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An evaluation of the impact of the Road Transport Management System (RTMS) workshop in promoting voluntary certification

Kamdar, Abdool Kader Ebrahim

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AN EVALUATION OF THE IMPACT OF THE ROAD TRANSPORT MANAGEMENT SYSTEM (RTMS) WORKSHOP IN PROMOTING VOLUNTARY CERTIFICATION

Abdool Kader Ebrahim Kamdar

A research report submitted to the Faculty of Engineering and the Built Environment, of the University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Science in Engineering.

Johannesburg 2020

DECLARATION



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Postgraduate Office, Faculty of Engineering and the Built Environment

1 Jan Smuts Avenue, Braamfontein, 2000, Johannesburg

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ABSTRACT

The Road Transport Management System (RTMS) is a South African road transport industry-led voluntary compliance scheme that ensures compliance in terms of vehicle condition, load safety, driver training, as well as speed and fatigue management. Certified companies report up to 20% fuel consumption reduction, and accidents reduced by up to 66%. The RTMS should therefore be readily adopted by industry, which, due to the safety outcomes, would be in the public interest. With 255 out of about 18 000 road transport companies in South Africa certified in the 16 years to end 2019, a penetration of about 2% has been achieved. The purpose of this investigation was to evaluate the effectiveness of the RTMS workshops towards increasing the number of companies attaining RTMS certification. In order to do this, the effectiveness of the RTMS workshops was evaluated, particularly towards improving participants' knowledge, motivation, commitment, and clarity on the requisite steps. A quasi-experimental single group pre-test post-test design was used. Surveys were conducted at five RTMS workshops around South Africa. Attendees answered questions pre and post the RTMS workshops and responded on a 5 point Likert scale in pencil-and-paper format. The results showed that the RTMS workshops increased the knowledge, motivation, commitment, and clarity on the requisite steps towards certification for first-time attendees and, to a lesser extent, repeat attendees and people from RTMS certified companies. The recommendations of this study are that the RTMS workshop be marketed specifically towards first-time attendees and that the two-day RTMS training course be positioned as an advanced offering to repeat attendees, or people from companies that are already certified. It is suggested that delegates be given course notes, as well as a flow chart of the steps to becoming RTMS certified. It is further suggested that a digital toolkit, examples of best practice and a list of RTMS consultants be made available to road transport operators wishing to get certified in order to reduce the barriers to implementation.

DEDICATION

I dedicate this work to my late uncle, Dr Cassim Kamdar, who graduated as a medical doctor at the age of 48 through sheer determination, perseverance and grit, to my parents Ebrahim and Zora Kamdar who have always supported my desire for learning, and to my children, Nazeer and Sabeeha — may you always be inspired to learn and may you always be constantly curious.

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I am grateful to have had Professor Frank Kienhöfer as my supervisor, and for his patience and guidance. This research project would not have been possible without the support of Shabir Mansoor, Managing Director, KDG Logistics, my friend and employer who tolerated my need for time off to attend classes and to conduct the research. I am also deeply grateful for the support of the RTMS Steering Committee, especially Dr Paul Nordengen. Thank you to all the RTMS workshop attendees who graciously participated in the surveys. I also owe a debt of gratitude to my sister and brother-in-law, Fathima and Shiraz Omar, as well as my good friends Lata and Rajesh Parbhoo for their friendship, generous hospitality, for being there whenever I needed a "sounding board" for ideas and whenever I needed to be motivated to continue. A huge thank you to my son Nazeer, for patiently teaching me statistics again. My gratitude to Antoinette du Plessis for sharing her Excel prowess. Finally, thank you to Dr Nazreen Dasoo for her invaluable guidance and motivation. May you all be constantly blessed in every aspect of life.

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LIST OF ACRONYMS

ARP	*Aanbevole*/Recommended Practice
CSIR	Council for Scientific and Industrial Research
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
KZN	KwaZulu-Natal
LAP	Load Accreditation Programme
NATMAP	National Transport Master Plan
OECD	Organisation for Economic Co-operation and Development
PBS	Performance-Based Standard
RTMS	Road Transport Management System
SABS	South African Bureau of Standards
SANS	South African National Standard
USA	United States of America

1. INTRODUCTION

1.1 Background

South Africa has 12.5 truck crash-related fatalities per 100 million kilometres travelled on its roads. This is 4 to 10 times higher than European countries such as Denmark, France, Germany and Switzerland (OECD, 2011). Logistics costs typically comprise a significant percentage of a country's gross domestic product (GDP). In 2015 logistics costs were 7.85% of GDP in the USA (Logistics Management, 2016) and an estimated 11.7% of GDP (50% higher) in South Africa (Havenga et al., 2016). This negatively impacts South Africa's manufacturing competitiveness and impedes economic growth. Truck-related road safety, as well as the costs of road transport, are misaligned with global norms and it would benefit South African society to improve on this.

The Brake and Tyre Watch project is a South African industry initiative, where technical experts provide training to traffic officials at roadside inspections on major transport routes. Heavy vehicles are pulled off the road and checked for defects, with a specific focus on brakes and tyres. During 39 events conducted between 2006 and 2018, 725 vehicles were inspected, with 494 being taken off the road, meaning that 68% of vehicles were found to have defects requiring the vehicle to be prevented from continuing its journey (Fleet Watch, 2016). These statistics present a cogent argument that regulation and enforcement are ineffective in South Africa. Brakes and tyres in heavy vehicles are at the very core of fleet safety and allude to systemic issues in the way a transport fleet is managed. They provide a "tip of the iceberg" test of the fleet maintenance management and are indicative of pervasive organisational safety cultures of non-compliance, as well as the ineffectiveness of enforcement. Besides poor maintenance, overloading is also a serious problem, and it is estimated that 15% to 20% of heavy vehicles are overloaded, causing 60% of all accelerated road damage (The Quarterly Sustainability Review South Africa, 2012).

Rail transport has a lower cost to operate, lower carbon emissions and many other benefits over road transport, and should be the first choice for consignors on major routes. It is however, unreliable, and has poor first and last mile integration which makes it cumbersome as an option for freight buyers. Rail freight is often priced at parity with road freight which diminishes its cost competitiveness as the reliability, timeliness and other issues further negates the value proposition. The number of rail stations and sidings has reduced dramatically since the 1990s and this reduces the points of engagement for rail service. As a result, road transport remains the dominant mode of inland goods transport. Notwithstanding Transnet's road-to-rail strategy to take cargo off roads (Department of Transport, 2017), it is still necessary to rehabilitate road transport to reduce its negative impacts.

The high truck crash and fatality rate, poor truck brake and tyre maintenance and overloading in South Africa suggest that law enforcement alone is unable to ensure road traffic legislation compliance (Nordengen, 1998). As a result, the Road

Transport Management System (RTMS) was established to address this problem through self-regulation.
The Road Transport Management System (RTMS) is described as:

> "An industry-led, government-supported, voluntary, self-regulation scheme that encourages consignees, consignors and road transport operators to implement a management system (a set of standards) that demonstrates compliance with the Road Traffic Regulations and contributes to preserving road infrastructure, improving road safety and increasing productivity." (Nordengen & Naidoo, 2014).

The RTMS was initiated in November 2005 to promote self-regulation in the South African road transport sector (Ibid, 2014). Regulatory compliance relies on law enforcement, while voluntary compliance is self-managed.

The broad long-term goals of the RTMS are to:

- Improve road transport efficiency,
- Increase levels of regulatory compliance,
- Reduce accelerated road infrastructure damage due to overloaded vehicles, and
- Improve road safety.

The RTMS covers a wide spectrum of activities related to road transport operation, including:

- Loading control (mass and dimensional compliance to eliminate overloading and reduce under-loading, in order to optimise efficiency without compromising safety or road degradation),
- Driver wellness (medicals, diet, rest breaks, HIV prevention and testing, driver scheduling and fatigue management, etc.),
- Safety and compliance (speed control, maintenance planning, pre-trip inspections, tyre management, documentation, and systems), and
- Training and development (annual training plan, defensive driving instruction, mentoring, counselling, monitoring).

RTMS certified companies report up to 20% fuel consumption reduction, and accidents reduced by up to 66% (Naidoo, 2015). In the 16 years to 2019, 255 out of 18 000 road transport operators have been RTMS certified. With such positive operator cost reduction outcomes, as well as the improved safety it is both in the interest of the operators and the public for the RTMS to be more widely adopted.

The RTMS workshops conducted by the RTMS Steering Committee are the key mechanisms through which road transport operators are informed of the objectives of the RTMS, the requirements for certification, and of the results achieved by operators who had successfully implemented the RTMS. There are usually six such workshops held each year in various parts of the country and the total attendance is about 600 delegates a year with about half being road transport operators (Kamdar

et al., 2017). Besides the workshops, there is also a two day RTMS course which is aimed at persons in road transport companies who are responsible for the RTMS implementation (see Appendix G for the two day course flyer).

In setting out to study: "What is the impact of the RTMS workshop on participants in terms of knowledge, motivation, clarity of steps and commitment to voluntary compliance?", a one group pre-test post-test research design was used. A survey instrument was developed to measure four constructs; knowledge, motivation, commitment and clarity of steps to certification. Participants at five RTMS workshops in various parts of South Africa were surveyed, and the results were represented graphically. The sign test was then applied to test the data for increases in the four constructs being measured. Test statistics were calculated to determine the significance of the results and reliability analysis was conducted using Cronbach's alpha to test for internal consistency. Covariance analysis was used to determine the interaction between "Attended RTMS workshop" and "Is your company RTMS certified?".

It has been detailed in this section that the negative impacts of road transport are largely the result of non-compliance to regulations and lack of enforcement. The RTMS has been introduced as a means of voluntary certification or "alternative compliance". The following section reviews the literature by exploring regulatory reform, and enforcement as well as survey instruments which can be used to evaluate alternative approaches.

1.2 Literature Review

This literature review explores factors in road safety, some impacts of non-compliance, reasons for non-compliance, approaches to regulatory reform in various countries, as well as actions taken towards improving road safety in these countries. Alternative types of regulatory reform are then presented which include the Chain of Responsibility approach, the demerit system, as well as the organization versus the driver's role in road safety agency and accountability. Operator licensing is then considered as a barrier to entry to new market entrants as a means to ensure adequate transport revenue to ensure quality of transport outcomes. Arguments are offered for Organizational Health and Safety (OHS) approaches to road safety, regulations and investigations. The various regulatory reform approaches are then critiqued with respect to how they have influenced regulatory reform in road transport, and how they may contribute to positive road transport outcomes. The Road Transport Management System, its formation and its structure, how it relates to the mentioned regulatory reforms, as well as some of the successes of self-regulation in other countries is considered and an argument presented for self-regulation as a means to efficient and effective road transport industry reform in South Africa. The role of the RTMS workshop is outlined and the workshop agenda is presented. Finally the design of the survey instrument as well as methods of assessing the constructs being examined are explored.

1.2.1 Factors in Road Safety

Raftery et al. (2011) have identified speed management and enforcement, as well as the effectiveness of accreditation schemes as two key aspects of heavy vehicle road safety. A transport accreditation scheme is a code of good practice that sets a standard for safety management and compliance, and is usually monitored by an independent authority. Ibid. (2011) further report that in Australia, the most common type of heavy vehicle crashes were single vehicle events which involve leaving the road or rolling over. Common factors associated with crashes include speeding, mechanical condition of vehicle which includes brakes, characteristics of the load carried which includes overloading, as well as human factors such as fatigue. Road design elements such as the horizontal alignment of curves and the sealing of road shoulders has a significant impact on road safety. Fatigue management is regarded as one of the key human related issues in the heavy vehicles industry together with substance abuse. Speed is also a critical issue for heavy vehicle road safety. Low speed infringements in high risk areas are often a bigger problem than is extreme speeding. Intelligent speed monitoring, or the use of telematics can be a very useful tool in monitoring and improving driver behaviour. The study notes that high visibility speed enforcement has proven to be very effective in reducing speed in targeted areas, although the effects of these campaigns are often short lived once the campaign ends. Speed enforcement cameras have also proven to be effective on routes in which they are installed. This study is very useful as it considers a multitude of rehabilitation and enforcement measures, as well as operator accreditation (similar to the RTMS) which has had positive results in improved safety outcomes.

Lydon et al. (2014) report that speed and speeding management are core to any attempt to reduce road crash incidents, with speed reduction having the largest influence on crash related trauma. The same study also reported that work-related road crashes account for about half of all the occupational fatalities and a significant proportion of road fatalities in Australia. This is consistent with some aspects of Raftery et al. (2011). Yagil (1998) found that age was also a factor in road safety with younger drivers less inclined to obey the law, and with a lower sense of perceived danger of violations. Older drivers have more of a sense of obligation to obey traffic laws. Attempts at managing speeding and rehabilitation of speeding offenders has to consider the human factors and what drives the behaviours.

It is important to understand the links between occupational safety, and the safety of the public. Quinlan, Johnstone and Mayhew (2006) make some very useful observations: 1. Occupational Safety and Public safety are inextricably joined in the instance of road transport operations. 2. The crash and fatality tolls in trucking is often highlighted by large crashes involving multiple vehicles and many lives lost, but the daily crashes and loss of life goes largely accepted as a natural consequence of transport. 3. Road regulations and enforcement largely focus on the behaviour of the individual, the driver, which shields the company from much of the corporate responsibility and culpability in their role as management of their operations. The death of truck drivers on duty is very rarely investigated and much less prosecuted which results in their having little or no regulatory significance.

Treating trucking transgressions via transport regulation rather than workplace safety regulations has been rather ineffective in reducing transgressions or incidents. In essence, by ascribing the transgression to individual agency, namely the truck driver, the responsibility for risk management and reduction has been moved away from transport management in many instances. They (Ibid. 2006) also assert, that when considering Europe, US and Australia, regulators have been unable or incapable of addressing the causative factors in road transport crashes. The focus on driver fatigue, speeding, general road rule evasion, poor vehicle maintenance, drug use, etc. have been ineffective as they focus on the symptoms but not the underlying causes of these bad practices. It is further argued that a fundamental cause is that economic interests of the transport business puts pressure on all other facets. In essence, competition for market share has driven rates down to the point where non-compliance is seen as a way to stay in business. A consequence of the current regulatory approach in road transport is that truck related crashes and fatalities are not investigated for breach of OHS law or related breach of corporate responsibility. Without considering the culpability of the company or organisation, serious breaches of regulations may go un-noticed. Charges are most often levelled at the driver of a heavy goods vehicle involved in a collision and it is his conduct that is investigated. The charging of the driver may be appropriate, but should not be the only enforcement action. Focus on the driver as the cause of the accident or his culpability introduces a bias and imbalance in 3 ways; Firstly, the focus on the driver sends a very poor signal to the consignor, consignee, and the owner of the transport business about their own conduct, responsibility and accountability in the transport endeavour. Secondly, if the objective of regulatory reform and strategy is to prevent incidents and injuries resulting from freight operations, then a focus has to be placed at the source of the problem namely the pressure on drivers, and the organizational constraints within which they function. Thirdly, when a truck driver dies in a crash it is seldom that there is any investigation into the possibility of corporate responsibility in the cause of the accident.

Quinlan, Johnstone & Mayhew (2006) argue that by focusing on the driver and his role as causative agent, regulators have chosen to not consider it as an OHS issue. By not taking an OHS perspective, the opportunity is lost to examine in detail the various aspects such as driver training, driver scheduling, fatigue management, vehicle maintenance, vehicle inspections, and other corporate responsibility factors that may in fact play a central role in the direct cause of the crashes. Understanding these contributions may reveal underlying causes such as over-intense price driven competition. Ibid. (2006) suggest that due to low barriers of entry into the transport industry, or the availability of lower priced drivers from across borders leading to longer working hours to make up a pay packet. Understanding these industry factors through their causative interactions in crashes may lead to alternative policy and regulatory reform towards operator licensing or permitting with the aim of regulating the supply side of road freight and inducing higher prices that allow for safer work practices. The inter-relatedness of the roles of driver and organisation cannot be ignored, and the driver cannot be the sole target in road safety investigations. The driver functions within a transport company and the company has benefit of his actions, and is responsible in directing same. Where regulation is

disjointed in the approach to driver and the company in transgressions, the regulation needs to be harmonised to ensure that accountability is directed at the correct entity. This study makes a strong argument for the organisation to be placed at the centre of safety systems implementation, enforcement and accountability similar to the OHS approach and is a complements the earlier mentioned studies. The central role of the organisation in road safety is a fundamental tenet of the RTMS, which takes an OHS approach consistent with what this study recommends.

Fatigue is also reported by Beaulieu (2005) as one of the biggest road safety issues facing road transport. Whilst it may seem intuitive that lack of sleep or long working hours may lead to fatigue, it is important to consider other causes or aggravators that may induce fatigue. These other factors are anaemia (including iron deficiency), insomnia, sleep apnoea, narcolepsy, ongoing pain, allergies, asthma, an underactive thyroid, use of alcohol or drugs, and depression or grief. Chronic infections and diseases such as tuberculosis, HIV/AIDS, congestive heart failure, diabetes, chronic liver disease, anorexia, arthritis, cancer and others may also induce fatigue even with acceptable work and rest schedules. The symptoms that fatigued drivers may present with include loss of alertness, difficulty in keeping eyes focused, frequent yawning, loss of concentration and wandering thoughts, reduced awareness of surroundings, memory lapses, failure to check rear view mirrors frequently, unconscious speed variation, driving too slow or too fast, drifting across lanes, missing turn-offs, etc. Whilst these are all factors directly attributed to the driver, the company would be well advised to be aware of drivers having pre-disposing conditions that increase the likelihood and impact of fatigue. This again implies the organizational role in what is often attributed to driver agency. Time of day fatigue risk is maximum between 10 pm and 6 am as most people have an established circadian rhythm. A road transport operator wanting to minimize the safety impacts of fatigue would not only schedule drivers to minimize fatigue, but will also train drivers to identify when they are at risk, or fatigued and encourage that they rest rather than continue their journey. These are important aspects of the RTMS as a safety system, and each company has to demonstrate auditable compliance to fatigue management and driver scheduling.

Goel (2018) found that the difference between observing the working hours and night hours definition in various European countries' legislation, compared to a worst case of 4 hours defined as night time resulted in a difference of 10% in average risk. This corroborates the findings of Beaulieu (2005) with regard to working hours and fatigue. A key contribution of Beaulieu (2005) is that fatigue management has to go hand in hand with managing health and wellness as its foundation. The RTMS has driver health and wellness as a core pillar of implementation and compliance.

Nævestad, Elvebakk, & Phillips (2017) identify risk factors related to drivers, vehicles, the road, and the organisation. Of the driver related factors, speeding is by far the most significant, followed by inattention, fatigue, and lack of seat-belt use. Vehicle related risk factors include insufficiently secured loads, bad brakes, blind spots and tyre-related issues. Work or organisation related issues encompass stress and time pressure, speeding and the wearing of seatbelts as an organisational

concern, working hours and fatigue management, pay systems that promote excessive work hours, lack of or ineffective safety management systems, and employer vs employee perceived responsibility for safety. A system of organisational safety management is proposed with a combination of safety structure and safety culture. Enforcement through a system of administrative as well as court sanctioned notices and penalties as shown in Figure 1.1 has been identified.

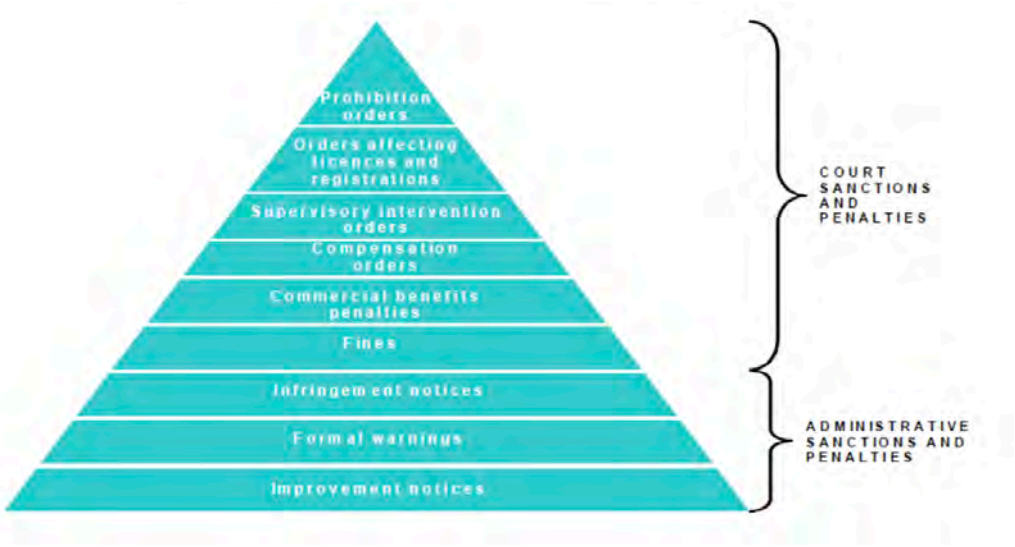


Figure 1.1 Responsive regulatory reform (Nævestad, Elvebakk, & Phillips, 2017)

Communication and written notices are a useful way of obtaining behaviour modification in transport companies, and have been used to good effect in Australia with improvement in compliance evident in 90% of cases where improvement notices were sent to companies (Jones, 2013). This in itself alludes to the desire of companies to inherently be compliant. Regulators need to respond in an even-handed manner that is consistent and fair to "win back" those who do not comply and to prevent those who are trying to comply from falling prey to the cynicism that will lower their desire to self-regulate. This approach to enforcement is very powerful as Figure 1.1 shows, there are 3 layers of remedial action prior to a fine being issued. This gives credibility to the intention of the regulation and enforcement being to rehabilitate rather than punish. The number of administrative warnings and notices makes it somewhat evident that the role of regulation and enforcement is not just to financially punish operators, but to actually change behaviour.

A safety strategy proposed by Nævestad, Elvebakk, & Phillips (2017), is to consider the mentioned risk factors and embark on developing a 4 stage "safety ladder" as shown in Figure 1.2. Step one is to enrol the commitment of managers and employees to safety. Step two is to follow up on speeding and the drivers' use of seatbelts. Step three is to focus on work-related (organisational) factors and their influence on safety. Step four is to embark on a formal safety management system implementation such as the ISO 39001.

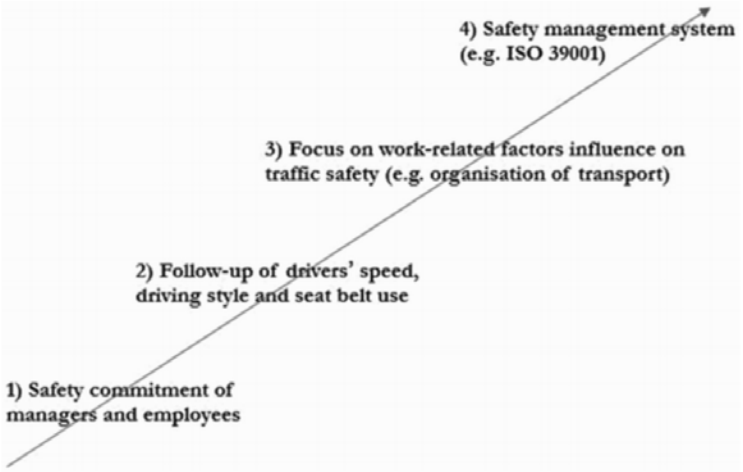


Figure 1.2 The Safety Ladder for road transport safety management (Nævestad, Elvebakk, & Phillips, 2017)

Whilst this presents good work done in identifying the risk factors affecting road safety, as well as some guidance towards developing a strategy, it is still rather vague in how this may be implemented at the company level, and how the effectiveness would be measured.

1.2.2 The Impacts of Regulatory Non-Compliance

Regulatory non-compliance has been directly linked to undesirable safety outcomes in the heavy vehicle goods transport industry with overloading being a commonplace non-compliance. Rys et al. (2016) found that an increase in the percentage of overloaded vehicles from 0% to 20% can reduce the fatigue life of asphalt road surfaces by up to 50%. Overloaded trucks are also likely to be less manoeuvrable and more difficult to control in an emergency. Speeding and fatigue are also associated with higher crash rates (Jones, 2013). In Australia as an example, heavy trucks and buses only make up 3% of all registered vehicles, and about 8% of kilometres travelled, yet are involved in 18% of all road accident fatalities (Australian Transport Council, 2011). The likelihood of death in a road crash was three times greater if a heavy truck was involved. Research has identified 6 motivations for regulatory non-compliance: 1. Failure of regulatory reach, 2. Lack of ability to comply, 3. Lack of willingness to comply, 4. Economic imperative, 5. Opportunism, 6. Determined Recidivism (The act of a person repeating an undesirable behaviour after they have either experienced negative consequences of that behaviour, or have been trained to extinguish that behaviour.)

1.2.3 Reasons for Non-Compliance

Failure of regulatory reach or impact is often simply due to lack of awareness. Whilst truck drivers are largely very much aware of the regulations, some operators are not quite on the same level of awareness of the road regulations. This is particularly true for operators for whom transport is peripheral to the main business

activity, such as farmers, construction companies, etc. These companies focus on their core business activities and do not pay adequate attention to their responsibilities within their transport function area. Education and awareness campaigns may be effective where persons are generally inclined to be compliant, but may not be fully aware of regulations. Ability to comply can relate to the regulations being described in sufficient detail and clarity to enable an unambiguous understanding of the requirements for compliance (Jones, 2013). Case in point is fatigue management, where regulations do not offer sufficient detail to offer the opportunity for compliance. In some cases, there are insufficient safe rest stops for truck drivers to pull over and rest even though they may want to comply with the requirements regarding rest breaks. Improving regulations and guidelines are a good starting point in this instance, as well as the promotion of Electronic Work Diaries which have worked well in the USA.

Jones (2013) argues that the profit intent is a strong motivator for non-compliance, especially with over-loading and speeding. Transport operators work with very low margins and therefore the slightest economic advantages could mean the difference between profit and loss. This often results in operators overloading, speeding or driving fatigued, more especially in the case of owner operator businesses. In order to promote a willingness to comply with laws, the laws must seem to have substantive purpose. There should be a perceived fairness to the regulation, its intent, implementation and enforcement. Failure in these elements can result in not only non-compliance, but also a culture of promoting others towards non-compliance.

Jovanovic et al. (2017) report that voluntary compliance with speed limits may be influenced by personal or social norms, as well as a moral perspective on the transgression. It may therefore be possible to rehabilitate offenders by appealing to their personal norms through awareness and education. In designing rehabilitation exercises it is important to consider breaking bad habits and forming new positive ones. Constant reinforcement is required either through incentivising the good practice or penalising the bad practice. An effective speed enforcement programme should therefore have elements of education, awareness, increasing the risk of apprehension, and the severity of the penalties.

1.2.4 Approaches to Regulatory Reform

There are no road transport solutions that are universally applicable “off the shelf” across different countries. The historical, cultural and socio-political context of each environment will guide the policy and regulatory reforms applicable in each context. Figure 1.3 shows some of the issues in Road transport as well as their causes. The inter-relatedness of the various stakeholders in road transport are shown, together the ways in which they may contribute to the issues or solutions. In any regulatory or policy reform, the objectives need to be clear. There should be an organized attempt to identify the issues, prioritize them, and design effective interventions towards meeting the objectives. This should be a data driven approach with the ability to monitor the effectiveness of the interventions in relation to the stated objectives. Sustainability of reform is ensured through proper identification

of key stakeholders and engagement to create ownership of the reform. Direct and indirect stakeholders such as societal structures as well as industry bodies could be useful in the embedding of change towards the reform objectives. It may be useful to consider regional reform where trade flows across borders create shared supply-chain elements and thus harmonized legislation may be more easily implemented (World Bank & IRU, 2017).

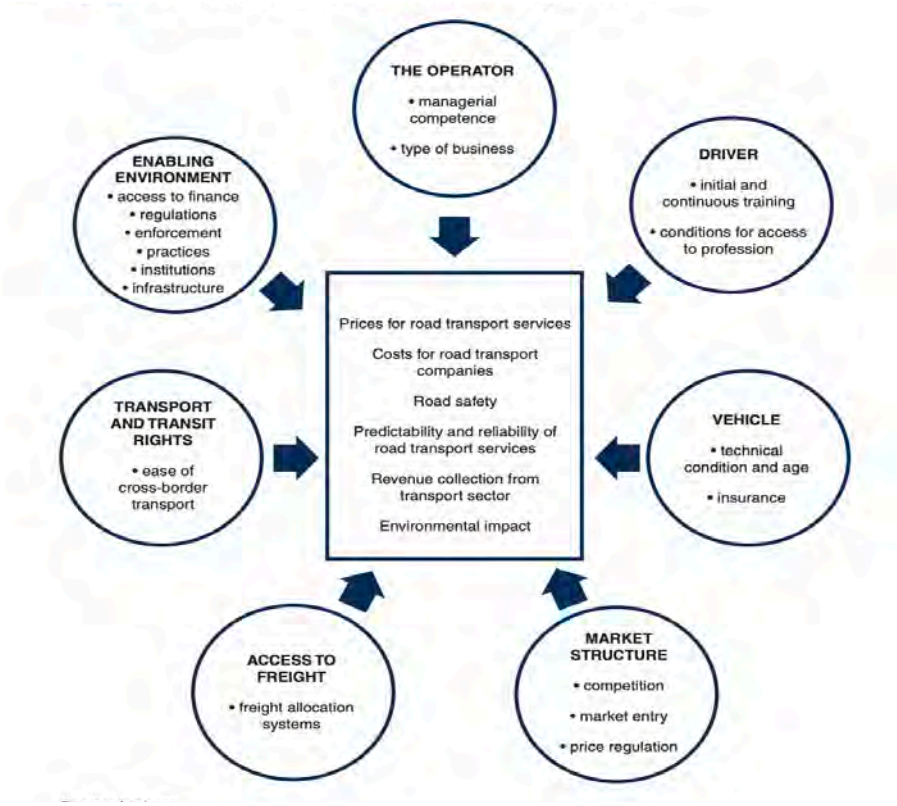


Figure 1.3 Issues and their main causes in the road transport sector (World Bank & IRU, 2017)

It is also likely that the problems themselves are common within a region, or that the required regulatory reform has already been implemented within the region. Such regulations may be replicated for uniformity. Regulatory reform on its own is poorly positioned to effect change, and proper enforcement is vital to ensure that the regulations are adhered to. To this end, proper administrative structures need to be enabled and trained to ensure credible application of the regulations.

Road transport operators are usually small enterprises, but in many instances these small companies have evolved into larger, and sometimes multi-national entities. The lack of a licensing regime for these businesses in many instances reduces the barrier to entry which results in severe competition. This is a disruptive force that impacts the viability of the sector. The driver plays a pivotal role in the transport endeavour as he is often the interface with the customer, regulatory and enforcement structures, as well as other motorists and the public. The driver is often required to obtain a professional driving permit to ensure a higher level of training and competence than is the case for general motorists. Drivers are often expected

to carry out a number of ancillary tasks such as loading, vehicle inspections, load securement, border customs processes, etc. and the driving task is often only one part of his general scope of activity. The vehicle is quite central to the transport task as well, with safety and quality of service often linked to the suitability of the vehicle, and the maintenance of the vehicle within the task specification. In the pricing, planning and execution of transport tasks it is often only the internal direct costs associated with the transport movement that is considered by the operator and passed on to the customer.

The key areas of road transport reform are identified in Figure 1.4: market structure, the operator, the driver, the vehicle, enabling environment and externalities. The road transport market is quite specific regionally and involves both qualitative and quantitative restrictions for operators to access these markets. Deregulation in some markets have reduced or eliminated some of these restrictions which has an impact on safety, security and quality of service. In these instances, voluntary certification, such as the RTMS can restore safety outcomes.

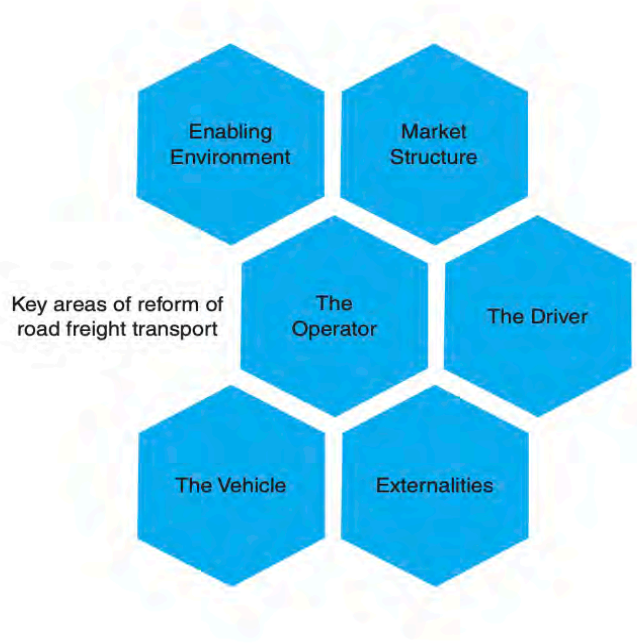


Figure 1.4 Areas of reform in road transport (World Bank & IRU, 2017)

One approach to safety, the Chain of Responsibility regulations in Australia has had a significant impact in reducing road safety contraventions as it places joint responsibility on the operator and supply chain partners, which are usually larger businesses and usually in some way are either responsible for the contraventions, are aware of them and condone them. (Beesley, 2016) The regulations apply to operators, prime contractors, consignors, consignees, loading managers, packers, unpackers and covers all aspects of the transport risk including speed, fatigue, mass and dimension, and loading. In essence the Chain of Responsibility regulations recognizes the role of key off-road stakeholder whether it be through their actions, demands or inactions and holds them accountable. This is a much more comprehensive approach to safety accountability than was proposed by Quinlan,

Johnstone & Mayhew (2006) where they looked to the organisation as the responsible agent in managing road safety rather than the driver. This approach has to some extent reached South Africa with the promulgation of Road Traffic Regulations 330A to 330D in 2014 which sets out to draw the supply chain partners into the chain of responsibility for overloading as an example. Whilst the regulation has been in force since 2014, enforcement has largely not yet been enacted. This is an example of the huge chasm between regulation and enforcement in road transport in South Africa. The RTMS draws consignors, transport operators and consignees into responsibility and accountability for regulatory transgressions.

Opportunism arises when people flout the law simply out of the belief that they will get away with it. The opportunist believes that the chances of the infringement being detected is so low that the non-compliance is worth the risk. To overcome this, regulators need to be seen to enforce regulations. It is the visibility of enforcement that serves as a deterrent to opportunism. When it comes to habitual repeat offenders, it has to be noted that some people are "beyond" conformance and rehabilitation. Whilst most people are inherently law abiding and compliant, there is in every society an element of anti-establishment and non-conformance. An often used regulatory action for these offenders is a demerit system. Regulators take the view that repeat offenders will run out of room to transgress. Livingstone (2011) found that the best predictor of future behaviour is past behaviour. What this means is that offenders with high demerit scores were more likely to repeat the offenses that they had enacted previously. Whilst this may first appear counter-intuitive, there is strong evidence of this for speeding and drunk driving (Ibid, 2011). This implies that a demerit system may not necessarily be of much use in curbing repeat offenders.

Kelly (2006) argues for a demerit system such as the Administrative Adjudication of Road traffic Offences (AARTO) in South Africa, citing good results achieved in Australia. He also admits that the results were achieved through a combination of "intensive law enforcement" and a penalty system. The implementation of a demerit system in the UK had mixed results and some motorists even "bought points" to evade the authorities. Kelly offers that successes with the demerit system were part of "tougher levels of law enforcement" as well as police commitment to stop road accidents. These studies show little evidence of a positive impact of a demerit system in the absence of a commitment to enforcement. One may conclude that conflating the application of a demerit system with enforcement fails to provide an argument for the application of the demerit system as the ensuing positive outcomes may in fact stem from the enforcement actions alone. This is consistent with du Plessis et al. (2020), who report that AARTO changes the administrative rules, but requires active and visible enforcement to be effective. The results point to a combination of financial instruments (penalties) and increasing the detection rate (enforcement) to impact non-compliance. Castillo-Manzano et al. (2019) find that improving legislation, application of a points (demerit) system for drivers' licensing, together with visible policing can bring good results. It was also found that the demerit system results may be short-lived with an effect duration of 17 to 22 months. It was also found that the critical success factor is the visibility of police officers in enforcement activities. These studies are consistent in arguing that

demerit systems work in concert with other actions such as visible policing, and may not of their own accord bring benefits.

1.2.5 Organizational Accountability and Occupational Health and Safety

An early approach to regulating road transport in Australia was the use of Occupational Health and Safety (OHS) provisions in legislation to regulate the working condition of drivers through the definition of duties of the operator and the employee. This approach resulted in the delineation of some of the responsibilities which are in fact interwoven. (Johnstone, 2002). Integration and harmonisation of road transport and Occupational Health and Safety laws as well as interagency co-operation has been promoted as a means to improve road safety in Australia (Stucky, Pratt & Murray, 2015). The role of fleet management programmes (similar to the RTMS) have become more significant in reducing crash rates. In the USA, workplace driving in heavy vehicles is covered by U.S. Department of Transport regulations, while light delivery vehicles used for work purposes are covered in the general Occupational Health and Safety Administration "general duty clause" (Stucky, Pratt & Murray, 2015). These regulatory disconnects leave much uncertainty in the conduct of transport operators as well as in enforcement of contraventions. The utility value in having an OHS approach lies in organisational accountability for its role in the transport actions. All of the agency in transport actions, especially transgressions should not be attributed to the driver.

Operator licensing takes different forms in different countries, from simple registration to safety ratings and certificates of competency. The aim of the registration and licensing has mostly been to control market entry or activity and reduce competition for rates. More than 80% of OECD countries required road transport operators to be licenced in 1998 (see Figure 1.5).

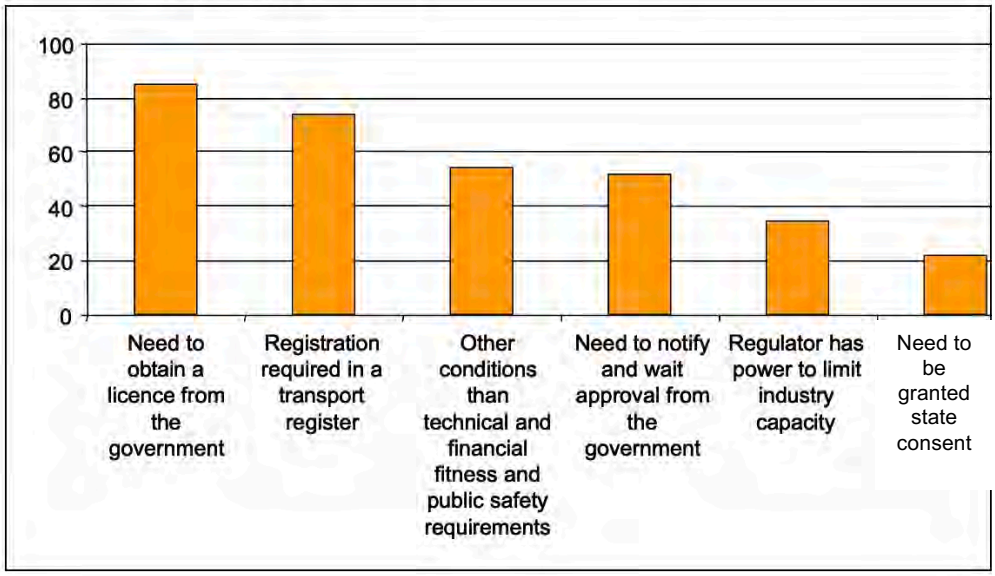


Figure 1.5 Road freight regulatory barriers to entry in OECD countries - percentage of OECD countries (OECD, 2000)

Deregulation of the transport sector since then has resulted in declines in road freight rates of 15% in France, 12 to 25% in the USA, and about 25% in the UK and New Zealand. Whilst the UK has some of the strictest operator licencing rules, audits of operators have found severe non-compliance in many aspects of fleet safety. Policies and procedures were often not in place or very loosely administered, and the safety programmes were either not a priority or ignored. Ironfield & Moore (2001) contend that there is little evidence to support the benefits of operator licencing, and the costs and administrative complexity are hardly worth the results.

1.2.6 Regulatory Reform Summary

The approaches to regulatory reform described thus far focus in most cases on a single aspect of regulatory reform for change. Speed management and enforcement was a recurrent theme, as was fatigue management, corporate accountability, focus of agency on the driver, operator licensing, the culpability of the operator, consignor and consignee accountability (Chain or Responsibility), etc. Focus on a single factor or a narrow set of factors that aim to reduce the negative impacts of transport has been reported on in the literature above. There is no single aspect of road transport regulatory reform than can solve all of the challenges. The solution would lie in a combination of actions that address all of the aspects that contribute to road transport safety. Whilst many of the described regulatory reforms have found their way into South African road transport regulations, the ineffectiveness of said regulatory reform lies in deficits in awareness, implementation and most of all enforcement. There is clearly a need for an integrated approach, one that ties in the competence and agency of the heavy vehicle driver with the organisational factors that promote positive outcomes for road transport. This approach has to be embedded in a new corporate culture of compliance where each step and each action in the transport endeavour is by its design and execution, compliant, and which ideally goes further to ensure management accountability through internal and external audit. It is abundantly clear that regulatory reform and enforcement alone do not provide the required outcomes and an alternative approach needs to be adopted. The Road Transport Management System (RTMS) encompasses speed management, overloading control, driver training, fatigue management, load safety and securement, health and wellness, vehicle maintenance and other factors which is a comprehensive approach holding the organisation accountable for implementation, monitoring and self-enforcement through internal audit.

1.2.7 The Role of Self-Regulation

In Australia, Yeo and Moore (1998) found that voluntary accreditation schemes for road transport comprising management-based compliance could improve the productivity of scheme members, improve the effectiveness of conventional enforcement, and improve compliance outcomes. “Alternative compliance” allows for operators to provide assurance of compliance which results in a lesser degree of on-road compliance checks (enforcement) which improves operator productivity. This approach is viewed as an alternative to enforcement. It is reported that road transport operators elected to join the accreditation programme seeking financial benefit, improved industry or company image, risk reduction, and improved

employee morale. They further suggested that the attractiveness of voluntary accreditation may increase with tangible benefits such as increased mass limits for certified road transport operators. This is consistent with positive road transport operator outcomes reported previously in South Africa (Kamdar et al. 2017).

The Overload Control Strategy for the province of KwaZulu-Natal (KZN) was proposed by the KZN Department of Transport as early as 1998, with implementation in 2000 (Nordengen et al. 2000) in the form of manned control centres on major routes. South Africa introduced the Load Accreditation Programme (LAP) in 2002, aimed at reducing overloading in the forestry industry (Nordengen & Oberholtzer, 2006). The heavy vehicle accreditation scheme was developed in 2003, which was based on the Australian model. This initiative was initially confined to the forestry sector but was eventually expanded to be all-inclusive to allow a broader impact on all road transport sectors, and a national steering committee was established (Nordengen & Pienaar, 2007). Vehicle monitoring under the scheme resulted in prosecutable overloading (more than 5% over the limit) dropping by more than 40%. In addition, average overload reduced by 14% (Nordengen & Oberholtzer, 2006). With the programme called "Load Accreditation Programme", the focus was on mass compliance, without recognising other aspects such as vehicle maintenance, driver wellness, training and productivity. To broaden the scope of what is managed, these aspects were incorporated into the 10 elements of the RTMS standard as follows:

1. Fleet inventory,
2. Load assessment and verification,
3. Road safety,
4. Maintenance of roadworthy vehicles,
5. Vehicle and load safety,
6. Health and wellness,
7. Training and HR development,
8. Documents and records,
9. Performance evaluation, and
10. Continual improvement.

1.2.8 The Road Transport Management System (RTMS)

In 2006, the South African Bureau of Standards (SABS) developed the RTMS as a "Recommended Practice" (ARP 067). ARP stands for *Aanbevole*/Recommended Practice. The ARP 067-1:2007 Part 1: Operator Requirements – Goods (Standards South Africa, 2007) was published in February 2007. The next step was the establishment of a SABS working committee (STANSA TC181B: Road Transport Management Systems) to transform the ARP into a full standard. The ARP 067 evolved into South African National Standard (SANS) 1395-1:2012 Road Transport Management Systems (SABS, 2014). In developing this standard, consideration was given to the relevant provisions of ISO 39001:2012 Road Traffic Safety Management Systems. The intention was that companies aligning to the RTMS would easily be able to attain ISO 39001 (Nordengen & Naidoo, 2014).

The 10 elements of ARP 067 have evolved into 13 elements in SANS 1395-1:2012.

These are:

1. Sites,
2. Fleet vehicles,
3. Road safety,
4. Maintenance of roadworthy vehicles,
5. Vehicle and load safety,
6. Driver health and wellness,
7. Support,
8. Competency training and awareness,
9. Documentation and records,
10. Performance evaluation,
11. Internal audit,
12. Management review, and
13. Continual improvement – efficiency and road safety. (SABS 2014)

The above 13 elements draw together much of what has been proposed in the various regulatory reforms as outlined in the prior passages of the literature review. The RTMS has an OHS influenced approach where occupational risk identification and mitigation are a key organisational responsibility. The operator and drivers each have focus areas of roles and accountability. In addition to the regulatory reform which focusses on crash and fatality reduction, there is an element which focusses on driver training, health and wellness. This is an important distinction from earlier regulatory approaches which place the driver at the focus of infringements as causative agent, and rather recognising that there is a strong onus of responsibility on the company to create the ideal working situation through fleet management as well as driver health and wellness management to deal with root causes of the negative impacts of the transport enterprise. In establishing the self-regulation scheme in a company, management assumes responsibility for each site, and the safety and environmental aspects of these sites. Fleet inventory needs to be managed with a view towards documentary compliance in all aspects of administration and operation, including licenses and permits. The safe operation of the vehicles, monitoring, reporting and control are all internalised into the company administration which anchors responsibility for the behaviour and accountability for rehabilitation if required. Vehicle inspections, loading, load securement, and overload control are all specifically documented and controlled to ensure auditable compliance. Non-conformances are investigated and corrective actions steps implemented. Driver health and wellness are the responsibility of the company and annual health checks have to be supplemented by programmes that address acute or chronic illnesses. Driver training is an ongoing activity with annual registers of activities and competence assessments required. Documentation and record-keeping has to be robust in order to support internal and external audit. Management review is part of the compliance to ensure that organisational accountability is grounded in transparency. Continual improvement ensures that the organisation implements remediation actions and monitors the outcomes. These changes are then embedded in training to ensure process improvement.

There is strong evidence that implementation of the RTMS has directly contributed to improved road safety, compliance, and operational efficiency in road transport in South Africa. It is through the constant measuring of key performance criteria against the self-imposed standards that a cycle of continual improvement arises and organisational development occurs. The RTMS seeks to foster a corporate culture of observing the law, and to promote good corporate governance by providing a framework for a management system in road transport companies to ensure adherence to good practice. The system is intended to help the road transport operator to achieve legal compliance, improve driver wellness, reduce corporate risk, and improve profits. Road transport operators have reported significant improvements in all these aspects of performance after becoming RTMS certified (Nordengen & Naidoo, 2014). Companies implementing the RTMS have reported qualitative and quantitative benefits, such as an up to 66% reduction in crashes, reduction in overloading, reduction in speeding incidents, and typically a 20% improvement in fuel consumption (Naidoo, 2015). Further benefits include: reduced turnover of drivers due to HIV and related issues, an improvement in driver wellness, a decrease in absenteeism, a reduction in vehicle breakdowns, improved fleet utilization through reduced downtime, improved driver behaviour, better control and confidence in the company, reassurance that drivers are fit to drive a heavy vehicle, and improved employee motivation (Nordengen & Naidoo, 2014).

The outcomes of voluntary compliance in South Africa is consistent with other countries. A survey of Swedish road transport companies found that 72% of companies surveyed reported that voluntary accreditation contributes to the company's profitability at a high or the highest possible level of fulfilment; 84% reported high or the highest possible level of fulfilment in road traffic safety, and 85% reported high or the highest possible level of fulfilment in overloading compliance (Johansson, 2012). In essence, self-regulation and voluntary compliance achieves what regulation and enforcement have failed to do.

In the USA, Naveh & Marcus (2007) found that even with ISO 9000 not being specifically transport focussed, transport operators that were ISO 9000 certified showed improved safety performance after certification than before. Their safety performance was also superior to non ISO 9000-certified companies. This may be due to the formalisation of training and maintenance procedures or improvements to how corrective actions are carried out. The ISO 9000 certification improves management practices, of which safety management forms a part.

The Performance-Based Standard (PBS) scheme in South Africa allows road transport operators to transport larger payloads with vehicles that are specifically designed to meet safety criteria and reduce road wear. These "smart trucks" are a win-win for industry and society, as they provide significant societal benefits in improved road safety, reduced road wear, emissions reduction and congestion alleviation whilst generating greater profits (through improved productivity), which makes the transition to the new and more expensive technology feasible and sustainable. To enter this scheme, road transport operators must demonstrate good corporate governance through compliance with the RTMS. Access to the PBS scheme is, therefore, a key benefit of RTMS certification.

The basic tenets of the self-regulation scheme comprising the RTMS was based on the Australian implementation and the quality of policy transfer and local adaptation of voluntary road transport self-regulation has been assessed through interviews with 12 stakeholders in diverse roles in the South African road transport sector (Walker, 2015). This study found that ineffective law enforcement was a key reason why some stakeholders favoured voluntary self-regulation. A respondent cited market forces, where voluntary self-regulation was driven by the fact that European and American clients favoured a programme that would demonstrate good governance, particularly around driver wellness. It was proposed that a voluntary self-regulation programme may improve relationships between regulatory authorities and road transport operators. The inability of enforcement to adequately address overloading was further described as posing a threat to the road network, with a significant negative impact on productivity and safety. Whilst Walker (2015) provided excellent feedback on the quality of implementation and local adaptation of the RTMS as a self-regulation programme, the study focused only on interviewees from within the RTMS fraternity. This view from the inside could be expanded to include a more comprehensive study that incorporates a multi-stakeholder perspective to provide greater insight into how the RTMS is perceived.

Mooren et al. (2014) compared heavy vehicle operators with low insurance claims to those with high insurance claims and found that in general the better performing companies (companies with lower claims) were smaller companies with fewer trucks. These companies did more safety checks, had fewer defect reports, did more on-site safety audits, actively monitored driver work and the work load, and paid active attention to policy and compliance. What was most note-worthy is that the poorer performing companies were larger companies that did more safety training, and had more policies in place. These larger companies also included a larger proportion of safety system accredited companies. The findings are that the existence of safety policies and training alone does not result in improved safety, but rather it has to become pervasive as part of the work practice rather than what has been dubbed “paper compliance”. This may at first glance appear to contradict the earlier studies that found good benefits in accreditation schemes, but the reason for poor impact is not the accreditation scheme but how it has changed the organisation’s culture towards compliance. The RTMS deals with this through an annual external audit that tests not just for the existence of safety systems and management controls, but also for their effective implementation in the organisation.

As an initial exploratory investigation for this research the author (Kamdar et al., 2017) surveyed road transport operators as well as a diverse range of related stakeholders, and presented perspectives on the RTMS from operators that were not RTMS certified, operators that had begun certification, and operators that were already RTMS certified. It was reported in this study that stakeholders and operators who were certified, or were in the process of becoming certified, perceived the costs of implementing the RTMS to be minimal in comparison to the benefits for the operator, and viewed the RTMS as offering a good return on investment. The reduction in crashes, reduction in fuel consumption, and improved operational efficiencies were highly regarded by RTMS-certified operators. Lack of awareness

of the impact of RTMS certification, lack of exposure to management systems, and lack of buy-in from the staff and management of road transport companies were regarded as impediments to the widespread adoption of the RTMS by companies that had not yet embarked on certification. The study reported that insurance companies and brokers do not generally encourage their clients to become RTMS certified, and that more work needs to be done to promote an awareness of the RTMS, its objectives, and what it achieves. This is in spite of the fact that RTMS-certified road transport operators report significant benefits in improved safety, reduced crashes, improved fuel consumption, operational efficiency and operating profits, and regard the RTMS as worth the effort and investment. The process of RTMS certification needs to be made clearer, digital resources should be made available and more effort needs to be expended on the marketing of the RTMS and its benefits. What has been demostrated through this study was that there are indeed significant positive outcomes for operators in the self-regulation. This is consistent with Hoque (2017) who noted that learning involves more than cognition, and includes affective as well as psycho-motor attributes or constructs.

Given the reduced operational costs and improved operational efficiencies achieved by companies that are RTMS certified, one would expect a high level of adoption of the RTMS in South Africa. However, as of the end of 2019, 255 transport companies were RTMS certified (P. Nordengen, personal communication, January 2020) which is less than 2% penetration of the roughly 18 000 road transport companies in South Africa. Taking into consideration the positive benefits of the RTMS presented above, it is clearly in the public interest in South Africa for the RTMS to have a greater penetration in road transport companies.

1.2.9 The RTMS workshops

There are typically six RTMS workshops held around South Africa each year. These workshops are arranged by the RTMS Steering Committee, and are usually sponsored, so that participants may attend free of charge. The topics covered in the RTMS workshop include the a discussion of issues facing the heavy vehicle industry in South Africa, the importance of self-regulation, some results of the RTMS, an introduction to the RTMS structure, a detailed overview of the RTMS and its compliance aspects, and finally there are case studies with guest presenters (Naidoo, 2015). The agenda for an RTMS workshop is shown as Appendix F. The workshops play a pivotal role in the on-boarding of road transport companies into RTMS certification and in order to measure the effectiveness of the workshop, survey research was conducted. The research design is explored in the next section.

1.2.10 Design of the inquiry

The one group pre-test post-test research design is the design most often used by behavioural sciences researchers to measure the effect of a treatment on a specific sample, especially in education. Allen (2017) distinguishes this research design by 2 features. The first is that the research is focussed on a single group of participants. This is the group that will be subjected to the intervention or treatment. The second

feature is that there is an assessment or test of each participant before and after the intervention or treatment.
Campbell &Stanley (2011) contend that there are eight threats to the internal validity of this type of research design:

1. History effects: The longer the period between the pre and post tests, the greater is the chance of outside influences impacting the results.
2. Maturation effect: The participants may experience an improvement of their own cognitive abilities over time, not necessarily as a result of the intervention, but as part of natural human development.
3. Regression to the mean: This is a phenomenon where a participant that scores very highly is more likely to have a lower score on the retest, and a participant with a very low score is more likely to have a higher score on the retest.
4. Selection: Participants should not be selected with a bias. A random sample is ideal.
5. Participant mortality: This is where a considerable number of participants withdraw participation in the study before it is complete.
6. Effect of testing: The pre-test may provide information that yields better post-test results even without the intervention.
7. Instrument variation: A difference between pre-test and post-test instruments may provide a variation in the measurement.
8. Design contamination: There may be differences in how the tests are adminsitered to different participants, or at different times.

Careful attention to the above threats would result in good internal validity of results (Campbell & Stanley, 2011). The one group pre-test post-test design is not as powerful in analysis as a design with a second, control group, but it is often difficult to have a control group. In this instance, careful attention to the internal validity can provide meaningful results (Allen, 2017).

1.2.11 The Survey

Three distinguishing features that characterise survey research have been identified by Pinsonneault & Kraemer (1993). First, a survey is used to derive data regarding specific aspects of a population. Often, the data is used to analyse or characterise the relationship between variables. Second, the data is collected from people and is therefore subjective. Third, the survey research utilises data gathered from a selected part of the population with the intention of inferring findings to the population. The survey itself is a data collection tool used to conduct survey research. Surveys can be used to assess needs, evaluate demand, and examine impact. Surveys can also provide information about attitudes and constructs that are difficult to measure through observational techniques. In the context of this study, the survey will be used to examine the impact of the RTMS workshop. Prior to the development of the survey instrument, the study itself must be clearly defined and the objectives translated into measurable factors, the researcher must be well acquainted with the topic and the survey must be administered consistently. Survey

questions should be worded considering the education level and language skills of the intended respondents (Ibid, 1993).

1.2.12 Developing the Survey Questions

Development of a valid and reliable questionnaire involves several steps. Radhakrishna (2007) proposed a 5 step process beginning with understanding the background to the problem. This includes the purpose, research question, who is the audience, the education levels of the audience, and how the sample is to be selected. The second step is the questionnaire conceptualization which relates to what is being measured, and the key task is to generate the appropriate questions that relate to what is being measured. Step 3 relates to the format of the questionnaire and includes how the subjects' responses will be quantified. This includes whether the responses are yes/no or on a scale. The data gathered should match the data analysis that will be used. The fourth step relates to validity. In this step an expert or panel of experts would consider if the questionnaire is appropriate for the sample, if the questions relate to what is being measured, are the questions comprehensive enough to gather all of the information required, and if the format of the questionnaire is suitable for the purpose. The fifth step, establishing reliability is performed using Cronbach's alpha, and a reliability coefficient of Cronbach's alpha of 0.70 or higher is considered acceptable reliability.

Development of the survey questions involved firstly understanding the constructs to be measured to ensure that the questions would be appropriate. Some aspects relating to the measurement of psychological constructs are detailed in the next section.

Hoque (2017) describes theories of learning and offers that learning involves cognitive, affective, and psycho-social constructs. In considering the impact of the workshop in preparing participants to actively engage in transformational actions towards voluntary certification it is therefore important to look beyond just measuring knowledge transfer. In order to have the desired impact on participants, the workshop needs to provide the required knowledge transfer, motivation to embark on the certification journey, provide clarity regarding the steps to certification, and instil a sense of commitment in the participants to embarking on the transformation towards self-regulation. Fowler (1995) offers that surveys can be used to assess respondents' familiarity with a subject with questions designed to identify respondents who believe that they are informed or knowledgeable about a subject from those who believe that they lack in the information or knowledge of the subject.

Motivation is described as the psychological force that enables action, and because it is a psychological construct, it cannot be measured directly. Measuring motivation may take the form of behavioural observation, cognitive or affective measurement or self-reporting (Touré-Tillery & Fishbach, 2014). Furthermore, different types of motivation may be measured. Stuhlfaut (2012) suggests that intrinsic and extrinsic motivation may be measured, while Touré-Tillery & Fishbach (2014) suggest differentiating between process-focused and outcome-

focused motivation. Significant correlations have been measured between methods such as self-reports, free elicitation, and "paper-and-pencil" tests . Self report measures of knowledge are likely to be highly correlated to objective measures of knowledge usually for participants that have undergone formal training in the knowledge area (Kanwar, Grund & Olson, 1990). For this research, the level of extrinsic or outcome-focused motivation was measured.

Touré-Tillery & Fishbach (2014) suggest that when measuring motivation, "One approach is to ask people to rate their motivation (i.e., "how motivated are you?")" but go on to caution that when asking people to rate their motivation, the response may be limited to the person's conscious understanding of their level of motivation; furthermore, the response may also be influenced by a bias toward a socially desirable response. They further advise that ability or capacity be measured independently of motivation. Scale discrimination in cognitive function is not exact and similar responses from different respondents may not necessarily represent the same level for the factor concerned (Sullivan & Artino, 2013). For this reason, the pre- and post-workshop motivation questions were supplemented by further questions directly asking if the respondent felt an increase in the level of knowledge and motivation as a result of the workshop. Researchers measure motivation in terms of observable cognitive constructs, affective constructs, behaviour, physiological responses, and using self-reports. It is important to identify the type of motivation being measured with outcome-focussed motivation being goal directed, while process-focussed motivation relates to the elements associated with the process of goal pursuit. Touré-Tillery & Fishbach (2014) also advise that the questions themselves may lead to "encouraging" positive responses. Self-reporting measures can be used on one occasion, or repeatedly to develop a longitudinal study and are often stable over time and across situations (Fulmer & Fritjers, 2009). The survey questions were developed with these findings in mind and were field tested with transport operators and an industry expert for validity, ease of understanding and to ensure that the participants would have the same understanding of the constructs being examined. Guidance was also offered to the survey participants relating to the reporting scale to ensure that scale discrimination would be more consistent between participants.

1.3 Problem Statement and Motivation for the Research

Road transport is a significant part of industrial activity and societal functioning in South Africa and at the same time has significant negative impacts (externalities) such as crashes, congestion, air pollution, road-wear, greenhouse gas emissions, etc. Regulatory reform has been largely ineffective in reducing these negative impacts. Evidence exists that self-regulation has the ability to reduce these negative impacts, and the RTMS has a demonstrated track record of not only reducing these negative impacts, but also in reducing the cost of road transport operations. As evident in the literature, the outcomes of the RTMS are positive for the company and society, it is therefore imperative that a larger proportion of the participants entering the RTMS workshops actually steer their companies towards certification. There are typically about 600 people attending the RTMS workshops each year, of which about 300 are road transport operators, yet in the 16 years of the RTMS only 255 companies

have been certified. For self-regulation to have significant impact in road safety on a national scale, it is vital that the number of RTMS certified road transport operators is increased.

1.4 Research Question and Objectives

The purpose of this investigation was to evaluate the effectiveness of the RTMS workshops towards increasing the number of companies attaining RTMS certification.

To achieve this purpose, the following research question was examined:

What is the impact of the RTMS workshop on participants in terms of knowledge, motivation, clarity of steps and commitment to voluntary compliance?

The research question has been distilled into the following objectives:

1. To measure the effectiveness of the RTMS workshop in imparting the required knowledge and the compliance steps to become RTMS certified.
2. To measure the effectiveness of the RTMS workshop to motivate and inspire commitments in participants to become RTMS certified.

The above measurements are prerequisites to developing improvements to the RTMS workshop to address shortcomings in the education on the RTMS and to increase participation in the RTMS: “If you can’t measure it, you can’t improve it.”

1.5 Ethical Considerations and Clearance

No information of a personal nature or relating to company trade secrets was gathered. The participants’ names and their company names were not requested in the surveys. All information gathered was anonymous, as the consent forms were separated from the survey forms at collection. Ethical approval was obtained with Ethical Clearance number MIAEC 006/18. Participation in the survey was voluntary.

1.6 Conclusion

The purpose of this chapter was to outline the background and motivation for this study, thereafter a detailed review of the literature was provided. Elements of the design of the enquiry was explored together with the research question and objectives. In the following chapter, the design of the research will be outlined, together with the scope of the study and the statistical methods used.

2. RESEARCH METHOD

2.1 Research Design

A single group pre-test post-test quasi-experimental research design was followed. The pre-test post-test design offers significantly more analytical power than a single test design, and although a little more complex in implementation, offers significantly more data and power of interpretation. Due to the difficulty in obtaining a reference group that will pursue RTMS certification without attending the workshop, a single group design was used. Comparison of a group attending the workshop to a control group would have provided for more insight. The single group pre-test post-test still provides adequate quality of data provided attention is paid to ensuring internal validity. In order to improve internal validity careful attention was paid to reducing the impacts of the 8 factors identified by Campbell & Stanley (2011).

Control of internal validity was ensured as follows:

1) History: The tests were applied immediately before, and after the workshop.
2) Maturation: Tests were conducted within hours of each other, hence there was no time for normal development of the measured constructs in participants.
3) Regression to the mean: Sample not chosen with a bias to high or low scores.
4) Selection: Candidates volunteered their participation and were not selected with a bias towards either high or low scores.
5) Experimental mortality: 93% of all candidates completed the pre and post tests.
6) Testing: Pre and post test questions for the 4 constructs remained the same. This allowed easier self-reporting and reduced possible confusion.
7) Instrumentation: The survey instrument was consistent throughout.
8) Design contamination: The survey design remained constant.

The survey instrument was a set of questions posed pre and post the RTMS workshop (Appendix C) on a 5 point Likert scale for the pre-post comparison questions. The pre-workshop questions were all listed on one side of the form, while the post-workshop questions were on the reverse side. This provided a clear distinction between the two response sets and reduced confusion.

The first two questions in the survey provided some information on the prior exposure history of the participant to the RTMS, as well as information on the company's RTMS status. The third question provided an opportunity to report qualitative data for companies that have not begun RTMS certification. Question 4 was asked to gain insight into the perceptions of the RTMS and what it achieves. The next four questions provided a self-report of the participants' level of RTMS knowledge, motivation, clarity of steps toward certification, and their commitment to become RTMS certified. These four questions were repeated post the workshop. Questions 13 and 14 scored the increase in motivation and knowledge as a result of the workshop, and question 15 asked how the RTMS certification process could be improved. Finally, question 16 asked how the RTMS workshops could be improved. The survey questionnaire is provided as Appendix C.

The survey instrument was reviewed by an industry expert at the CSIR, Dr Paul Nordengen, who is also on the RTMS Steering Committee in South Africa. Dr Nordengen validated that the survey questions were aligned with the intent of the RTMS workshops. It was agreed that for the RTMS workshop to achieve its objective of increasing RTMS certification, road transport operators need adequate knowledge of the RTMS, and a level of motivation to embark on the transformation. Further to this, commitment to implementation as well as clarity on the steps to achieve certification would be necessary. To test for ease of understanding, appropriateness for the target population and to measure the time taken to complete the survey form, two road transport operators who had already attended the workshop were asked to complete the survey and provide feedback. Their responses were used to improve the survey format and questions, and after 3 iterations, the final version of the survey instrument that was used. The survey instrument was deployed at the RTMS workshops, and road transport operators were invited to participate in the research. Participation was voluntary. Attendees were given a Participation Information Sheet (Appendix A), requested to sign a Consent Form (Appendix B), and were presented with a short explanation about the research objectives. The survey forms were then captured to Excel and the statistical software package IBM SPSS version 25 was used for the statistical analysis.

2.1 Scope of Research

Participants at the RTMS workshops conducted from July 2018 to May 2019 were invited to participate in the survey. These workshops were in Mpumalanga, Johannesburg, Durban, Pietermaritzburg and Stellenbosch. All road transport operators attending were invited to fill in the survey. Participation was voluntary and the data was gathered without participants' personal details. The surveys were conducted at five RTMS workshops from July 2018 to May 2019 with a convenience sample of 96 participants.

2.2 Statistical Method

A paired sample t-test is suited to data where the distribution of the differences is normal (Sullivan & Artino, 2013). If the distribution is not normal, it could lead to false positives (rejecting the null hypothesis if in fact it is true). In cases where the distribution is not normal, the Sign Test or Wilcoxon Signed Rank tests are often used. These tests are suitable for Likert-scale data. In calculating the P-value for the signed rank test, there is an assumption that the data are measured on a continuous scale, and that there are no ties. The signed rank test is still often used for Likert scale data, with the argument that the ties will not matter much if the sample size is large (N>30). The sign test does not assume that there are no ties, and is therefore better suited to this data set. (Shadish, Cook & Campbell, 1979), (de Winter and Dodou, 2010). The change in responses before and after the workshop were calculated using the sign test (Dixon & Mood, 1946). The sign test was used to compare the number of respondents who selected a higher rating after the workshop to those who selected a lower rating after the workshop. A one-sided significance level of 0.05 was used. The null hypothesis was that the workshop did not affect the

ratings, and the alternative hypothesis that the ratings were more positive after the workshop than before.

Cronbach's alpha was used to test for internal consistency (Cortina, 1993). In general, Cronbach's alpha of 0.6 to < 0.7 shows moderate internal consistency, 0.7 to < 0.8 shows good internal consistency, 0.8 to < 0.9 shows very good internal consistency, and 0.9 and above shows excellent internal consistency (Hair, Celsi, & Samouel, 2016). Stuhlfaut (2012) achieved Cronbach's alpha values in the range of 0.70 to 0.77 in measurements of motivation and deemed these satisfactory, while McCord (2013) proposed that a Cronbach's alpha above 0.70 is acceptable in measurements of motivation.

In the next chapter, the research results are presented graphically and discussed. Statistical analysis is performed, as well as internal reliability analysis using Cronbach's alpha. Descriptive statistics with a repeated measures general linear model then provides further insight into the data.

3. RESULTS AND DISCUSSION

3.1 Introduction

In this section we consider the survey responses graphically, and then the sign test is applied to test the data for increases in the four constructs being measured. Test statistics are calculated to determine the significance of the results and reliability analysis conducted using Cronbach's alpha to test for internal consistency. Covariance analysis is used to determine the interaction between *Attended RTMS workshop* and *Is your company RTMS certified?*

3.2 Survey Results and Discussion

Figure 3.1 below is a bar chart depicting the results for the question; *Have you attended the RTMS workshop before?*, together with the results for the question; *Has your company adopted the RTMS?*

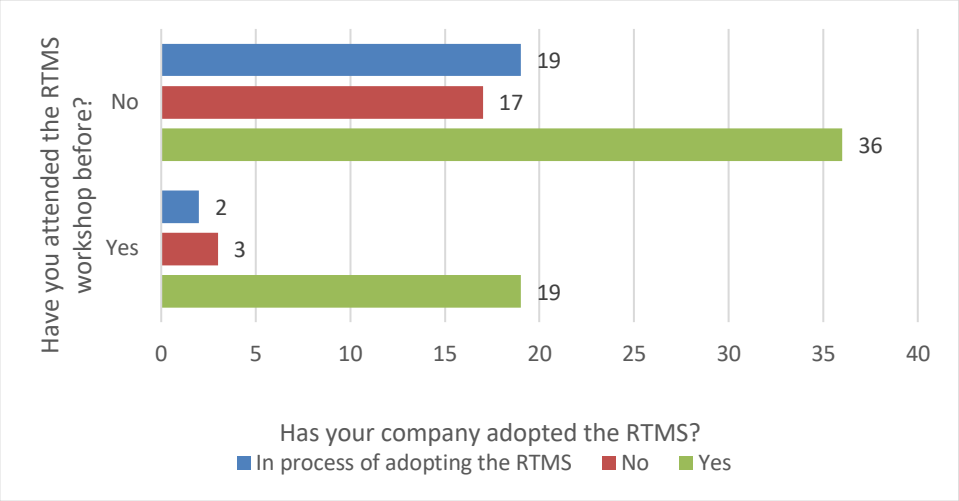


Figure 3.1 Prior exposure to the RTMS by workshop attendance and company implementation (N=96)

Twenty five percent of respondents had attended an RTMS workshop before, and 75% percent of respondents had not attended an RTMS workshop before. 57% of respondents were from companies that had already been RTMS certified, 22% were from companies in the process of adopting the RTMS but were not yet certified, and 21% were from companies that had not yet begun the RTMS process.
Of the repeat attendees, 79% were from companies that were RTMS certified, this points to the need for ongoing skills development for RTMS-certified companies which is not the primary aim of the workshop. Fifty percent of first time attendees were from RTMS certified companies which indicates a need for ongoing support of RTMS certified companies.

The column chart in Figure 3.2 shows the respondents' responses to the question; *What in your opinion are the benefits of the RTMS?* Respondents were asked to rate the level of benefits offered in terms of *Safety*, *Cost Reduction*, *Driver Wellness*,

Reduced Road Damage, and *Improved Operational Efficiency*. Figure 3.2 shows that *Safety* was regarded as a key benefit of RTMS certification, with 71% of the respondents perceiving it to be a *Crucial or exceptional benefit*, and 28% perceiving it to be a *Good benefit*. *Cost Reduction* was regarded by 47% of the respondents as a *Crucial or exceptional benefit*, and as a *Good benefit* by 38%. *Reduced Road Damage* was viewed as a *Crucial or exceptional benefit* by 60% of the respondents, and as a *Good benefit* by 28%. *Improved Operational Efficiency* was regarded as a *Crucial or exceptional benefit* by 63% of the respondents, while 32% regarded it as being a *Good benefit*.

Overall, there were very positive perceived benefits of RTMS implementation reported for companies, for their drivers, and for society as well (safety and reduced road damage). This would likely provide a foundation for motivation and commitment to RTMS implementation.

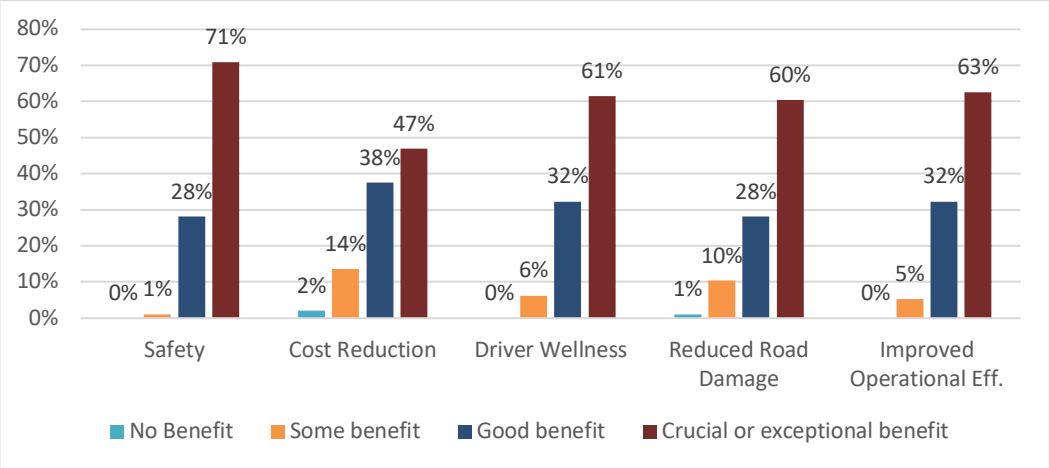


Figure 3.2 What in your opinion are the benefits of the RTMS? N=96

Participant responses pre and post the workshop:
Respondents were required to consider the same set of 4 constructs before and after the workshops and to self-report on a Likert scale for each.
Before the Workshop:
Question 5: *I have knowledge of the requirements for RTMS certification*
Question 6: *I am motivated to embark on RTMS certification*
Question 7: *I am committed to RTMS certification*
Question 8: *The requisite steps for RTMS certification are clear to me*

After the workshop:
Question 9: *I have knowledge of the requirements for RTMS certification*
Question 10: *I am motivated to embark on RTMS certification*
Question 11: *I am committed to RTMS certification*
Question 12: *The requisite steps for RTMS certification are clear to me*

Knowledge of the requirements for RTMS certification pre and post the RTMS workshops

The bar charts in Figure 3.3 (a-r) below show a comparison of the responses to the statement, "*I have knowledge of the requirements for RTMS certification*" pre and post the workshop. The data is filtered to consider the workshop participants' prior attendance of the workshop and their company's RTMS certification and whether these prior exposure factors result in a shift in knowledge reported in the survey. In Figure 3.3 (q-r), the response *Totally agree* rises from 46% before the workshop to 70% after the workshop for all respondents. This shows that in general, the RTMS workshop appears to result in an increase in the knowledge of requirements for certification. It appears that the post-test outcome for *Agree totally* is in most cases improved over the pre-test.

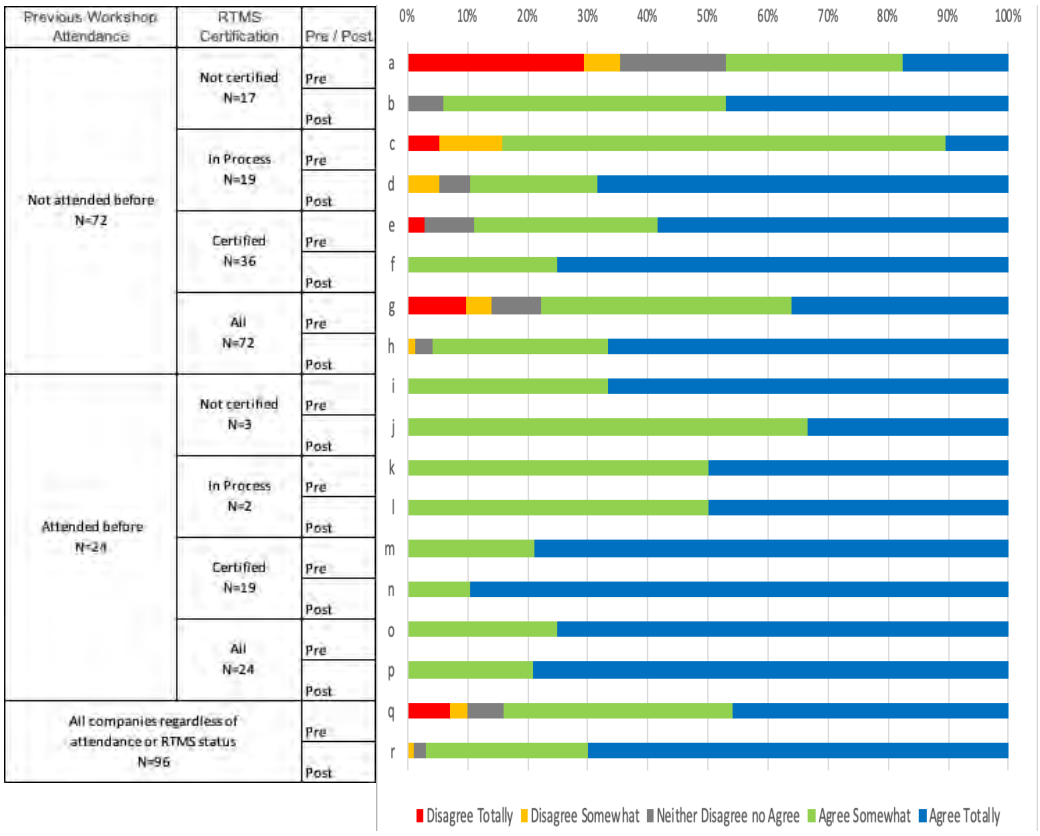


Figure 3.3 (a - r) Knowledge of the requirements for RTMS certification pre and post RTMS workshops by prior exposure. (N=96)

This is not the case for respondents who have attended the workshop before from companies that are not RTMS certified (Figure 3.3 i-j), as well as from companies in process of being certified (Figure 3.3 k-l) who show poor knowledge increase outcomes. In both cases N is low, hence we can disregard these as findings. Participants that have attended the workshop previously (Figure 3.3 o-p), show a slight increase in RTMS knowledge, while participants that have not attended the workshop previously (Figure 3.3 g-h), report a good increase in RTMS knowledge.

Figure 3.3 (a-r) identifies the participants that have not attended the RTMS workshop previously as the group that has reported good benefitted in terms of knowledge as a result of the RTMS workshop.

Motivation to embark on RTMS certification before and after the workshop

The bar charts in Figure 3.4 (a-r) show a comparison of responses to the statement, "*I am motivated to embark on RTMS certification*" pre and post the RTMS workshop. Respondents reported an increase in their perceived level of motivation to embark on RTMS certification: *Totally agree* increases from 79% pre the RTMS workshop to 85% post the workshop (Figure 3.4 q-r).

In order to consider the workshop participants' prior attendance of the workshop and their company's RTMS certification and whether these prior exposure factors influence the shift in motivation reported in the survey, the data is filtered accordingly. To this end the data for pre the workshop versus post the workshop is presented in Figure 3.4 (a – r).

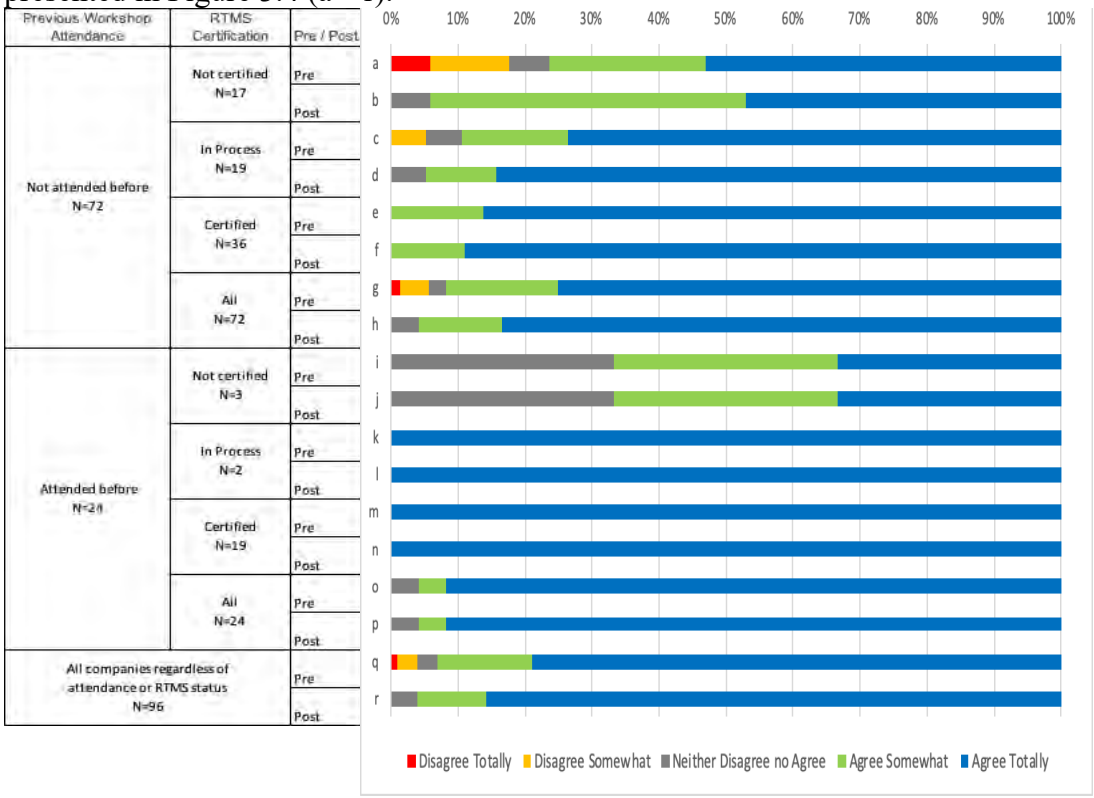


Figure 3.4 (a-r) Motivation to embark on RTMS certification pre and post RTMS workshop by prior exposure. (N=96)

Respondents who had attended the RTMS workshop before (Figure 3.4 o-p), report a high level of motivation to embark on RTMS certification with no motivation benefit from attending the workshop. Figure 3.4 (i-j) shows data for respondents who had attended the RTMS workshop before, and were from companies that were not RTMS certified. The results show that there is a relatively low level of motivation to embark on RTMS certification for respondents before the workshop,

with no change after the workshop. N=3 and therefore this may not be a significant result.

Commitment to RTMS certification pre and post the RTMS workshop

The bar charts in Figure 3.5 (a-r) show a comparison of the responses to the statement, "*I am committed to RTMS certification*", pre and post the RTMS workshop. Respondents reported an improvement in their level of commitment towards RTMS certification: *Totally agree responses* increased from 74% to 84% (Figure 3.5 q-r).

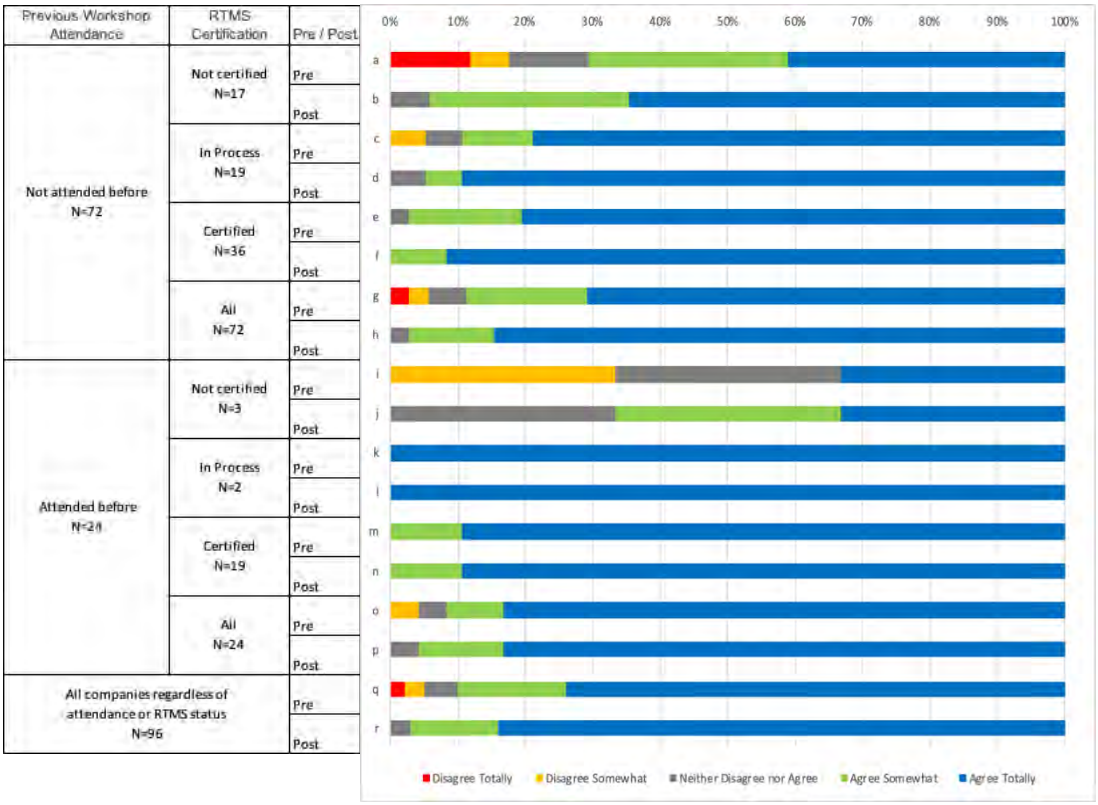


Figure 3.5 (a-r) Commitment to RTMS certification pre and post RTMS workshops by prior exposure N=96

Figure 3.5 (a-b) shows data for respondents who had not attended the RTMS workshop before, and were from companies that were not RTMS certified. The results show a reasonable amount of commitment to RTMS certification prior to the workshop on the part of respondents. However, 12% of these respondents disagreed totally, and 6% disagreed to some extent that they were committed to RTMS certification. There was quite a strong increase in the scores after the workshop, with disagreement being eliminated entirely, and *Totally agree* rising from 41% to 65%. There is a larger improvement in commitment to the RTMS certification in participants who had not attended the workshop previously (Figure 3.5 g-h) as compared with those that had attended previously(Figure 3.5 o-p).

Clarity on the requisite steps for RTMS certification before and after the workshop

Participants were required to respond to the statement, '*The requisite steps for RTMS certification are clear to me*', pre and post the RTMS workshop. As shown in Figure 3.6 (q-r) below, in general respondents reported an improvement in their clarity on the requisite steps to achieving RTMS certification after the workshops: *Totally agree* responses rise from 58% before the RTMS workshop to 72% after the workshop. The bar charts in Figure 3.6 (a-r) show the results filtered for prior exposure through either prior attendance to the workshop or the company being RTMS certified.

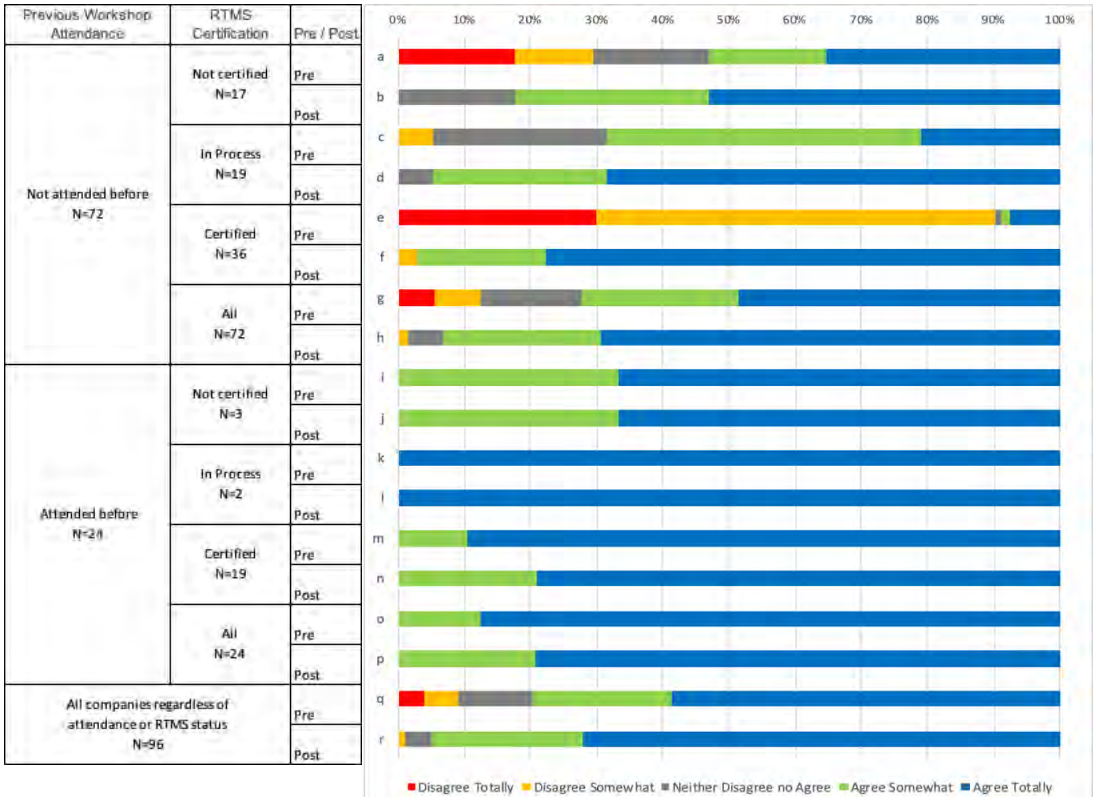


Figure 3.6 Clarity of steps for RTMS certification pre and post RTMS workshops by prior exposure (N=96)

Figure 3.6 (g-h) shows the results for respondents who had not attended the RTMS workshop before. These respondents reported that they had a fair amount of clarity on the steps involved in RTMS certification before the workshop (with 49% reporting *Totally agree* and 24% *Agree to some extent*). A major increase was evident in the scores after the workshop, with *Totally agree* rising to 69%. *Agree to some extent* still reflected 24%.

Figure 3.6 (o-p) shows data for respondents who had attended the RTMS workshop before. These respondents reported a high level of clarity on the steps for RTMS certification pre workshop, with 88% selecting *Totally agree* and 13% selecting *Agree to some extent*. However, these respondents report a lower level of clarity after the workshop (79% *Totally agree* and 21% *Agree to some extent*). This was

not a good outcome and is cause for concern. Figure 3.6 (m-n) shows the results for respondents who had attended the RTMS workshop before, and were from companies that were RTMS certified. The results indicate that the scores for clarity on the steps for RTMS certification after the workshop (79% *Totally agree* and 21% *Agree to some extent*) were lower than the scores before the workshop (89% *Totally agree* and 11% *Agree to some extent*). The decline in scores in Figure 3.6 (o-p) is as a result of the decline in scores in Figure 3.6 (m-n). This may have been as a result of confusion around the steps to RTMS and may point to a deficit in the material presented at the workshop for this audience, particularly as relates to the clarity on the steps to RTMS certification.

The column chart in Figure 3.7 below shows the participants' responses to the statement: *The RTMS workshop resulted in a positive shift in my motivation to begin RTMS certification*. The majority of the respondents (80%) selected *Totally agree* in response to the statement. This may at first appear to be incongruent in scale with Figure 3.4 (a-r), which shows a difference of only 6% in the *Totally agree* responses before and after the workshop. However, it is important to heed Touré-Tillery & Fishbach's (2014) caution that when asking people to rate their motivation, their response may be limited to their conscious understanding of their level of motivation. Respondents may have had difficulty in self-assessing and reporting their level of motivation before and after the workshop on a scale, or as in this case, on multiple scales. Nevertheless, Figure 3.5 and Figure 3.11 both show a positive shift in motivation to begin RTMS certification, which confirms a positive outcome for motivation as a result of the workshop.

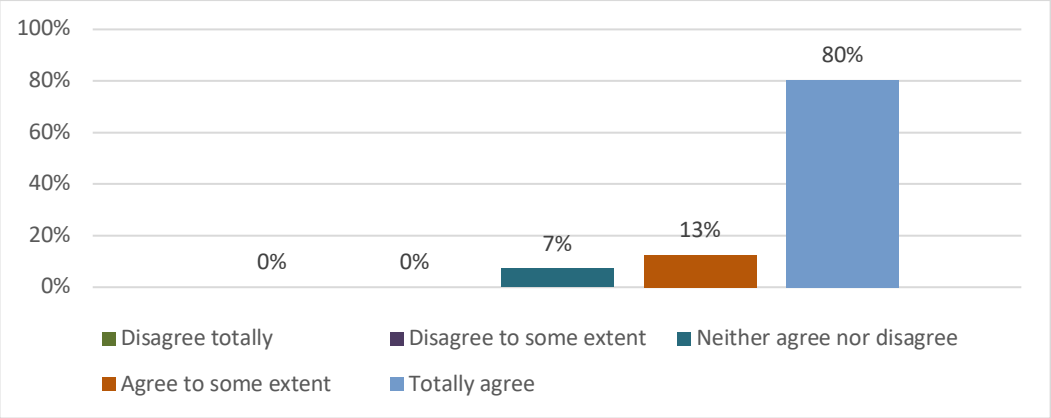


Figure 3.7 The RTMS workshops resulted in a positive shift in motivation to begin RTMS certification (N=96)

The column chart in Figure 3.8 below shows the participants' responses to the statement: *The RTMS workshop has increased my knowledge of the requirements for RTMS certification*. An increase in their knowledge of the requirements for RTMS certification as a result of the workshops was reported by the respondents, 79% of whom responded *Totally agree* to the statement. This is consistent with the responses to Figure 3.3 (a-r), where an increase in respondents' self-reported level of knowledge of the requirements for RTMS certification was reported.

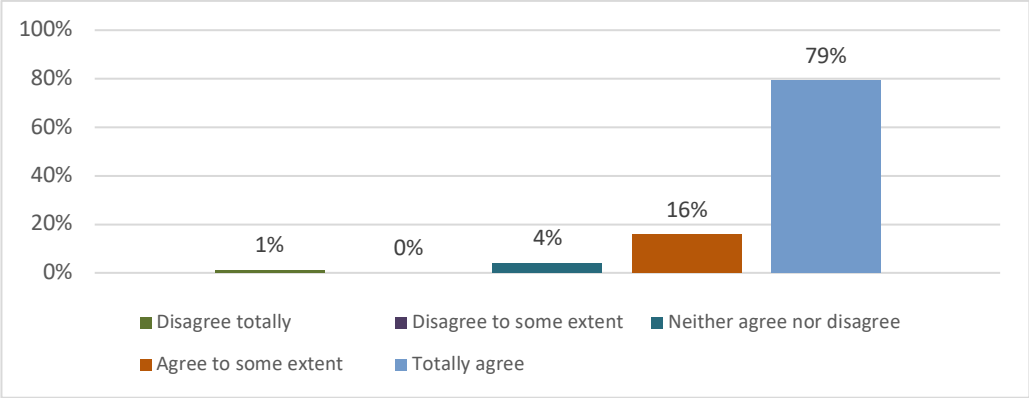


Figure 3.8 The RTMS workshop has increased my knowledge of the requirements for RTMS certification (N=96)

3.3 Statistical Analysis

3.3.1 Comparing pre- and post-workshop responses

Table 3.1 shows the frequencies of response differences before and after the workshops and is followed by a summary of the response changes.

Table 3.1 Frequencies of response differences pre and post the workshops

		N
9. I have full knowledge of the requirements for RTMS certification. — 5. I have full knowledge of the requirements for RTMS certification	Negative Differences [a,d,g,j]	3
	Positive Differences [b,e,h,k]	34
	Ties [c,f,I,l]	59
	Total	96
10. I am motivated to embark on RTMS certification — 6. I am motivated to embark on the RTMS certification	Negative Differences [a,d,g,j]	5
	Positive Differences [b,e,h,k]	13
	Ties [c,f,i,l]	78
	Total	96
11. I am committed to RTMS certification — 7. I am committed to the RTMS certification	Negative Differences [a,d,g,j]	2
	Positive Differences [b,e,h,k]	17
	Ties [c,f,i,l]	77
	Total	96
12. The requisite steps for RTMS certification are clear to me — 8. The requisite steps for RTMS certification are clear to me	Negative Differences [a,d,g,j]	7
	Positive Differences [b,e,h,k]	26
	Ties [c,f,i,l]	63
	Total	96

a. 9. I have full knowledge of the requirements for RTMS certification. < 5. I have full knowledge of the requirements for RTMS certification

b. 9. I have full knowledge of the requirements for RTMS certification. > 5. I have full knowledge of the requirements for RTMS certification

c. 9. I have full knowledge of the requirements for RTMS certification. = 5. I have full knowledge of the requirements for RTMS certification

d. 10. I am motivated to embark on RTMS certification < 6. I am motivated to embark on the RTMS certification

e. 10. I am motivated to embark on RTMS certification > 6. I am motivated to embark on the RTMS certification

f. 10. I am motivated to embark on RTMS certification = 6. I am motivated to embark on the RTMS certification

g. 11. I am committed to RTMS certification < 7. I am committed to the RTMS certification

h. 11. I am committed to RTMS certification > 7. I am committed to the RTMS certification

i. 11. I am committed to RTMS certification = 7. I am committed to the RTMS certification

j. 12. The requisite steps for RTMS certification are clear to me < 8. The requisite steps for RTMS certification are clear to me

k. 12. The requisite steps for RTMS certification are clear to me > 8. The requisite steps for RTMS certification are clear to me

l. 12. The requisite steps for RTMS certification are clear to me = 8. The requisite steps for RTMS certification are clear to me

Summary of Response changes

I have full knowledge of the requirements for RTMS certification

59 respondents did not change their rating after the workshop.
3 respondents gave a lower rating after the workshop.
34 respondents gave a more positive rating after the workshop.

I am motivated to embark on RTMS certification

78 respondents did not change their rating after the workshop.
5 respondents gave a lower rating after the workshop.
13 respondents gave a more positive rating after the workshop.

I am committed to RTMS certification

77 respondents did not change their rating after the workshop.
2 respondents gave a lower rating after the workshop.
17 respondents gave a more positive rating after the workshop.

The requisite steps for RTMS certification are clear to me

63 respondents did not change their rating after the workshop.
7 respondents gave a lower rating after the workshop.
26 respondents gave a more positive rating after the workshop.

Table 3.2 a) below shows the results of the sign test comparing pre- and post-workshop ratings. Probability is expressed as a p-value and compared with the test statistic of 0.05. For each construct, we have statistical evidence that the number of higher ratings was significantly more than the number of lower ratings.

Table 3.2 Test statistics for RTMS workshop

			Knowledge post-pre	Motivation post-pre	Commitment post-pre	Clarity post-pre
All participants	a)Post-pre	Exact Sig. (1-tailed)	.000	.048	.000	.001
Attended workshop	b)No	Exact Sig. (1-tailed)	.000	.048	.000	.000
Attended workshop	c)Yes	Exact Sig. (1-tailed)	.500	1.000	.500	.250
RTMS certification	d)No	Exact Sig. (1-tailed)	.006	.090	.011	.090
RTMS certification	e)In process	Exact Sig. (1-tailed)	.001	.312	.125	.001
RTMS certification	f)Yes	Exact Sig. (1-tailed)	.003	.500	.109	.212

a. Sign test

Comparing respondents who had attended previous workshops to those who had not attended RTMS workshops previously showed that 24 respondents had attended such a workshop before and 72 had not. The results of the sign test in Table 3.2 (b and c) show that in the case of respondents who had not attended a workshop before, their responses to all of the repeated questions were significantly more positive after the workshop. In the case of respondents who had attended a workshop before, their responses to these questions after the workshop was not significantly different from their responses before the workshop. Comparing respondents whose companies had already adopted the RTMS with those from companies who were in the process of adopting it and those from companies who had not yet adopted it, showed that 20 of the respondents said their company had not yet adopted RTMS, 21 said their company was in the process of adopting it, and 55 said that their company had already adopted it. The results of the sign test in Table 3.2 (d,e,f) show that in the case of respondents who said “No” (their companies had not adopted the RTMS), the difference after the workshops was significant at the 5% level of significance for knowledge of requirements for RTMS certification and clarity on the requisite steps for RTMS. In the case of respondents who responded “In process”, the difference after the workshops was significant for knowledge of requirements for RTMS certification and clarity on the requisite steps for RTMS certification. In the case of respondents who responded “Yes” (their companies had adopted the RTMS), the difference after the workshops was significant for knowledge of requirements for RTMS certification.

3.3.2 Reliability analysis

Cronbach's alpha was calculated to test if the answers to the four questions in the pre-workshop questionnaire were internally consistent. Table 3.3 below shows the pre-test Cronbach's alpha 0.842 which is high (>0.70), indicating good internal consistency. The same calculations were performed for the responses post the workshop with Cronbach's alpha (0.713) which is acceptable (Radhakrishna, 2006; Stuhlfaut, 2012; Hair, Celsi, & Samouel, 2016).

Table 3.3 Cronbach's alpha pre and post workshop

	Cronbach's alpha	N of items
Pre workshop	0.842	4
Post workshop	0.713	4

Table 3.4 below shows the results for Cronbach's alpha items deleted test for the pre and post workshop responses.

Table 3.4 Cronbach's alpha pre and post workshop (items deleted test)

	Cronbach's alpha if item deleted	
	Pre-test	Post-test
I have full knowledge of the requirements for RTMS certification	.824	.639
I am motivated to embark on the RTMS certification	.794	.657
I am committed to RTMS certification	.780	.604
The requisite steps for RTMS certification are clear to me	.805	.705

Deleting scale items in each case in Table 3.4 does not improve the Cronbach's alpha hence the scales represent a similar construct. As a result, the means can be used as a composite factor: "Prepared for RTMS before workshop", which is calculated as the average of the four items: (Q5+Q6+Q7+Q8)/4. Table 3.4 also shows the results for Cronbach's alpha items deleted test for the post workshop responses. Deleting scale items in each case in Table 3.4 does not improve the Cronbach's alpha hence the scales represent a similar construct. As a result, the means can be used as a composite factor: "Prepared for RTMS after workshop", which is calculated as the average of the four item means: (Q9+Q10+Q11+Q12)/4.

The summary statistics for the "Prepared for RTMS before workshop" and "Prepared for RTMS after workshop" are shown in Table 3.5. The mean score before (4.40) was lower than the mean score after (4.73).

Table 3.5 Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Prepared for RTMS Before	96	1.25	5.00	4.40	.82
Prepared for RTMS After	96	3.00	5.00	4.73	.40

Table 3.6 shows the descriptive statistics for "*Have you attended the RTMS workshop before?*". Respondents who had not attended such a workshop before showed a much higher increase (from 4.26 to 4.71) than respondents who had attended a workshop before (4.80 to 4.81).

Table 3.6 Descriptive statistics for "Have you attended the RTMS workshop before?"

		N	Minimum	Maximum	Mean	Std. Deviation
No	Prepared for RTMS Before	72	1.25	5.00	4.26	.88
	Prepared for RTMS After	72	3.00	5.00	4.71	.41
	Valid N (listwise)	72				
Yes	Prepared for RTMS Before	24	3.50	5.00	4.80	.38
	Prepared for RTMS After	24	3.75	5.00	4.81	.34
	Valid N (listwise)	24				

Table 3.7 shows the descriptive statistics for "*Has your company adopted the RTMS?*". In the case of the "No" answer, the increase in the mean was large. It was somewhat smaller in the case of the "In process" answer, and smaller still in the case of the "Yes" answer.

Table 3.7 Descriptive statistics for "Has your company adopted the RTMS?"

		N	Minimum	Maximum	Mean	Std. Deviation
No	Prepared for RTMS Before	20	1.25	5.00	3.66	1.15
	Prepared for RTMS After	20	3.00	5.00	4.45	.58
	Valid N (listwise)	20				
In process	Prepared for RTMS Before	21	2.00	5.00	4.26	.69
	Prepared for RTMS After	21	4.00	5.00	4.71	.33
	Valid N (listwise)	21				
Yes	Prepared for RTMS Before	55	3.00	5.00	4.71	.47
	Prepared for RTMS After	55	4.00	5.00	4.85	.27
	Valid N (listwise)	55				

A repeated measures general linear model was used to test within-subject contrasts in relation to "*Have you attended the RTMS workshop before?"* as a factor, as shown in Table 3.8 below. The significant interaction between *Prepared for* and *Attended* shows that the difference (Post – Pre) depends on whether or not the respondent had attended the workshop before.

Table 3.8 Tests of within-subject contrasts

Measure: MEASURE_1

Source	Attitude	Type III Sum of Squares	df	Mean Square	F	Sig.
Prepared for	Linear	1.891	1	1.891	8.069	.006
Prepared for * Attended	Linear	1.723	1	1.723	7.352	.008
Error (Prepared for)	Linear	22.026	94	.234		

Figure 3.9 below shows the interaction between "Have you attended the workshop before" and "Prepared for RTMS". A larger increase in "Prepared for RTMS" in the group that had not attended the workshop previously compared to those that had.

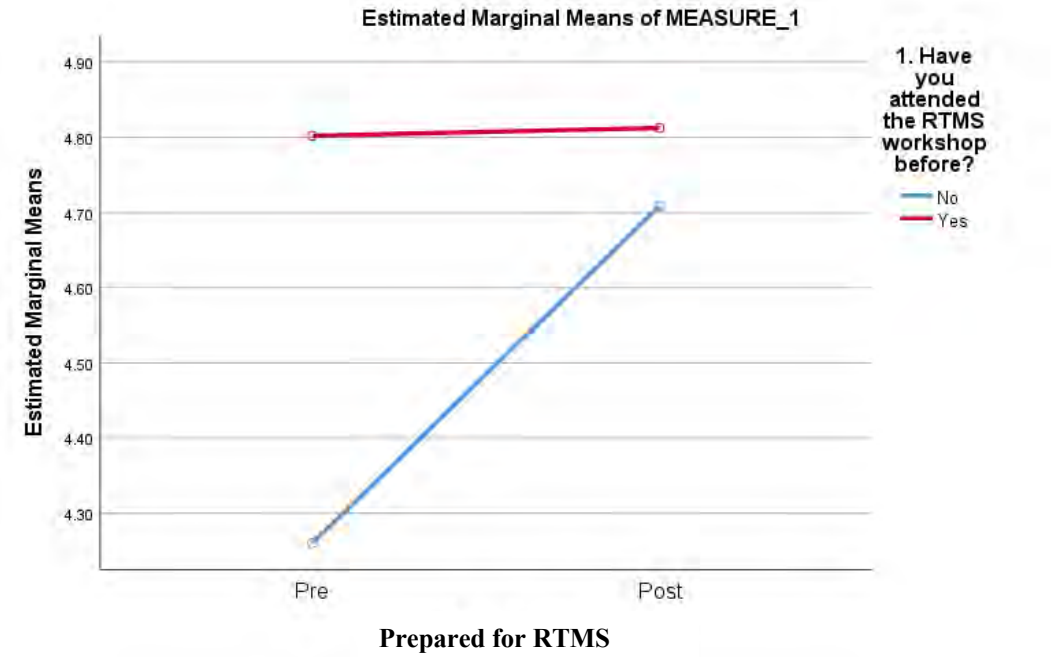


Figure 3.9 Estimated Marginal Means versus Prepared for RTMS (N=96)

It is clear in Figure 3.9, when considering all four constructs together, participants that have not attended the RTMS workshop before experience a more significant benefit in preparing them for RTMS certification.

A repeated measures general linear model was also used to test within-subject contrasts in relation to "*Has your company adopted the RTMS?"* as a factor, is shown in Table 3.9 below.

Table 3.9 Tests of within-subject contrasts

Measure: MEASURE_1

Source	Attitude	Type III Sum of Squares	df	Mean Square	F	Sig.
Prepared for	Linear	8.124	1	8.124	36.997	.000
Prepared for * Adopted	Linear	3.327	2	1.663	7.575	.001
Error (Prepared for)	Linear	20.422	93	.220		

The significant interaction between *Prepared for* and *Adopted* shows that the difference between post and pre scores depends on whether or not the company had adopted the RTMS as evident in Figure 3.10 shown below. The slope of the graph indicates the development of the construct from pre to post workshop with the increase in preparedness greatest for companies that have not adopted the RTMS.

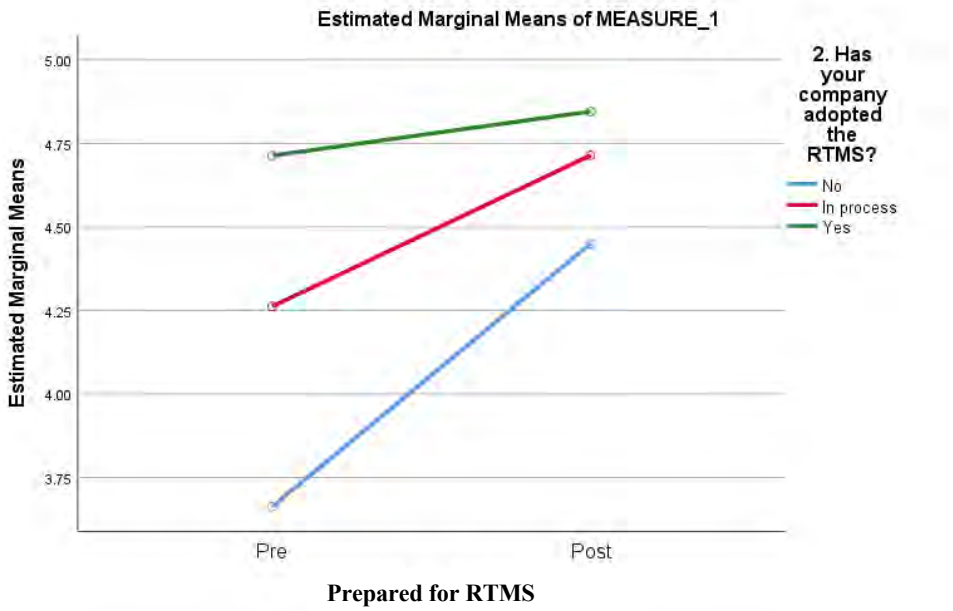


Figure 3.10 Estimated marginal means versus prepared for RTMS (N=96)

It is clear in Figure 3.10, when considering all four constructs together, that participants from companies that have not adopted the RTMS workshop derive the most benefit from the workshop (steepest gradient). Participants from companies in process of adopting the RTMS experience a lesser but measurable benefit comparatively (moderate gradient). Participants from companies that are RTMS certified experience a lower benefit than the other two groups.

3.3.3 Qualitative questions

The final two questions in the survey qualitatively explored how the RTMS certification process and workshops could be improved. These responses were coded thematically and are presented graphically as Figure 3.11 and Figure 3.12 below.

The bar graph in Figure 3.11 below shows the frequency of responses to the question, "*In your opinion, how can the RTMS certification be improved?*". The respondents who provided feedback considered marketing and awareness of the RTMS certification process to be a high priority (15 respondents) with suggestions such as "promote RTMS to the broader community" and "seminars for drivers" as well as "advertise on social media and tv". A greater focus on RTMS training was proposed by 7 respondents with suggestions for "more detail in the training" and "more workshops". A digital platform or toolkit "to implement the RTMS and manage it" was also requested (6 respondents). Two respondents suggested regulatory or government interventions (policy), and 2 respondents also suggested that consultants should be made more accessible. The roadworthiness of vehicles, as well as best practice examples, were also mentioned. One respondent suggested that the RTMS should be made compulsory (which suggests that he missed the point of self-regulation versus enforcement). This suggests that the distinction between enforced behaviour as compared with voluntary compliance needs to be made clearer in the workshop. The complete list of responses is shown in Appendix D.

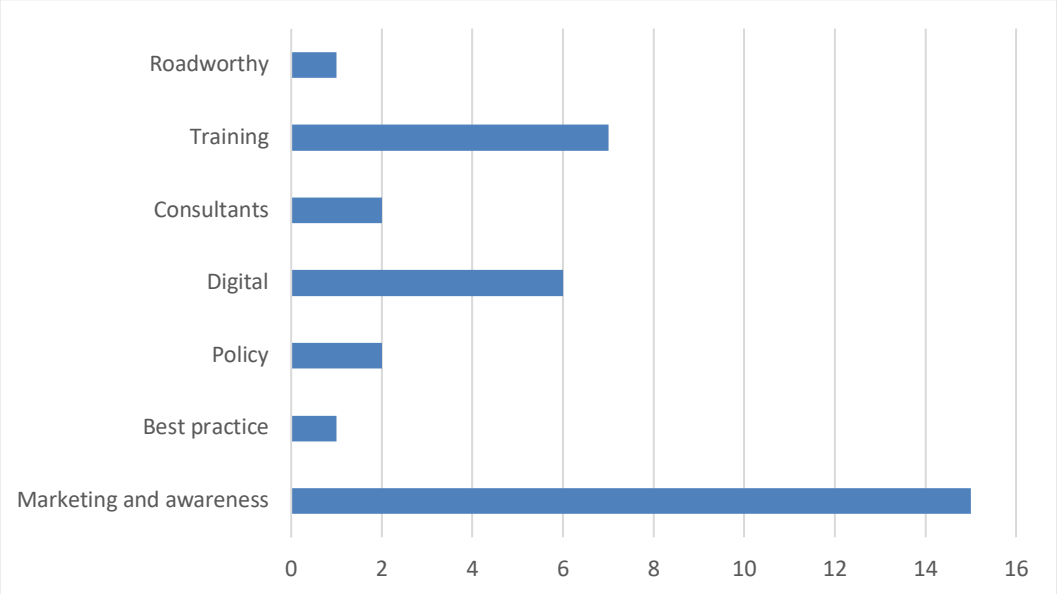


Figure 3.11 How can the RTMS certification process be improved?

The bar graph in Figure 3.12 below shows the frequency of responses to the question, "*In your opinion, how can the RTMS workshop be improved?*". Marketing and awareness was indicated as a high priority for improving the RTMS workshops by 11 respondents, with suggestions such as "involve more operators, involve the public", invite more participants", "invite the DOT", "invite the taxi industry" and "go live on tv". Five respondents suggested that the workshops should be held more

frequently, and five respondents also suggested providing workshop notes and an agenda. Incorporating question-and-answer sessions into the workshops was suggested by 2 people, and a further 2 people suggested eliciting stakeholder feedback. A helpline, competitions and awards, "Develop digital techniques to assist. Benchmark and provide data to assist." and "detailed and clear audit steps" were also suggested as improvements. The complete list of responses is shown in Appendix E.

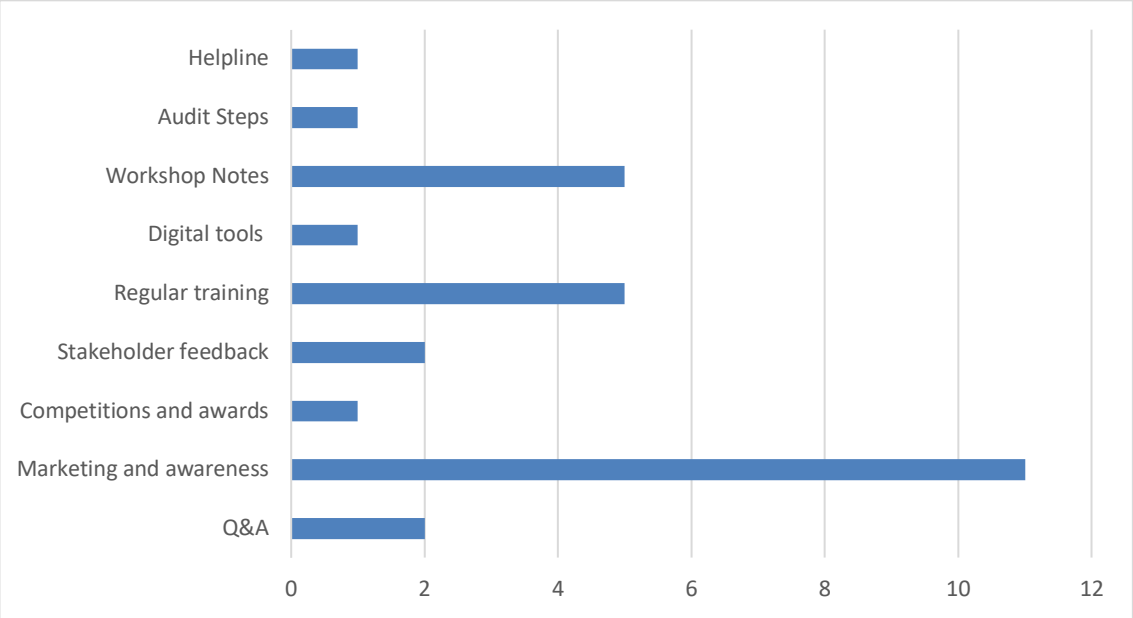


Figure 3.12 How can the RTMS workshop be improved?

3.4 Analysis of Results

The survey responses showed that 25% of all participants had attended the workshop before, 57% of all attendees were from RTMS-certified companies and 22% were from companies in process of certification. This was an unexpectedly high number of attendees who already had previous exposure to the information about RTMS certification. The perceived benefits of the RTMS reported show significant improvements in safety, cost reduction, driver wellness, road damage, and operational efficiency. This is consistent with studies conducted by Johanssen (2012) and Walker (2015).

The RTMS workshop increases participants' knowledge of the RTMS particularly for first time attendees, and for attendees from companies that are not RTMS certified. Repeat attendees report little or no increase in knowledge, and would probably have benefited from a more focused interaction to guide them towards certification, which is the purpose of the separate two-day RTMS training course.

There is a relatively high level of motivation in participant's pre engaging in the workshop, and a moderate increase post engagement. Motivation towards RTMS certification is more notably increased in first time attendees to the workshops and from participants from companies that were not RTMS certified. The sample, being

workshop participants, is not a random sample of transport operators, and by attending the workshop implies some bias or motivation towards RTMS.

Respondents reported a generally high level of commitment to the RTMS pre the workshop. An increase in commitment to the RTMS was shown by first-time workshop attendees and from companies that were not RTMS certified. Respondents from RTMS certified companies and repeat attendees showed little or no increase in RTMS commitment.

There is a general improvement in clarity of steps to RTMS reported as a result of the workshop. Respondents that have not attended the RTMS workshop before and from companies not RTMS certified report very low levels of clarity of steps before the workshop, and reasonably good levels post the workshop. This would suggest that the workshop adequately addresses the needs of those who have not attended the workshop before in terms of making the certification steps clear.

Considering the four constructs, knowledge, motivation, commitment and clarity of steps, a higher post-workshop score is reported for motivation (85% Totally agree), and commitment (84% Totally agree) than for knowledge (70% Totally agree) and clarity of steps (72% Totally agree). The participants report significantly lower post workshop scores for the cognitive constructs (knowledge and clarity of steps) than the affective constructs (motivation and commitment). It is important for the workshop to address the knowledge increase requirement. The use of course notes and deeper insight into examples of best practice could be easy to implement interventions. It is also important to improve the clarity of steps to certification as this may be a barrier to candidates going forward towards certification. It may benefit workshop participants to be guided by a flowchart that shows the process steps to attain certification clearly. This would provide a valuable refinement to the workshop and is easy to implement. This flowchart could also introduce the two day program as a suggested next step in developing the knowledge and understanding for RTMS certification.

The repeated measures general linear model shows that when considering all four constructs together, participants that have not attended the RTMS workshop before experience a more significant benefit in preparing them for RTMS certification. It is also evident that participants from companies that have not adopted the RTMS workshop derive the most benefit from the workshop. Participants from companies in process of adopting the RTMS experience a lesser benefit comparatively. Participants from companies that are RTMS certified experience the least benefit.

The course content of the RTMS workshop is tailored to meet the needs of first-time attendees, and the participants should be selected accordingly. Workshop participants should also be introduced to the requirements for certification through a flow chart or process map to make the steps to certification clear. A course outline for the two-day workshop should also be presented so that the respective purposes of the 2 programmes are clearly understood. The two-day training course should be focussed on the needs of people who have already attended the RTMS workshop and are already familiar with the RTMS. The intent and focus of the two

programmes must be made clear in the advertising for workshops. Marketing of the RTMS workshops should aim to draw in first time attendance to the workshop and to direct further engagement to the two-day training course. The schedule of workshops and two-day courses should be published more widely to engage a wider audience, and the frequency of these events increased. It is suggested that an online digital toolkit be made available in order to make it easier for companies to apply the compliance steps and to enhance best practice.

The high number of repeat workshop attendees could mean that these attendees lack awareness of the two day RTMS training course, which is a separate and more comprehensive programme. This programme focuses in more detail on the compliance steps and certification requirements for the RTMS and would probably be of more benefit to those who had already attended the workshop and who need a more substantial programme to guide their RTMS system development and implementation. The two day workshop could be scheduled as a follow up within a week or two of the workshop in each region in order to build on the momentum towards certification developed in the workshop.

The qualitative data suggests that participants attending the RTMS workshop and the training course be given course notes to help facilitate focus, understanding and knowledge retention. These materials should contain clear process steps toward certification. Q&A sessions should also be included in both the RTMS workshop and training course. Post the workshop and prior the two-day RTMS training course, a gap analysis could be conducted by emailing a questionnaire to the attendees to gather information about their needs in order to allocate time to addressing those needs over the two days. Examples of best practice could also be made available at both the RTMS workshop and the two-day training course, and this could possibly be reinforced through a digital toolkit. A register of consultants could also be made available to companies seeking certification, (although this should not detract from internal capacity building in companies). Finally, government should play a more active role in promoting the RTMS, and in providing operator benefits for compliant companies. Roadworthiness of transport fleets should also be made part of the audit process to ensure legal compliance.

4. CONCLUSION, LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The purpose of this investigation was to evaluate the effectiveness of the RTMS workshops towards increasing the number of companies attaining RTMS certification. To achieve this purpose, the following research question was examined: What is the impact of the RTMS workshop on participants in terms of knowledge, motivation, clarity of steps and commitment to voluntary compliance? It was found that the RTMS workshop did have a significant impact on each of the measured constructs; knowledge, motivation, commitment and clarity of steps to certification. The RTMS workshops are therefore, effective in preparing participants toward RTMS certification.

Participants reported significantly higher scores post workshop for motivation and commitment than for knowledge and clarity of steps. It is important for the workshop to address the knowledge increase requirement. The use of course notes and deeper insight into examples of best practice are suggestions for easy to implement interventions. It is also important to improve the clarity of steps to certification as this may be a barrier to candidates progressing towards certification. It may benefit workshop participants to be guided by a flowchart that shows the process steps to attain certification. This would provide a valuable refinement to the workshop and is easy to implement. This flowchart should also introduce the two day program as a suggested next step in developing the knowledge and understanding for RTMS certification.

The RTMS workshops have more of a positive impact for first time workshop attendees, and participants form companies that are not RTMS certified than on repeat attendees and participants from certified companies. The focus areas of the RTMS workshops, and the two day course may be differentiated in marketing collateral and it is suggested that the RTMS workshop is marketed as a precursor to the two day RTMS course.

The literature review indicated that there is strong evidence that regulatory reform, although powerful, has little effect without enforcement. Even alternative approaches such as demerit systems (AARTO) have little effect without visible policing and enforcement. Voluntary certification is distinctly different from most transport reform in that it does not rely on enforcement for its success, but is self - policing. Accreditation and voluntary compliance schemes have had good results in Sweden, Australia and South Africa, but not consistently in the United Kingdom where there are gaps in implementation and possibly in quality assurance or audit. There is substantial evidence in the literature that points to the RTMS having benefits for road transport operators, as well as for other road users, and this study has confirmed that this is the case in South Africa.

4.1 Limitations of the study

The research design was based on a single group pre-test and post-test. Not having a control group limits some of the analytical power of the research. The survey involved a purposive sample from attendants at the RTMS workshops, and not a random sample which would have improved the generalisation of results. The surveys relied on respondents reporting their perceived level of knowledge, motivation, clarity of steps and commitment to the RTMS. The self-report is subjective as each person has a different frame of reference so both the intensity of the construct being measured, as well as the scale reported against could be significantly different between respondents. To some extent, this effect was mitigated by comparing the pre workshop versus the post workshop responses for each respondent to measure a shift in the respective construct. Self-assessment was sometimes also affected by the tendency to report socially desirable outcomes.

4.2 Suggestions for further research

This study focussed on participants in the RTMS workshop. This is the first time that the impact of training on voluntary certification in road transport has been studied and the research could be further enhanced by a longitudinal study that would survey participants before, during and perhaps a year after the workshop to investigate how their journey toward certification as well as implementation has progressed. It would also be useful to extend this study to include interviews with companies that successfully completed RTMS certification, as well as those that did not obtain RTMS certification order to understand critical success factors and barriers to certification. In this way, barriers to attaining certification could be identified and eliminated. Further research could also assist in a wider and faster adoption of the RTMS.

Research in the area of voluntary certification in road transport with specific emphasis on identifying what characterises successful implementation, and how to ensure that the reform is pervasive in organisational culture and enduring in time is also suggested. The impact of AARTO on improving road safety in South Africa is also a researchable topic, especially in relation to road transport where truck drivers cover significant distances annually. A truck driver may drive up to 200 000 km a year, as compared to a motorist who may drive 10 000 to 20 000km in a year, and this legislation may have a profound impact on professional drivers' ability to remain licensed through the year. The counter-argument would be that the professional driver should not be transgressing, but the literature has shown that it is often outside of the driver's locus of control (Quinlan, Johnstone & Mayhew, 2006). There are also regulatory and enforcement mechanisms in AARTO to accrue demerit points to transport operators and even to vehicles, which has created much confusion in the industry. The RTMS could prove to be a powerful mechanism for companies to reduce their vulnerability to AARTO through a culture of compliance.

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APPENDIX A: PARTICIPANT INFORMATION SHEET

July 2018

Dear Participant,

Re: Participation in research: "An evaluation of the impact of the Road Transport Management System (RTMS) workshop in increasing voluntary certification"

Thank you for considering participation in this survey. It is a list of 16, mainly multiple choice, questions and should typically take less than 5 minutes to complete. The results are intended to measure the impact of the RTMS workshops, and may help improve the workshops in future.

I am a research student in the School of Mechanical, Industrial and Aeronautical Engineering at the University of the Witwatersrand, under the supervision of Professor Frank Kienhofer. The title of my research is "An evaluation of the impact of the Road Transport Management System (RTMS): workshop in promoting voluntary certification."

The broad aims of my research are to measure the impact of the RTMS workshops in improving knowledge of the requirements for RTMS certification and in motivating participants towards certification.

Participation in the study is voluntary, and you may withdraw at any time. Anonymity (regarding company name and any owner/manager/employee names) and confidentiality of information provided will be assured and respected.

The results of the study will form part of my research degree submission, and may also be reported in academic papers and at conferences. A summary of the results of the research will be made available to you on request.

Please contact me if you have any questions regarding the research and participation in the study.

I look forward to hearing from you.

Yours faithfully

Abdool Kamdar
Student Number: 8582023
Tel: 031 4081 467 and Email: 8582023@students.wits.ac.za

Supervisor: Professor Frank Kienhöfer
Telephone number: 011 7177 320 Email: Frank.Kienhofer@wits.ac.z

APPENDIX B: PARTICIPANT CONSENT FORM

Letter of Consent

I, (participant) _____, agree to participate in the research entitled "An evaluation of the impact of the Road Transport Management System (RTMS) workshop in promoting voluntary certification" to be undertaken by Abdool Kamdar under the supervision of Professor Frank Kienhofer and certify that I have received a copy of this letter of consent.

I acknowledge that the research has been explained to me and I understand what it entails, as follows:

1. There will be a survey form to be filled in with sections for before and after the RTMS workshop.
2. The survey form will not require name, personal details, or name of company.
3. I have the right to withdraw my assistance from this project at any time without penalty, even after signing the letter of consent.
4. I have the right to refuse to answer one or more of the questions without penalty and may continue to be a part of the study.
5. I may request a report summary, which will come as a result of this study.
6. I am entirely free to discuss issues and will not be in any way coerced into providing information that is confidential or of a sensitive nature.
7. This project was approved by the Faculty of Engineering and the Built Environment of the University of the Witwatersrand and the School of Mechanical, Industrial and Aeronautical Research Ethics Committee (non-medical) of the University.
8. If I have any questions or concerns about my rights or treatment as a participant, I may contact the Chair of the School of Mechanical, Industrial and Aeronautical Research Ethics Committee (non-medical) at (phone # 011 717 7343) or by (email bruno.emwanu@wits.ac.za).

Signed (Participant): _____

Date: _____

Questions concerning the study can be directed to: Abdool Kamdar
Tel: 031 4081 467 and Email: 8582023@students.wits.ac.za

Alternatively, (Supervisor) Professor Frank Kienhöfer
Telephone number: 011 7177 320 Email: Frank.Kienhofer@wits.ac.za.

APPENDIX C: SURVEY FORM

RTMS Workshop Survey for Road Transport Operators

1. Have you attended the RTMS workshop before?
   Yes ⬭ No ⬭

2. Has your company adopted the RTMS?
   Yes ⬭ No ⬭ In the process of adopting the RTMS ⬭

3. If your answer to Q2 is **No**, why have you not yet adopted the RTMS?
   a) High Cost to Implement ⬭
   b) It is difficult to implement ⬭
   c) Lack of enthusiasm for change in the company ⬭
   d) Other..... ⬭

4. What in your opinion are the benefits of the RTMS? (Mark only one oval per row with an X)

	No Benefit	Some Benefit	Good Benefit	Exceptional Benefit
a) Safety	⬭	⬭	⬭	⬭
b) Cost reduction	⬭	⬭	⬭	⬭
c) Driver wellness	⬭	⬭	⬭	⬭
d) Reduced road damage	⬭	⬭	⬭	⬭
e) Improved operational efficiency	⬭	⬭	⬭	⬭

Before the RTMS workshop

5. I have knowledge of the requirements for RTMS certification?
   a) Disagree totally ⬭
   b) Disagree to some extent ⬭
   c) Neither agree nor disagree ⬭
   d) Agree to some extent ⬭
   e) Totally agree ⬭

6. I am motivated to embark on RTMS certification.
   a) Disagree totally ⬭
   b) Disagree to some extent ⬭
   c) Neither agree nor disagree ⬭
   d) Agree to some extent ⬭
   e) Totally agree ⬭

7. I am committed to RTMS certification.
   a) Disagree totally ⬭
   b) Disagree to some extent ⬭
   c) Neither agree nor disagree ⬭
   d) Agree to some extent ⬭
   e) Totally agree ⬭

8. The requisite steps for RTMS certification are clear to me.
   a) Disagree totally ⬭
   b) Disagree to some extent ⬭
   c) Neither agree nor disagree ⬭
   d) Agree to some extent ⬭
   e) Totally agree ⬭

After the RTMS workshop

9. I have knowledge of the requirements for RTMS certification?
   a) Disagree totally
   b) Disagree to some extent
   c) Neither agree nor disagree
   d) Agree to some extent
   e) Totally agree

10. I am motivated to embark on RTMS certification.
   a) Disagree totally
   b) Disagree to some extent
   c) Neither agree nor disagree
   d) Agree to some extent
   e) Totally agree

11. I am committed to RTMS certification.
   a) Disagree totally
   b) Disagree to some extent
   c) Neither agree nor disagree
   d) Agree to some extent
   e) Totally agree

12. The requisite steps for RTMS certification are clear to me.
   a) Disagree totally
   b) Disagree to some extent
   c) Neither agree nor disagree
   d) Agree to some extent
   e) Totally agree

13. The RTMS workshop resulted in a positive shift in my motivation to begin RTMS certification.
   a) Disagree totally
   b) Disagree to some extent
   c) Neither agree nor disagree
   d) Agree to some extent
   e) Totally agree

14. The RTMS workshop has increased my knowledge of the requirements for RTMS certification?
   a) Disagree totally
   b) Disagree to some extent
   c) Neither agree nor disagree
   d) Agree to some extent
   e) Totally agree

15. In your opinion, how can the RTMS certification process be improved?

.....

.....

16. In your opinion, how can the RTMS workshop be improved?

.....

.....

APPENDIX D: RESPONSES TO SURVEY QUESTION 15

Promote RTMS to the broader community
More visibility especially on the vehicles
A seminar for drivers highlighting the value of the RTMS
Show best practice examples
Get all provinces involved in the RTMS
Implement tool kits for first time users
More workshops, more consultants
Provide more detailed training for operators. Convince consignors to use RTMS operators preferentially
advertise on social media and tv
advertise more
Not many people are aware of the RTMS
Motivate short term insurance brokers to get their clients to join
provide tool kits
software to implement the RTMS and manage it
more content in workshop
have regular workshops
paperless system should be embraced
Consider condition of fleet, especially verify roadworthiness
Aim workshops at company directors
it should be compulsory for all transporters
Provide more detailed guidelines, eg. for driver training and load securing
guidance on how to align existing processes to audit requirements
invite more small operators to participate, large fleets like PUTCO also need to be involved
training on the audit
recruit more companies to the workshops
compile a certification doc pack on the RTMS website
simplify
assistance is required for implementation
improve candidate recruitment
there is so much room for digitalisation
regional workshops quarterly
people attending workshop must get certificate
more advertising and awareness
more awareness

APPENDIX E: RESPONSES TO SURVEY QUESTION 16

More time for Q&A with the leading role players
Invite more smaller operators to attend, so it helps them to grow
Provide more in depth information with Q&A
Have awards and competitions
Go live on TV
Feedback from drivers, mechanics etc. How has the system improved their working conditions to make them want to make a success of the system
Invite more operators, involve the public
Develop digital techniques to assist. Benchmark and provide data to assist
Scheduled courses per region every quarter
It needs to be introduced to more companies
RTMS course manual with notes, and place to write
Invite operators in industrial hubs to the RTMS meetings
more practical guidelines for attendees
invite more participants to attend
invite DOT, and taxi industry
More details on steps in the process
more detail required on the auditing process
Allow newcomers to present their challenges
There should be more detail. Presenters were rushing through slides
more specialist sessions
use community radio stations to sensitize public on the importance of the RTMS and the promotion of road safety
more workshops, training notes prior to workshops
more awareness to reach companies not yet RTMS
more workshops needed
use schools to spread the word about the RTMS
Issue an agenda for the workshop and name and contact details of presenters
There should be a RTMS helpline for assistance
more workshops
focus on 2-3 aspects per workshop
more advertisements
more case studies

APPENDIX F : RTMS WORKSHOP AGENDA

ROAD TRANSPORT MANAGEMENT SYSTEM (RTMS) and PERFORMANCE-BASED STANDARDS (PBS) WORKSHOP

MTM KZN, 13 - 17 Davlen Park, 11 Halsted Road, Mkondeni, Pmb

24 APRIL 2019

PROGRAMME

08h30 – 09h00	**Tea/coffee & Registration**	
09h00	Introduction and welcome	Mike Hellens: MTM KZN
09h05	Importance of self-regulation from a govt. perspective	Chris Stretch: KZN DoT
09h20	Issues facing the heavy vehicle industry in SA and Introduction to the RTMS	Paul Nordengen: National RTMS Committee/CSIR
09h55	RTMS Case Study: Measurement and compliance	Oliver Naidoo: JC Auditors
10h30	**Tea/coffee break**	
10h50	RTMS case study: General freight	Sean Charles: SG Freight
11h05	RTMS case study: General freight	Women in Logistics (tbc)
11h25	RTMS case study: Forestry	Francois Oberholzer: Forestry SA
11h45	RTMS case study: Forestry	Bruce Goatley: NCT
12h15	The Smart Transport Transformation Programme	AK Kamdar: KDG Logistics
12:45	Questions and discussion	All
13h00	**LUNCH**	
13h45	The PBS approach to vehicle design	Paul Nordengen: CSIR
14h30	Questions and discussion	All
14h45	Closure	Chris Stretch: KZN DoT

APPENDIX G: RTMS TRAINING COURSE (2 DAY PROGRAMME)

CSIR

Road Transport Management System
RTMS

JC AUDITORS

RTMS TRAINING COURSE 2019

RTMS is an industry-led, government-supported, voluntary, self-regulation scheme that encourages consignees, consignors & road transport operators to implement a management system (a set of standards) that demonstrates compliance with the Road Traffic Regulations and contributes to preserving road infrastructure, improving road safety, ensuring driver health and wellness & increasing productivity.

This course will cover the RTMS Standard (SANS 1395-1:2014)

The course is intended for persons who are responsible for implementing RTMS within the operation. The course will examine each element of the SANS 1395-1 RTMS standard and provide guidance on how to comply with the specified requirements. As far as possible, practical examples will be used so that maximum benefit is derived for all delegates.



The course will cover the following:

- ✓ RTMS Background
- ✓ RTMS Outcomes
- ✓ Interpretation of the standard
- ✓ RTMS Reporting
- ✓ Audit evidence
- ✓ RTMS Internal Audits
- ✓ RTMS quarterly online submissions
- ✓ Link between RTMS & PBS (Smart Trucks)

RTMS

The course will be held in 2 venues as follows:

DATE : 21-22 February 2019
VENUE : Blue Mango Lodge,226 Sixth Avenue, Bredell, Kempton Park

DATE : 26-27 March 2019
VENUE : Mokaranga Conference Centre, No 1A Igwababa Road, Kloof, KZN

TIME : 8H00 – 16H00 (BOTH DAYS)

COST : R 3 950 + VAT

(Tea/Lunch included)

Please complete the attached registration form to confirm attendance

Road Transport Management System
RTMS

