Truck Drivers' Environmental and Energy Literacy at Chirundu Border Post: An Attitudes and Exploratory analysis

by

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Abstract

Social and behavioral research is crucial for securing environmental sustainability and improving human living environments. There is a growing awareness to the role that natural resources such as water, fuel, land, forests, and environmental amenities play in our lives. There are many competing uses for natural resources, and society is challenged to manage them for improving social well-being. The main objective of this study was to explore driver attitudes about energy and the environment as a basis for modelling behaviour and educational programs to encourage truck drivers to reduce engine idling as a way to cut down on diesel emissions and fuel consumption. It has proven difficult, however, to target education and outreach to truck drivers, partially because little is known about them. Based on interview survey of 31 drivers who were randomly sampled, the link between drivers' environmental and energy attitudes and their adoption of idle-reduction measures were examined. The results of this survey on the environment show that truck drivers attach great value to the environment and are increasingly aware of the role that the environment plays in their lives. The environment has an indisputable importance in the lives of citizens. However, their green attitudes do not always translate into environmentally friendly behaviour and concrete actions. Therefore the main challenge revealed by this survey appears to be how to better inform truck drivers about environmental issues and encourage them to act on their environmental convictions. The study recommends some form of environmental education and education for sustainable development (ESD) that may help truck drivers acquire knowledge that promotes behavioral change towards environmental citizenship.

Key words: environment, energy, literacy, education, knowledge, conservation

Introduction

Diesel combustion contributes to social and environmental problems, such as poor air quality, noise, accidents, and fuel consumption. With significant reductions in passenger-car emissions, regulators are targeting the environmental and energy effects from diesel trucks. In addition to new engine emissions and fuel standards, some options include: emission control equipment, vehicle retirement, engine replacement, alternative fuel vehicles, and idling reduction.

Some solutions, such as idle-reduction, may require behaviour change on the part of the truck driver. Although no formal studies have been conducted, the adoption rate of idling technologies may indicate that efforts over the last decade to motivate long-haul truck drivers to reduce idling have been only modestly successful. Because we know very little about truck drivers or their attitudes about the environment and technology, it is difficult to design programs to motivate them to change their behaviour. To date, the in-depth studies of truck drivers are related to occupational health and safety (McCall and Horowitz, 2005; Solomon et al., 2004; Adams-Guppy and Guppy, 2003) or political and economic policy (Peoples and Wayne, 2004; Condon and Sinka, 2001). Education outreach, and policy should be informed by how drivers view their work, their costs, and their role in changing the environment. This paper discusses initial efforts to develop a link between drivers' attitudes, idle-reduction behaviours, and drivers' characteristics.

Background

According to Mweemba 2014), environmental literacy and awareness of global warming and its causes is an important step towards undertaking remedial measures. People have to be aware of environmental problems, its consequences and eventual mitigating measures before they can engage in any conservation behaviour. Awareness of the problem through environmental literacy should generate greater willingness to change practices in order to engender environmental improvement. Truck drivers are unlikely however, to take individual action or strongly support government policies until

they view global warming as a serious risk.

Studies have examined what motivates or induces individuals to adopt Pro-Environmental Behaviours (PEBs), such as turning off an engine or opting to use an idle-reduction device. Different theories stress different reasons – both internal (or cognitive) factors and external factors (such as financial considerations) for adopting idle-reduction technology. Environmental concern reflects one possible set of cognitive factors or attitudes, and research has attempted to demonstrate the extent to which individuals' environmental concern translates into pro-environmental behaviours (PEB)

Various scales have been developed to measure environmental concern, such as Lounsbury and Tornatzky's (1977) measure of attitudes toward environmental quality; Maloney and Ward's (1973) measure of ecological attitudes and knowledge; Dunlap and Van Liere's (1978) new environmental paradigm scale; and Weigel and Weigel's (1978) environmental attitudes scale, but two are most common in the sociological literature. The first is the Ecological Attitude Scale by Maloney *et al.* (1975), and the second is the New Environmental Paradigm Scale by Van Liere and Dunlap (1980), which was modified in 1990. On these scales, environmental concern is measured according to human-centred values, such as concern about environmental degradation and its effects on human health and future resource availability (Baldassare and katz, 1992; Corbett, 2005). In addition, the scales also include "bio-centric" attitudes, which reflect concern for ecology in its own right (Stern *et al,* 1995).

By contrast, economic models tend to stress sociodemographic or "external" factors, such as income, in determining whether individuals adopt pro-environmental behaviours (PEB) However, much of the research on environmental concern applies these factors when predicting environmental concern. Sociodemographic factors that researchers correlate negatively with reported environmental concern include age, political conservatism, and lower educational attainment and income (Black *et al,* 1985; Howell and Lask, 1992; Nord *et al,* 1998), Race and gender are ambiguous determinants of environmental concern, with women reporting both higher and lower

reported concern for the environment (Davidson and Freudenburgh, 1996; Slovic, 1999).

Individual environmental concern, however, may not correlate with a specific pro-environmental behaviour, such as idle-reduction, but some level of environmental awareness and concern appears to be necessary to pro-environmental behaviour generally (Eagly and Kulesa, 1997; Hines *et al.,* 1987). Researchers have proposed numerous models for understanding how environmental attitudes relate to behaviour; mediating factors include individual self-efficacy and intentionality (Ajzen, 1991; Gollwitzer and Brandstatter, 1997), the match between an individual's environmental behaviour and the social norms of his or her peer groups (Schawartz, 1992), and whether a PEB runs counter to an individual's habits (Dahlstrand and Biel, 1997). Even though many factors may affect the likelihood that an individual undertakes a PEB, environmental concern, awareness, and attitudes form the basis for that action (Fransson and Garling, 1999). Thus for programs and incentives to work, we must first understand driver attitudes about the environment.

Aim

The main objective of this study was to explore driver attitudes about energy and the environment as a basis for modelling behaviour and educational programs.

Research questions

This survey was guided by the following research questions:

(a) What are the images of 'Environment' by the truck drivers at Chirundu Border post?
(b) How do the truck drivers participate and view different environmental risk policy management and decision making?
(c) Do truck drivers hold pro-environmental attitudes?
(d) What are barriers to environmental citizenship by truck driver?

Methodology

For this analysis, a survey was used to collect information on five broad statements or assumptions about truck drivers and their attitudes. A structured questionnaire was conducted with truck drivers in mid-January 2018. The study used a non-probability sampling technique. Accidental or availability sampling was applied where all cases of truck drivers were taken on hand until the desired sample was achieved. The drivers filled out the survey at booths in the truck stops, and survey administers were available to make clarifications to questions which were not very clear to respondents. The driver attitudes portion of the survey, which is the subject of this paper, employed a standard Likert scale with possible responses of strongly disagree, disagree, neutral, agree ad strongly agree. A sample of 31 drivers was achieved out of the 151 drivers. They were picked using systematically randomly sampling.

RESULTS

Visioning of global environmental issues by truck drivers

The researchers started with a visioning exercise by asking the truck drivers to respond to the statement, "What do you think the world will look like in 50 years?" The responses to this question were overwhelmingly negative: there will be more crime, more pollution, overpopulation, less tolerance, diminishing resources etc. Before allowing the respondents to wallow for too long in the depressing nature of the dystopia they've just imagined, a slightly different question was asked, "What do you want the future to look like in 50 years?" Changing just one word in this question yielded very different responses. Now respondents excitedly explained their visions: a world where everyone gets enough to eat every day, the air and water are clean, neighborhoods are walkable, and local and global communities are thriving. A subtle shift in language empowered truck drivers to think about what we want our future to look like. This exercise was done because it demonstrated the foundation of what education for sustainability was all about, that is, to give respondents the tools to be involved and engaged in creating

their future.

Respondents' image - association with the word environment

The first research question sought to establish the images or words of association of the term 'Environment' by the truck drivers at Chirundu Border post. A summary of the results indicate that there were many categories in which truck drivers associate environment. The number of different categories indicates that environment was a richly meaningful term, evoking many different connotations. Associations to man's surrounding (Affect mean = 4.71; SD = 2.83) was the most dominant category. Examples included, "floods and water shortages," "too hot", "too cold", "too dry," "water," "dry rivers," "unreliable rainfall." Associations to where one lives (Affect mean = - 3. 72; SD = 3.93) was the second most dominant category. The third most dominant category was comprised of pollution in towns and cities (Affect mean = -2.11; SD = 3.67). Examples include, "garbage", "water pollution", "smell". The fourth dominant category was associated with general protecting nature (Affect mean -4.11; SD = 3.19). Examples include, "trees," "grass and wild animals."

The fifth most dominant category was associated with green and pleasant land scape species (Affect mean = -2.97; SD = 3.09). Examples include, "grass and trees," "animals and their habitat." Finally the sixth category was comprised of associations to general changes in the climate system (Affect mean = - 1.91; SD = 2.11). D = 1.11). Examples include, "seasonal shifts," short summers causing crop failure," "long and severe winters."

The second research question sought to establish how truck drivers participate and view different environmental risk policy management and decision making.

Resource recovery and waste management

Table 1 shows the mean frequency responses to each environmental management policy in relation to resource recovery and waste management. Concerning the policy of charging garbage fee from each household to raise money for building a landfill, nearly 75%

of the respondents indicated that they would support the garbage fee policy, and only 15% of them opposed it. The mean scores show that the fee paying for garbage collection was the most supported policy (mean = 3.37; SD = 0.71), while saving cardboard boxes for later use was least supported (mean = 3.12; SD = 0.82).

Table 1: Resource recovery and waste management

Items	Mean	SD
Pay fee for garbage collection	3.73	0.71
Use mugs instead of paper cups, cloth instead of paper napkins, rags instead of paper towels.	3.14	0.81
Double-side photocopies; use reverse sides of paper	3.57	0.61
Bring your own canvas shopping bags to the market, or reuse the bags	3.62	0.63
Buy returnable/recyclable glass, metal, or plastic containers	3.27	0.71
Save cardboard boxes for later use	3.38	0.77
Maintain and repair appliances, and other equipment to lengthen their lives	3.12	0.82

Energy and water conservation

Table 2 shows the mean frequency responses to each environmental management policy in relation to energy and water conservation. Regarding these policies, the switching off lights in any space when not in use was highly supported (Mean = 3.81; SD = 0.44) while purchase of energy-efficient appliances even though the costs of these products were higher was the least supported policy (mean = 3.09; SD = 0.79). Respondents were asked to report how they would like a proposed policy that might increase domestic water supply price by 10%. Only 17% of the respondents believed that they would support the water policy, while nearly 83% of the respondents opposed it.

Table 2: Energy and water conservation

Items	Mean	SD
Switch off lights in any space when not in use	1.81	0.44
Use electricity and hot water efficiently	3.71	0.51
Purchase energy-efficient appliances, e.g., refrigerators, air conditioners, etc.	3.09	0.79
Do not let water run when it's not actively in use	3.42	0.74
Buy non-toxic, phosphate-free, biodegradable soaps and detergents	3.22	0.76

Transportation and air quality control

Table 3 shows the mean frequency responses to each environmental management policy in relation to transportation and air quality control. The mean scores show that planting and caring for trees was the most supported policy (mean = 3.77; SD = 0.47), while purchase of ozone-safe products, e.g., coolants for refrigeration even though the costs of these products were higher was least supported (mean = 2.86; SD = 0.93). Regarding the policy of increasing gas taxes to prevent CO2 emission and reduce the risk of global warming; only 15% of male respondents said they would support the tax increase policy, while 75% of them would oppose the policy. Respondents were asked how they would support the policy in practice if an industry emits more than its allocation and it must buy emission rights from the industries that do not reach their allocation, or must pay heavy fines. The result reveals that 53% of the respondents would support the policy, while 47% of them would oppose it.

Table 3: Transportation and air quality control

Items	Mean	SD
Use public transportation, carpool, bike, or walk	3.56	0.65
Purchase an energy efficient car, e.g., renewable-energy automobiles	3.30	0.70
Encourage the development of electric cars	3.03	0.86
Support for taxing gasoline to encourage its more efficient use	3.19	0.78
Purchase the ozone-safe products, e.g., coolants for refrigeration	2.86	0.93
Plant and care for trees in your own plot, community, and town	3.77	0.47
Support gas tax policy	3.20	0.71

Driver Response to Idling Reduction Options

Respondents indicated that fuel cost is significant compared to other costs. Seventy-one percent disagreed with the statement that fuel costs were not significant. Only 40% said idling options were too costly. Fifty percent said small diesel generator sets were attractive, and 33% were neutral. Fifty-eight percent were neutral on whether the available alternatives were reliable, and there were no significant differences in reporting on perceived reliability between owner-operators and fleet drivers. Seventy-one percent of respondents indicated they agreed or strongly agreed that fuel cells were an attractive anti-idling technology. Drivers reported that they were concerned with the costs of idling; 54% either agree or strongly agree that they are concerned with the cost of idling. They are also, however, concerned about the cost of buying idling alternatives.

Environmental attitudes

The third objective investigated pro-environmental attitudes truck drivers held. Truck drivers were asked in Part C of the survey about their opinions on several key energy and environmental issues, such as air quality, foreign fuel dependency, global warming, fuel consumption and resource depletion. We broadly refer to these as "environmental attitudes." There were several environmental and energy statements. Foreign fuel dependency had the greatest

portion of people (79% of the respondents) either strongly agreeing or agreeing that it was a problem. Drivers who also reported that resource depletion was a problem with 63% responding that they either disagreed or strongly disagreed with the statement that it was not an issue, the survey states this question negatively. Respondents reported significantly strong disagreement with the statement that resource depletion is not a problem.

More than 50% of respondents strongly disagree or disagreed that air quality, global warming, and fuel consumption are problems. Only 25% of the respondents agreed or strongly agreed that air quality was a problem. However, 67% of the respondents were concerned about the quality of air they were breathing at truck stops. Fifty percent of the respondents disagreed or strongly disagreed that fuel consumption was a problem. For the statement that global warming was a problem, 26% of the drivers agreed or strongly agreed. About 28% of the drivers were neutral about global warming.

Noise is a general environmental issue and a health concern. It portends personal health effects, because it can interfere with driver rest. However, 62% of the drivers agreed or strongly agreed that they were not concerned about drivers losing rest due to idling noise. In fact, 81% of the drivers agreed or strongly agreed that they got used to the noise.

Despite the responses to the issue about resource depletion, many responses tend to validate the anecdotal evidence that truckers, as a group, do not report high levels of concern over the environment – especially for abstract statements regarding the global environment or the problem of poor air quality.

Although the cluster of truckers who report pro-environmental values is not large, it is itself a significant finding. Truckers do not hold uniform opinions about the environment; a small group of truckers report consistently pro-environmental attitudes for everything ranging from their own environmental health to the global environment and resource depletion.

Two attitudes are also significantly associated with the probability of interest in idle-reduction technology, and both are related to resource depletion. Disagreement that fuel consumption

is not a major national problem increased the likelihood that a driver expressed interest in idle-reduction, as did agreement that resource depletion is an important national issue.

Barriers to environmental behavioral change.

Respondents' perceived barrier factor

The results show that 90% of the respondents agreed with the statements that they did not taken actions to ameliorate their environment; that the environmentally safe/friendly alternatives for many of the products they want to buy were just too expensive (89%). Further the results show that 91% of the respondents were not willing to pay for the sake of the environment; that they perceived themselves not having enough information on global warming (89%); that they could not solve environmental problem on their own (86%); and that there was no channel accessible for taking environmental problems (79%). Factor analysis suggests 6 items that measure perceived barriers to environmental improvement.

Table 4: Perceived barrier loadings

Item	Factor loading	Cronbach's alpha α
Barrier		0.84
Environmentally safe alternative products are expensive	0.74	
I didn't feel I could solve environmental problems alone	0.67	
I didn't think it is worth sacrificing for environment protection	0.83	
I didn't perceive myself having enough information about warming	0.91	
Acting for the environment is not of interest at all to me	0.65	
There is no channel accessible for taking environmental issues	0.59	

These items have high loadings on the perceived barrier factor. The

coefficient alpha was $\alpha = 0.84$ for all six items (Table 4). Based on the coefficients, the scale measuring the items is reliable.

Conclusion

This survey and analysis demonstrates that there is some diversity among truck drivers regarding their beliefs about the environment. The results of this survey on the environment show that truck drivers attach great value to the environment and are increasingly aware of the role that the environment plays in their lives. The environment has an indisputable importance in the lives of citizens. However, their green attitudes do not always translate into environmentally friendly behaviour and concrete actions. Therefore the main challenge revealed by this survey appears to be how to better inform citizens about environmental issues and encourage them to act on their environmental convictions.

Even though at the group level, fleet drivers expressed particularly strong environmental values, they did relate concern over resource depletion. In general, fleet drivers reported some limited pro-environmental values. However, a cluster analysis shows that a subset of truckers consistently expressed agreement with pro-environmental statements. Drivers with some college education were more likely to belong to the cluster reporting pro-environmental attitudes and concerns.

Both cost and environmental consciousness were also associated with interest in idle reduction alternatives among owner-operators. Some drivers, however, considered the alternatives too costly, and few drivers expressed high levels of agreement that the alternatives do not necessarily trump savings in fuel costs, because concern over fuel cost is positively and significantly associated with idle-reduction. The findings also indicated that respondents did not perceive themselves as having more information, skills, and/or knowledge on most of the environmental actions that they wanted to perform. Respondents stated that the environmental friendly alternatives for many of the products they wanted to buy were just too

expensive. Respondents also said that their society had no channel accessible for taking environmental actions. The study recommends that further study be done to deal with truck driver's environmental behavior by country of origin. This will put on spot which countries require energy literacy policy.

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