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Drivers of and barriers to the adoption of green fleet management practices in Zimbabwe: A case study of the funeral assurance sector

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Authors:
Tenson Kachilala[1]
Smart Dumba[2]

Affiliations:
[1]School of Entrepreneurship and Business Sciences, Chinhoyi University of Technology, Chinhoyi, Zimbabwe

[2]Department of Marketing and Logistics, Faculty of Management Sciences, Namibia University of Science and Technology, Windhoek, Namibia

Corresponding author:
Smart Dumba,
sdumba@nust.na

Background: For complex fleet operations (e.g. unpredictable routing multiple corpse destinations, longer driver working hours and rough terrains) witnessed in the funeral assurance companies, it is increasingly difficult to strike a balance between cost-effectiveness and reducing environmental impacts. Existing studies do not address this gap on how firms with complex fleet management practices can or should adopt green fleet management (GFM). Against this background, this study explores the organisational constraints faced by companies to go green, as a starting point for effective and sustainable GFM adoption.

Objectives: The aim of this study was to examine the drivers of and barriers to the adoption of sustainable fleet management, particularly in the context of complex transport operations as those prevailing in companies within the funeral assurance sector.

Method: A qualitative research paradigm was adopted, based on a case study of three companies with a sizeable fleet size within the funeral assurance sector in Zimbabwe. We conducted extensive key informant interviews with different management levels of the three companies. Documentary analysis was performed on the legislative framework governing fleet management in Zimbabwe to assess its provision for GFM in Zimbabwe and its effectiveness therefrom.

Results: An analysis of the institutional frameworks for environmental sustainability shows that Zimbabwe has some Acts of parliament that deal with GFM. However, there is a paucity in terms of enforcement. Furthermore, there are no financial or fiscal incentives for the acquisition of a green fleet. Environmental considerations were peripheral in the fleet acquisition, maintenance and disposal decisions.

Conclusion and contribution: Environmental considerations are least prioritised when crafting fleet operations decisions; this is despite the existence of a myriad of Acts of Parliament championing environmental preservation from transport. This article contributes to transport policy and planning by calling for a close examination of the firm specific fleet operational characteristics with a view to develop appropriate strategies for GFM adoption.

Keywords: green, fleet, environment, sustainability, organisation.

Introduction

The contribution of the transport sector to environmental damage is widely acknowledged (EEA 2019; International Transport Forum [ITF] 2020; OECD 2021). In its 2021 report, the United States Environmental Protection Agency (2021:1) pointed out that the transportation sector accounted for the largest portion (29%) of total US green house gas (GHG) emissions in 2019. Without policy interventions, the environmental damage is likely to increase in the future. This necessitates the need for increased calls to move a new growth path that is consistent with the protection of the environment and a sustainable use of scarce natural resources while still achieving sizeable gains in living standards and reducing poverty (OECD 2014:1).

The impact of GHG emissions (global warming and climate change) has led to the increased calls for the development and implementation of green transportation policies. Sustainable fleet management or green fleet management (GFM) is at the core of green transport. Green fleet management policies have been adopted at different scales and scopes in different parts of the world, with developing countries leading the race and most developing countries are lagging behind because of a myriad of factors, such as operational barriers and cost implications (Anosike et al. 2021:6).

Study background and motivation

In any typical non-transport business such as the funeral assurance, the transport function is generally regarded as ancillary. This, however, is debatable when it comes to the funeral assurance sector in Zimbabwe. The sector has grown significantly over the years, and in the process, some entities have acquired a sizeable fleet of more than 100 vehicles (buses and support vehicles combined) in order to effectively meet their transport function. A significant growth in ancillary vehicles to a non-transport organisation makes it difficult to classify these vehicles as ancillary. Furthermore, while other transport sectors such as public and freight companies may find it easier to adopt GFM policies, the funeral assurance sector has a quite different fleet operational characteristics to either freight or public transit operations. Table 1 shows a comparison on transport operations under a conventional transport organisation and funeral assurance companies.

As illustrated in Table 1, the nature of operations of the funeral assurance sector involves complex vehicle routing and driver scheduling because their customers (funeral policyholders) are all scattered around the country. It becomes very difficult to minimise the mileage travel (as one of the pillars of GFM requirements) of the entire fleet because of the highly fluid route planning to meet customer demands. Increased vehicle-kilometre travelled ultimately leads to increased fuel consumption, high levels of emission, generation of more traffic and high risks of accidents. Besides the fact that transport activity is not their core activity but just a supporting function, the sector relies on a huge variety of fleet sizes, which ranges from small vehicles to buses, in order to accomplish their operational needs. As such, the organisational structure requires workforces at various levels of management that ensures greening of the fleet. Burton, Dubner and Cumber (2016) postulate that it is increasingly difficult to strike a balance between cost-effectiveness and reducing environmental impacts because of the rising costs of fuel, alternative technologies and new regulations. It is within this context that this study seeks to explore the different organisational constraints faced by funeral assurance companies with sizeable fleets in their endeavours to adopt GFM practices.

TABLE 1: Fleet operational characteristics between the conventional transport companies and the funeral assurance companies.

Basis of comparison	Convectional transport sector	Funeral assurance sector
Routing and scheduling	Predictable vehicle scheduling and routing with specified destinations	Complex vehicle routing and scheduling around the country with fluid destinations
Fleet mix portfolio	Limited fleet mix	Diversified fleet mix that ranges from small vehicles to big trucks and buses
Driver cost overheads	Limited overtime as driving hours are restricted	Extended driver overtime throughout, driving hours not limited
Transport activity	Core business function	Supporting function, yet sizeable fleet with complex fleet operations

Literature review
Defining green fleet management

Munuhwa et al. (2020:166) reiterate that research in GFM has significantly expanded over the past few decades in connection to the growing importance of the environmental components in the management of supply chains. Green fleet management includes different approaches by which companies work with their suppliers and/or customers in order to improve the environmental performance of their operations. While this is the case, there is not an established definition of GFM initiatives in the current literature, and as indicated by Sarkis (2009), the boundary of GFM is strictly dependent on the type and scope of initiatives adopted by companies participating in supply chain processes (Sarkis 2009:20). An attempt to define green transport was made by Ahmed and Monem (2020:20) who viewed it as any form of transportation that takes humanity into account and offers affordable, safe and different types of transport modes. Moreover, it depends on renewable or regenerated energy rather than fossil fuels and has a low impact on the environment. Ideally, green fleet issues at a company level must be enshrined within a fleet management policy or at least in green fleet action plan. A GFM policy or strategy is premised on three key types of measures as shown in Table 2.
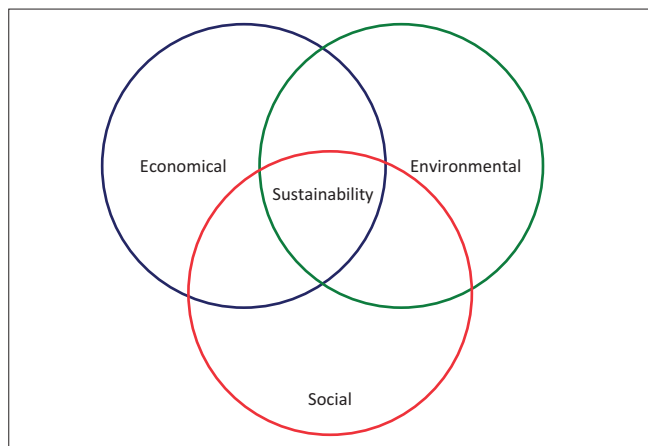
Theoretical model
The triple bottom line model

In 1994, Elkington coined the triple Bottom Line Model, which localised the concept of sustainable development at the individual firm level. The model calls for companies to strike a balance between social, economic and environmental benefits in order to realise sustainable development goals. Bloemhof (2005:12) agrees with this and argues that the triple bottom line is specifically focused within the forward logistics of a logistics chain, that is, from producer to consumer, and is therefore linked with the concept of green logistics. According to Porter and Kramer (2006:7–10), establishing social and environmental initiatives can allow managers to implement

TABLE 2: Green fleet management strategies.

Strategy	Explanation
Transport demand management (TDM)	TDM seeks to reduce the kilometres driven by examining whether trips are necessary, and considers if they can be combined and whether the optimum routes are being used, whether a trip can be replaced by video conference, whether a trip is nearby and it can be replaced by walking, etc. By examining current practices, significant mileage savings can be made, thereby reducing fuel and mileage costs, emissions and even the size of a fleet.
Cleaner fuels and technologies	This strategy aims to use the lowest emission vehicles appropriate to their role. With existing diesel and petrol vehicles, use the smallest, most efficient vehicle appropriate for the job. Explore new, lower mission technologies such as electric vehicles (EVs) or sustainably produced biofuels that may be suitable.
Efficient vehicle use	Here the emphasis is on driver performance and vehicle maintenance, as these are significant variables on fuel use. A reduction in fuel consumption will variably lead to emissions and running costs reduction.

Source: Rashid, F. & Lugaric, L., 2018, *Green fleet management: Implementation guidebook for organizations in UAE*, viewed 24 July 2022, from https://dubaisce.gov.ae/wpcontent/uploads/2021/06/Green_Fleet_Management.pdf.

FIGURE 1: The triple bottom line and sustainability.

a strong strategic value. The Triple Bottom Line model is a useful tool to understand the goals of sustainable development.

According to the triple bottom line theory, a sustainable company is one that accomplishes a balance between the socio-economic and environmental factors. However, there is a trade-off between these three factors. An environmentally friendly decision may not always be the most economically viable option in the short run.

Existing works

Both push and pull forces exist in the call for green fleet adoption. On the push factor side, environmental laws are being enacted to ensure compliance to environmental preservation. The ISO 14001 is one such example of environmental law in operation. The ISO 14001 is part of the ISO 14000 family of standards that help companies to manage their environmental responsibilities. The ISO 14001, thereby, focuses on environmental systems to achieve the transition towards more sustainable conduct (International Organization for Standardization 2019).

Literature has it that countries such as the United Kingdom (DBERR 2008), Malaysia (Khidir ElTayeb et al. 2010), Japan (Zhu et al. 2010), China (Huang, Tan & Ding 2015) and Germany (Matten & Moon 2008) implemented some form of regulation to steer companies towards corporate social responsibility. As part of fulfilling this legal imperative, a number of organisations are publishing environmental data alongside financial data as part of their corporate reporting process in annual reports and environmental statements.

The push factors are not only limited to government requirements, but there is also a growing environmental consciousness from stakeholders such as suppliers and customers demanding greater openness on the environmental impact of business furthermore, some international financiers place much emphasis on environmental consciousness as

a condition for providing loans to companies. Greenhouse gas emissions from transportation account for about 27% of total GHG emissions in countries such as the United States of America, making it the largest contributor to US GHG emissions.

On the pull factor side, organisations are moving towards green fleet practices as a strategic move to achieve competitive advantage over rivals. Walker, Di Sisto and McBain (2008) contend that external competitors can act as a driver for sustainable practices for firms that seek to achieve a competitive advantage and to improve their performance. This is in line with the study of Röhrich, Hoejmose and Overland (2017), who stress that broader industry competition is one of the most critical external drivers to the adoption of sustainable practices along the supply chain.

Studies on GFM particularly in the developing world context are limited. Akkartal and Aras (2020) concur that sustainability in the sphere of fleet management at corporate levels has not yet much attracted researchers, and the literature is lacking ample studies on this topic. Hence, the present study relied primarily on related studies that indirectly touch on GFM and/or sustainable fleet management practices. Among these few studies is the study by Hinrichs and Jannik (2019), which focused on drivers of and barriers to the adoption of sustainable procurement in small to medium enterprises (SMEs). Although these scholars focused on procurement and not fleet management, the drivers and barriers may be applicable to fleet management. For example, one major driver towards sustainable procurement was found to be the financial motives, which depict a significant reason for SMEs to adopt sustainable procurement practices. Earlier, Lamming and Hampson (1996) found out that cost efficiencies and financial motives are potential driving factors. Cost savings can be realised through less pollution, reduction of raw material wastes, energy savings and recycling (Haanaes et al. 2013; Huang et al. 2015; Svensson & Wagner 2012). The study also found that the implementation of sustainable procurement practices is facilitated by managerial support.

Furthermore, the greening of transport and logistics activities has been identified as a source for achieving and maintaining competitive advantage and increasing market share (Lieb & Lieb 2010). This is particularly true of logistics service providers (LSPs). However, this may not apply to companies that have the transport function as their ancillary function such as those in the funeral assurance sector, despite having a huge vehicle fleet.

A study by Isaksson (2014) has identified initiatives undertaken by LSPs in order to reduce the environmental burden and the measures that received the highest means were transport planning management, eco-driving and offering documented emissions data as well as measures to reduce empty running. These measures were also significantly higher than all the other measures. Less commonly adopted

measures included alternative fuels for transports and switching to less energy-intensive transport modes. This can perhaps partly be explained by the study of Isaksson (2012), who points to the economic barriers when investing in environmentally friendly vehicles and also the issue regarding limited gas stations for alternative fuels.

Two issues from Isaksson's study are of particular importance: firstly, it is unlikely that the companies in the funeral assurance business would offer documented data because the nature of their business entails high kilometre travelled per corpse ferried, and such data usually constitute high emission levels. Secondly, empty runs in the funeral assurance business are inevitable; after a corpse has been buried, the bus and other supporting vehicles need to go back to the garage empty, and this makes it very difficult to adhere to this initiative. Burton et al. (2016) concurred that it is increasingly difficult to strike a balance between cost-effectiveness and reducing environmental impacts because of the rising costs of fuel, alternative technologies and new regulations. Hence, there is the need to fully examine the particular firm barriers in the adoption of GFM in order to realise its benefits both at the firm and industry levels.

While there might be regulatory pressure from governments or customers demanding increased environmental consciousness from companies, it is a daunting challenge for funeral assurance companies to fully adopt GFM without increasing the cost of doing business. A research by Karkatsoulis et al (2017) supports this when it established that 'the transport sector possesses the most complex challenges, because it encompasses fuels, vehicle technology, infrastructure, as well as behavioural changes. Bio fuels alone cannot solve the problem'. The study was commenting on the need of companies to adopt biofuels as a way of minimising GHG emissions; however, this alone was found to be inadequate because there are so many other issues in the transport sector.

Moore (2022) posits that one way for companies to go green is by ensuring efficient driving and route optimisation. This is primarily achieved through the use of GFM systems, which automatically optimises routes and reduces the amount of fuel burnt by making journeys as fuel efficient as possible. The system also eliminates some common contributors to fuel waste, such as those related to poor vehicle maintenance, by keeping diagnostics records and histories of vehicle maintenance to allow managers to optimise their maintenance plans. Without sound financial justification on the benefits of companies investing in GFM systems, such technologies are less likely to be acquired considering the high fleet maintenance costs within the funeral assurance business.

In other countries such as Sweden, governments are aware of the financial barriers to GFM adoption at the company level and have introduced incentives. An example that demonstrates how the Swedish government incentives have worked in increasing the uptake of Low Emission Vehicles (LEVs) includes the city of Stockholm (Batley, Toner & Knight 2004). The city of Stockholm has had an LEV project in place since 1994, promoting the adoption and usage of these vehicles, along with the associated fuel types (34). Between 1994 and 2005, several steps were taken to gradually push for a shift in the supply and demand of LEVs. Two of the main initiatives implemented during this period include replacing conventional vehicles in the government fleet with LEVs and introducing tax incentives to increase the demand for alternative fuels.

Study methodology
Research approach and design

This study is explorative in nature as it sought to examine the drivers of and barriers to effective GFM practices. Exploratory studies are defined as 'loose structures with the objective of discovering future research tasks' (Cooper & Schindler 2008:143). In order to achieve this, the study sought to answer the following five key research questions:

1. What is the prevailing legislative and policy framework governing the adoption of GFM practices at national and firm levels, respectively?
2. How effective are these legislative and policy framework in compelling the adoption of GFM at the firm level?
3. To what extent do firms consider green fleet issues during fleet acquisition, maintenance and disposal?
4. What are the driving factors towards the adoption of GFM within the funeral assurance sector in Zimbabwe?
5. What are the fleet operational constraints that militate against the adoption of GFM considering the rather unique fleet operational characteristics of the funeral assurance firms?

In this endeavour, the study adopted a qualitative research paradigm based on a case study of three companies within the funeral assurance sector. The study applied a purposive sampling strategy based on some pre-defined selection criteria: firstly, the criteria revolved around those players (firms) within the funeral assurance sector with a sizeable fleet, more than 50 operational pools of vehicles; secondly, a wide kilometre coverage throughout the country, more than 100 000 km combined mileage per year; and, thirdly, those with similar fleet management practices: fleet acquisition, maintenance and disposal. After subjecting all the companies within the funeral assurance sector, Table 3 shows 'the qualifying' study cases.

After the selection of the three study organisations, the next step involved the sample size determination for conducting semi-structured interviews. As the researchers could not establish the exact number of key informants within the organisational structures of the three companies, they applied a snowballing sampling strategy wherein they would identify

TABLE 3: Qualifying study cases.

Organisation	Nominal fleet	Operational fleet
Company A	565	539
Company B	368	332
Company C	132	94

Source: Annual Fleet Maintenance Registers-Company A, Company B and Company C (2020). Availed by Company officials

one key informant who would respond to the semi-structured interview guide and direct the researchers to the next person and so on, until a point (data saturation) was reached having similar responses. Through this snowball technique, the researchers managed to conveniently engage 70 interviewees from the three organisations. In depth face-to-face oral interviews enabled the researchers to gather rich exhaustive primary data and unpacking hidden facts about GFM within the funeral assurance sector.

Interview booking arrangements were made with top-, middle- and lower-level managers and the workshop workers. The average duration of the interviews was 30 min. The researchers proceeded with the interviews with fleet managers, operations managers and finance managers. Shop floor workers also participated in this study, who include workshop supervisors, workshop technicians, transport or dispatch clerks, transport officers, transport administrators and buyer or procurement officers and drivers. Online interviews were conducted with some interviewees who could not be reached physically.

Critical questions asked during the interviews revolved around whether the companies had GFM policies in place and the extent to which they would adhere to the provisions of their own policies regarding GFM. Furthermore, the different levels of management were asked to rate the different issues they consider critical during fleet acquisition, maintenance and disposal. The idea with such a question was to determine the extent of environmental preservation prioritisation in fleet management. Table 4 presents a summary of key interview questions asked.

The collected data were then cleaned removing unnecessary or repetitive statements and then sorted this data into some clusters (themes). Thematic and narrative analysis was conducted with the aid of ATLAS.ti software to organise the data into themes for interpretation and drawing meaningful insights.

Study findings

This section presents the study findings, their interpretation and analysis.

Socio-economic profile of respondents

Tannenbaum, Greaves and Graham (2016) explain that the individual differences on specific issues like age, education, family background or culture have a bearing on views on critical issues. Consequently, it became important in this study to engage many different groups of people by gender, education and work experience. The socio-economic characteristics of the respondents are as shown in Figure 2.

Figure 2 shows that there are more male workers than their female counterparts especially within the companies' transport departments. This is probably because of the nature of transport operations, where funeral assurance services involve hard labour and sometimes long working hours, which most women, because of the patriarchal societal norms, cannot accept. For example, the drivers for hearses and buses may drive very long distances, in difficult terrain for long hours. Similarly, automobile technicians and motor mechanics are involved in heavy load lifting and sometimes long working hours in difficult situations.

In terms of educational qualifications, Figure 2 shows that the entire participants hold a high school qualification. The shop floor workers, which include the technicians, drivers, vehicle mechanics and other ancillary staff members, have their education as follows: 16% with ordinary level education, 21% with certificates, 34% with diplomas, 18% with undergraduate degrees and the remaining 11% with postgraduate degrees. Further, 45% of management members held diploma certificates, 40% held undergraduate degrees and 15% held postgraduate degrees. This suggests that all the members who participated in the study are literate and would reasonably respond to the questions. Tannenbaum et al. (2016) charge that experience is almost everything as it hones one's skills and knowledge in whatever capacity. This study extracted the work experience of the participants as a way of validating the responses to the questions asked. In the management, 53% have been within their organisation for a

TABLE 4: Key research questions asked during the key informant interviews.

Key research question (RQ)	Specific questions asked	Targeted interviewees
RQ1: How effective is the legislative and policy framework in compelling the adoption of GFM at firm level?	i. Are you aware of the national legislative frameworks governing GFM adoption and practices in Zimbabwe? If so, briefly discuss on these.	Top- and middle-level management
	ii. As a company do you have an internal policy for GFM?	
	iii. How effective are these legislative and policy frameworks in compelling you to adopt GFM?	
RQ2: To what extent does your company consider green fleet issues during fleet acquisition, maintenance and disposal?	i. Can you rate the importance of the following factors during fleet acquisition, maintenance and disposal at your company (very important, important, neutral, and unimportant)?	Middle- and lower-level management
	a. Operational needs	
	b. Financial capabilities	
	c. Redundancy	
	d. Environmental regulations	
	e. Safety	
	f. Corporate image	
RQ3: What are the driving and restraining factors towards the adoption of GFM at your company?	i. What are those factors that are compelling you to adopt GFM practices at your company?	Middle- and lower-level management
	ii. What constraints do you face when you attempt to adopt GFM considering your rather unique fleet operations model for the funeral assurance sector?	

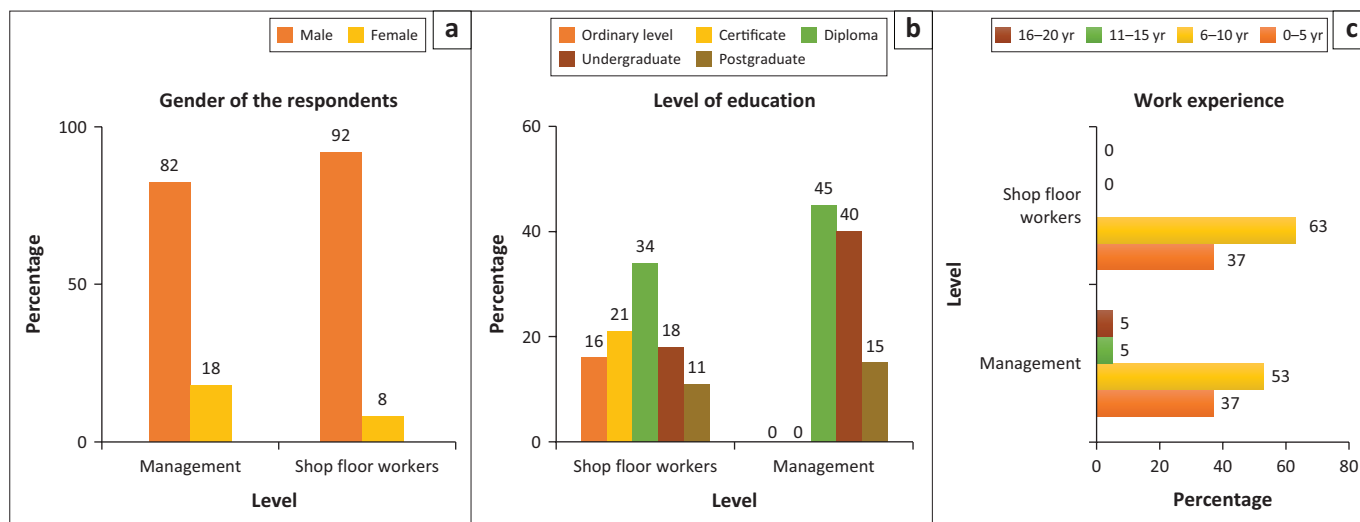GFM, green fleet management; RQ, research question.

FIGURE 2: Socio-economic characteristics of the study participants (a-c).

period of 6–10 years, followed by 37% with 0-5 years, 5% with 11–15 years and 5% with more than 15 years of experience. In the shop floor workers category, 65% have been within their organisation for a period of 6–10 years and the remaining 37% for a period of 0–5 years.

Existence of organisational-level policy framework for 'greening' fleet within the funeral assurance companies in Zimbabwe

Having established the demographic profile of respondents, the second step sought to establish if the organisations in the funeral assurance business have internal policies that drive the institutions to green practices in fleet management. Figure 3 shows the results on the availability of an internal policy framework within the funeral assurance sector.

As shown in Figure 3, the majority of participants (46%) indicated that there is no policy framework for GFM, followed by 36% who stated that there is indeed an internal policy and 18% said they are not sure. The results, although at variance with the findings from the key informant interviews, are clear in that there is no policy on GFM within the studied entities. This is partly attributable to the absence of a stand-alone national policy framework on the same subject. However, the informants were quick to point out that some of the efforts being implemented in individual organisations implicitly fed into the GFM ethos. As pointed by an official from Company B, who said:

'… [C]urrently, we do not have a GFM policy, possibly because we have no legislation that pushes us to have one. However, we have a lot of activities which can be feed into green fleet management …' (Participant F, Company C, Male)

Furthermore, in agreement with the above-mentioned view, an official at Company A also said:

'… [W]e understand green practices are very topical these days. We do not have GFM policy but we have a lot of activities
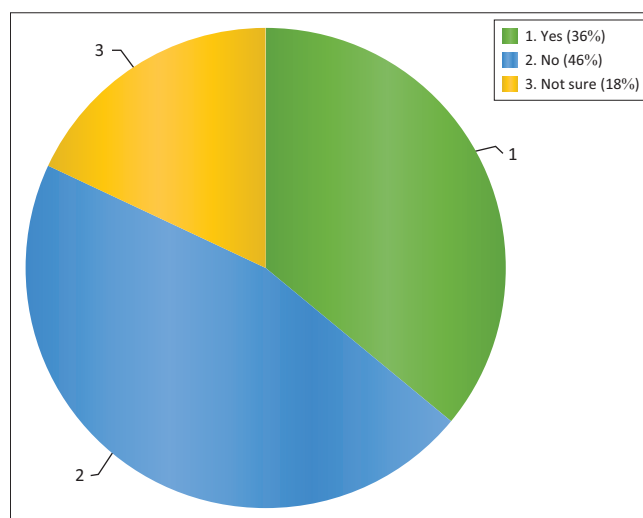
GFM, green fleet management.

FIGURE 3: Organisational policy of green fleet management.

that feed into the objectives of GFM …' (Participant G, Company B, Male)

These sentiments clearly state that the players in the funeral assurance sector have not yet made an effort towards effective GFM. Disjointed and not so well-grounded activities towards GFM were reported. These include, firstly, the control and monitoring of mileage and fuel consumption; secondly, the conscious fleet acquisition decisions prioritising small engine sizes, diesel engines and manual transmission vehicles for local town drives, driver improvement training programmes, carbon emissions measuring and tree planting (Company A is engaged in national tree planting exercises where the tree are carbon sinks). These activities show that the management is aware of green practices, which have taken the centre stage of both policy and academic discussions. The absence of a compelling comprehensive legislative drive at the national level contributes to attitudinal and technique-related barriers to the adoption of GFM. Attitudinal barriers refer to the posture of resistance, passivity, reactivity or inactivity in relation to the environment, scepticism in

relation to the benefits derived from GFM practices (Kasim & Ismail 2012; Mathiyazhagan, Govindan & Haq 2014). Technique-related barriers correspond to the commitment of the processes because of the lack of method or procedure (Barve & Muduli 2013).

Greening fleet during fleet acquisition, maintenance and disposal at the organisational level

Fleet acquisition

An interrogation was made on the three companies regarding the extent to which they consider environmental consciousness when making a fleet acquisition or fleet replacement decision. In this study, the researchers identified the major attributes considered when making vehicle acquisition decisions and the aggregated results are shown in Figure 4.

The results show that the majority of participants (50%) believe that operational needs are a priority when purchasing vehicles, followed by financial capabilities (30%), redundancy (10%) and environmental regulations (10%). This is because of the nature of vehicles required in the funeral assurance business; hence, there is a need to consider the operational characteristics of the vehicles; for example, most of the vehicles must be off-road as they navigate difficult and rugged terrains in the rural areas. After selecting a vehicle, which suits the purpose, then there is consideration of the financial capabilities of the organisation to buy the vehicle. Thus, the first step is to identify a vehicle, which can satisfy the required tasks, and then consider the financial resources available to meet the cost of acquisition. Most importantly, from the results, it is evident that the environmental considerations are peripheral in vehicle acquisition decisions. There is little consideration of the environmental issues like the pollution levels.
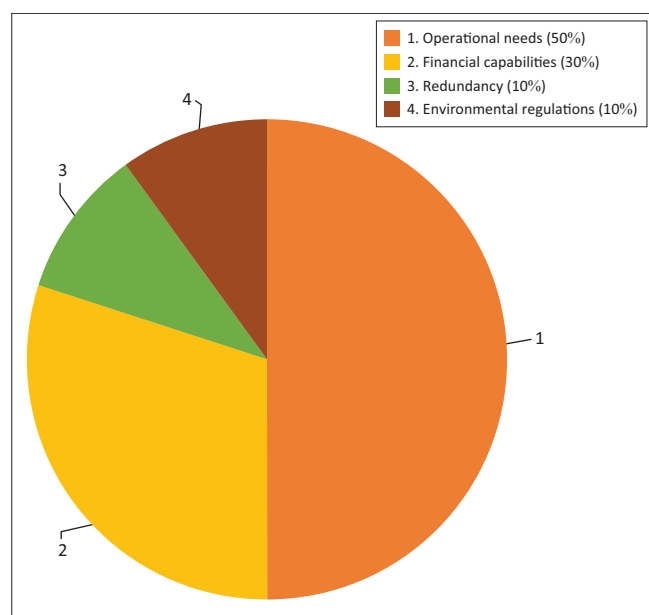

FIGURE 4: Key considerations when making the fleet acquisition decision.

Although the companies indicated that they do not have explicit policy frameworks on greening their fleet, they, however, consider the engine size of the vehicle and the type of fuel used. There was an indication that all the studied entities preferred diesel-powered vehicles over petrol-powered ones. Diesel-powered vehicles inevitably lead to increased air pollution. They also consider small engine capacity with reduced fuel consumption; this in turn results in less operational costs. Another important aspect is that the companies consider vehicle age when making vehicle acquisition decisions, generally companies prefer new vehicles over pre-owned ones because of the longer distances travelled in the provision of their services. There was a consensus among the three companies that older vehicle fleet harms the environment. Newer vehicles are fuel efficient and can reduce the carbon emissions. However, small players in the funeral assurance sector are dependent on pre-owned vehicles because of the high costs of new vehicles. This finding resonates well with other studies such as those by Alahgesan and Daud (2019), Lah (2012) and Isaksson (2014) who found that the cost of vehicle acquisition inhibits companies to focus on GFM investments, and the benefits to the environment arising from vehicle acquisition decisions are not deliberate but coincidental.

Fleet operation

As suggested by Jabali and Erdogan (2015), fleet operation involves the daily efficient utilisation of the entire fleet through the reduction of kilometres travelled. Poor fleet operation decisions are associated with high GHG emissions, and it is now important for any fleet operator to take responsible steps in the reduction of such emissions. Poorly managed fleet operations result in misuse of vehicles, fuel and increased overtime overheads that negatively affect the environment. Although some of the measures to reduce GHGs in fleet operations are done to minimise operational costs, they also seek to promote sustainability. These measures are internal control mechanism used to monitor fleet usage and assist decision making. Hindsight of this fact, the study sought to understand the fleet usage monitoring systems used by companies in the funeral assurance sector. The measures include the monitoring of driver behaviour and fuel usage among other measures being employed in fleet management.

The study established that fleet managers from the three companies have put in place measures to deal with mileage and fuel consumption. By making sure that mileage for the entire fleet is under check, it means the amount of fuel consumed is also under control. This also means reduced GHG emissions. All the companies testified that they have set their vehicle's speeds to a maximum of 100 km/h. This measure on the top of achieving safety from the travellers is also meant to curb excessive fuel consumption as has been established by specialists that vehicles consume more fuel when in high speeds. The evaluation of the vehicle-mileage control mechanism is as shown in Figure 5.

Figure 5 shows that the majority (43%) of respondents believe that the fuel-mileage control mechanism in the organisations is fair followed by those who think they are good (41%), poor (8%), very good (5%) and not available (3%). The results show that generally the participants believe that the mechanisms used in the mileage-fuel control mechanism are workable (fair, good and very good). This is a testimony confirmed by the management during the interviews. In one of the interviews, one official from Company B said:

> '… [W]e have put in place vehicle tracking systems which is very effective in curbing vehicle abuse and arbitrary fuel consumption. The technology can actually report on the driver behaviour like speeding …' (Participant A, Company B, Female)

The above excerpt confirms that the companies have put in place mechanisms to monitor and control the vehicle use, which implicitly reduce fuel consumption and vehicle miles travelled. This finding concurs with the finding by Rashid and Lugaric (2018) who noted that effective use of telematics in fuel management results in cost savings of about 10%. Green fleet management advocates for driver behaviour monitoring and control as a way of reducing fuel consumption. However, it was noted with concern that the insufficient utilization of telematics at Company C was provided an opportunity for vehicle abuse by unscrupulous drivers.

Fleet maintenance

The GFM practices advocate for predictive vehicle maintenance to avoid the negative environmental and safety implications associated with poor vehicle maintenance. Routine vehicle maintenance and repair ensure that the fleet is roadworthy with minimum negative environmental impacts, less safety risks and low operational costs especially on fuel and oil consumption. In the interest of an evaluation of the current fleet management practices in line with GFM, it became necessary to understand the maintenance and servicing routines of the companies within the funeral assurance sector. The first aspect looked into is the priorities of the funeral assurance companies when planning and/or scheduling vehicles for maintenance or servicing. The results on this variable are shown in Figure 6.

Figure 6 shows that the funeral assurance companies, in that order, prioritise cost, safety, corporate image, life span
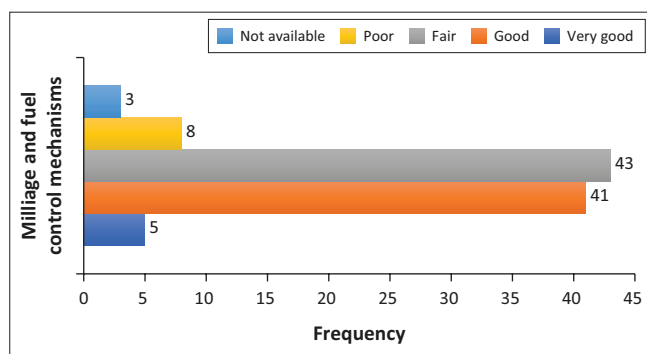
and environmental issues when planning for vehicle maintenance. On cost, 88% of the respondents indicated that cost is a major determinant for decision on vehicle routine maintenance, and only 20% viewed it not as a priority. This is so because vehicle servicing has a serious cost implication on the fleet operations. Because of the nature of the operations and the distances travelled in the funeral assurance sector, vehicle servicing imposes a serious cost on the fleet operations. One official at Company A pointed out that adhering to the manufacturer's recommendations on vehicle servicing and maintenance is very expensive as it may take only 2 weeks to reach the recommended mileage for vehicle servicing – for example, 5000 km for light motor vehicles and 10 000 km for other vehicles. Furthermore, the organisations have shifted the vehicle servicing routines from the manufacturer's specifications; for example, Company A shifted from the recommended 5000 km – 10 000 km for light motor vehicles and 10 000 km – 15 000 km for other vehicles as a strategy of reducing maintenance costs. This goes against GFM practices, which call for scheduled maintenance as prescribed by the vehicle manufacturer.

Another priority area is safety. Of the respondents, 83% chose safety as a priority and only 17% thought it was not a priority. The results indicate that safety is a critical component for the companies. This is also in line with the ethos of GFM, which puts emphasis on safety, health and environment. The fleet managers believe that faulty vehicles are a hazard to the drivers and those carried in the vehicle – hence the need to protect them. From the explanations given during interviews, it came out that safety measures are tied onto good corporate image. The funeral assurance sector is very competitive, and hence the organisations involved seek to provide top-notch services. Hence, transportation forms part and parcel of the corporate image building and thus there is the need to routinely service and maintain vehicles so that they could be reliable, safe and convenient in discharging their funeral assistance services. It is against this backdrop that firms would want to service their vehicles to avoid a bad image, which is associated with frequent breakdowns, smoking vehicles and high frequency of accidents among other negative environmental externalities arising from sub-
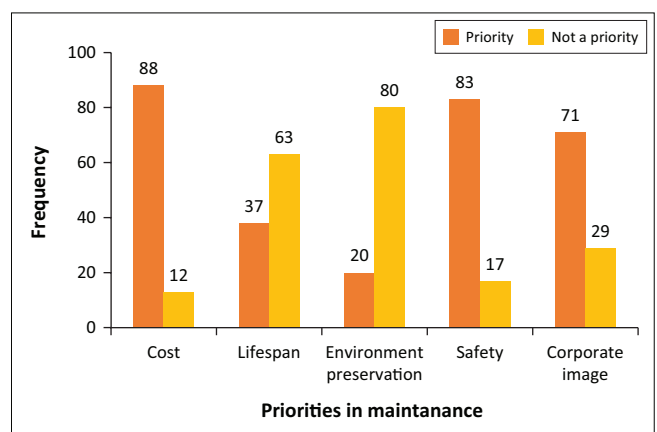
FIGURE 5: An evaluation of the fuel-mileage control system.

FIGURE 6: Key consideration in vehicle maintenance.
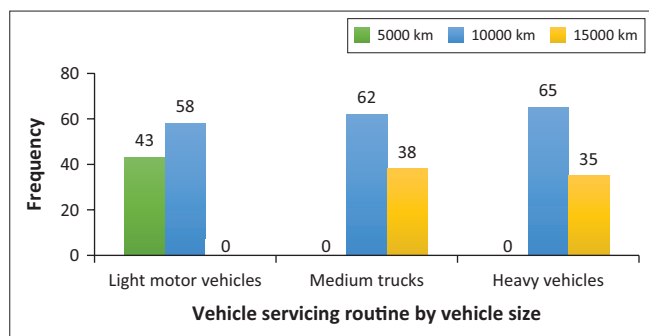
FIGURE 7: Vehicle fleet servicing routines.

FIGURE 8: Key considerations in fleet disposal.

serviced vehicles. In this study, it became important to assess the vehicle servicing and maintenance routines of the organisations within the funeral assurance sector.

Figure 7 shows that the bulk of the light motor vehicles are serviced at 10 000 km as pointed by 58% of the respondents and only a few (43%) on the recommended 5000 km. Medium-sized trucks are mostly serviced at 10 000 km and a few at 15 000 km, and the heavy vehicles at 10 000 km and a few at 15 000 km. Although the servicing routines for medium and heavy vehicles are commendable, there is a worry on the light motor vehicles, which are usually serviced at double the recommended mileage. Again, this confirms the assertions by the management that the cost implication plus the pressure (multiple deaths at the same time with clients scattered all over the country) which this sector sometimes endures may lead to overdue servicing. The impact of delayed servicing of vehicles includes increased carbon emissions because of a variety of reasons known by the specialist in engine emission.

Fleet disposal

The fleet disposal stage is the last and critical stage of the lifecycle of vehicle. It is the assessment that the vehicle has reached the end of its operational or contractual cycle (Redemer 2016). The study sought to understand the disposal policies of the funeral assurance companies picking the important considerations when disposing any vehicles from the fleet; the results are presented in Figure 8.

The vehicle maintenance cost was ranked first across the studied entities, with 70% of the respondents in agreement and only 30% of respondents think otherwise. This view is in line with the total cost analysis concept where fleet managers compare the cost of operating, maintaining and repairing the vehicle with the residual value of the vehicle to arrive at a decision. Consequent to this, high costs of maintenance usually because of vehicle age may result in the disposal of a vehicle because it ceases to make economic sense to own it. The vehicle age was ranked second, with the majority of respondents (40%) believing that the vehicle age is the most important factor in vehicle disposal, followed by 30% who believed it is important, 10% who stated it is moderate and the remaining 10% believing that it is unimportant. As the vehicle age increases, the cost of running and maintaining
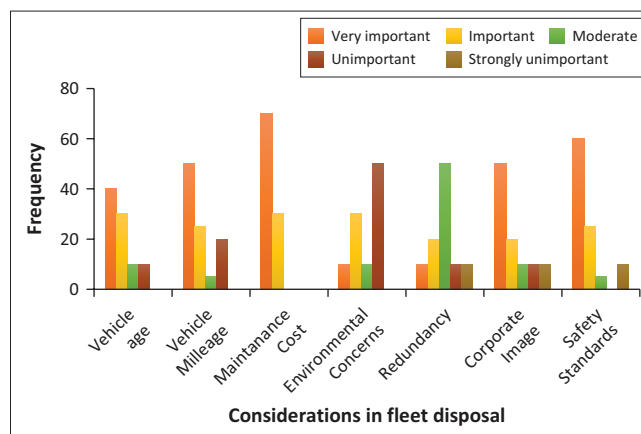
that particular vehicle increases (Makan & Heyns 2018). The results presented show that although the age of a vehicle is an important consideration in crafting vehicle disposal policies, the funeral assurance companies are not adhering to their disposal policies.

Discussion of findings

The overarching theme that came out of the findings of this study is that cost implications are a major barrier to the adoption of GFM within the studied funeral assurance entities in Zimbabwe. The cost implications emanate from the high mileage type of fleet operations, which then translate to the high cost of vehicle maintenance. The cost implication then gives rise to other secondary barriers, such as attitudinal barriers, wherein there is passivity, reactivity and inactivity in relation to the environment.

This passivity and/or inactivity need to be understood in the broader context of the effectiveness of the national policy framework governing GFM in Zimbabwe, and the following discussion touches on this.

National institutional framework for 'greening' fleet in Zimbabwe

The authors conducted an extensive documentary analysis on various legislative documents governing environmental preservation in Zimbabwe. These are:

1. The *Environmental Management Act* [Chapter 20:27], 2002
2. The Environment Management (Atmospheric Pollution Control) Regulations, 2009
3. The *Customs and Excise Act* [Chapter 23:02], 2014
4. The *Petroleum Act* [Chapter 13:22]. 2006.

Environmental Management Act [Chapter 20:27], 2002

This Act establishes the emission standards (including motor vehicles), the criteria and guidelines for air pollution control for mobile sources and the guidelines to minimise emissions of GHG. For example, Section 63(2) of this Act, on air quality standards, posits that any person

who emits any substances, which cause air pollution in contravention of emission standards established under this Act, shall be guilty of an offence and liable to a fine and/or imprisonment.

Further, Section 68(1) states that:

[N]o owner or operator of a transport conveyance shall operate it in such a manner or condition as to cause air pollution in contravention of prescribed emission standards for the class of transport conveyance concerned.

As such, any transport operator who pollutes the environment by contravening the emission standards commits an offence. The provisions in this Act directly impact the vehicle acquisition decisions in that the acquirer must buy vehicles, which do not exceed the statutory emission thresholds, both for diesel and petrol engines. Further, it also imposes a responsibility on the fleet managers, during the operation of the fleet, to ensure that all the vehicles are serviced and maintained to operate within the permitted emission levels. There is a push for fleet managers to monitor the emission levels of their vehicles (to avoid being penalised) and engage in predictive fleet maintenance to ensure that all the vehicles are not emitting more than the prescribed emission levels. This has the potential to reduce greenhouse gases from the fleet. By implication, the Act also affects the vehicle disposal policy of any transport operator.

Environment Management (Atmospheric Pollution Control) Regulations 2009

The *Atmospheric Pollution Control Regulations*, 2009 (Statutory Instrument 72 of 2009) prescribes motor vehicle emission standards in the form of maximum permissible discharge for a particular compound and provides the enforcement mechanisms of the standards. In Section 5(1), the regulations say an inspector may stop any vehicle to inspect and test, whether on a road or elsewhere, in order to ascertain whether or not the vehicle complies with the emission standards. Section 5(3) goes on to point out that if a motor vehicle does not comply with the emission standards, an inspector may, by written notice given to the driver or owner of the vehicle, direct that the vehicle shall not be used on any road or shall be used subject to conditions specified in the notice. The emission standards are as presented in Table 5 for the major polluting elements and these are: Carbon Monoxide, (CO), Lead, (Pb), Nitrous Oxide, (NO), Sulphur Dioxide, (SO_2) and Ozone, (O_3).

The minimum emission limit values shown in Table 5 are also applicable to imported vehicles. According to the Environmental Management Agency, the vehicle inspection and monitoring programme has been in place since 2009 for in-service vehicles. The emission testing is supposed to be conducted at the point of entry with pre-inspection certificate being issued before export. However, it is not clear if all the imported vehicles have those pre-inspection certificates. Further, Section 22 of the regulations prescribes that carbon

TABLE 5: Vehicle emission standards.

Compound	Limit	Exposure
CO	100 mg/m³ or 90 ppm	15 min
Pb	0.5–1 mg/m³	Annual
NO	200 μg/m³ or 11 ppm	1 h
O3	120 μg/m³ or 6 ppm	8 h
Particulate matter	50 μg/m³ or 25 ppm	Annual
SO_2	500 μg/m³ or 175 ppm	10 min

Source: Atmospheric Pollution Control Regulations, 2009 (Statutory Instrument 72 of 2009)
CO, Carbon Monoxide; Pb, Lead; NO, Nitrous Oxide; SO_2, Sulphur Dioxide; O_3, Ozone.

tax shall be charged per fuel type and payable to the agency at port of entry for imported fuels or at the point of production and distribution for fuels not imported. Carbon tax rates are prescribed in the seventh schedule of the Act. The impact of this tax is to try and internalise the cost of the negative externalities generated by vehicle users based on the user-pay principle.

Customs and Excise Act [Chapter 23:02], 2014

This is an Act to provide for the imposition, collection and management of customs, excise and other duties, regulating, controlling and prohibiting of imports and exports, the conclusion of customs and trade agreements with other countries and forfeitures and for other matters connected therewith. This legislation has an impact on vehicle acquisition with the possibilities of entrenching sustainable practices in vehicle selection and procurement. Of importance to sustainable vehicle acquisition, this Act imposes customs duty on imported fuel (diesel and unleaded petrol) with the impact of increasing the price of fuel. The resultant effect is to compel the acquisition of fuel-efficient vehicles, preferably with smaller engines to effectively manage the fuel economy during operations of the fleet. The high cost of fuel instils discipline in fleet management and eventually achieving some of the GFM practices. The high cost of fuel also may lead to organisations managing driver behaviour on fuel consumption, which on top of managing the running cost of the vehicle also reduces the carbon footprint.

Section 172 of the Act further provides for charging of a special excise duty on second-hand goods. This duty is charged on the value of used motor vehicles sold, transferred or otherwise disposed of to any person inland. The rate of special excise duty applicable depends on the engine capacity and year of manufacture of a vehicle. The excise duty increases as the engine size and the number of years increase. Further, this Act, in Section 97, provides for charging surtax on second-hand light passenger motor vehicles. Surtax is charged on imported second-hand light vehicles (that are more than 5 years old at the time of importation).

Vehicles with larger engine capacities attract higher customs duty. The customs dusty inclusive of the surtax is at 86% for < 1500 cc engine sizes and 96% for > 1500 cc engine size. The rationale is to discourage the importation of used and higher engine capacity vehicles. Consequently, the provisions

have an influence when an organisation is making vehicle purchasing decisions.

Petroleum Act [Chapter 13:22], 2006

This legislation gave rise to fuel quality regulations: the Petroleum (fuel quality) Regulations, 2013 and Petroleum (Mandatory Blending of Anhydrous Fuel Ethanol with Unleaded Petrol) Regulations, 2013. These have a bearing on the fuel quality being used in Zimbabwe, and consequently on the sustainable fleet management. Both regulations were promulgated in terms of Section 37(1) of the Petroleum Act [Chapter 13:22]. The Petroleum (fuel quality) Regulations, 2013 are meant to establish fuel quality standards for fuel used by consumers in Zimbabwe. Regulations apply to fuel importers, fuel blenders, fuel wholesalers, fuel retailers and fuel producers. The fuel quality standards prohibit a petroleum licensee from importing or selling specified petroleum products unless they meet the prescribed quality standards. Furthermore, the standards prohibit the importation, offering for sale of one grade of automobile fuel as if it was another grade. The standards prohibit the importation of any blend or mixture of different automobile fuels, prohibit importation of unleaded petrol with an oxygenate content of +0.2% and require blending of ethanol and unleaded petrol to be undertaken at a licensed blending site. Finally, the ethanol for purposes of blending should be sorely procured from a locally licensed producer.

Petroleum (Mandatory Blending of Anhydrous Fuel Ethanol with Unleaded Petrol) Regulations, 2013 (S1 17/2013) are meant to reduce carbon monoxide emissions and to increase the efficiency of fuel use in automobiles. The regulations illegalise the sale of unleaded petrol in the country. Statutory Instrument 17 of 2013 says that mandatory blending is required for unleaded petrol imported into Zimbabwe with anhydrous ethanol. It goes further to prohibit any procurement licensee or wholesale licensee to sell unleaded petrol unless the unleaded petrol is blended with a prescribed amount of locally produced anhydrous ethanol (now, ethanol blend grade E20). The Statutory Instrument also allows only a licensed ethanol blender to blend anhydrous ethanol with unleaded petrol. The quality control mechanisms require that every licensed ethanol producer has to furnish a blender with a quality assurance certificate for every batch supplied.

As pointed out by Hogarth et al (2015), fuel quality matters in the reduction of GHG and similarly the *Petroleum Act* [Chapter 13:22] has an impact on the GFM through the fuel quality regulations. Important to note is the fact that it makes it mandatory for petrol blending and ethanol blending creates a mix that releases fewer emissions into the environment and is considered cleaner in the future. Furthermore, this has a positive environmental effect given that ethanol is a renewable and domestically produced transportation fuel. This also reduces the carbon footprint in the transportation of the fuel itself. Whether used in low-level blends, ethanol helps reduce emissions. The carbon dioxide captured when the feedstock crops are grown to produce ethanol offsets the carbon dioxide released by a vehicle. This differs from gasoline and diesel, which are refined from petroleum extracted from the earth. No emissions are offset when these petroleum products are burnt. According to EEA (2019), on a life cycle analysis basis, GHG emissions are reduced on average by 34% with ethanol from dry mills and range between 88% and 108% with ethanol from cellulosic feedstock depending on feedstock type as compared to gasoline and diesel production and use. Thus, the mandatory fuel blending is ideal in terms of environmental protection.

An analysis of the institutional frameworks governing the adoption and practice of environmental sustainability shows that Zimbabwe has some Acts of parliament that deal with GFM. However, there is a paucity in terms of enforcing these Acts and there are two explanations for this. The first reason is that there is no capacity, both financially and technically, to monitor the vehicle emissions and enforce the law. Another critical policy issue to note is that Zimbabwe does not have policy instruments to encourage or incentivise the acquisition of green fleet. The existing legislation is from a 'push' side as opposed to it being on a 'pull' side. This is in line with the assertions made by Mbandi et al. (2019) who pointed out that there is a need to adopt purchasing rules that favour alternative fuels and advanced vehicle technologies.

At organisational level, fleet management operations (fleet acquisition, maintenance and disposal) were taken with less attention to environmental considerations and more on cost reduction. It is obvious that the cost informs much of the business decisions; hence, anything that reduces the cost of the business is the most welcome. In fleet acquisition, the study established that the age of a car, the cost, operational characteristics, the type of transmission (manual or automatic), the type of fuel used and engine size are considered. In fleet operations, maintenance is influenced by the manufacture's recommendations, costs and operational condition of the vehicle. Disposal is also influenced by cost, age of the vehicle and the condition of the vehicle. All of these considerations, at some point, achieve both economic and environmental objectives, therefore achieving a clean transport system in the funeral assurance sector.

Conclusion and recommendations

Environmental friendliness is rarely deliberately considered when crafting fleet acquisition, maintenance and disposal decisions, suggesting a low environmental consciousness among the studied entities. Fleet operations in the funeral assurance involve high mileage on rough terrains and increased overtime wages for drivers; all these drive the cost of fleet maintenance that then overshadows the push towards investments into green transport. The national policy frameworks appear to cover on GFM albeit indirectly; however, there is a serious paucity in terms of enforcement owing to technical and resource constraints at the national level to enforce these pieces of legislation. Weak enforcement of environmental

related legislation at the national level creates passiveness at the company level to push the green agenda.

This study has explored various barriers to GFM adoption in companies whose transport function is ancillary but at the same time with complex operational characteristics such as those in the funeral assurance business. Policymakers should make a deliberate attempt to examine and understand the nature of fleet operations with a view to encourage GFM adoption while meeting the cost reduction objective of the companies. This could be done by incentivising GFM practices as the current trade-off analysis between adoption and non-adoption of GFM favours the latter.

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Authors' contributions

Ethical considerations

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Data availability

Disclaimer

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