional road transport training programmes they conducted. Operational KPIs are essential tools for the freight industry. They provide a consistent basis for measuring transport efficiency across different fleets by comparing like with like. The operational KPIs used are diverse and multidimensional. Transport managers explained how they benefited from having an annual number of IVMS violations with which to measure the impact of training on their drivers' performance in terms of safe driving. The interviewees reported that IVMS provided important data for evaluating drivers' performances after receiving professional training, since driving is one of the least supervised activities which the drivers engage in.

Another KPI used by case study companies was vehicle fuel consumption expressed kilometres per litre. Transport managers believed that commercial vehicle operating costs per kilometre varied depending on driving patterns and conditions, and that professional training helps drivers to adjust their driving patterns in order to save as much as possible on fuel. Furthermore, managers explained that more economical driving styles and improved safety records had saved their companies lots of money as the overall repair and maintenance costs of vehicles decreased. Customer complaints due to delayed pickups, late deliveries and claims resulting from cargo damage were used to evaluate customer satisfaction. In general, transport managers perceived that professionally trained drivers helped to increase customer satisfaction and decrease the number of complaints and claims, due to reduced cargo damage and delivery delays.

An exhaustive list of companies' operational KPIs related to successful professional road transport training programmes is provided in Table 31. It shows KPIs before and after professional training programmes, in addition to the average percentage improvements in case study companies.

Table 31: Average Improvements in Operational KPIs following Professional Training Programmes

Indicator	Before Training*	After Training**	Percentage
Average annual number of IVMS violations (i.e. speeding, safety belt, aggressive braking and "jackrabbit starts")	273	116	-58%
Average kilometres covered per litre of fuel (km/litre)	2.7	3.2	+14%
Average annual percentage saving on tyre costs	1.7%	9.9%	+8%
Average annual maintenance and repair costs per truck	USD 2,600	USD 2,080	-20%
Average annual number of near miss reports	114	242***	+112%
Average annual number of customer complaints	127	61	-52%
Average annual number of customer claims	33	14	-58%
Average annual ratio of damaged deliveries (partially or fully damaged) to the total number of deliveries made	0.01	0.006	-42%

* Average values were calculated for the year preceding the commencement of professional training programmes for commercial drivers.
** Average values were calculated based on figures related to fiscal year 2014 following the commencement of professional training programmes for commercial drivers.
*** An increase in near miss reports indicates improvements in the culture of safety.

The results show that the implementation of professional training programmes for truck drivers brought about several operational improvements within the commercial transport companies in this study. Training commercial drivers has been proven to change the way drivers behave behind the wheel, saving more fuel and producing fewer carbon emissions than investing in new vehicles could. It can also reduce expenses on repairs, tyres and general fleet maintenance. This would imply that training programmes for commercial drivers are extremely viable options for when companies have some spare capital, as is the case for many commercial carriers in the Arab region's current economic situation.

3.8 ROI of Professional Training for Commercial Transport Company Drivers

This section examines the return on investment (ROI) of professional training for the drivers working for case study's commercial transport companies. Commercial transport industry companies only have preliminary procedural steps for calculating the ROI of professional training programmes for their drivers. Transport managers reported that their procedures entailed calculating the reduction in total operational and accident costs per year resulting from enhanced driver performance. The results were then compared to the total cost of training their drivers. Ultimately, this allowed the measurement of cost reductions/gains (i.e. the amount of return) relative to the total training costs for drivers (i.e. the amount of investment). Transport managers also added that, in the majority of cases, their efforts remained relatively humble. They lacked the integrated financial systems which would allow them to show their superiors the instant savings made possible by professional training: differences to the company's bottom line demonstrable by comparing the ROI of different professional training programmes given to commercial drivers.

The following ROI formula was used to calculate an average ROI from the professional training programmes given at case study companies:

$$ROI = \frac{CostReduction/Gains - CostofInvestmentinDrivers\hat{}' ProfessionalTrainingPrograms}{CostofInvestmentinDrivers\hat{}' ProfessionalTrainingPrograms}$$

Information was collected on the average annual cost of professional training programmes given to drivers. Simultaneously, the average annual reductions in total operational and accident costs resulting from enhanced driver performance were calculated based on the data reported by case study companies. Table 32 illustrates these ROI calculations.

Table 32: Calculations of the Average Annual ROI from Professional Training Programmes for Commerical Drivers

Cost of Investment in Professional Training Programmes for Commercial Drivers	
Items	Results
Average annual number of drivers trained	85
Average annual cost of professional training programmes per driver	USD 270
Average annual total cost of professional training programmes	USD 22,950
Crash Cost Reduction	
Average annual number of major accidents before training	1.63
Average annual number of major accidents after training	0.91
Average annual number of major accidents reduced	0.72
Average cost of a major accident	USD 76,000
Average annual cost of major accidents reduced	USD 54,720
Operational Cost Reduction	
Average annual savings in maintenance and repair costs	USD 83,200
Average annual savings in tyre costs	USD 7,800
Average annual savings in fuel costs*	USD 252,000
Average annual total cost savings (including crash cost reduction)	USD 397,720
Average ROI= $\frac{(\text{USD } 397{,}720 - \text{USD } 22{,}950)}{(\text{USD } 22{,}950)}$ =	1,632%

*calculations are based on the average price for 1 litre of fuel in the KSA, which is USD 0.21

The above ROI calculations show that for every USD 1 spent on professional training for commercial drivers, there was an ROI of around USD 17 in the case study companies.

The ROI calculation for the road safety component alone is 138%.

3.9 Professional Training Programmes Required at Commercial Transport Companies

Almost all of the commercial transport managers interviewed stated that good professional training for their drivers must involve setting priorities and working on the most important ones first. We have drawn up the following list of training modules which transport managers wished to develop and implement in their companies over the following three years. They have not been prioritised, however.

- Defensive driving
- Road safety
- Lifting and lashing
- Load securing
- Awareness about fatigue and journey management
- Customer service and satisfaction training
- Hazardous materials training
- Traffic rules training programmes for foreign drivers
- Safety and Quality Assessment System (SQAS)
- Safety awareness sessions for drivers
- Trailer suspension training
- Braking techniques

This extensive list of training priorities suggests that the senior management in commercial transport companies must commit to the successful implementation of training programmes. Safety management for best practice companies begins with the clear and unequivocal support of top management, and the integration of a focus on safety in all aspects of commercial transport training. In addition, the extent of the above list suggests that the Arab region's commercial transport sector is in real need of significant investments to further promote safe driver behaviours.

3.10 Commercial Drivers Questionnaire Results

The researchers collecting interview data from transport managers were concurrently collecting questionnaires from commercial drivers from all the case study companies. These asked diverse questions about drivers' perceptions of the training they had received, potential improvements to their skills and other related issues (see Appendix 2). A total of 300 questionnaires were distributed at the 32 case study companies selected; 57 questionnaires (19%) were not returned; 243 questionnaires (81%) were returned but only 146 provided valid data sets as they were filled out completely; the rest were only about 50% answered. This provided a relatively low 49% response rate, which may be explained by the fact that the study took place immediately before one of the region's most important religious holidays. At the time of interviews, 57 drivers did not return to their company depots due to very tight delivery schedules and other assignments; their questionnaires were considered not

returned. Furthermore, due to the fact that the majority of drivers in case study companies came from foreign countries (such as India, Pakistan, Bangladesh, etc.) and had very low levels of education, their low level of proficiency in English was a real barrier. Yin states that using statistical generalisation to generalise case study results is considered a fatal flaw – since case studies are not sampling units, they should not be chosen as such. Instead, cases studies should be searched for patterns with which to make analytical generalisations and compare them with previously developed theories. Therefore, Yin's statement would suggest that the response rate achieved with the commercial drivers was adequate in number to produce patterns in case study companies involved. Accordingly, only the valid data collected through questionnaires were prepared for statistical analysis; data were scored by giving a numerical value to each question's response. All the responses received were analysed using SPSS (Statistical Package for the Social Sciences software, Version 11.0) to identify patterns in case study companies.

3.10.1 Demographics of the Commercial Drivers Participating in the Study

a) Countries Where Respondents Worked

Of the total number of commercial drivers who completed questionnaires, about 9% worked for commercial transport companies operating from Bahrain; 29% were based in Egypt; 7% in Jordan; 34% in Saudi Arabia; 7% in Qatar; and 14% in the United Arab Emirates. Details of where the commercial drivers were based are shown in Table 33, below.

Table 33: Countries Where Respondents Worked

Country	No. of commercial drivers	Percentage
Kingdom of Saudi Arabia	50	34.2%
Egypt	42	28.9%
United Arab Emirates	21	14.4%
Bahrain	13	8.9%
Jordan	10	6.8%
Qatar	10	6.8%
Total	**146**	**100.0%**

b) Commercial Drivers' Ages

As Table 34 shows, below, only about 8% of commercial drivers were younger than 30 years old, 35% were 30-40 years old, and 38% were 41-50 years old. Among older drivers 14% were 51-60 years old, whereas 6% of commercial drivers who returned a valid questionnaire were aged over 60 years old.

Table 34: Distribution of Respondents' Ages

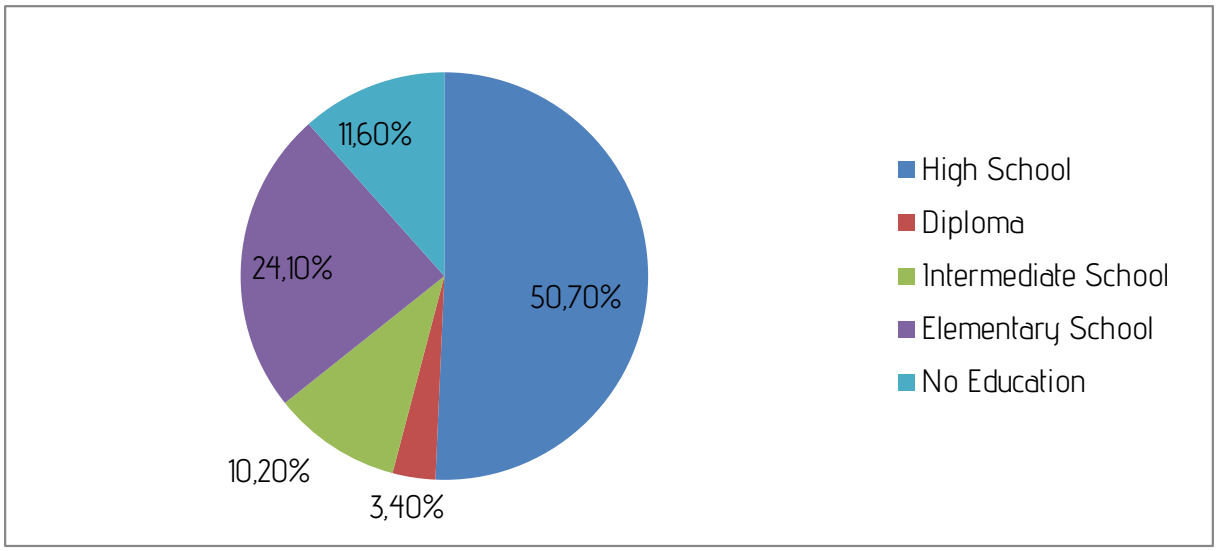
Age (Years)	Frequency	Percentage
Over 60	8	5.5%
51-60	21	14.4%
41-50	55	37.7%
30-40	51	34.9%
Under 30	11	7.5%
Total	**146**	**100.0%**

Previous research has proved that age has a strong relationship with involvement in crashes[22]. The results above indicate that the majority of the drivers who responded to this study (73%) were from the middle age groups, from 30-50 years old. Young commercial drivers (under 30 years old) have crash rates that are several times higher than those in the older age groups of this population.

c) Commercial Drivers' Levels of Education

The commercial drivers who participated in the study had a wide range of educational levels. Around half (51%) of commercial drivers had been educated up to the high school level or equivalent and 3% were graduates from technical colleges, with vocational diplomas. However, 10% had only passed the intermediate school level, 24% only had an elementary level education and the remaining 12% of commercial drivers had not received any sort of formal education. Figure 13 shows the distribution of commercial drivers' according to their educational level.

Figure 13: Educational Level of Commercial Drivers

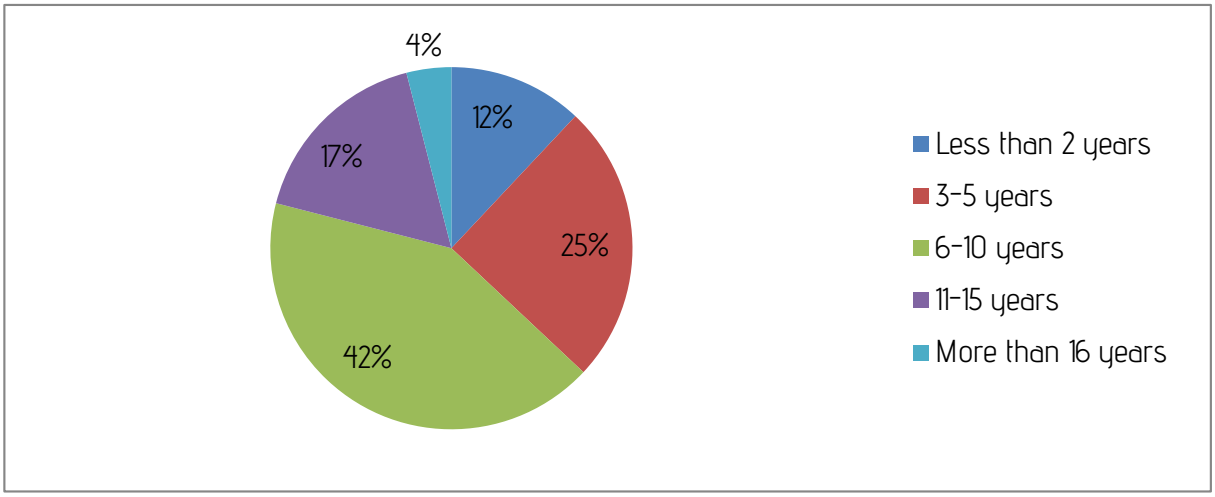


These results illustrate that the general educational level of commercial truck drivers was very low. Furthermore, transport managers perceive the majority of their commercial drivers to have very low levels of education. Clearly, drivers with a low level of educational achievement are likely to perform worse in training programmes than drivers who have had a better education.

d) Seniority in Case Study Companies

The questionnaire results showed that, at the time of the study, a significant proportion of drivers (42%) had been working in the case study companies for 6-10 years; 25% had been working for 3-5 years; 17% had 11-15 years of service; more inexperienced commercial drivers with 1-2 years of service, and very experienced drivers with more than 16 years of service, made up 12% and 4% of this population, respectively. Figure 14 presents the distribution of commercial drivers' working years in case study companies.

Figure 14: Commercial Drivers' Years Worked at Case Study Companies

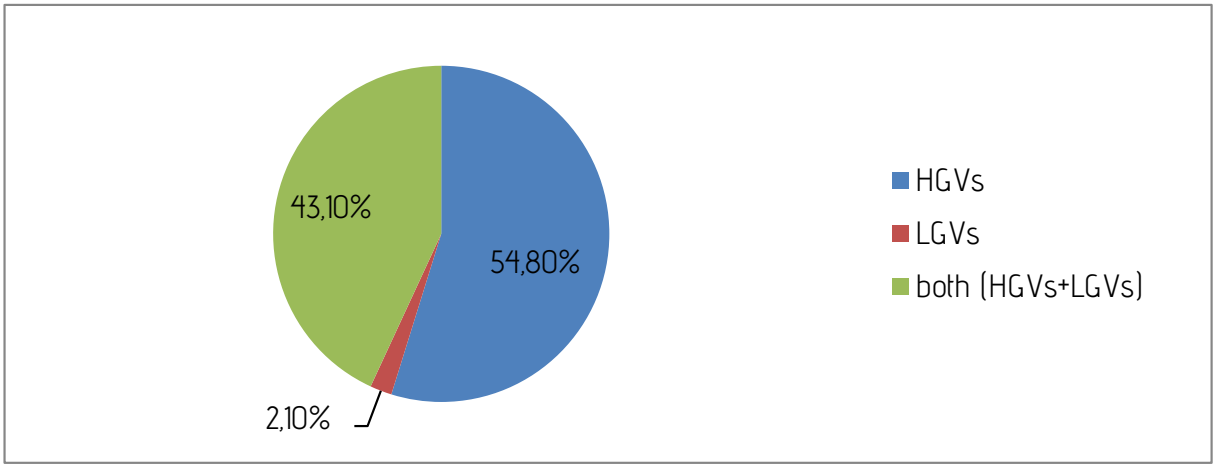


The majority of respondents could be considered experienced commercial drivers. Almost 60% of drivers had 6-15 years of experience driving a commercial vehicle. We would expect these drivers to be among the most valued in their fleets.

e) Types of Commercial Vehicles Driven

The majority (about 55%) of commercial drivers who responded fully to the questionnaire drove HGVs only (with 47% driving semi-trailer trucks and 8% driving rigid trucks). Only 2% of drivers drove light goods vehicles (LGVs) only, whereas 43% of drivers drove both HGVs and LGVs. Figure 15, below, illustrates this distribution.

Figure 15: Types of Commercial Vehicles Driven

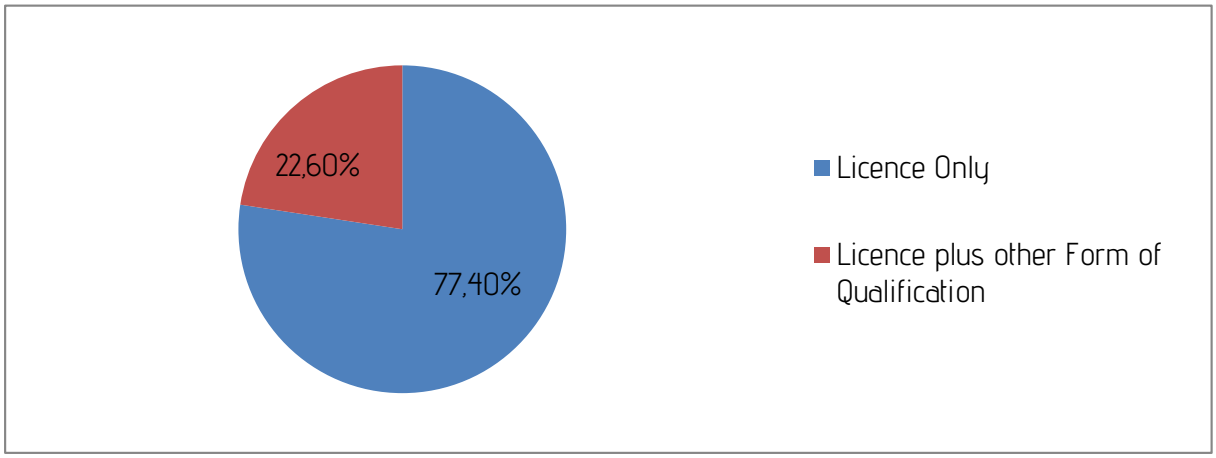


Because of their operational limitations, particularly their longer stopping distances, HGVs are more than proportionately involved in fatal crashes. The great mass of these vehicles can lead to severe consequences for other road users involved in their crashes. However, the results showed that 98% of commercial drivers' drove HGVs. In view of this, and the growth of HGV usage internationally, lower speed limits for HGVs may be an appropriate way to reduce road accident rates.

f) Types of Qualification Held by Commercial Drivers

As Figure 16 shows, below, about 77% of the commercial drivers in our sample only held a commercial driving licence, whereas the remaining 23% had other forms of qualifications in addition to their driving licence.

Figure 16: Types of Qualifications Held by Commercial Drivers

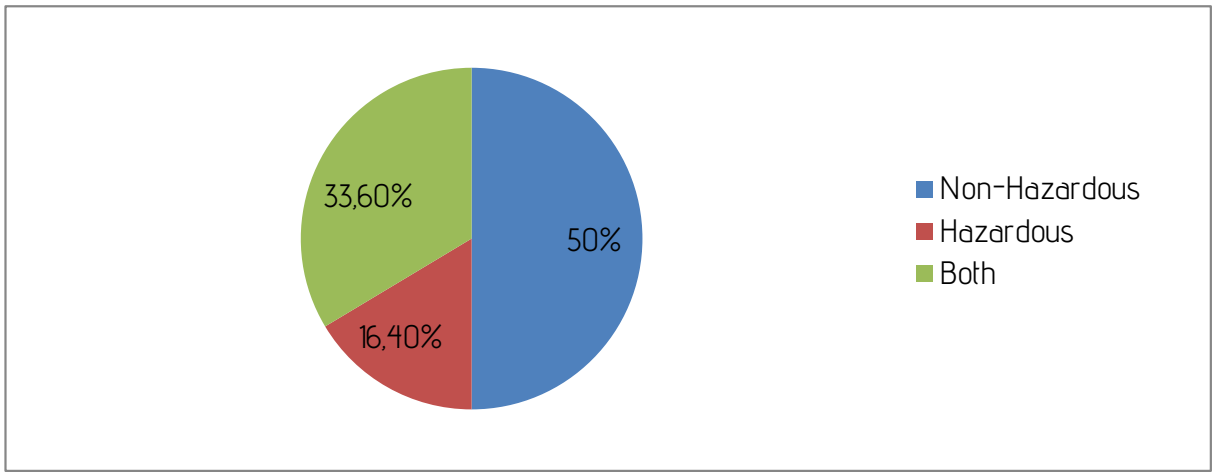


This analysis shows that a commercial driving licence is the only compulsory measure enforced on commercial truck drivers by the Arab region's governments. Driving schools play an important role in educating student drivers about correct, safe driving procedures. In order to obtain a commercial driving licence, student drivers are required to pass written and practical tests. The written test is on traffic rules, road signs and the principles of traffic safety.

g) Types of Cargo Transported by Commercial Drivers

Respondents were asked about the types of cargo they delivered, in order to estimate the range of services that these drivers provide to their companies and customers and to emphasise the need for professional training to run commercial transport operations safely. Half of the drivers transported only non-hazardous cargoes, about 16% transported only hazardous materials and 34% transported both. Figure 17 shows the distribution of types of cargo transported by commercial drivers.

Figure 17: Types of Cargo Transported by Commercial Drivers

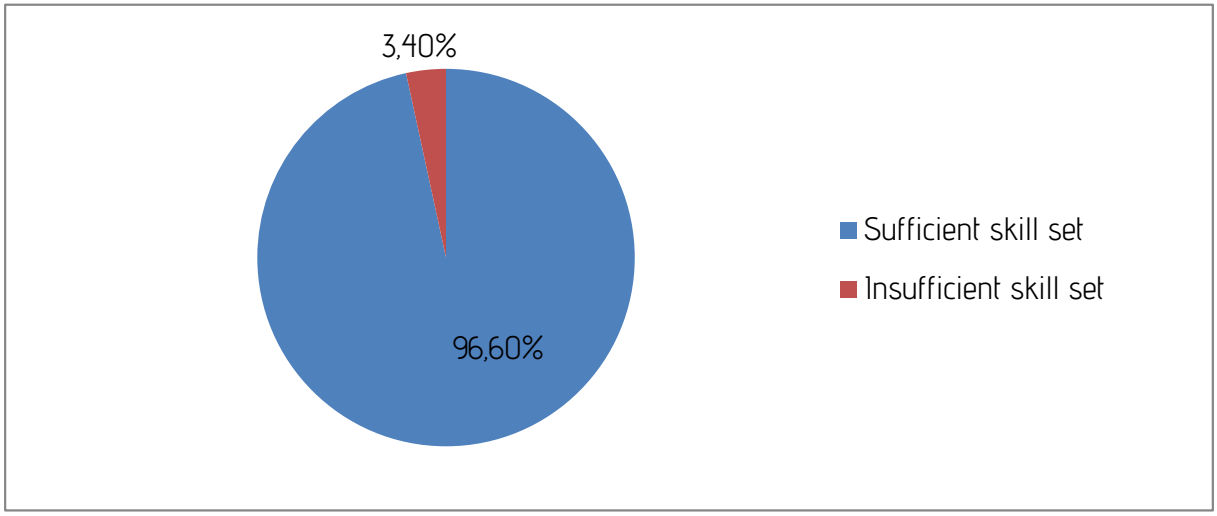


Thus, 50% of the commercial drivers in this study were involved in transporting hazardous materials. This type of work requires strict regulations to protect against the risks to life and the environment. In the Arab region, regulations about the transport of hazardous materials are still in their initial stages of implementation.

3.10.2 Knowledge and Skills Required to Perform the Job Safely and Efficiently

The researchers in this study decided that it was necessary to understand commercial drivers' perceptions of their own driving skills and the knowledge required to perform their work safely and efficiently. Overwhelmingly, about 97% stated that they were confident that they had enough knowledge and skills to perform their job safely and efficiently; only about 3% indicated that their current level of skills and knowledge was insufficient. Figure 18 illustrates drivers' perceptions of their skill set.

Figure 18: Commercial Drivers' Perceptions of whether their Level of Knowledge and Skills was sufficient to Perform their Job Safely

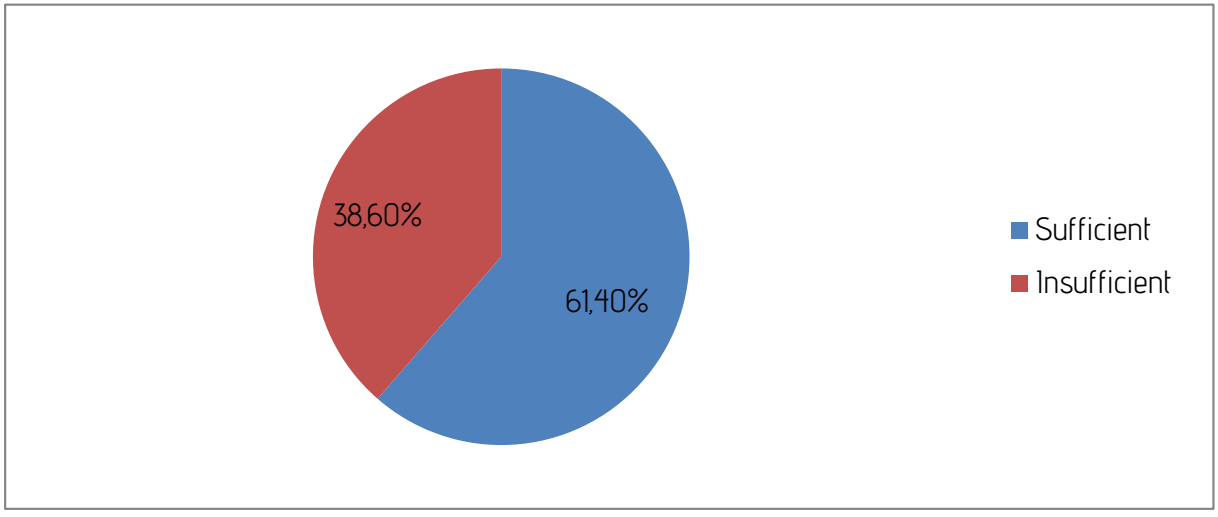


As mentioned earlier, almost 60% of commercial drivers had 6-15 years of experience, which goes some way towards justifying why some 97% of them were confident that they had enough knowledge and skills to perform their job safely and efficiently.

3.10.3 Currently Applicable Driving Tests for Commercial Drivers Countries' Traffic Departments

Commercial drivers must pass the currently applicable driving tests set by the traffic departments in the countries in which they are based. Questionnaires showed that about 61% of commercial drivers believed that licencing a commercial driver was sufficient; the remaining 39% believed that this was insufficient and that further measures should be implemented to raise to the skills and capacities of commercial drivers. Figure 19, below, illustrates these responses.

Figure 19: Commercial Drivers' Perceptions about whether the Currently Applicable Driving Tests for Licencing Commercial Drivers are Sufficient

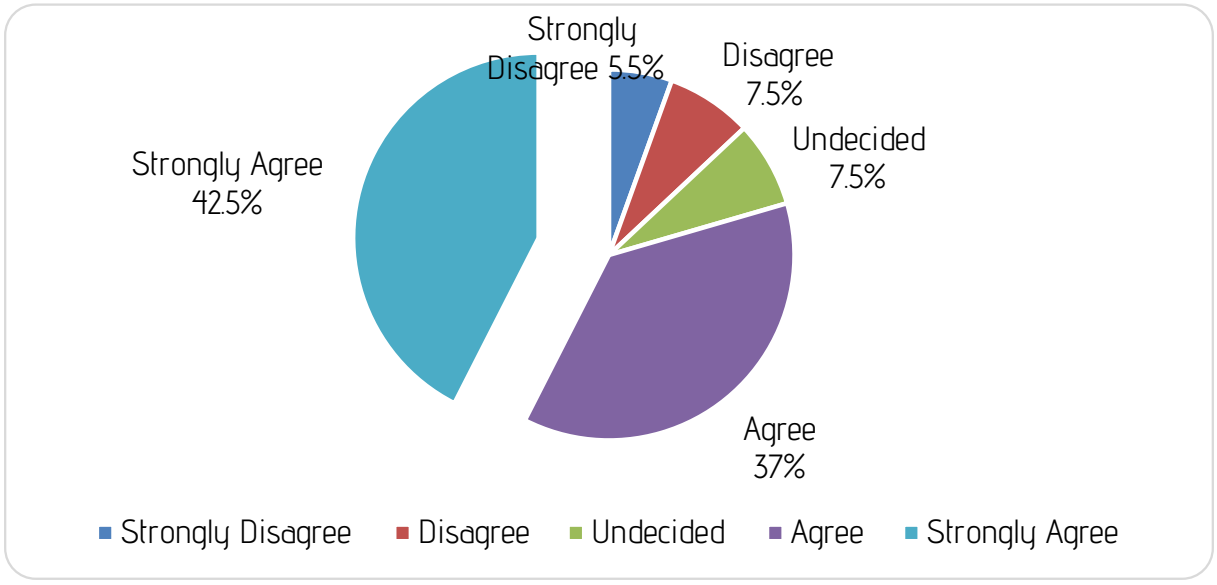


The relative seniority of the study participants could explain why the currently applicable measures for licensing commercial truck drivers were perceived to be sufficient – those drivers perceived themselves to have a high level of experience and knowledge. However, according to Issa and Ratrout2, driving schools in Saudi Arabia and some other Arab countries did not provide students with enough suitable practice to be able to drive in real-world situations. The training programmes offered by these schools for prospective truck drivers were considered weak. This is part of the reason why about 39% of respondents perceived the driving tests for licencing commercial drivers to be insufficient and that further measures should be adopted.

3.10.4 The Major Cause of Commercial Vehicle Accidents is Poor Driving Behaviour

The questionnaire's responses revealed that about 80% of all commercial drivers participating in the study agreed that poor driving behaviour was the major cause of commercial vehicle accidents. In order to promote road safety, more attention must be given to commercial drivers, especially with regards to training, coaching and refresher training programmes. Figure 20 presents the distribution of commercial drivers' perceptions of the major cause of commercial vehicle accidents.

Figure 20: Do Commercial Drivers' Agree that Poor Driving Behaviour is the Major Cause of Commercial Vehicle Accidents?



The result shown above is similar to the findings of several related studies about commercial truck drivers' causes of accidents. As mentioned in the literature review section of this study, commercial drivers' poor behaviour is indeed the principal and critical cause for traffic crashes. Driver's poor behaviour included failure to recognise crash threats, speeding and failure to execute manoeuvres safely. Other factors include noncompliance with traffic regulations, running off the road and improperly following other vehicles[22]. Based on this result alone, we can conclude that a principal goal of professional training for commercial drivers should be to reduce the human behavioural errors that result in crashes and the human risk factors that make those errors and crash outcomes more likely.

3.10.5 Types of Training Delivered

This section presents results for the two types of external training/awareness raising sessions given to commercial drivers, namely general training/awareness sessions and professional road safety training programmes. The results were as follows:

a) General training programmes/awareness raising sessions given to drivers Table 35, below, shows the percentages of the commercial drivers surveyed who had attended general training programmes/awareness raising sessions. It is evident that first aid training programmes were the most commonly attended training programmes by commercial drivers (about 82% of drivers attended); followed by training on appropriate uncoupling/coupling procedures for combination vehicles (75%); and third, vehicle restraint system and safety equipment training (70%). However, customer service and service quality training programmes were least attended by commercial drivers, with only 47% attending. Indeed, this result matched transport managers' analyses of the need to implement and increase the training programmes in the areas of service quality and customer satisfaction in case study companies.

Table 35: General Training Programmes/Awareness Raising Sessions Attended by Drivers

General Training Programmes/Awareness Raising Sessions	Number of drivers	% of drivers surveyed
First aid	119	81.5
Appropriate uncoupling/coupling procedures for combination vehicles	109	74.7
Vehicle restraint systems and safety equipment	102	69.9
Awareness of risks	99	67.8
Backing and docking	98	67.1
Loading/unloading techniques	94	64.4
Vehicle air brake system inspection for units equipped with air brakes	83	56.8
Economical driving programmes	73	50.0
Customer service and service quality	68	46.6

b) The professional road safety training programmes attended by commercial drivers, and shown in Table 36, included defensive driving techniques to reduce rates of road traffic accidents. This was the most frequently given professional training programme. Only some 17% of the sample attended a Transport of Dangerous Goods (ADR) training programme although our study revealed that 50% of drivers sometimes transport hazardous cargoes. Only

one driver in the sample population had attended an awareness raising session about the effects of medication and substance abuse, precautions for executing night operations, or had had on the job training with an instructor. A significant and worrying 4% of commercial drivers had received no professional road safety training.

Table 36: Professional Road Safety Training Programmes Attended last by Drivers

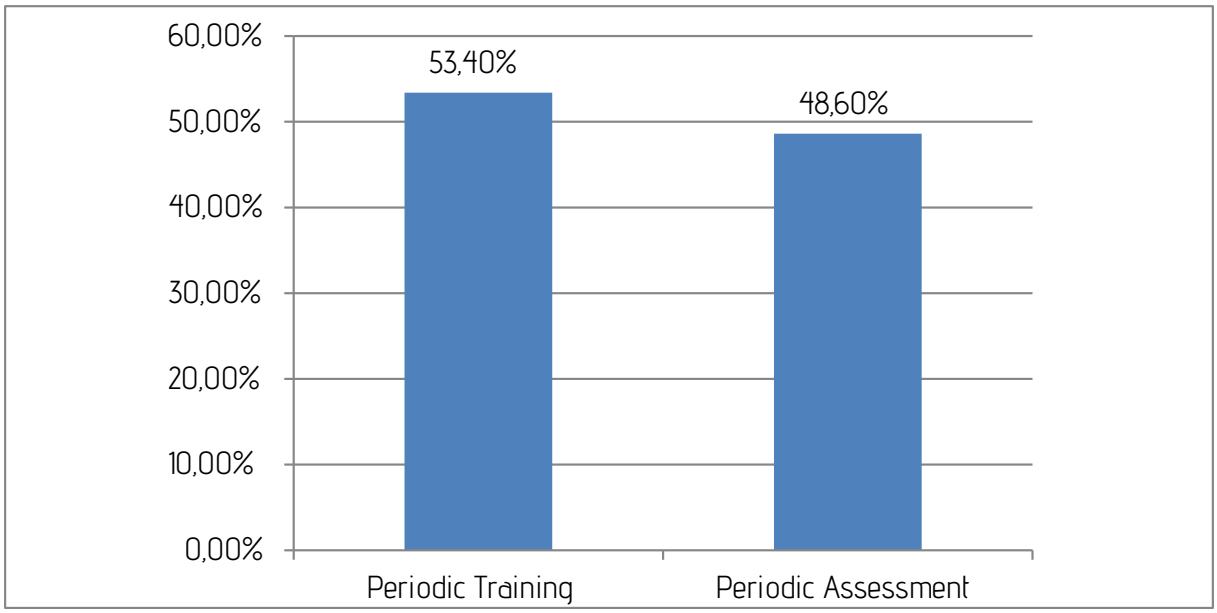
Road Safety Training	Number of drivers	Percentage
Defensive driving techniques	94	54.6%
Other road safety training	38	22.1%
ADR – carriage of dangerous goods by road	30	17.4%
Did not receive any road safety training	6	3.5%
Awareness about the effects of medication and substance abuse	1	0.6%
Night operations	1	0.6%
"Behind-the-wheel" training on the road with an instructor	1	0.6%
"Behind-the-wheel" training on a driving range with an instructor	1	0.6%
Total	**172**	**100.0%**

It is evident from these results that much of commercial drivers' training takes place within commercial transport companies (e.g. first aid, risk awareness raising, and customer service training), in addition to at training schools. This reveals an awareness among commercial transport companies of the necessity to build up their current drivers' capacities for safe driving. Technological advances and modern safety equipment have helped to stress the increasing importance of the quality of commercial driver training programmes. However, the study results also showed that some types of training programmes lacked focus: there were hardly any participants in training programmes on the effects of medication and substance abuse or night operations; barely any drivers ever had an instructor ride-along with them, whether on a driving range or on the road. This suggests that when developing their training delivery strategies, transport companies in the Arab region should consider a better balance between the different types of training available.

3.10.6 Frequency Training and Assessment

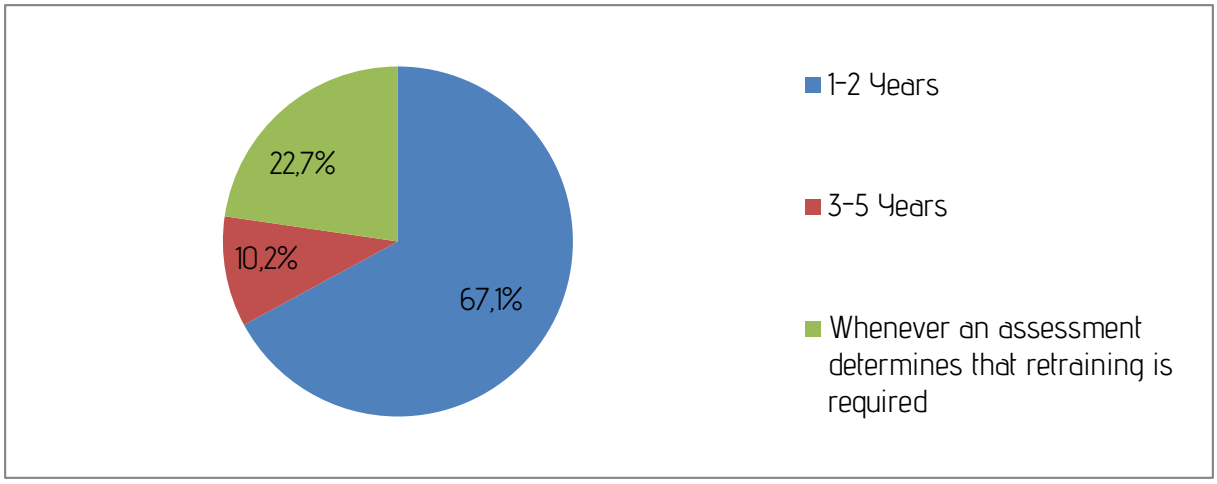
The study revealed that about 53% of the commercial drivers underwent periodic training and 49% underwent periodic assessment. Figure 21 shows the distribution of commercial drivers who underwent periodic training and assessment.

Figure 21: Percentage of Commercial Drivers who Underwent Periodic Training or Assessment



Participating drivers were also asked about their perceptions of the most appropriate frequency with which to conduct periodic professional road transport training programmes. About 67% believed that it should happen every 1-2 years; 10% thought every 3-5 years; and 23% believed it should be done whenever an assessment determined that retraining was required. Figure 22 shows these percentages.

Figure 22: Perceived Appropriate Frequency for Professional Road Transport Training Refresher Programmes

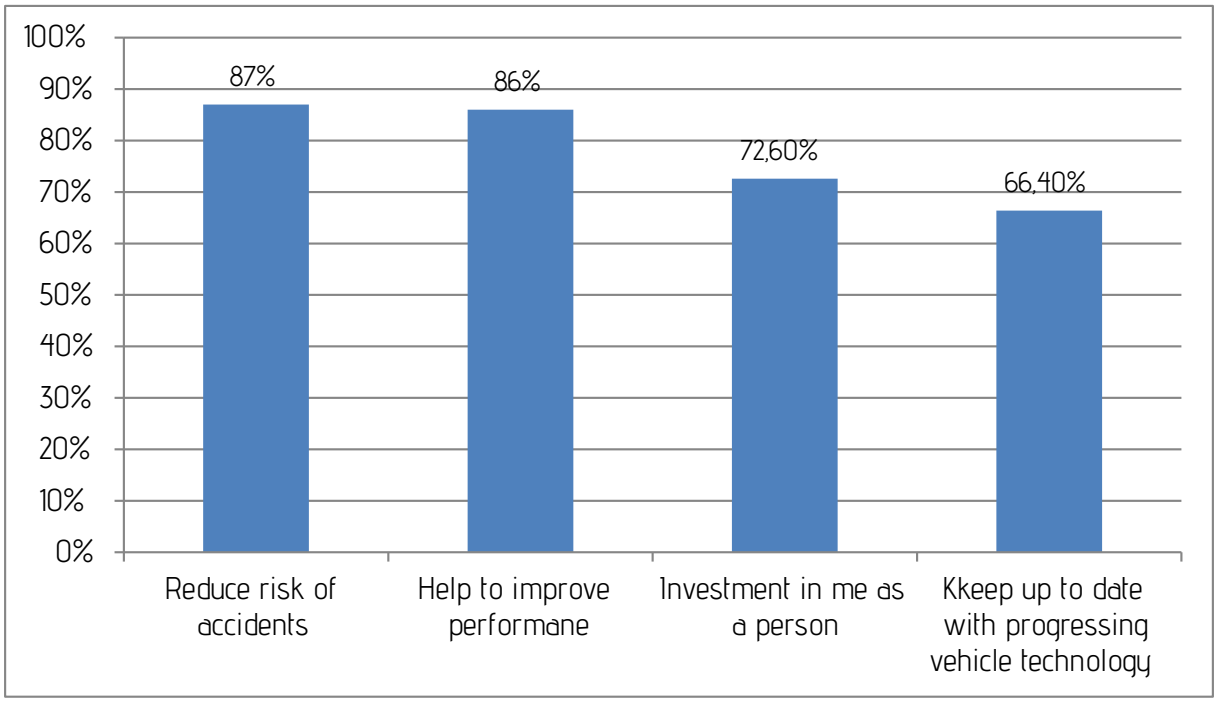


Analysis showed that periodic training and assessment took place at relatively similar levels in the case study companies. Commercial transport companies can significantly improve their safety records by assessing their drivers. These assessments can gather relevant information about drivers' medical conditions via an occupational therapist and about their on-road driving ability via a licenced driving instructor. Depending on the results of such driver assessments, different driver training programmes can be recommended. However, the study results also suggested that the majority of respondents (67%) would prefer that periodic professional training be conducted every 1-2 years. This preference is clearly correlated to the findings in section 3.10.4 where 80% of respondents indicated that poor driving behaviour was a major cause of commercial truck accidents, and that periodic training programmes were necessary to improve the existing situation.

3.10.7 Drivers' Perceptions of the Importance of Training

A very significant 87% of the sample population agreed that the risk of accidents could be mitigated through training: 86% of commercial drivers believed that training helped to improve their performance; 73% considered that it added value to themselves as drivers; and 66% believed that it kept them up to date with new vehicles technologies. These responses are illustrated in Figure 23, below.

Figure 23: Reasons why Drivers Perceive Training to be Important



This result on the perceived importance of receiving training was consistent with the findings reported in section 3.10.4, where poor driving behaviour was seen to be the main cause of commercial vehicle accidents. 80% of the commercial drivers in the sample population agreed about this causal relationship. This helps explain why 87% of respondents agreed that numbers of commercial vehicle accidents could be

reduced through driver training, and that 86% of the sample asserted that driver training helps improve performance.

Descriptive statistics calculated using the SPSS software also helped to calculate the means and standard deviations in commercial drivers' perceptions of the importance of training for transporting standard goods and transporting dangerous goods. These are presented below:

a) Importance of Training for Transporting Standard Goods

An overall mean of 3.43 indicates that commercial drivers relatively agreed on the importance of training for the safe transportation of standards goods. Results showed that drivers perceived training in fire prevention and fire fighting skills to be most important when transporting standards goods, and that training was least important for reducing stress. Table 37 shows all the descriptive statistics on the importance of training for transporting standard goods.

Table 37: Importance of Training: Standard Goods

Importance of training: Standard goods	Min.	Max.	Mean	Standard Deviation	Variance
Fire prevention and fire fighting	1	5	4.50	1.28	1.16
Increasing compliance with transport procedures	1	5	3.84	1.32	1.11
Keeping delivery schedules (Journey Management)	1	5	3.75	1.25	1.19
Improving client satisfaction	1	5	3.75	1.02	1.16
Avoiding distracted driving	1	5	3.51	1.53	1.92
Chances of avoiding severe traffic violations	1	5	3.33	1.42	1.55
Staying alert and fit to drive (Fatigue Management)	1	5	3.13	1.31	1.08
Boosting job satisfaction and morale	1	5	2.57	1.15	1.30
Reducing Stress	1	5	2.52	1.26	1.51
Overall Mean			**3.43**		

Analysis indicated that drivers were aware of the importance of training for transporting standard goods. This finding was consistent with those reported earlier in this section, where respondents confirmed the relationship between training and better performance and accident risk reduction. However, respondents perceived training for transporting standard goods as not helpful for boosting job satisfaction and morale or reducing stress. These issues were ranked lowest, with mean scores of 2.57 and 2.52, respectively. It seems that there was a lack of understanding among respondents about training's role in boosting job satisfaction, since it is widely accepted that training is one means of improving drivers' performance, thereby potentially raising job satisfaction. Either or both professional training and job satisfaction can have a favourable impact on a commercial transport company's performance. The trends in Table 37 suggest that there is a need to improve the delivery process for training

programmes so that they better reflect the individual needs of commercial drivers. This could help drivers to feel like true participants in the training and thus be more likely show satisfaction and exhibit higher morale. The authors also had a general feeling that respondents underestimated the role of training in reducing the stress that is often caused by driving tasks. This suggests that the relationship between driver stress and the likelihood of involvement in an accident would be worthwhile topics for the professional training programmes given to drivers in the Arab region.

b) Importance of Training for Transporting Dangerous Goods

The questionnaire revealed that drivers perceived training to be most important for improving dealing with emergencies and for proper rules for communication when carrying dangerous goods. They felt it was least important for improving driving and parking rules in general. Table 38 shows the complete descriptive statistics on the importance of training for transporting dangerous goods.

Table 38: Importance of Training: Dangerous Goods

Importance of training: Dangerous goods	Min.	Max.	Mean	Standard Deviation	Variance
Emergencies and proper rules for communication when carrying dangerous goods	1	5	3.56	1.45	1.08
Awareness about the specific precautions for dangerous goods	1	5	3.24	1.23	1.31
General driving and parking rules when transporting dangerous goods	1	5	3.16	1.57	1.14
Overall Mean			**3.32**		

An overall mean of 3.32 indicates that commercial drivers also relatively agreed (albeit at a lower level than for transporting standard goods) on the importance of training for the safe transportation of dangerous goods. As mentioned in section 3.10.5, only about 20% of the sample had undergone any training on transporting dangerous goods, whereas almost 50% of commercial drivers did indeed transport hazardous materials. This finding shows that almost 60% of commercial drivers transporting hazardous materials for case study companies did so without having received any related training. This can be explained by the fact that, throughout the region, government regulations concerning the transportation of dangerous goods by road are still in their initial stages of development. It also confirms the need for each country in the Arab region to implement specific safety measures through its own national legislation. This will ensure that dangerous goods (including dangerous waste) can be safely transported across international borders in the future, provided, of course, that drivers and vehicles comply with regulations.

3.10.8 The Impact of Training on Drivers' Behavioural Skills

The means and standard deviations of the perceived impact of training on eleven different behavioural skills in the questionnaire were calculated using the SPSS software. The overall mean for the perceived impact of training on overall behavioural skills was relatively high, at 4.08. The means of the eleven behavioural skills ranged from 3.60 to 4.48. Table 39 provides all the descriptive statistics for the perceived impact of training on behavioural skills.

Table 39: Impact of Training on Drivers' Behavioural Skills

Behavioural Skills	Min.	Max.	Mean	Standard Deviation	Variance
Driving combination vehicles safely	1	5	4.48	1.14	1.31
Identifying the proper placarding for hazardous materials	1	5	4.34	1.52	2.3
Responses to sudden tyre/brake failures	1	5	4.20	1.10	1.22
Driving in poor weather and on slippery surfaces	1	5	4.18	1.05	1.10
Night driving	1	5	4.15	1.25	1.57
Controlling the vehicle and making allowances for other drivers on the road	1	5	4.08	1.05	1.11
Anticipatory driving	1	5	4.07	1.04	1.08
Securing and balancing the cargo	1	5	4.03	1.38	1.90
Stopping Tailgate driving	1	5	3.93	1.45	2.11
Considering the changed centre of gravity when driving loaded vehicles	1	5	3.89	1.40	1.97
Saving fuel by regulating driving speed	1	5	3.60	1.45	2.11
Overall Mean			**4.08**		

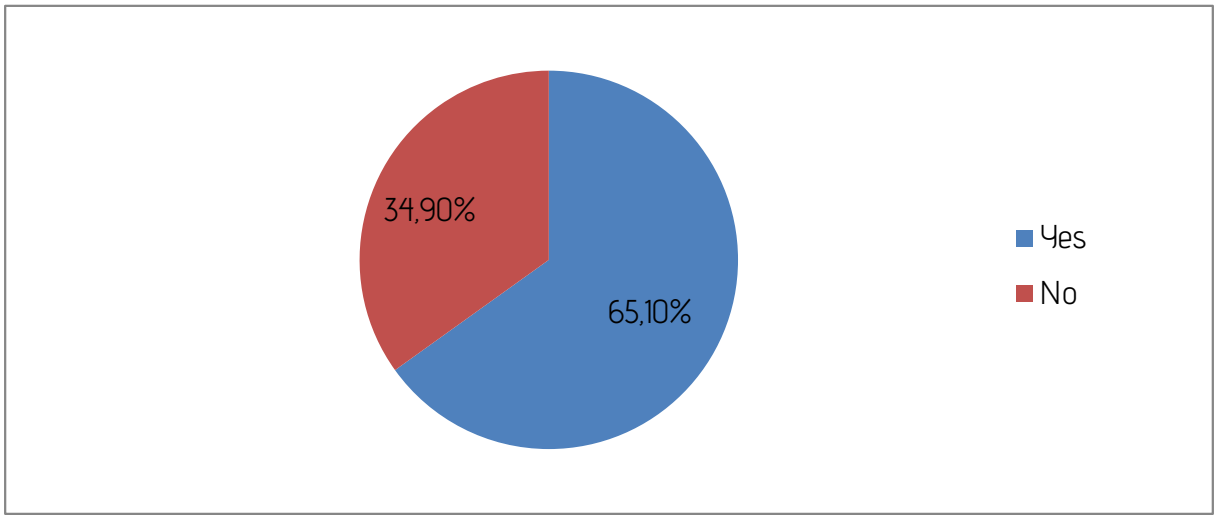
These results suggest that the commercial drivers in this study, who had undergone training, felt fairly strongly (mean score of 4.08 out of 5) that training would be able to improve a wide range of their behavioural skills. Driving combination vehicles safely was ranked as the skill on which training had had the highest impact on drivers. This was not a surprise as training on appropriate uncoupling and coupling procedures for combination vehicles was the most common form of general training programme attended by drivers, after first aid (see section 3.10.5). Identifying hazardous materials placarding was ranked the training which had the second highest impact on drivers' skills. However, as professional training for dealing with hazardous materials was only given to around 20% of respondents (see section 3.10.5), there is a clear deficiency here. This would suggest that drivers are able to develop this skill over long years of experience of commercial driving. There was a similar result for night driving skills, where the perceived impact of training was relatively high (mean score of 4.15), but almost none of the drivers had participated in any professional training programme on night driving. Since 50% of respondents had participated in general training programmes on driving economically, as shown in section 3.10.5, saving fuel by regulating speed was ranked as the skill on which

training had had the least impact. These results strongly emphasise the need to evaluate the effectiveness of the existing training programmes and to take necessary corrective actions before offering them again.

3.10.9 Incentive Programmes to Encourage Compliance with Road Safety Measures

Commercial drivers were asked whether the case study companies provided them with incentives to encourage their compliance with road safety measures and procedures. About 65% of sample population stated that they did. However, they all indicated that their company's only measure was a financial bonuses for drivers. Figure (24) below illustrates these percentages.

Figure 24: Existence of Incentive Programmes to Encourage Compliance with Road Safety Measures



The commercial drivers explained that incentive schemes using measures other than financial rewards, could be of paramount importance in aiding commercial transport companies to encourage, recognise and reward exceptional driving performance. Such schemes are meant to motivate commercial drivers to improve their driving in terms of road safety and compliance with rules. It is also expected that some motivation schemes could increase commercial drivers' loyalty to their commercial transport company employer. However, commercial transport companies operate largely on the principle that bad behaviour should be punished and good behaviour goes unrewarded[47]. The above results indicate that the commercial transport sector in the Arab region has room to address the balance of incentives.

3.11 Investments Required for Further Enhancing the Professionalism of Commercial Drivers

The analysis of the results presented in this chapter suggests that the current situation in the region's commercial transport companies requires that their truck drivers should be guided towards career professionalism. To a large extent, transport companies see their commercial drivers as employees with very low levels of education, which might cause them to perform

poorly in the training programmes offered by those companies (see section 3.5). Similarly, the majority of commercial truck drivers agreed that poor driving behaviour was the major cause of commercial vehicle accidents in their companies, and that road safety can only be promoted through proper training, coaching and refresher training programmes (see section 3.10.4). What is more, commercial transport companies believe in the need to raise their drivers' capabilities in the areas of customer service and service quality. However, customer service and service quality training programmes were the skills in which commercial drivers received the least training. The results also showed that the incentive programmes implemented by commercial transport companies were inefficient and based merely on financial bonuses for drivers, without any other incentives measures.

Due to the overall situation described above, this section looks at the types of investments that will be required to enhance the professionalism of commercial truck drivers across all the Arab region countries. Table 40 shows the major investments required for enhancing the professionalism of commercial truck drivers, as perceived by their transport managers. Almost 69% of transport managers indicated that major investments were required to enhance their commercial drivers' capabilities and professionalism. Companies tend to specialise in the roles that they do best. Hauling single, full loads is different from moving less-than-truckload (LTL) cargo and companies' logistical setups use different processes to accommodate each type. Dry or liquid bulk loads are yet another type. Transport managers revealed that increasing

Table 40: Investments Required for Enhancing the Professionalism of Commercial Truck Drivers

Codes	Investments identified	Theme
• Professional training • Fatigue • Service quality • Safety • Incentive schemes	• Professional training programmes for commercial drivers • Customer service training • Incentive schemes to increase compliance with safety rules	Investments required for enhancing the professionalism of commercial truck drivers

the number professional training programmes should be a priority for commercial transport companies operating in the Arab region. They highlighted that training had a tremendous positive impact on their companies in terms of improved service and increased profits. More specifically, transport managers asserted the need for more training programmes related to safety awareness and traffic rules, transporting hazardous materials, fatigue and journey management, and safe braking techniques. Furthermore, customer service training programmes were also viewed as another priority; managers believed that this would increase customer satisfaction, creating customers who were willing to deal with the company again and again.

CHAPTER 4

4. CONCLUSIONS

Research shows that commercial vehicle traffic accidents occur less frequently than those involving other vehicles types, but when they occur, commercial truck accidents have a greater impact and cause much greater losses in lives and property. Commercial vehicle traffic accidents also result more frequently in deaths or injuries. Previous research2 has shown that in Saudi Arabia, the death rate per commercial truck accident reached 0.14/accident, compared to 0.01 for other vehicle types. The situation was similar in other Arab countries, including the GCC countries[3].

The ETAC study4 highlighted that the main cause of truck crashes in Europe was human error – in more than 85% of occurrences. However, only 25% of the accidents linked to human error and involving trucks were caused by truck drivers. Similarly, the LTCCS5 study found that the main cause of accidents involving large trucks was truck driver errors – in 48% of all accidents. Studies conducted in Arab countries also stressed the significant proportion of human errors in road traffic accidents.

This naturally raises questions the quality of Arab region drivers' safety knowledge and skills, as well as their professionalism. In professional road transport companies, this problem is probably aggravated by the low level of educational attainment of commercial truck drivers, as the study showed. Notably, about 12% of drivers had received no education whatsoever, and 62% had not gone further than elementary school. Moreover, many drivers came from cultures and social backgrounds where safety compliance is not considered a priority.

Road traffic accidents have been identified as causing significant losses in wealth across the Arab region. Data collected showed that GDP loss reached 6.77% in Sudan, 6.45% in Iraq, and 6.08% in Djibouti, followed by Yemen, Jordan, Libya and Lebanon (6.02%, 5.59%, 5.19% and 4.75% respectively).

This project's research showed that the region's top five causes of driver-related commercial truck accidents were speeding and loss of control in bends, overconfident driving, unsafe lane changes, a lack of professional driving abilities, and violating traffic rules. 58% of commercial truck accidents occurred en route, 29% during manoeuvring, and 13% during loading and unloading activities.

The measures, policies and practices implemented internally by the case study companies, to prevent or minimise road accidents, were made up of two types:

Firstly, measures related to professional training. These included regularly organised meetings on safety issues, induction, refresher, and continuous training programmes and tests, and communicating the causes and effects of recent road traffic accidents to other commercial drivers.

Secondly, performance monitoring measures. These included receiving and using comments from the public on commercial truck drivers' safety-critical behaviours, periodic driving skills assessments/checks, IVMS technologies and ride-along observation with an instructor.
Most importantly, there is solid evidence about the efficiency of these measures, as calculations have revealed that higher numbers of measures related to professional training and performance monitoring result in lower average numbers of reported accidents per million kilometres.

Case studies have illustrated that professional training has a positive effect on improving the safety and efficiency records of commercial freight transport companies.

However, training only reaps positive results when it takes place in a professional and high quality manner. In the Arab region, there is far too often evidence that the lack of quality and consistency in training programmes means that they cannot reach their full potential for positive results.

This study demonstrates that internal measures, policies and practices, as well as external training programmes delivered to truck drivers, can have a wider impact on a company's overall performance. This has been proven by the evolution of the key performance indicators listed below for after the introduction of training:

- Average reduction of 46% in the number of reported accidents per 1 million kilometres
- Average annual cost of medical care (in cases of exceeding insurance cover) reduced by 30%
- Cumulative man-days lost per year as a result of drivers' injuries reduced by 25%
- Average annual loss of revenues due to truck downtime caused by accidents reduced by 48%
- Annual cost of fleet repairs caused by accidents (in cases exceeding insurance cover) reduced by 17%
- Annual number of damaged deliveries due to accidents reduced by 51%
- Average annual cost of hiring and training new drivers as replacements for injured/absent drivers as a result of accidents reduced by 55%.

The impact on transport efficiency was also demonstrated by:

- Average annual IVMS violations reduced by 58%
- Average fuel consumption per kilometre improved by 14%
- Average annual percentage of savings on tyre costs improved by 8%
- Average annual maintenance and repair costs/truck reduced by 20%
- Average annual number of near miss reports increased by 112%, thus reflecting an

improvement in a culture of safety

- Average annual number of customer complaints reduced by 52%
- Average annual number of customer claims for damages reduced by 58%
- Average annual ratio of damaged deliveries to the total number of deliveries reduced by 42%

The ROI of professional training for drivers in the case study companies amounted to an astounding 1,632%. In other words, for every USD 1 spent on professional training for commercial drivers, around USD 17 was saved by the case study companies.

CHAPTER 5

5. RECOMMENDATIONS

Considering the very high costs of road traffic accidents in the Arab region, both for society in general and for the road transport carriers, and due to the proven fact that these costs can be considerably reduced by taking appropriate action targeting professional drivers' skills, the study's authors make the following recommendations.

Recommendations for governments and policy-makers:

Governments and policy makers should:

- Make road safety a key priority by adopting appropriate legislation and ensuring strict enforcement of the regulations.
- Introduce criteria for recruitment in the road transport professions, including minimum training qualifications, with a particular focus on safe and efficient driving. The study's findings suggest that training on these issues is a necessity. It is also critical that training (and related examinations) meets internationally recognised standards of quality.
- Require a minimum educational level for commercial truck drivers, in order to make sure that they are able to complete paperwork and trip records properly, comply with traffic laws and successfully undertake professional training programmes.
- Support and facilitate the establishment of institutions to train professional commercial drivers with the aim of establishing training programmes in which the goals of safe and efficient commercial transport operations are prominent.
- Introduce road safety awareness programmes into the educational curricula of schools and universities in order to promote a culture of road safety among all road users, including specific initiatives targeting the commercial transport industry.
- Make driving improvement courses mandatory for repeat violators of traffic laws and persons who commit serious driving offences.
- Introduce frameworks for professional qualifications for commercial drivers, in a harmonised manner throughout the Arab region, for example, by adopting and recognizing the international certificates issued by the IRU Academy.
- Commission in-depth, country-specific studies to further analyse scenarios for the introduction of professional qualification frameworks and their impacts on road safety and transport efficiency.

Recommendations for professional training schools:

- Establish high quality professional training programmes, backed by international industry standards, particularly in the field of road safety.
- Develop training curricula that also meet the needs of foreign commercial truck drivers with a limited understanding of Arabic and English.
- Ensure that programme instructors have been trained to deliver the very best in-class training and are certified by an international body as qualified road transport training instructors.

Recommendations for commercial transport operators:

- Improve companies' abilities to track KPIs in order to help them identify weaknesses, thus improving the efficiency of training and associated measures.
- Establish and instil a culture of learning which promotes a professional qualification as a key requirement for driving a company's commercial vehicles.
- Systematically ensure that transport companies' workforces, particularly their professional drivers, undertake appropriate training and retraining and obtain certificates to attest to their professional competence.

CHAPTER 6

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CHAPTER 7

7. APPENDICES

APPENDIX 1: COMMERCIAL DRIVERS' QUESTIONNAIRE

Commercial Drivers' Questionnaire
Ref. No. IRU/JDH/D01

Arab World Research Study on the Impact of Professional Training on Commercial/Freight Drivers

Dear Participant,
Thank you for your willingness to participate in this interview from **Jadarah Group** [1] conducted on behalf of **The International Road Transport Union** (IRU) [2], and we value your answers and comments.

The IRU is the world road transport organization, which upholds the interests of bus, coach, taxi and truck operators to ensure economic growth and prosperity via the sustainable mobility of people and goods by road worldwide. The IRU, as the global voice of the road transport industry, works towards achieving the twin goals of sustainable development and facilitation of road transport worldwide. [3]

Several studies such as the European Truck Accidents Study (ETAC) [4] and the Large Truck Crash Causation Study (LTCCS) [5] stated that the human factor is by far the most important cause of road accidents involving commercial transport vehicles. Hence the need arises to conduct a research study to tackle the impact of professional training on commercial transport within Arab World, and to measure its positive effect on road safety, as well as on efficiency gains.

As part of this research study, face-to-face interviews will be conducted with leading road transport operators active in the Middle East Region, where a driver training programme is established and runs, in order to collect evidence of performance improvement.

Thank you very much for your contribution in this important project which contributes to the UN Decade of Actions on Road Safety.

Questionnaire Consent Form

Place/Company Name: .....

.....

Part 1: Participant part

1. I agree to fill in this questionnaire for the purposes of the research named above.
2. The purpose and nature of the questionnaire has been explained to me.
3. The researcher has informed me that no names will be used or cited, and that identity of respondents will not be disclosed under any case.

Name of Participant: .....
Position: .....
Signature: .....

Part 2: Researcher Part

I have explained the nature of research to the participant and I have confirmed to participant that names will be kept anonymous and that information will be used for the sake of research purposes only.

Name of researcher: .....
Signature: .....
Date: ...../...../ 2015

1. Warm up [demographic & work history]

Could you please provide us with some details about you and your job?

a) How old are you?	☐ Under 30 years ☐ 30-40 years ☐ 40-50 years ☐ 50-60 years ☐ Over 60 years
b) Total years of commercial driving experience	..... years
c) Highest educational grade/qualification attained	.....
d) Years worked at this facility	|__|__|years|__|__|months
e) Which type of commercial vehicles do you drive?	☐ **Heavy Goods Vehicles (HGVs)** ☐ Rigid truck ☐ Semi-trailer truck ☐ Others (please specify): ☐ **Light goods vehicles (LGVs)** ☐ Van ☐ Others(please specify): .....

f) Which type of cargo do you transport?	☐ Hazardous ☐ Non- hazardous ☐ Both
g) Which type of qualification do you hold?	☐ License only ☐ License and other form of qualification (please specify): ....

1. Warm up [demographic & work history]

		Answers
Q1	Do you believe that you have enough knowledge and skills to perform your job safely and efficiently?	☐ Yes ☐ No
Q2	Do you think that the current applicable driving test carried out by your country's traffic departments is enough to license a commercial driver?	☐ Yes ☐ No
Q3	Poor driving behavior causes 90% of commercial vehicle accidents, and to promote road safety, we have to focus on the drivers, especially on training, coaching [6], and refresher training programs to provide the opportunity to acquire the knowledge and develop the attitudes that will help them to be safer commercial drivers.	☐ Strongly disagree ☐ Disagree ☐ Undecided ☐ Agree ☐ Strongly agree
Q4	What are the "General Training Programs/Awareness "sessions you have received [7], and where?	
	Training program / Awareness	**Place of training** (Driving School, Previous company, etc.)
	Awareness of risks	
	Inspection of the vehicle's air brake system for units equipped with air brakes	
	Vehicle restraint systems and safety equipment	
	Loading/unloading techniques	
	Backing and docking	
	The appropriate uncouple/couple procedures for combination vehicles	
	Economic driving programs	
	First aids	
	Customer service & service quality	
	Others (please specify):	
	I did not receive any general training	

Q5	What were the "Road Safety Training" programs you have attended?	☐ Defensive driving techniques ☐ Awareness about effects of medication and substance abuse ☐ Night operations ☐ ADR - carriage of dangerous goods by road. ☐ "Behind-the-wheel" training on the road with instructor ☐ "Behind-the-wheel" training on a driving range with a driving instructor ☐ Other(please specify): ☐ I did not receive any road safety training
Q6	a) Do you undergo periodical training? b) Do you undergo periodical assessment?	☐ Yes ☐ No ☐ Yes ☐ No

Q7

a) How do you perceive training?

1	2	3	4	5
Not at all important ( )	Not very important ( )	Neutral ( )	Somewhat important ( )	Very important ( )

b) In the previous question, if you perceive that training is somewhat important or very important, why do you think so? (Please select all that apply)

Reasons	1	2	3	4	5
Help to improve performance					
Reduce risk of accidents					
Investment in me as a person					
To keep up to date with progressing vehicles' technology					
Other reasons (Please specify)					

Q8

FOR DRIVERS WHO RECEIVED TRAINING

If you have attended one or more of the training programs mentioned in Q4 and Q5, how would you rate the impact of training on your performance in each of the following areas, using the below 1-5 scale:

1	2	3	4	5
Very low	Low	Moderate	High	Very high

A) Impact of training on behavioural skills:

	1	2	3	4	5	
1. Control of your vehicle & granting allowance for other drivers on the road						
2. Your "**anticipatory driving**": (To be constantly aware of what is happening around you. You should constantly be scanning the road ahead and checking your mirrors)						
3. Stopping "**tailgate driving**": (Keeping safe distance between you and other drivers on the road)						
4. Your response to sudden tire / brake failures						
5. Driving combination vehicles safely						
6. Driving loaded vehicles considering the issue of "center of gravity"						
7. Night driving						
8. Driving in poor weather, and on slippery surfaces						
9. Identifying the proper placarding for hazardous materials						
10. Securing and balancing the cargo						
11. Saving fuel by regulating your speed						

Q8	**B) Importance of training:**						
		1	**2**	**3**	**4**	**5**	
	a) Standard goods: 1. Staying alert and fit to drive:(Fatigue Management)						
	2. Fire prevention & fighting						
	3. Not to drive distracted (Use of mobile phone, look to "other things" on the road not linked to your driving, etc.)						
	4. Your chances of avoiding severe traffic violations						
	5. Keeping your delivery schedules: (Journey Management)						
	6. Reducing stress						
	7. Boosting your job satisfaction and morale as of a training						
	8. Improving client satisfaction						
	9. Increasing compliance with transport procedures						
	b) Dangerous goods: 1. Driving and parking rules in general, and specifically when transporting dangerous goods						
	2. Emergencies and proper communication rules when having dangerous goods						
	3. Awareness about the precautions specific for dangerous goods						

Q9	Is your company implementing a quality incentive program to encourage complying with road safety measures and procedures? If yes, which types of incentives are in place?	☐ Yes, and this includes: ☐ Financial bonus ☐ Salary increase ☐ Promotion to supervision position ☐ Other(please specify): ☐ No incentives
Q10	Based on the nature of business, and from your point of view, what are the appropriate frequencies to refresh road transport professional training programs?	☐ 1-2 years ☐ 3-5 years ☐ Whenever an assessment determines re-training is required ☐ No need
Q11	Are there any additional comments you would like to share with us?	

Thank you very much for your help

References:

[1] Jadarah Group homepage: www.jadarahgroup.com
[2] IRU homepage: www.iru.org
[3] www.iru.org/en_history_and_mission
[4] ETAC, European Truck Accident Causation Study http://www.iru.org/cms-filesystem-action?file=mix-publications/2007_ETACstudy.pdf
[5] LTCCS, Large Truck Crash Causation Study: An initial overview http://www-nrd.nhtsa.dot.gov/Pubs/810646.pdf
[6] www.ogp.org.uk/pubs/365-6.pdf
[7] American Association of Motor Vehicle Administrators: "Commercial driver license manual", July 2010

APPENDIX 2: TRANSPORT MANAGERS' INTERVIEW PROTOCOL

Transport Managers' Interview Protocol
Ref. No IRU/JDH/M01

Arab World Research Study on the Impact of Professional Training on Commercial/Freight Drivers

Dear Participant,
Thank you for your willingness to participate in this interview from **Jadarah Group** [1] conducted on behalf of **The International Road Transport Union** (IRU) [2], and we value your answers and comments.

The IRU is the world road transport organization, which upholds the interests of bus, coach, taxi and truck operators to ensure economic growth and prosperity via the sustainable mobility of people and goods by road worldwide. The IRU, as the global voice of the road transport industry, works towards achieving the twin goals of sustainable development and facilitation of road transport worldwide. [3]

Several studies such as the European Truck Accidents Study (ETAC) [4] and the Large Truck Crash Causation Study (LTCCS) [5] stated that the human factor is by far the most important cause of road accidents involving commercial transport vehicles. Hence the need arises to conduct a research study to tackle the impact of professional training on commercial transport within Arab World, and to measure its positive effect on road safety, as well as on efficiency gains.

As part of this research study, face-to-face interviews will be conducted with leading road transport operators active in the Middle East Region, where a driver training programme is established and runs, in order to collect evidence of performance improvement.

Thank you very much for your contribution in this important project which contributes to the UN Decade of Actions on Road Safety.

Interview Consent Form

Place/Company Name: .....

.....

Part 1: Interviewee part

1. I agree to be interviewed for the purposes of the research named above.
2. The purpose and nature of the interview has been explained to me.
3. I agree that the interview may be electronically recorded to make it easier for researcher to analyse data.
4. The researcher has informed me that no names will be used or cited, and that identity of interviewees will not be disclosed under any case.

Name of interviewee: .....
Position/Job title: .....
Signature of interviewee: .....

Part 2: Researcher Part

I have explained the nature of research to the interviewee and I have confirmed to participant that names will be kept anonymous and that information will be used for the sake of research purposes only.

Name of interviewer: .....
Signature of interviewer: .....
Date: ...../...../ 2015

4. Introductory Part

Could you please provide us with some details about you and your job?

a)Total years of experience in managing commercial fleets	..... years
b)Highest educational grade/qualification attained	
c) Nature of business	
d)Years worked at this facility	|__|__|years|__|__|months
e)Type of commercial vehicles in operation	☐ **Heavy Goods Vehicles (HGVs)** ☐ Rigid truck ☐ Semi-trailer truck ☐ Others (please specify): ☐ **Light goods vehicles (LGVs)** ☐ Van ☐ Others(please specify): .....
f)Types of cargo your company transports	☐ Hazardous ☐ Non- hazardous ☐ Both

5. Interview Questions

Q1	Could you please tell me about the current size of your operating fleet, the ratio of owned, to outsourced (if any), average annual total distance (Km) travelled by your fleet?
Q2	Tell me about the average number of reported accidents per 1,000,000 Km over the last three years?
Q3	a) What are your key performance indicators related to accidents and what has been their evolution over the last 3 years? b) Where are accidents happening? (i.e.; in route, whilst manoeuvring, loading-unloading, etc.)

IDENTIFICATION OF ACCIDENT CAUSES

Q4

"The identification of the accident causes is one of the approaches mainly used to improve road safety"[5]
According to your accident classifications, which of the following are the top 10 causes of accidents involving commercial drivers?

	Unprofessional drivers
	Over speeding & loss of control on bends
	Drowsy, and reckless driving
	Alcohol and drug impaired driving
	Distracted driving, and cell phone use and texting
	Impatient and tailgating
	Overconfidence
	Incorrectly secured cargo to the truck
	Not observing traffic rules (e.g. Running red lights/Stop signs)
	Avoiding safety gears like seat belts,....etc.
	Unsafe lane changes
	Tire blowouts
	Animal crossings
	Poor weather condition
	Defective vehicle parts: breaks, air bags, etc.
	Defects on roadway construction
	Improper tagging of construction zones
	Others' mistakes, especially young novice drivers
	Others (please specify):

Q5

What is your general perception of commercial driver professionalism?
Please grade your perceptual experience using the following 1-5 scale:

1	2	3	4	5
Not at all professional ( )	Not very professional ( )	Undecided ( )	Somewhat professional ( )	Very professional ( )

Q6

If you think, in Q5, that commercial driver's professionalism is not ranked at 5? What are the reasons behind this?

Q7	**BEST PRACTICE** What are the measures, policies, and practices implemented in your organization to prevent / minimize road accidents? **a) Professional training related measures** ☐ Driver performance through induction, refresher, and further training programs. ☐ Provision of the company driver manual. ☐ Top-down communicated "cause and effect" of accidents. ☐ Regular "Tool Box" safety tips. ☐ Periodical driver skill assessment / checks. ☐ Training tests. ☐ Others (please specify): ☐ We do not have a training policy
	b) Performance monitoring measures ☐ Riding-along (monitoring) to observe safety-critical behaviours of drivers. ☐ Receiving and using comments from the public to observe safety-critical behaviours of drivers (Dial in number on trucks for observation on driver behaviour). ☐ Formal safe driver recognition and incentive program. ☐ Periodical driver skill assessment / checks. ☐ Random drug / alcohol tests. ☐ IVMS (In Vehicle Monitoring System). ☐ Formal review program for driver qualification. ☐ Clear role of drivers' immediate supervisors and dispatchers regarding safe driving. ☐ Others (please specify):
Q8	What investment and efforts do they require and what are the results?
Q9	**IMPORTANCE OF TRAINING COMPONENT IN THE HIRING PROCESS** To which extent road transport professional training is important in the hiring and selection process of new drivers at your company?

Q10	What are your key criteria you consider when hiring drivers today? ☐ Driver's license ☐ Language ☐ Training ☐ Age ☐ Experience ☐ Other (please specify):
Q11	Where/how do you hire your drivers today? ☐ Locally ☐ International through local hiring agency ☐ International through foreign agency ☐ International through own network ☐ Using Internet job hiring sites Please describe:
Q12	In your hiring process, would you benefit from a web-platform where you could search for qualified drivers with international certification that would match your needs? ☐ Yes ☐ No If not why?
Q13	**MEASURING THE SUCCESS OF DRIVERS' PROFESSIONAL TRAINING** a) How do you measure the success of your road transport professional training program?
	b) Which KPIs are in place to measure success?

IMPACT OF DRIVERS'TRAINING ON THE ORGANIZATION

Can you provide KPI figures before and after training have been introduced?

KPI	Figures	
	Before training	After training

Q14

And can you provide KPI figures of trained vs. untrained drivers?

KPI	Figures	
	Before training	After training

Q15	**MEASURING RETURN ON INVESTMENT (ROI) OF COMMERCIAL DRIVERS' PROFESSIONAL TRAINING** a) Based on your answer on Q14, what is the ROI of the professional training of the drivers at your company, and how it is measured? b) Based on training-related KPI improvements, can you estimate the savings achieved through training, i.e. the extra costs incurred if training were not delivered?

Q16	a) Which are the training programmes you will prioritize to be developed and implemented in the next 3 years? b) How would you like to develop and implement these programmes? ☐ Develop internally ☐ Implement Internationally recognised best practices and implement internally ☐ Rely on an external vendor ☐ Other (please specify):
Q17	Is there any additional comments or recommendations that you would like to share with us?

Thank you very much for your help

References:

[1] Jadarah Group homepage: www.jadarahgroup.com
[2] IRU homepage: www.iru.org
[3] www.iru.org/en_history_and_mission
[4] ETAC, European Truck Accident Causation Study http://www.iru.org/cms-filesystem-action?file=mix-publications/2007_ETACstudy.pdf
[5] LTCCS, Large Truck Crash Causation Study: An initial overview http://www-nrd.nhtsa.dot.gov/Pubs/810646.pdf
[6] Hermitte, T:"D5.9 Review of Accident causation models used in Road Accident Research of the EC FP7 project. DaCoTA" – 2009.
[7] www.roadsafetyobservatory.com/Review/10049

IRU founded in Geneva, Switzerland, on 23 March 1948 is the global industry association for road transport, driving the sustainable mobility of people and goods across the planet.
www.iru.org

The Arab Union of Land Transport, located in Amman, Jordan, was established in 1976, as an offspring of the Arab Unified Economical Council. It is a Pan - Arab Organisation representing the road transport interests in Arab States League and has 60 members in 15 countries. The main objective of the AULT is to coordinate the efforts of its members in developing the land transport sector in all Arab countries by promoting operational efficiency and by increasing the scope of activities. It also provides assistance to its members to expand intra-Arab transport of individuals and goods, to facilitate transit transport, and to connect land transport fleets and modernise the road networks.
www.auolt.org