ECO-DRIVING

Changing truck driver behavior to achieve long-term sustainability results

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MSoc.Sc. in Services Management

96 pages / 159,192 STUs

FOREWORD

I would like to begin this project with the following quote by Ellyn Spragins, a women-right advocate, a dynamic corporate leadership speaker and an author of *What I Know Now about Success* bestseller:

> "THE GREATEST BOUNDARIES THAT WE FACE IN OUR LIVES ARE VERY OFTEN THE ONES WE OURSELVES CREATE IN OUR MINDS".

This quote beautifully captures the main idea of this thesis and offers an insight into my personal worldview that has guided some theoretical and methodological choices.

I would like to thank CBS for giving me an opportunity to go through the journey of acquiring knowledge in my professional field. It has been a unique and enriching experience. This thesis project, a culmination of the two-year process, has been valuable to me in providing with the opportunity of thinking through a tough issue and using my skills to identify the solution.

I would like to thank my good friend Tatyana Nikonchuk for being a wonderful discussion partner and for motivating me along the whole process. Her support was invaluable to me!

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EXECUTIVE SUMMARY

Increased road transportation activity has resulted in increased burden on the environment. In particular, transportation-generated pollution in the form of greenhouse gases can cause acid rains, photochemical smog, water runoff, and it is strongly associated with global warming processes. Greenhouse gases are a byproduct of fossil fuel combustion. Even though policy instruments have greatly reduced levels of heavier gasses, they have not yet fully addressed CO2 emissions.

The magnitude of the problem calls for prompt actions to create sustainable road freight transportation. Cutting down resource inefficiencies is a major task on the way to sustainability. The project is looking at eco-driving, a non-technical educational measure of reducing fuel consumption. Eco-driving is set of rules that have been developed to decrease fuel use, which involves both efficient driving practice and vehicle maintenance. Numerous studies have indicated that this measure has a potential of reducing fuel use up to 30% per truck driver. However, actual results have not lived up to the potential. Drivers soon lose interest in the practice and stop using the skills acquired during the eco-driving training.

The Planned approach to change offered a perspective on why that might be the case. Motivation alone is not enough to produce a long-term change. According to Kurt Lewin, sustained group changes are achieved when the forces resisting the change are removed. Thus the research focused on identifying resisting forces at JC KURS LTD, a road transportation and haulage service provider in Belarus.

The case study analysis revealed that truck drivers hold certain group norms, which act as resisting forces to implementing eco-driving. Namely, they believe that it is impossible to learn a new driving style; it is difficult to build new driving skills; driving style is a driver's 'signature'; the practice is not suited to the local conditions, and eco-driving trainers have little expertise in teaching professional truck drivers. An extended implementation strategy was developed that aims to guide the drivers though a 3-step process of *unfreezing*, or disconfirming existing beliefs about eco-driving, *change* and *refreezing* the new group norms about acceptable driving behavior.

CHAPTER 1: INTRODUCTION

The last few decades can be characterized as a period of intensified flow of goods, services and people across the globe. Even though scholars still disagree on the direction of causality, it is becoming clear that globalization is associated with intensified levels of transportation activity. For example, in 2005 there were a little under 650 million road vehicles in use in just OECD countries – a three times increase from 1970 (Zegel, 2007). Goods vehicles now travel more than 1400 billion kilometers each year, the same threefold increase from 454 billion in 1970 (Zegel, 2007). Such intensified transport activity has been termed as *hypermobility*. Hypermobility refers to "more driving, longer trips for people and freight, more sprawl, and more land and energy consumption" (Schiller, Bruun, & Kenworthy, 2010).

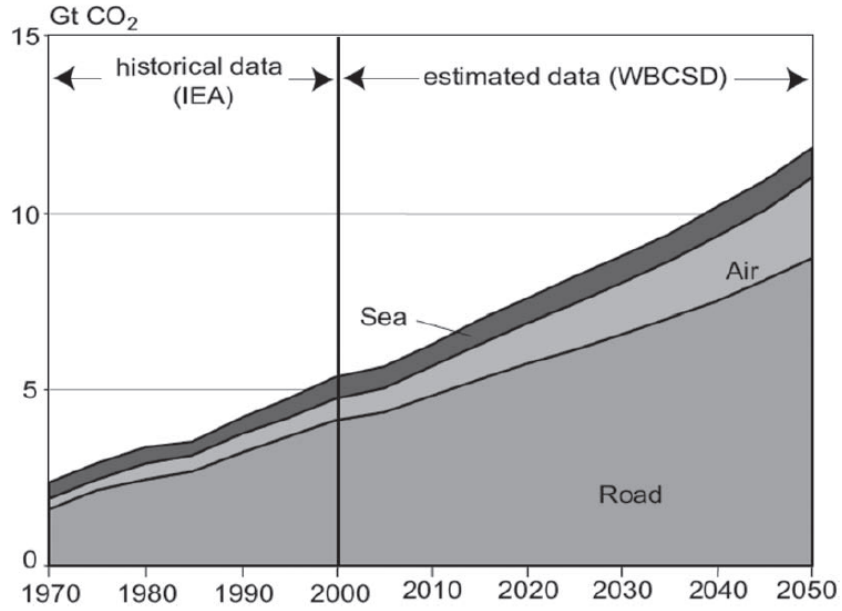
Increased transportation activity has numerous impacts: environmental, social, economic, and cultural to name just a few (Schiller, Bruun, & Kenworthy, 2010). Some of the impacts are highly beneficial to people, such as goods can reach their destinations quicker and cheaper facilitating trade, but some impacts are very harmful to human health and wildlife (Schiller, Bruun, & Kenworthy, 2010). In particular, transportation-generated pollution in the form of greenhouse gases can cause acid rains, photochemical smog, water runoff, and it is strongly associated with global warming processes (Schiller, Bruun, & Kenworthy, 2010). According to OECD report (2010), a 1% increase in trade leads to a 0.58% increase in CO2 emissions for an average country. This means that over the last years there has been a steep increase in burden that human activity put on the environment.

Greenhouse gases are a byproduct of fossil fuel combustion. In trucks and vans, tailpipe emissions of pollutants such as hydrocarbons, carbon monoxide and nitrogen oxides become a result of incomplete combustion

process (Cullinane & Edwards, 2010). Even though tightened government regulations and improved technology reduced the levels of emitted pollution, potential still exists to lower environmental costs by a significant margin (McKinnon, 2010a).

Future projections are not very optimistic. Both energy consumption and CO2 emissions are expected to rise in coming years to unprecedented levels. Figure 1 illustrates the difference in levels of emission growth from road transportation compared to sea and air modes. The volume of road transport is projected to grow by 78% between 2000 and 2030 in the European Union, and the global energy use of freight transport is expected to triple, despite improved fuel efficiency (OECD, 2010).

FIGURE 1: HISTORICAL AND PROJECTED CO2 EMISSIONS FROM TRANSPORT BY MODE WORLDWIDE

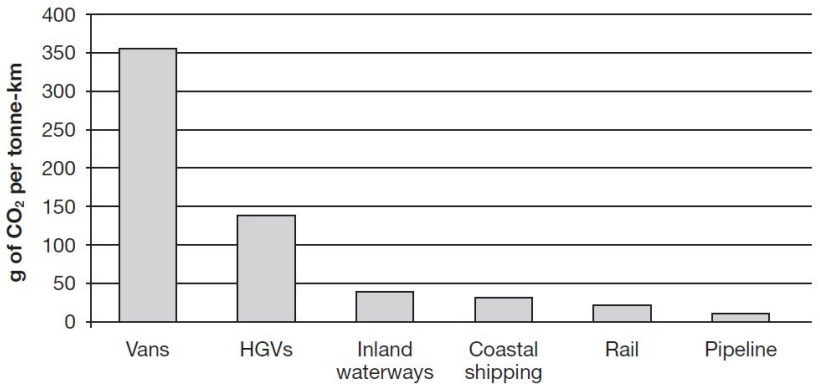


Source: (OECD, 2010)

As of today, vans and heavy goods vehicles with gross combination mass of more than 3.5 tones are the ‘dirtiest’ freight transportation mode according to CO2 intensity values (Figure 2). The rate of increase of

energy use in road freight transport is also faster than in cars and buses (McKinnon, 2010a).

FIGURE 2: ESTIMATED AVERAGE CO2 INTENSITY VALUES FOR FREIGHT TRANSPORT MODES



Source: (McKinnon, Environmental sustainability: a new priority for logistics managers, 2010)

Historical statistics as well as future projections indicate that there is a need for sustainable road transportation on the global arena. CO2 emissions from burning fossil fuels are a major contributor to the global warming effect, and road transport almost entirely relies on oil (OECD, 2010). Unless the trend of ever-increasing CO2 emissions is reversed, the world can witness global events of extraordinary magnitude.

1.1 PURPOSE OF THE RESEARCH

Different measures exist that attempt to reduce emissions from road transportation. Eco-driving is one of such measures aimed at altering driving technique. It is a set of driving and vehicle maintenance rules, which if followed, reduce greenhouse gas emissions, reduce noise, improve road safety, enhance driving skills, lower vehicle maintenance costs and reduce costs of accidents (ECOWILL, 2011). Right now, eco-driving has been incorporated into introductory driver education classes in some European countries (Barkenbus, 2010). It is also being promoted

during high-visibility public relations campaigns sponsored by private companies.

The measure offers a potential of reducing greenhouse gasses from road freight transportation up to 30% (Kolman, 2009). However, the actual results of implementing the scheme have not lived up to the potential. After a few months, the savings potential falls up to 5% per truck driver (OECD, 2010). A.E. af Wahlberg (2007) has found that 12 months after fuel-efficient driving training for city bus drivers, savings of only two percent were achieved and of four percent when using feedback equipment. Studies have found that drivers quickly lose interest in the practice and stop using their skills after a while (Barkenbus, 2010). The general opinion of industry specialists is that training alone is not enough because a change in driving behavior requires a change of team attitudes, high morale and motivation as well as proper incentives to use the skills in fuel-efficient driving (Jones, 2007; McKinnon, Increasing fuel efficiency in road freight sector, 2010).

The goal of this research is to explore the topic and to uncover resisting forces of implementing eco-driving by studying a case haulage operator using the Planned Change theoretical perspective. According to the theory, individual and group behavior is sustained in a status-quo by a set of driving and restraining forces. A sustained change in driver behavior can only be achieved when the forces resisting change are removed. Thus the research question is:

What are the forces resisting implementing eco-driving among Belarusian truck drivers?

Identifying the forces will create a platform for drawing implications relevant for the managers wishing to cut down company's fuel consumption by altering their employees' driving style. The study will also add to the body of literature on sustainability change within service organizations.

The research was carried out in Belarus, in Brest oblast. The country is located in an advantageous geographic position on the crossroad of major trans-European highways with international classification «II» («West-East») and «IX» («South–East») (Ministry of Foreign Affairs of the Republic of Belarus, 2009). It connects the traffic flows between European Union countries and Russia, Kazakhstan and other Asian countries. After the fall of the Soviet Union in 1991, the country has experienced a steep increase in road freight transportation activity, which was facilitated by the creation of Free Economic Zones across the whole region. Fully developed infrastructure continues to support the volumes of road cargo transportation, which has grown by 26% in 2007 alone (Ministry of Foreign Affairs of the Republic of Belarus, 2009).

1.2 Personal motivations

I chose the topic of eco-driving because of my personal interest in topics on environment. I believe that the issue is pressing and I, as a future manager, will have to make choices and come up with solutions that will reverse present environmental trends. Road freight transportation is a good example of a service industry that needs to address this issue in the near future. The theoretical part of the research is very helpful in determining the scale of the issue and how it has been dealt with up to date.

My second personal interest is human psychology. I feel that our values, beliefs and attitudes have great impact on the flow of our lives. The nature of our inner worlds determines what we go through in life. Thus, in my opinion, this topic is worth studying and exploring. The environmental challenges that have become apparent in recent years can have roots in our inner belief systems about the world, nature, and ourselves. Studying beliefs and attitudes of long haul drivers offers insights into the forces that keep people from behaving in a sustainable way.

1.3 CLARIFICATION OF CONCEPTS

The following section will present some of the concepts used throughout the text to establish clarity and scope of the research.

International road freight transportation refers to a service industry whose main business is transporting freight across country borders using the road mode. Another way of expressing it, they are involved in *commercial trucking operations*. This type of service is cheaper but slower than air freight and faster but more expensive than sea transportation (OECD, 2010). Companies working in this industry almost entirely rely on *heavy-duty* or *heavy-goods vehicles* to conduct their operations. The industry is contrasted to domestic freight movements, which is usually shorter in distance travelled and might employ smaller vehicles. The industry is on the rise, because new options are becoming available due to infrastructure development and international agreements between neighboring countries (OECD, 2010). *International transportation companies* and/or *road haulage operators* are road carriers working in the international road freight transportation industry.

The present research is focusing only on *long-haul drivers*. The trucking operations can be long-haul, line-haul, and short-haul depending on the distance travelled (Roetting, Huang, McDevitt, & Melton, 2003). Long-haul drivers can be on the road for days, sometimes even weeks and have unstable schedule (Roetting, Huang, McDevitt, & Melton, 2003). They can either own the truck they are driving or use corporate trucks. This study considers both owners and corporate drivers, since both kinds are hired by companies in Belarus and both are subject to corporate policies.

The next set of concepts used is related to environmental terminology. *Transport-related externalities* include air pollution, noise, accidents, vibration, land-take and visual intrusion (Cullinane & Edwards, 2010). *Tail-pipe emissions* are the main contributor of transport-related air pollution. As notes earlier, it is a result of fuel combustion process. Fossil

fuels, which mostly consist of hydrogen and carbon, when burning are transformed into water, carbon dioxide (CO2) and various gasses. *Greenhouse gas (GHG) emissions* are gasses that contribute to greenhouse effect. Namely, carbon dioxide (CO2), methane (MH4), nitrous oxides (NOx), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulphur hexafluoride (SF6), six categories agreed by the Kyoto Protocol in 1997 (Cullinane & Edwards, 2010).

Up to day, regulatory measures have not focused enough on reducing *carbon emissions* or *CO2*, which constitutes approximately 85% of all tail-pipe emissions; only Japan has introduced CO2 standards (OECD, 2010; Cullinane & Edwards, 2010). Chapter 2 will elaborate further on various measures that can be used to reduce GHG emissions and how eco-driving fits into the bigger picture of creating sustainable transport.

1.4 THESIS STRUCTURE

The paper is organized into seven sections: Introduction, Related literature, Theoretical focus, Methodology, Data findings, and Discussion.

Introduction: The paper begins with the chapter that states the overview of the problem, which motivates the research. It also presents the research questions to be studied, main terms used and personal motivations. The structure of the research is also presented.

Related literature: The chapter will begin with frameworks that outline methods used to limit pollution in road freight transportation. Then it will go on to presenting eco-driving scheme. In the next sub-section, research related to eco-driving will be presented.

Theoretical focus: The theoretical focus chapter will present main theoretical perspective used to explain eco-driving phenomenon and to establish background for research methodology. First, the process of implementing eco-driving scheme will be explained with a help of Lueneburger-Goleman Sustainability Initiative model. Then Kurt Lewin's

theoretical foundation for changing group behavior will be presented. The chapter will conclude with a conceptual representation of how to go about implementing eco-driving in freight transportation companies.

Methodology: The chapter will start with assessing methodological considerations, such as philosophical positions, choice of methods, reliability and validity concerns. Then each research method that has been used will be described in detail. Finally, a choice of data analysis procedures will be explained.

Data findings: This section will present the results of the study in three sections. First, the results from interviews with managers will be presented that set up social field for the driver group. Then Interview results will be given organized into common themes or topics using discourse analysis. The chapter will conclude with survey results.

Analysis: Analysis chapter will combine and examine all the findings identified earlier. The purpose of this exercise is to arrive at a Force-Field diagram, which will combine all the driving and resisting forces that relate to eco-driving scheme at the case company.

Discussion: This chapter will put a Force-Field diagram into wider perspective of bringing change to the group behavior using the Planned Change framework. Implications for managers and will be given at three phases of the change process: unfreezing, change and refreezing.

Conclusion: The last section of the paper will sum up the research that has been done and its achievements. Final thoughts and concluding remarks will wrap up the topic.

CHAPTER 2: RELATED LITERATURE

2.1 REDUCING EMISSIONS IN ROAD FREIGHT TRANSPORT

The magnitude of the CO2 emissions problem in road transportation requires significant actions. Sustainability is an emerging mega-trend that has caught the attention of most world leaders and industry specialists (Lubin & Esty, 2010). Sustainability or ability to "meet the needs of the present without compromising the ability of future generations to meet their needs" offers the logic of solving environmental dilemmas at the profit to organizations (Hart & Milstein, 2003; Nidumolu, Prahalad, & Rangaswami, 2009). In other words, sustainable companies must do more than just limiting their exposure to unsustainable practices, such as using non-renewable resources, producing waste, etc. (Ehrenfeld, 2005).

Literature defines sustainable transport as the one that:

- "Allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations
- Is affordable, operates efficiently, offers choice of transport mode and supports a vibrant economy
- Limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise" (Schiller, Bruun, & Kenworthy, 2010).

This definition reconciles three major objectives of sustainable transportation: environmental, economic and social. Such reconciliation received a term 'triple-bottom-line', which means that organizations' behaviors as well as government environmental strategies need to consider all three objectives (McKinnon, Environmental sustainability: a new priority for logistics managers, 2010), (Hart & Milstein, 2003). In practice,

however, most measures of reducing CO2 emissions in logistics and transportation offer vast cost saving possibilities (McKinnon, Environmental sustainability: a new priority for logistics managers, 2010).

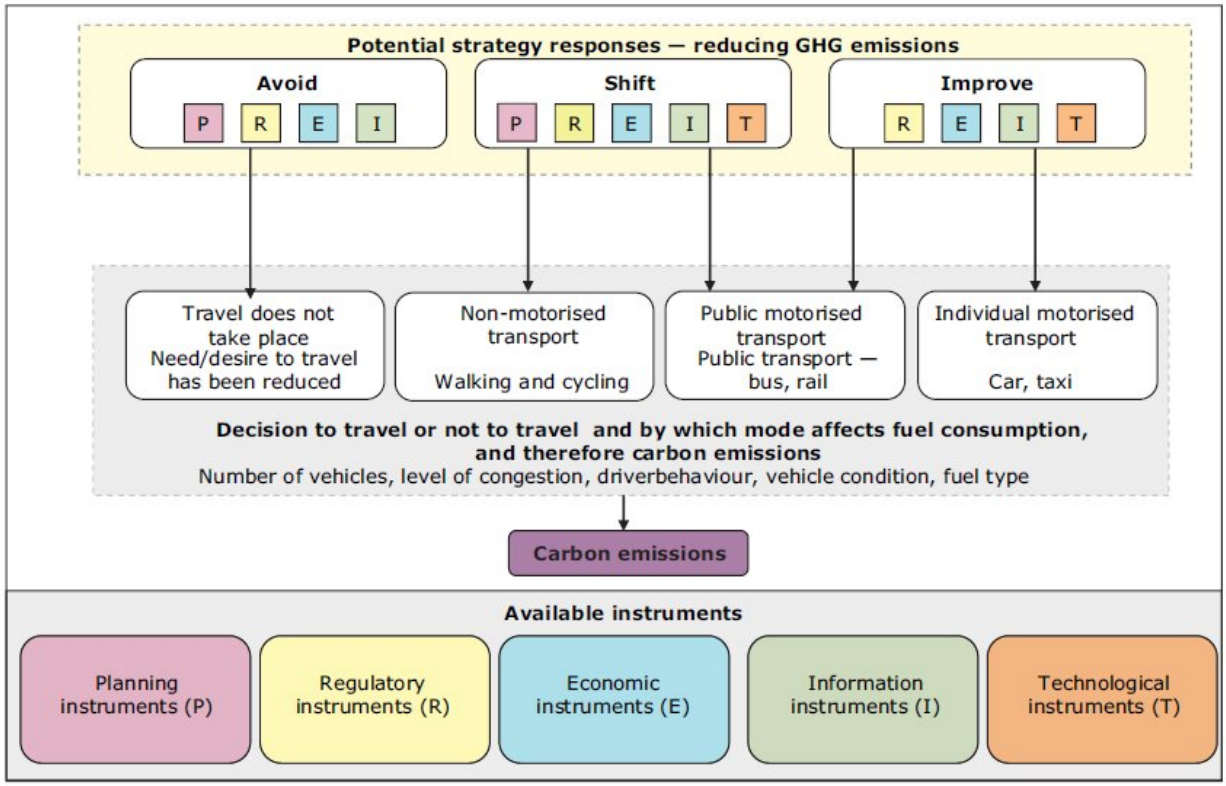
Most companies go through five stages to becoming sustainable:

1. Viewing compliance with government environmental regulations as opportunity
2. Making value chains sustainable by cutting down resource inefficiencies
3. Designing sustainable products and services
4. Developing new sustainable business models
5. Creating next-practice platforms of the business logic (Nidumolu, Prahalad, & Rangaswami, 2009).

Each stage is very distinct in the challenges it tackles and capabilities companies develop, and each stage is equally important in achieving a low-carbon economy. In transportation sector, there is still much inefficiency, which produces unsustainable levels of greenhouse gas emissions (see Chapter 1: *Introduction*). Freight transportation companies making the transition to sustainable practice inevitably face the challenge of limiting their current tail pipe emissions. Without identifying, measuring and minimizing fuel inefficiencies, road freight transportation will not move further on the road to sustainability. This paper elaborates only on the second stage of sustainability path, in particular, on cutting CO2 emissions, which occur from burning fossil fuels.

Different strategies aiming to limit tail-pipe emissions exist. There are government regulations, companies' efforts, technical and non-technical measures. Government regulations are usually mandatory and more technical, while environmentally conscious companies often employ management-oriented standards (Cullinane & Edwards, 2010). European Environmental Agency (EEA) uses a framework (Figure 4) developed by Dalkmann and Brannigan to outline various options that can be used to limit CO2 emissions from all types of road transportation (European Environmental Agency, 2010).

FIGURE 3: POTENTIAL STRATEGIES FOR REDUCING GHG EMISSIONS



Source: (European Environmental Agency, 2010)

This framework combines three strategies, *avoid, shift* and *improve*, and five policy instruments, *planning, regulatory, economic, information* and *technological*, into a matrix of various measures that can be used to tackle CO2 emissions problem in transport.

Planning instruments are land use and infrastructure planning; *regulatory instruments* include emission limiting and safety standards, speed limits, parking organization and road space allocation, and production processes; *economic instruments* are fuel taxes, road pricing, various subsidies, purchase taxes, fees and levies, and emission trading; *information instruments* such as public awareness campaigns, mobility management and marketing schemes, co-operative agreements, and eco-driving schemes; *technological instruments* include fuel improvement, use of

clean technologies, end-of-pipe control devices, and cleaner production (Dalkmann & Brannigan, 2007).

These instruments ultimately affect levels of carbon emissions by altering the number of vehicles, level of congestion, driver behavior, vehicle condition and fuel type (Dalkmann & Brannigan, 2007). This framework takes into account all key drivers of greenhouse gas emissions from transportation sector and provides a pathway of desired 80% global emission reduction potential by 2050 (European Environmental Agency, 2010). Although only a combination of measures is able to have the greatest impact, each instrument is highly important to study, because only deep understanding of all elements of the framework can ensure that desired reductions of pollution are reached.

The interest of this research is in information instrument aimed at altering driver behavior. More specifically, the focus is on eco-driving – an *improve* strategy. Eco-driving schemes have considerable benefits: they reduce fuel consumption and company costs, reduce unnecessary loads, reduce speeds, and improve vehicle maintenance (European Environmental Agency, 2010). Later in the chapter, I will further elaborate on eco-driving, its postulates, costs and fuel-saving potential. But first, I will give an overview of other measures used to decrease emission levels in road freight transportation.

2.2 Overview of emission reducing measures

Increasing transport volume discussed in Chapter 1 is not the only driver of emissions in freight transport. There are certain factors that influence emission levels per vehicle-kilometer. While on the road, distance travelled, driving pattern, i.e. speed, acceleration and gear changing, road gradient and payload are major contributing factors to the amount of tail-pipe emissions (Ericsson, Larsson, & Brundell-Freij, 2006). Overall, freight transport causes emissions in the following ways: vehicle usage (burning of fuels), fuel production, vehicle production, maintenance and

disposal, and infrastructure building, maintenance and adjustment (OECD, 2010).

Policy measures

Almost all countries have now implemented policy measures that regulate emission levels from road transportation. Road pricing, fuel taxes, fuel efficiency standards for vehicles, use of alternative fuels and logistical improvements are the most widely used measures used to limit freight lorry related externalities (OECD, 2010).

Today diesel and gasoline fuel are still dominant energy sources for heavy-duty trucks. The Climate Action and Renewable Energy Package, a set of legislative proposals intended to fight global warming and limit the increased dependence of the European Union on imported energy, intends to introduce mandatory blending of sustainably produced bio-fuels in road transport fuel (European Environmental Agency, 2010). In Belarus, there is no such proposal as of today. Furthermore, relatively cheap oil from Russia provides additional disincentive for increasing bio-fuel blends.

Increasing maximum gross lorry weight limit is another policy measure that can have large potential impact on reducing GHG emissions. In late 70s, UK government was the first one to suggest increasing the maximum gross lorry weight from 32 to 44 tones (Cullinane & Edwards, 2010). When weight limits are relaxed, "vehicles can be redesigned to maximize the resulting gain in carrying capacity" (McKinnon, Allen, & Woodburn, Development of greener vehicles, aircraft and ships, 2010). However, these changes were not fully implemented; only a limited number of European countries and a few US states allow trucks with maximum gross weight of 44 tones (McKinnon, Allen, & Woodburn, Development of greener vehicles, aircraft and ships, 2010). In Belarus, maximum gross weight of trucks is 32 tones for four-axle trucks and 38 tones for trucks with five and more axles (BAMAP, 2011).

In 1992, the first EURO standard was implemented. Table 1 outlines the evolution of EURO standards for heavy-duty diesel engines. These European emission standards define the acceptable limits for exhaust emissions of new vehicles sold in EU member states. The standards regulate levels of emissions of Nitrogen oxides (NO), Total hydrocarbon (THC), Non-methane hydrocarbons (NMHC), Carbon monoxide (CO) and particulate matter (PM). In 2008, European Commission has welcomed European Parliament Euro VI proposal to lay down common EU rules on heavy motor vehicles and their engines due to enter in 2012 (European Commission, 2008). Belarus uses EURO standards as well: only new trucks with EURO 5 standard are allowed to be imported into the country.

TABLE 1: EMISSION STANDARDS FOR HEAVY-DUTY DIESEL ENGINES (G/KWH)

Tier	Date of implementation	CO	HC	NOx	PM
Euro I	1992 (>85kw)	4.5	1.1	8.0	0.36
Euro II	1998	4.0	1.1	7.0	0.15
Euro III	2000	2.1	0.66	5.0	0.10
Euro IV	2005	1.5	0.46	3.5	0.02
Euro V	2008	1.5	0.46	2.0	0.02
Euro VI	2013	1.5	0.13	0.4	0.01

Source: (Cullinane & Edwards, 2010)

Even though emissions standards have been quite successful in reducing pollutant emissions from heavy duty trucks, they do not address CO2 at all. Only Japan has introduced CO2 emission standards aiming for a reduction of 12% per vehicle-kilometer by 2015 (OECD, 2010).

Industry measures

Tightening fuel emission standards is not the only sustainability incentive within the industry. Since fuel costs are a significant part of heavy duty vehicle operating costs, improving efficiency has been an important driver of engine and vehicle developments (OECD, 2010). There are two ways of looking at industry measures to reduce tail-pipe emissions from freight lorry. There are technical measures and non-technical. Table 2 outlines technical measures together with their fuel saving potential.

TABLE 2: TECHNICAL MEASURES TO LIMIT CO2 EMISSIONS IN ROAD FREIGHT TRANSPORTATION

Measure	**Fuel saving potential (%)**
Low rolling-resistance tires	~6%
Engine improvements	~5%
Reduction of air resistance	~6%
Lightweight construction	~7%
Hybrid propulsion	~15%

Source: OECD, 2010

Even though technology developments improves fuel economy and lowers industry costs, market signals are not enough private incentives to reach desired levels of CO2 emission reductions (OECD, 2010).

Non-technical measures include eco-driving and traffic measures. Since the study focuses only on eco-driving it will be described in greater detail in the following sub-section. Traffic measures can be implemented to smooth the traffic flow and reduce driving dynamics (OECD, 2010). One

of the ways to do so is to employ driver navigation system that optimizes the route not by shortest time or distance, but by lowest total fuel consumption (Ericsson, Larsson, & Brundell-Freij, 2006). Pilot studies have found that such method has potential of reducing fuel consumption by 4% for all journeys longer than 5 minutes (Ericsson, Larsson, & Brundell-Freij, 2006).

Another way of optimizing truck fuel consumption is using efficient routing and scheduling that minimizes the distance the truck travels with heavy load. Sequencing the customer visits so that heavier items are unloaded first while lighter items are unloaded later has a potential of saving 5 to 7% of fuel during test simulations (Suzuki, 2011).

Other incentives besides fuel cost exist for employing technical and non-technical measures of reducing tail-pipe emissions. A large body of survey evidence has accumulated to show that companies around the world are keen to promote their green credentials through the management of logistics (Cullinane & Edwards, 2010). Companies that apply green credentials naturally look into sustainable transportation modes to ensure consistency. Thus transportation companies have interest in meeting certain environmental standards (Cullinane & Edwards, 2010). Also it is important to mention that major logistics companies are gaining bigger role in setting the trends for international transport industries (OECD, 2010).

A few companies in the freight transportation industry are now industry leaders in implementing sustainable principles to reduce harmful emissions. For example, a global grocery retailer Tesco employs best practices in efficient load fill. It has maximized load fills both ways, reduced empty truck running and maximized driver hours. LKW Walter focuses on people component of successful sustainable strategy. It uses intensive training programme “train the winner” over the period of several months in addition to day-to-day guidance and coaching.

Technical and non-technical measures, when taken separately, do not offer a significant CO2 reduction potential. It's only when the measures are implemented as an integrated sustainability package, that a major shift in environmental trend would be seen. There are eight main focus areas that should be considered when a freight transportation company aims for sustainable operations:

1. Efficient load fill
2. Efficient deliveries
3. People
4. Technology
5. Network design
6. Transport Modes
7. Information sharing
8. Measurement (ECR Europe and Boxwood, 2008).

However, once again, a careful scientific analysis of each of the focus areas is required to draw implications on managerial and policy levels.

2.3 ECO-DRIVING

In road freight transportation, there are three fundamental factors that influence vehicle fuel consumption: the vehicle, the driving conditions and the driver operations (Kolman, 2009). In driver operations "speed and acceleration has the largest impact on vehicle's fuel economy and tailpipe emissions; both pollutant and GHG emissions" (Barth & Boriboonsomsin, Energy and emissions impacts of a freeway-based dynamic eco-driving system, 2009). The acceleration/deceleration events that occur under heavy congestion result in higher fuel consumption and vehicle emissions per unit distance (Barth & Boriboonsomsin, 2009). Eco-driving considers these impacts and aims at reducing their negative effect by smoothing the traffic flow and providing efficient vehicle maintenance.

In general terms, eco-driving is a set of rules that has been developed to decrease fuel use. It involves both efficient driving practice and vehicle

maintenance. There are two stages to eco-driving: before the journey and after the journey. Before the journey, drivers are advised to:

- maintain the vehicle properly according to the manufacturing standards,
- consolidate trips to bypass congested routes,
- unload as much as possible as soon as possible, and
- keep the tyres properly inflated (IRU, 2011).

During the journey, the drivers should:

- drive at a steady speed by using the highest gear possible,
- accelerate and break smoothly by allowing a safe distance between vehicles,
- decelerate smoothly using the retarder and the engine break,
- close windows at high speeds,
- minimize the use of heating and air conditioning,
- decrease the speed to a maximum legal limit to avoid unnecessary overtaking of other vehicles on the road,
- avoid idling altogether,
- avoid driving through the city center, and
- drive off from a standstill – but always try to avoid stopping (IRU, 2011).

A company in Belarus wishing to implement eco-driving scheme into its daily operations holds a special training for the drivers. It is usually a two-day training that includes both a theoretical and practical sessions. The trainers are invited from Russia or Ukraine (Melnik, 2011). First, each driver together with the trainer drives a short course as he normally would. During this initial test-drive, a special fleet management system records the vehicle fuel consumption. Then the drivers in a group listen to a theoretical lecture by the training professionals about what constitutes eco-driving and what are the benefits of using it. Finally, each driver again goes through the test drive together with the trainer, who makes comments and gives practical advice on the driving. Vehicle fuel consumption is recorded once again and then compared to the initial results (Melnik,

2011). A two day eco-driving training for 4 truck drivers costs Belarusian companies on average 500 Euro (approximately 3600 DKK) (Melnik, 2011).

Eco-driving method has large potential of reducing fuel consumption. Upon review of seven articles, an average estimate of fuel saving potential was found to be between 10 and 30% (Table 3). Considering the fact that fuel constitutes approximately 40 percent of total operating costs of goods vehicles, the cost savings are significant (Jackson, 2010). The savings from ecological driving style are more significant in long distance haulage than from short to medium distance (Bozicnik & Hanzic, 2009). Furthermore, eco-driving can offer emission reduction potential that is higher than any technical measures mentioned earlier in Table 2 and other non-technical measures.

TABLE 3: FUEL-SAVING POTENTIAL OF ECO-DRIVING

Reference	Fuel saving potential
(Barkenbus, 2010)	10%
(Kolman, 2009)	30%
(Mele, 2008)	26%
(Walden, 2008)	25%
(Barth & Boriboonsomsin, 2009)	10-20%
(Hitchings & Ward, 2010)	18%
(OECD, 2010)	25%

Proper vehicle maintenance and adequate fleet management are important elements of eco-driving, bug truck drivers have the largest control over and the greatest impact on fuel consumption savings (Bozicnik & Hanzic,

2009). Also, while drivers can greatly differ in their driving style, even the best ones can still improve their driving techniques (Bozicnik & Hanzic, 2009).

The scheme was implemented in several organizations across Europe. Nissan's eco-driving program, oriented at monitoring drivers' eco-efficiency was highly successful. The drivers began competing among each other and as a result achieved 18% fuel economy improvements (Hitchings & Ward, 2010). Hardstaff, a UK haulier, was able to achieve great fuel savings by following eco-driving training with bonus scheme for drivers, based on their mileage per gallon (Jones, 2007). Wiklunds Åkeri is another example of great interest in eco-driving methods. The company invested in training and data recorders for most vehicles; drivers with particularly high reductions in fuel receive individual salary bonuses (Advantage Environment, 2010). Organizations such as RECODRIVE and SAFED exist to promote eco-driving principles and help companies implement them through education and consulting.

As part of educational efforts across Europe, training is held, which usually consists of train-the-trainer sessions, employer-targeted campaigns, and individualized training at special events (Barkenbus, 2010)

Despite the potential that eco-driving has and success examples mentioned earlier, there is a certain amount of skepticism about the scheme. According to Smokers et al. (2006) abatement costs associated with eco-driving are expected to be negative for most combinations of fuel price and costs of lessons (OECD, 2010). Hamburg Senate calculated amortization period of implementing eco-driving to be 4.4 years if fuel use is reduced by 8% (Table 4). Both the costs of training and monitoring devices were included in calculations. This means that unless a way of reaching potential savings is developed, eco-driving scheme is not likely to gain wide popularity among transportation companies.

TABLE 4: POSSIBLE AMORTIZATION OF ECO-DRIVING IMPLEMENTATION CALCULATED BY HAMBURG SENATE

Fleet		Reduction of emissions	
40 vehicles "Ford Sprinter"		Fuel reduction 8%	12,400 l Diesel
Mileage	25,000 km/driver	Avoidance of CO_2	31,612 kg
Total mileage	1,000,000 km		
Total fuel consumption	155,000 l Diesel		

Costs/amortization		Grant	
Investment for 40 monitoring systems	40,000 €	30% of investment (incl. Training courses)	16,080 €
Investment for 80 training courses (2x40)	13,600 €		
Total investment	53,600 €		
Cost saving Diesel	12,152 €		
Amortization:	4.4 years	Amortization with grant:	3.1 years

Source: (VTL, Breithaupt, & Eberz, 2005)

Eco-driving scheme has attracted some popularity in research circles. The studies focused primarily on individualized feedback devices and their effect on long-term fuel saving (Barkenbus, 2010; Elias et al., 2009; Huang, Roetting, McDevitt, Melton, & Smith, 2005). This area of research reflects behavioral theories that "unless the individual can see or feel the results of his/her actions – preferably on an immediate and continuous basis – that individual is unlikely to maintain the behavior over time" (Barkenbus, 2010).

Such studies have generally found that drivers usually have positive attitudes towards monitoring devices, and such devices make them more aware of their driving habits. Another study has found that drivers prefer human feedback and respond better to positive feedback systems than to negative ones (Huang, Roetting, McDevitt, Melton, & Smith, 2005). However, over time there is a gradual adaptation to feedback devices

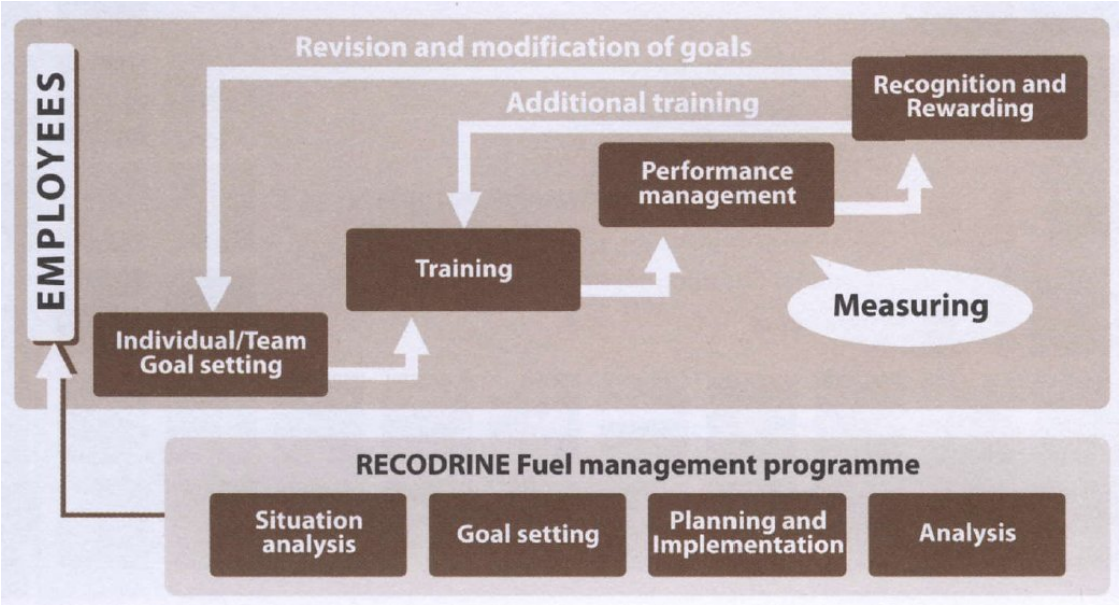
followed by a return to pre-training driving style, which does not bring out the expected saving results in the long term (Elias et al., 2009).

A study among US truck drivers has looked at the effect of drivers' pro-environmental motivation on their driving behavior (Schweitzer, Brodrick, & Spivey, 2008). Exploratory analysis identified that truck drivers vary significantly regarding their beliefs about the environment. Few had strong pro-environmental position but most had concerns regarding resource depletion. Pro-environmental beliefs had little effect on pro-environmental behavior, idle-reduction, in particular. However, cost concerns were the primary motivator for adopting idle-reduction technologies (Schweitzer, Brodrick, & Spivey, 2008). This means that drivers are more likely to adopt eco-driving out of cost reduction motivation than pro-environmental motivation.

The literature largely lacks data on the management side of eco-driving. It is very unclear how transportation companies need to go about implementing eco-driving. Eco-driving is oriented at changing driving behavior, which is a hard task to begin with. Managers need to know how they can achieve sustainable change in driving behavior of their employees.

Intelligent Energy Europe (IIE), a European Commission programme that funds climate change initiatives and supports energy targets in EU, developed a RECODRIVE (Rewarding and Recognition Schemes for Energy Conserving Driving, Vehicle procurement and maintenance) project. The project promotes eco-driving, sustainable fleet management and aims to merge existing eco-driving initiatives with progressive logistics optimization practices (Bozicnik & Hanzic, 2009). The project's emphasis is on rewarding and recognizing driver efforts by the means of training, motivation and insight (Bozicnik & Hanzic, 2009). The implementation process consists of four steps: goal setting, training, performance management, and recognition and rewarding (Figure 4).

FIGURE 4: ECO-DRIVING IMPLEMENTATION STEPS BY RECODRIVE



Source: (Bozicnik & Hanzic, 2009)

According to this 4-step process, the implementation goals and methods are set based on the situational analysis within the company. Then the truck drivers are trained and their performance is measured. Accurate measurement system ensures that the drivers are rewarded adequately and proportionally to their performance. The RECODRIVE scheme points out importance of stressing the control mechanisms and reward systems to the drivers prior to eco-driving training and then implementing them immediately after (Bozicnik & Hanzic, 2009). On average, the scheme yields 4.5% reduction on fuel consumption over 6 months.

According to an eco-driving trainer at Volvo Truck Corporation in Belarus, trainers experience strong driver resistance during the training. The fact that no company has reached the expected results of eco-driving suggests that a way of breaking the resistance has not been identified yet. That is why the study took an exploratory approach to produce a reliable platform to knowledge, which can further produce meaningful findings.

CHAPTER 3: THEORETICAL FOCUS

3.1 SUSTAINABILITY INITIATIVE

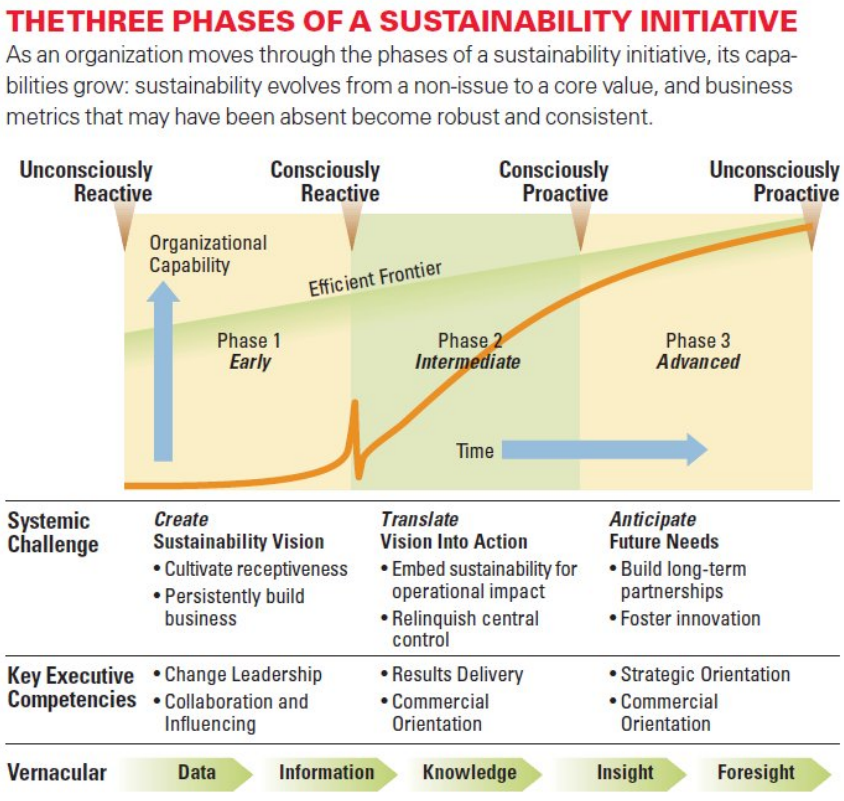
The following section will give a recap of literature on the main theoretical perspective used in this study. First, I will describe what eco-driving is in terms of sustainability initiative and what it means for the company and for employees. Then I will move on to explaining the Planned Approach to change that has been chosen as a mean to deal with difficulties of implementing sustainability initiative. Lastly, I will propose a Logical Levels of Change model as a model to understand Force-Field analysis proposed by Kurt Lewin.

Eco-driving is a sustainability initiative that produces an organization-wide change. The characteristic of organizational change is that it comes with costs, while the benefits are often unclear (Cawsey, Deszca, & Ingols, 2011). In the evolutionary stage of organizational development, firms learn from experience and develop patterns of habits, responses and assumptions about how the world works (Cawsey, Deszca, & Ingols, 2011). Change shakes those patterns and can be very stressful.

Lueneburger and Goleman (2010) identified that sustainability initiatives are very different from any other corporate undertakings. First of all, sustainability initiatives have to be supported by operational reality before the company can publicize about them. Secondly, organizations rarely know potential commercial impact of sustainability. And finally, sustainability initiatives touch every role and every action in organizations and require widespread operational and cultural changes (Lueneburger & Goleman, 2010). It is natural for sustainability initiatives to move slowly in the beginning of their implementation stages and for leaders to feel strong resistance before sustainability can be imbedded into the company DNA. (Lueneburger & Goleman, 2010).

Implementation process of successful sustainability initiatives moves through three distinct phases (Figure 5). In the beginning of the implementation process, employees are generally unconsciously reactive to the proposal because of the uncertainties that sustainability initiative brings. It is followed by conscious reactivity when employees find real reasons for their opposition. Only after two preceding phases employees become first consciously proactive and then unconsciously proactive to the sustainability project suggested by the management.

FIGURE 5: THE THREE PHASES OF A SUSTAINABILITY INITIATIVE



Source: (Lueneburger & Goleman, 2010)

Lueneburger and Goleman (2010) give suggestions for sustainability leaders on how to deal with employee reactivity and move through the phases successfully. Phase 1 is about creating sustainability vision. This stage calls leaders to make a compelling case for sustainability influencing

key opinion formers throughout the organization. That is done to introduce employees to the potential risks and opportunities of sustainable initiatives and gain everybody's support. At the end of this phase, sustainability becomes a powerful mandate at all levels of the organization. Phase 2 is about developing and implementing programs that target to reach high-level sustainability commitments identified earlier or translating vision into action. A comprehensive change program with clear tracking metrics and structured corrective actions helps leaders capture the most value from sustainability initiatives during this phase. Phase 3 is about making sustainability an organization's core value; that is integrating sustainability into core purpose of organizational existence (Lueneburger & Goleman, 2010).

This model is helpful in understanding the process of bringing organizational change and what the process of becoming sustainable means for companies in particular. Although it acknowledges the fact that employees are reactive to sustainability changes, the authors do not offer a clear blueprint for overcoming the reactivity. Making a case for sustainability might not always produce expected change, as it is a case with eco-driving. Motivating drivers during the eco-driving training about the benefits of the practice and showing its potential results has not lead to long-term change. Other frameworks are needed to get further insight into the change process and requirements for success.

The Planned approach to change offers a unique perspective to change, acknowledging that long-term change happens when there is a motivation to change and when forces resisting change are removed. This approach is one of the three main schools of change literature: directed, planned and guided (Buono & Kerber, 2010). Directed change is a classic way of thinking about change, where programs are initiated at the top and then instilled onto the organization. "Leaders create and announce the change" and rely on persuasion, authority, and compliance (Buono & Kerber,

2010). This approach can be fairly rigid and too narrow-minded because of lack of employee support and initiative. The guided change approach is on the opposite side of the spectrum. It treats change as an emergent process that occurs spontaneously within an organization. It is based on the group commitment to organizational purpose and it can change with the dynamic of organizational growth (Buono & Kerber, 2010).

Planned approach is a mid-ground between directed and guided perspectives. It treats change as a process, which can be planned but still relies on employee support and input. The process is mitigated by a change leader who is making "extensive use of specific actions, identified through research and experience, which mitigate the typical resistance and productivity losses associated with directed change" (Buono & Kerber, 2010). This approach is associated with the work of Kurt Lewin and John P. Kotter. The Planned approach and the work by Kurt Lewin have been chosen as primary foundations for this research, because they offer the best explanation for bringing in sustainability initiative.

Sustainability initiatives still involve a realm of unknown for organizations, because their costs and benefits are yet unclear for most. Employee input can be highly beneficial to ensure success and to promote commercial impact. The urgency of environmental changes in road transportation industry calls for projects initiated at by sustainability leaders. This means that both directed and guided approaches to change might not be the best way of bringing in sustainability change. The Planned approach considers both aspects and offers a way of initiating change on the top of organization and achieving employee 'felt-needed' motivation.

3.2 Kurt Lewin and the Planned Change

Kurt Lewin, a German-American psychologist, is a major contributor to theoretical foundations of social sciences whose main focus was dynamics of group behavior and organizational development. He identified that

certain reactivity exists in most change projects. His Planned Approach to change offers a framework that explains the nature of employee reactivity and proposes a way of dealing with it. The complete framework consists of four components: The Field Theory, Group Dynamics, Action Research, and 3-Step Model. Lewin saw that all these elements are reinforcing to each other and are needed to bring change effectively (Burnes, 2004).. The aim of the planned change is to identify: "What 'conditions' have to be changed to bring about a given result and how can one change these conditions with the means at hand?" (Lewin, 1943e). The following paragraphs will give a brief overview of the complete Planned Change framework

3-Step Model

Lewin has argued that a successful organizational, group or societal change occurs through three steps: Unfreezing, Moving, and Refreezing.

Unfreezing

Through the lens of the Field Theory, group behavior is a 'quasi-stationary equilibrium' of driving and restraining forces. In order for change to occur, old equilibrium needs to be 'unfrozen' so that old behavior can be unlearnt and new behavior successfully adopted (Burnes, 2004; Miner, 2006). In other words, before new behavior can be learnt, social habits, which represent social resistance to change, must be first discovered and then destabilized (Miner, 2006). This stage is crucial because the equilibrium is easier to move when restraining forces are removed, since adding driving factors only produces immediate counterforce to maintain the status-quo (Schein, 1996; Miner, 2006). Laboratory experiments have shown that adding the driving forces to the equilibrium produces fatigue, aggressiveness, high emotionality and low constructiveness (Papanek, 1973).

Lewin saw unfreezing process as a group technique: group discussion followed by a group consensus (Miner, 2006). However, he cautioned

that: “Managers rushing into a factory to raise productivity by group decisions are likely to encounter failure. In social management as in medicine there are no patent medicines and each case demands a careful diagnosis” (Lewin, Frontiers in Group Dynamics, 1947). Group decisions are effective in producing change when each member of the group is committed to maintaining the group norm as he perceives it (Papanek, 1973). This means that leaders wishing to initiate change and to successfully implement it should not rely on group decision alone.

According to Lewin’s experimental studies, change happens most easily when individuals in a group decide on the change themselves (Wolf, 1973). However, it’s simply utopist to wait for groups to decide to change, especially to decide to behave in a more environmentally sustainable way. The unfreezing step provokes a ‘felt-needed’ change by removing resisting forces in the group field.

Schein (1996) has elaborated on the work of Lewin and proposed a full description of the unfreezing process. According to his findings, both individual and group change is a process of “profound psychological dynamic process that involves painful unlearning without loss of ego identity and difficult relearning as one cognitively attempts to restructure one’s thoughts, perceptions, feelings, and attitudes” (Schein, 1996). He agrees with Lewin that in order to provoke change restraining factors in the field should be removed. He wrote that restraining forces are the hardest to identify because often times they are personal psychological defenses or group norms embedded into an organizational culture or a community.

Schein identified that unfreezing consists of three processes, all of which have to be present to motivate change in a group. First is *disconfirmation*, which is a process of generating a feeling of frustration with the current group expectations and hopes. As Schein (1996) wrote: “The disconfirmation must arouse what we can call “survival anxiety,” or the

feeling that if we do not change, we will fail to meet our needs or fail to achieve some goals or ideals that we have set for ourselves ("survival guilt")". Second process is dealing with *learning anxiety*. Learning anxiety is a feeling of loss of self-esteem that a person feels after admitting that something is wrong in his behavior and needs to change. Third process is a creation of *psychological safety* in a group. Schein (1996) argued that "unless the sufficient psychological safety is created, the disconfirming information will be denied or in other ways defended against, no survival anxiety will be felt, and consequently, no change will take place". Thus, effective change management is ability to balance the threat produced by disconfirming group behavior with enough psychological safety, so that employees will accept the information, feel the survival anxiety and become motivated to change (Schein, 1996).

The goal of the unfreezing process is cognitive redefinition. Cognitive redefinition is process of redefining the usual concepts and seeing them in a new light. It occurs "when the learner has become unfrozen (i.e. motivated to change) and has opened him- or herself up to new information" (Schein, 1996). Schein argued that this process is fundamental to any group changes if the leader wants them to last.

CHANGE

Once the cognitive redefinition has occurred and the individuals or a group has established new mental models, they start testing new behavior. It is a period of trial and error, which leads to either confirmation of the new mental model or further disconfirmation and search (Schein, 1996).

Schein (1996) explains the role of external consultant during this process. He or she becomes a source of change solutions and a role model, which might not fit into the culture of client organization or into group norms. This makes the changes short-lived. This might explain why eco-driving is a short lived initiative among the long-haul drivers. The way eco-driving

is presented to the drivers and the meanings the trainer proposes might not fit into the organizational cultures and drivers' group norms.

This step involves a process of moving from a less preferred to a more acceptable set of behaviors, by the means of Action Research. That is going through an iterative development of research, action and more research about the forces within the group (Burnes, 2004).

Action Research

Action Research has a theoretical foundation in Gestalt psychology, which stresses that change in behavior is possible only when an individual has gained a new insight into the totality of their situation (Burnes, 2004). It is a method of psychological research that is done not in a laboratory, but rather in a 'real-life' setting. Lewin argued that only through changing psychological phenomena, its underlying dynamics are revealed (Papanek, 1973).

The reason lies in the basic characteristic of group dynamics: "Any kind of group action or individual action, even including that of the insane, is regulated by circular causal processes of the following type: individual perception or 'fact-finding' – for instance, an act of accounting – is linked with individual action or group action in such a way that the content of the perception or fact-finding depends upon the way in which the situation is changed by action. The result of the fact-finding in turn influences or steers action" (Lewin, Frontiers in Group Dynamics, 1947).

Refreezing

Without the unfreezing and re-freezing stages the equilibrium, which is a self-maintaining force field, will return to its earlier state (Papanek, 1973). Refreezing seeks to stabilize new behavior in a quasi-stationary equilibrium. This step involves a group activity of transforming routines and norms, which sustains changes in individual behavior (Burnes, 2004). In organizational terms it means changing corporate culture, norms, policies and practices (Burnes, 2004).

Field Theory

The three step change process aims to demolish present group field and establish a new one. The Field theory explains what constitutes a group field and how one can identify the forces inside it. According to Lewin, group behavior is an “intricate set of symbolic interactions and forces that not only affect group structures, but also modify individual behavior” (Burnes, 2004). Individual behavior is a function of the group field the person is in. “Any behavior or any other change in a psychological field depends only upon the psychological field at that time” (Lewin, Defining the "Field at a Given Time", 1943). Lewin believed that the field is not stable though. He argued that “change and constancy are relative concepts; group life is never without change, merely differences in the amount and type of change exist” (as cited in Burnes, 2004).

Every field includes both psychological and non-psychological forces. While non-psychological forces only determine the boundary conditions of the group or individual life, psychological forces determine the actions within certain situations (Lewin, Psychological Ecology, 1943). Psychological forces can be classified in two ways: *cognitive structures*, or the terms in which people think and speak about the issue at question, and *motivations*, the system of values behind the choices (Lewin, Psychological Ecology, 1943). “Driving forces – corresponding, for instance, to ambition, goal needs, or fears – are ‘forces forward’ something or ‘forces away from’ something. They tend to bring about locomotion or changes. A ‘restraining force’ is not in itself equivalent to a tendency to change; it merely opposes driving forces” (Lewin, Frontiers in Group Dynamics, 1947).

There are two ways to determine the properties of a field: historical conclusions and present tests (Lewin, Defining the "Field at a Given Time", 1943). Historical conclusions analysis, or *anamnesis*, includes collecting data of the field properties found in the past and then ensuring

that there were no interferences to the system. The method of identifying the properties of the present situation is seen as superior because it avoids the uncertainties of historical conclusions (Lewin, Defining the "Field at a Given Time", 1943). This means that in order to accurately identify the forces that sustain the group field, one should make a careful analysis of the present situation.

In diagnosing the present situation it is important to understand that every psychological field also contains the views about the past and the future. These views might not be always correct but they define “the reality” for the individual and/or the group (Lewin, Defining the "Field at a Given Time", 1943). There are three main conditions that a researcher must keep in mind when studying a psychological field:

1. “Objectivity in psychology demands representing the field correctly as it exists for the individual in question at that particular time. Knowing the physical and social conditions is useful because they limit the variety of possible life spaces – probably as boundary conditions.
2. The social aspect of the psychological situation is at least as important as the physical.
3. The concept of the psychological field as a determinant of behavior implies that everything which affects behavior at a given time should be represented in the field existing at that time, and that only those facts can affect behavior, which are a part of a present field” (Lewin, Behavior and Development as a Function of the Total Situation, 1946).

Lewin (1944) has argued that the forces being psychological constructs can be analyzed quantitatively if they satisfy two conditions. The first condition is “only those entities which have the same conceptual dimension can be compared as to their magnitude”, and the second condition is “the magnitude should be measured with the same yardstick (unit of measurement)” (Lewin, Constructs in Field Theory, 1944). Given the scope of this project, I will not attempt to measure restraining factors that in implementing eco-driving. The sole purpose of further investigation

is identifying the driving and restraining forces in order to draw implications for managers of transportation companies wishing to carry out the scheme and for policy makers who design the project.

Group Dynamics

Group Dynamics refers to the study of the forces that exist within a group. It studies "what gives rise to them, what conditions modify them, what consequences they have, etc." (Cartwright, 1951 as cited in Burnes, 2004). According to the concept, groups should be the main focus of change rather than an individual because every individual is confronted by numerous group forces to conform to.

That does not mean that studying individuals in change projects is obsolete. Lewin (1947) wrote: "In the social as in the physical field the structural properties of a dynamic whole are different from the structural properties of subparts. Both sets of properties have to be investigated. When one, and when the other, is important depends upon the question to be answered. But there is no difference in reality between them."

Lewin's Planned approach to change has high validity and usefulness as a theory; it has been tested empirically and has been acknowledged as being practical (Miner, 2006; Lueneburger & Goleman, 2010; Burnes, 2004).

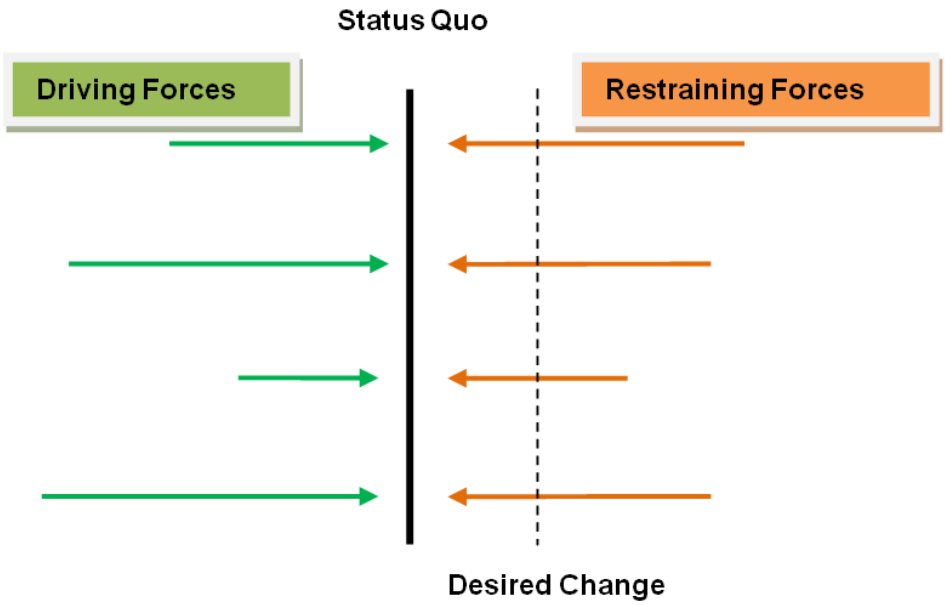
3.3 Force-Field Analysis

A tool for illustrating the Planned approach to change and the Field theory is Force-Field analysis. It is also considered to be a diagnostic tool for bringing about planned change (Schein, 1996). Force-Field analysis can be seen as part of organizational diagnosis, a precursor "for informed and effective organizational development and change (ODC) interventions" (Cronshaw & McCulloch, 2008).

The Force-Field diagram is a diagram with two sets of forces facing each other (Figure 6). The forces that are seeking to promote change are the *driving forces*; the ones that try to maintain the status quo are *restraining*

and/or *resisting forces*. Their direction faces each other producing the status-quo at the meeting point. Lewin argued that "if one could identify, plot and establish the potency of the forces then it would be possible not only to understand why individuals, groups and organizations act as they do, but also what forces would need to be diminished or strengthened in order to bring about change" (as cited in Burnes, 2004).

FIGURE 6: FORCE-FIELD ANALYSIS DIAGRAM



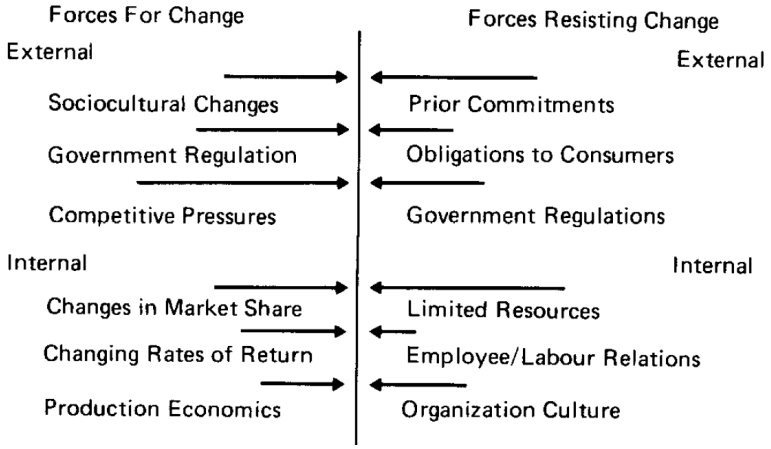
Source: (Thomas, 1985)

The purpose of Force-Field Analysis in bringing about Planned change is "to figure out what we need to change and discover where there is already some motivation to change that we can link with" (Schein, 1996). Thus an inquiry of the 'present' state of an organization is conducted by the means of interviews or surveys (Schein, 1996). In his study on initiating change in eating habits among German housewives, Lewin used group interviews as a research method to identify the forces (Miner, 2006). He was exposing groups of women to lectures about nutrition as a war effort and was persuading them to change the eating habits of their families. Then

the groups were asked to reflect upon the lecture and discuss how similar housewives would react to such prospect of change (Miner, 2006).

Force-Field analysis has been most widely used by organizational change and development practitioners (Thomas, 1985). Appendix 1 provides an example of a sample Force-Field analysis tool kit. The process consisted of brainstorming the forces for the both sides and then prioritizing them according to one's own or group understanding (Pojasek, 2001). On an organizational level, the forces come from sources outside the organization or from the inside (Thomas, 1985). Possible internal and external origins of the forces that influence equilibrium state of the firm range from socio-cultural changes of consumers, to prior organizational commitments, to production economics (Figure 7). Pojasek (2001) has grouped the driving forces into opportunities, strengths and controls, and restraining forces into risks, weaknesses and threats.

FIGURE 7: SAMPLE FORCES OF ORGANIZATIONAL CHANGE



Source: (Thomas, 1985)

There are no frameworks that could identify group forces though, because every case is unique. Lewin (1946) wrote that everything that affects individual at some point of time determines his/her behavior (behavior is a function of the person's environment) and constitutes his/her

psychological field. He identified that *forces* in Force-Field analysis are psychological constructs that have "tendency to locomotion" (Lewin, Constructs in Field Theory, 1944). Forces differ from *positions* and *goals*, for example. *Position* is a psychological concept, such as group belongingness of an individual, involvement in activity, etc., which doesn't induce any behavioral movement (Lewin, Constructs in Field Theory, 1944). *Goal* is another concept, which is very close to a force, but does not have its dimension. According to Lewin, a goal is a force field in itself where all forces point toward the same region.

If managers wish to bring about change using the Planned approach, they require a mean of identifying the forces in the field of a group that is required to change behavior. Having diagnosed that, leaders would know which forces need to be removed. As noted earlier, resisting field forces are psychological constructs or cognitive structures. On a group level, they are *group norms* or generally accepted *beliefs*. Logical Levels of Change framework offers a perspective on ways of identifying such beliefs.

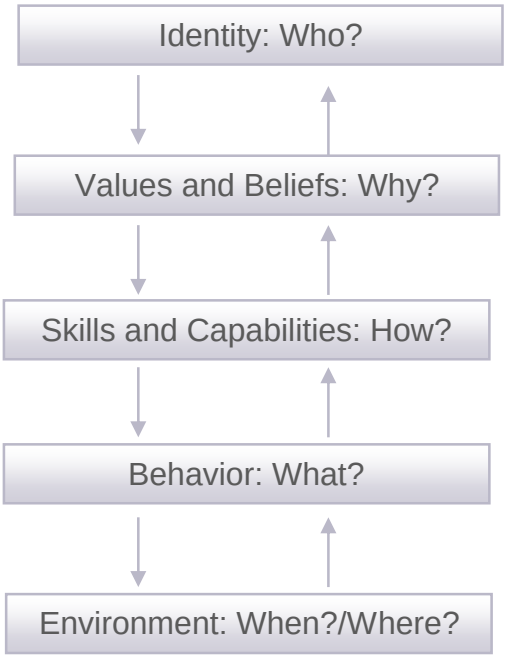
3.4 Logical Levels of Change

A field of applied psychology, which is particularly concerned with changing human behavior, is Neuro-Linguistic Programming (NLP). NLP studies human thinking, experiences and behavioral processes by finding connections between nervous system and the language (Derkach, 1996). It uses linguistic patterns to identify individual's belief systems and identity. One of the basic models used in the field is Logical Levels of Change (Figure 8). Another name of this model is Neurological Levels of Alignment (Yemm, 2006).

The model identifies six levels of individual's thinking and being: Identity, Values and Beliefs, Skills and Capabilities, Behavior, and Environment. By asking questions that correspond to the each level, it is possible to identify what level and what kind of resistance to change an individual has. The model can be applied not only to analyzing

individuals, but also to organizations and groups of people (Derkach, 1996).

FIGURE 8: LOGICAL LEVELS OF CHANGE



Source: (Dilts, 2000).

The first level is environment. This level portrays the physical and timely environment that surrounds an individual: actual or as a person perceives it to be. The level might also include the social world, family, colleagues, and the company. 'When' and 'Where' questions helps understand how individuals and/or groups perceive their environment. The second level is an individual's common behavior or how he or she usually reacts to the environment. Questions like 'What do you do to…?' and 'What is your response to…?' uncover behavioral patterns. The third level is the skills and capabilities a person uses to behave in a certain way. 'How' questions correspond to this level. The skills are chosen and maintained according to the values and beliefs that a person holds (level 4). 'Why' questions are used to reveal beliefs. The values are formed through the prism of a person's self-identification, which is an answer to the question 'Who are

you?'. An interested reader is referred to Appendix 2, where a table with a broad spectrum of language indicators within each level is given.

It is possible to identify the beliefs not only on the individual level but also on a group or organizational levels. Both whole organizations and members of the organization act according to underlying beliefs, norms and values (Korte & Chermack, 2007). A set of norms, beliefs, and values of correct reasoning and actions toward any given problem within an organization is usually referred to as organizational culture (Korte & Chermack, 2007). Another way of looking at organizational culture is as a shared mental model. Doyle and Ford (1998) defined a mental model of a dynamic system as "a relatively enduring and accessible, but limited, internal conceptual representation of an external system (historical, existing or projected) whose structure is analogous to the perceived structure of that system".

For example, an individual at the working environment chooses certain behavior from a 'list' of skills and capabilities that correspond to his beliefs and values, which stem from the person's self-identification. The model, likewise, identifies the top-down direction of causality. A person who identifies himself as being a driver holds certain beliefs and values associated with this role and acts in the environment using skills that support such identification. Same can be said about groups of people.

When a company implements eco-driving scheme, it requires the group of drivers to change their behavior and their skills. If that group has conflicting beliefs, or beliefs that hinder their ability to adopt eco-driving scheme, then it acts as a resisting force. A way of identifying the resisting forces is by speaking with the drivers and asking 'Why' questions.

3.5 Eco-driving and the Planned change

Research among truck drivers has found that attitudes, subjective norms and perceived behavioral control accounts for variance in driving behavior (Poulter, Chapman, Bibby, Clarke, & Crundall, 2008). This means that the

drivers' assumptions about eco-driving and beliefs on their ability to cut back on tail-pipe emissions can have real influence on the actual eco-driving behavior. Eco-driving training per se shows drivers the method of achieving fuel savings and builds up skills to do so; however it does not 'unfreeze' old driving style.

When trainers come in lecturing about the benefits of eco-driving and showing how to achieve fuel savings on a test drive, they bring in motivations to change. Lewin wrote: "A lecture and particularly a discussion may be quite effective in setting up motivations in the desired direction. Motivation alone, however, does not suffice to lead to change." (Lewin, Frontiers in Group Dynamics, 1947). This might be the reason why eco-driving has not yielded the fuel savings it had been expected to. A sustained change in driving style requires all three steps: unfreezing, change, and refreezing.

When looking at a company that attempts to implement eco-driving, the whole organization should be regarded as a social field, or a totality of coexisting entities, such as groups, subgroups, members, barriers, and channels of communication (Lewin, Frontiers in Group Dynamics, 1947). The drivers constitute a group that is required to acquire new skills and change behavior. They, as a group, have a psychological field or a combination of beliefs that keeps their driving in status-quo mode. Some forces within the field will support changing their driving to eco-driving and some will resist it. The managers' aim is to discover those resisting beliefs and then disconfirm them to achieve 'felt-needed' motivation.

It is important to differentiate group beliefs, or group norms, from individual norms, because disconfirming group beliefs later assists in the refreezing process. It facilitates changing the individual and stabilizes his/her individual conduct on the new group level (Lewin, Frontiers in Group Dynamics, 1947). A change in the group norms of the drivers that resist implementing eco-driving will bring in change in views of every

individual driver on the issue. When it happens, the company will unfreeze the old driving style, making room for new skills and new eco-driving style.

Once the unfreezing has occurred, managers can go on to the next steps of bringing in change: change and refreezing, or translating vision into actions and expanding boundaries as referred to by Lueneburger and Goleman. These steps will help to create a new driver group field, which will lock in new sustainable driving style. A training session acts as a change step followed by activities that further reinforce eco-driving.

The main purpose of this research is to identify resisting forces at a case international road freight transportation company located in Belarus. To do so, the research will unfold in three steps. First, an interview with company managers will be conducted to locate the drivers' life-space or social boundary conditions. Secondly, groups of drivers will be interviewed to identify their group beliefs that might resist implementing eco-driving. And finally, an anonymous individual survey will be given out to the drivers, which will be based on the results received from the interviews. A combination of methods will produce data to draw a Force-Field diagram for the case company.

CHAPTER 4: METHODOLOGY

4.1 RESEARCH DESIGN

To acquire good findings and to draw reliable conclusions, a well-thought research design is needed. A research design is a "process of collecting, analyzing, and interpreting observations" or a blueprint that deals with four problems: "what questions to study, what data are relevant, what data to collect, and how to analyze the results" (Yin, 2003). In other words, it is an intersection of research philosophy, strategies of inquiry and specific methods (Mason, Augustyn, & Seakhoa-King, 2010). There are five important components to a research design:

1. Research questions
2. Propositions, if any
3. Unit(s) of analysis
4. The logic linking the data to propositions, and
5. The criteria for interpreting the findings (Yin, 2003).

Implementing eco-driving requires groups of drivers to change their behaviors. According to the Planned Change approach, change will not happen unless the resisting forces within the group are removed. Thus the research question is the following: **What are the forces resisting implementing eco-driving among Belarusian truck drivers?** The nature of the research question calls for exploratory study design. A very basic characteristic of exploratory research is absence of study propositions (Yin, 2003). However, it still requires a purpose and criteria for judging field explorations (Yin, 2003).

Studying resisting forces within a group of truck drivers will be conducted on site of a single-case transportation company in Belarus. The single-case design was chosen to identify the resisting forces within a *representative* or a *typical* case of a road carrier (Yin, 2003). The rationale behind the decision was to draw conclusions that might be applicable for an average

road transportation company in Belarus. The unit of analysis was chosen to be a group of truck drivers. Since the resisting forces are more likely to be found on the group level, it is important to distinguish them from the beliefs of individual truck drivers. A finding will be regarded successful when the group beliefs will differ from the individual beliefs.

4.2 Philosophical considerations

Lewin was, in the first place, a physicist and came from a philosophy of causal, deterministic and ultimately comprehensible world that had grown from a Newtonian tradition (Crano, 1981). He argued that same logic can be applied to studying social reality. He believed that every individual has a 'subjective' psychological world, or a life-space, that is formed by social facts and social relations (Lewin, Field Theory and Experiment in Social Psychology, 1939). That world is as real as objective physical one and the forces inside it can be as strong as the physical ones.

When doing research in physics, a clear stimulus-response connection can be established in a controlled setting. In social world, there hardly can ever be a controlled setting for individuals or groups. Human behavior is very complex and is a subject to many forces. Thus it is a daunting job to identify causal relationships when studying individual or group behavior. This study is not aiming to make causal claims about truck driver behavior or take on experimental approach, but instead do an exploration of the group beliefs with the purpose of drawing implications to revise eco-driving implementation strategy.

The study reflects Lewin's perspective and takes on subjectivist view on ontology. Subjectivist view, or constructionism, takes a perspective that "reality does not exist outside individuals" (Eriksson & Kovalainen, 2008). This means that social reality is always constructed by the individuals through their interpretation of certain experiences. Since the study is aiming at discovering the social forces that exist only in the truck drivers minds, I, as a researcher, had to be careful not to impose my

assumptions onto the respondents. To avoid doing so, interview respondents were given freedom to answer questions in their own manner (interview structure and process are elaborated further on in this section), and the survey questions were constructed based on the interview data.

Wittengstein has argued that scientific truth is embedded in language (Richter, 2004). A meaning of a word can be known only by knowing its use. "So if a lion could speak, Wittgenstein says, we would not be able to understand it. We might realize that "roar" meant zebra, or that "roar, roar" meant lame zebra, but we would not understand lion ethics, politics, aesthetic taste, religion, humor and such like, if lions have these things" (Richter, 2004). To understand the forces within a group field, one must talk to its members with empathy and listen to their 'rules'.

External validity

The question of external validity is whether it will be possible to generalize results of this study to other road transportation companies. Are the resisting forces that will be found only exist in the case company, or are they something that most haul carriers will encounter when implementing eco-driving? Or are they the forces that exist in most change projects regardless of the industry? According to Lewin, each case requires a careful diagnosis. This means that each group change project will most likely have different resisting forces within the group field. However, the research has found that truck drivers are indeed a fairly homogenous group (Wahlberg, 2007). This might give a basis for generalizing results across companies within the geographical region under the research scope. However, it is more unlikely that the results will be applicable for companies in other countries, because of the cultural differences that might be actively present.

Reliability

Reliability check makes sure that "if a later investigator followed the same procedures as described by an earlier investigator and conducted the same

case study all over again, the later investigator should arrive at the same findings and conclusions" (Yin, 2003). The next section of the methodology chapter will describe the process of the data collection and analysis strategies that have been used in great detail.

4.3 DATA COLLECTION PROCESS

The study has been methodologically structured following the example of two scientific articles. Since the study has a goal of identifying driver beliefs and attitudes towards eco-driving, As mentioned earlier, the present study is exploratory. The main difference between exploratory and explanatory study is that the former is usually conducted when there is lack of sufficient information about the topic (Adams, Khan, Raeside, & White, 2007). The value of such study is also in providing knowledge of feasibility of certain approaches and instruments, as well as exploring if certain areas of research are worthwhile.

The present research employs mixed methods. It uses methodological triangulation as a method of primary data collection. The reason for that is "to gain a full access into informants' knowledge and meanings" and "to achieve plausibility and credibility of the evidence presented and assertions made" (Adams, Khan, Raeside, & White, 2007). Individual and group interviews were conducted to determine common themes and detect patterns, followed by a survey to test their prevalence among the truck drivers. This methodology is one of the ways to combine qualitative and quantitative research to increase representativeness of data (Silverman, 2010).

4.4 INTERVIEWS

Interviewing in the social research is a widely acknowledged method of data collection, which yields "rich insight into people's biographies, experiences, opinions, values, aspirations, attitudes and feelings" (May, 2001). A semi-structured format of the interviews was selected to gather data from the truck drivers: eight questions about the drivers' attitudes

towards eco-driving were predetermined to transition into an open-ended discussion about eco-driving (see Appendix 3). The aim was to let drivers to talk about the topic in any way they choose. Advantage of this method is that it reveals issues of respondents' concern and "patterns of perception and behavior of particular social groups", which was the primary goal of this stage of research (May, 2001).

PARTICIPANTS

A total of 12 people were interviewed: 10 long-haul truck drivers and 2 company managers. All of them had extensive experience working in transportation industry: 2 respondents had less than 10 years of experience, 8 respondents – 10 to 20 years, and 2 respondents – more than 20 years.

The managers and the long-haul drivers were recruited from JC KURS LTD, an international transport and expedition service provider located in Brest, Belarus. The company has been in business since 1993, and is a member of The Association of International Road Carriers (BAMAP) in Belarus. One of the drivers interviewed is an honorary recipient of professional recognition award by the International Road Transportation Union in Geneva in 2008.

PROCESS

All interviews were conducted on the working site during the office hours. The first three interviews were with the managers and with the eco-driving professional. They took semi-structured form, where a set of introductory questions were developed to ensure consistency.

The interviewing process was designed to insure three conditions for the successful completion of interviews: accessibility, cognition and motivation. *Accessibility* refers to ensuring that the person answering the questions has access to the information that the interviewer asks (May, 2001). Although driver discussion about eco-driving was mostly

theoretical, because none of them had gone through the training at the time of conducting the interviews, the questions were coupled with a discussion of what constitutes an eco-driving practice. A pamphlet *Eco-driving checklist for truck drivers* developed by International Road Transport Union (IRU) in Russian was shown to facilitate the discussion (IRU, 2011). This was done to ensure that both the interviewer and the respondents speak of the same practice. To ensure *cognition*, or "an understanding by the person being interviewed of what is required of them in the role of the interviewee", the respondents were introduced to the purpose of the research (May, 2001). The participants were reminded that the research is not intended to persuade them of the benefits of eco-driving but instead to identify their opinions and attitudes. Throughout the dialogues, the respondents were reminded that their opinions are the most valuable finding for the study to maintain their *motivation*.

Five drivers were interviewed individually and five were interviewed together as a group. The individual interviews with the drivers lasted for about half an hour each, and the group discussion – for an hour. Field notes were taken during all interviews and the focus group was recorded on an audio device. All interviews were supported by the drivers' oral consent.

The field notes and the transcribed content were analyzed manually to detect themes using the Framework approach (Adams, Khan, Raeside, & White, 2007). After having familiarized myself with the data, I have determined key themes, which are presented in the following chapter (Chapter 5: Data Findings). The reliability of the themes was ensured by handing the copy of the interview transcripts to a colleague of mine with the same task of identifying common themes.

4.5 Survey

Participants

The survey was distributed among 76 truck drivers at JC KURS LTD. The completed forms were returned by 32 respondents, which yielded a 42% response rate.

Questionnaires

A two-page questionnaire in Russian was distributed to the drivers (Appendix 4). Each questionnaire contained 6 demographic questions and 28 questions regarding drivers' attitudes. After a short presentation regarding the purpose of the research, drivers were asked to fill out the questionnaires during weekly corporate meeting sessions. The forms were then collected and the participants were thanked for their time. On average, drivers took about 15 minutes to answer the questions.

Likert scale

The questions were designed in a closed format; that is the respondents were given a restricted choice of answers. The drivers were asked to rate the level of their agreement with given statements on a 5-point Likert scale. Likert scale items are used to collect attitudinal data by providing items that respondents rate according to the strength of their feeling (Dittrich, Francis, Hatzinger, & Katzenbeisser, 2007).

The scale was proposed by Likert in 1932 to collect and assess respondents' attitudes. Likert-type items can be analyzed using descriptive statistics or non-parametric statistical techniques, which do not use means and standard deviations (Classon & Dormody, 1994). Descriptive statistics is often used to analyze individual items, and non-parametric techniques, such as chi-square, Mann-Whitney-Wilcoxon U tests, or Kruskal-Wallis analysis of variance tests to analyze paired or sets of items.

The items can be treated as ordinal or nominal data and not interval (Classon & Dormody, 1994). Nominal data represents only categories

without any numerical categorization. Ordinal data is data in which ranking and order is possible, but it is impossible to measure distances between the categories. When both ordering and distance measurement are possible, the data is interval (Allen & Seaman, 2007). The eco-driving survey was a rating scale, thus the data produced is ordinal, which will be later analyzed using descriptive statistics techniques.

All the questions were positively worded to combat positive-negative asymmetry in Likert scale format (Alexandrov, 2010). Positive-negative asymmetry means that positively and negatively worded items are not true opposites and produce different mean results. The implication is that Likert scale items should be positively worded with a fairly high level of intensity (Alexandrov, 2010).

4.6 LIMITATIONS

The study is subject to a few limitations. First of all, it is time and region specific. It was noted earlier that the results might only be generalized to other road freight carriers in Belarus. Analytic generalization strategy attempts to overcome this limitation. A primary purpose of case studies is to generalize results to theory, as opposed to statistical generalization (Yin, 2003). This means that the results are not gathered to identify population characteristics of truck drivers, but instead to draw analytic inferences. The inferences will later be used to suggest implications to managers and about eco-driving implementation strategy.

Secondly, the study relies heavily on self-reported information. The fact that the interviews were conducted on working site and with colleagues present, a social desirability effect could have occurred. Finally, the drivers were commenting on a hypothetical eco-driving program. Respondents might have had different knowledge about the scheme and they were reflecting on what they think it is rather than on actual training experience. This limitation was addressed by discussing what is eco-driving and how it is usually implemented.

CHAPTER 5: DATA FINDINGS

Chapter 4 focused on presenting the study's methods of data collection and reasons underlying methodological considerations. In the following chapter, data findings will be presented. The data gathered is divided into three sub-sections: case company description, interview results organized into themes, and survey results.

5.1 CASE DESCRIPTION

The research has been carried out in JC KURS LTD (later KURS), an international road freight carrier, located in Brest oblast, Belarus. The company has been in business since 1993. There are a total of 96 employees working at the company, out of which 82 are truck drivers. The company operates 40 20-tonne 90 m3 trucks. KURS stands out from in the industry in that the fleet has been updated recently and all of the trucks satisfy EURO 5 engine standards, which is quite unusual for the industry. Every truck is equipped with a tachograph, a vehicle device that records the truck speed, driver activity and fuel consumption over a specified distance travelled.

The company operates to most Western and Eastern European countries, with majority of clients in Russia. KURS does not specialize on any certain type of cargo, but, at the time when research was carried out, was adding transporting perishable goods to its pool of activities. The company is a member of The Association of International Road Carriers (BAMAP) in Belarus and the company director is a member of the BAMAP Regional Council in Brest oblast.

KURS has a reputation of a 'good company to work for' due to several reasons that has been discovered during the interviewing process. First of all, it looks out for its employees. The drivers get salary above industry average and are paid in advance of their trips with no indebtedness. Secondly, there are no fuel norms set up prior to the trips. The industry

practice is to impose predetermined fuel norms for the trips that drivers are required to meet. This means that each driver is free to use as much fuel as he needs while on the route. Finally, the company has a rigorous employee selection policy where many criteria should be met. Common selection criteria include a valid driver license with a class consistent with vehicle regulations, driving experience, and no history of major accidents. KURS also requires the drivers to speak at least one foreign language and exhibit good standing behavior.

The truck drivers get fixed monthly salary of 130 Euros (equivalent to approximately 1000 DKK). Every trip yields additional earnings: for example, a single trip Brest – Milano – Nizhny Novgorod – Brest yields 670 Euros (approximately 5000 DKK), and Brest – Milano – Chelyabinsk – Brest is 880 Euros (~6500 DKK). The company also carries all the expenses associated with the trips such as visas, telephone conversations, downtime, and truck service.

JC KURS LTD has never organized an eco-driving training for its employees. Both managers that have been interviewed recognized lack of trust in company management as the biggest stumbling block to implementing eco-driving. To their opinion, drivers do not trust their management teams because of lack of belief in long-term employment contracts within one company. Why would they care to invest in building their skill base then? To their opinion higher compensation options is the reason why drivers often switch companies. Another issue that has been discussed is fuel thief. In Belarus, drivers have a long tradition of stealing fuel from their trucks while on the road and then selling it to third parties. To their opinion it is the strongest resisting force to implementing eco-driving. To their opinion, drivers do not trust their management and have short term orientation.

5.2 INTERVIEW RESULTS

During the interviewing process a total of six themes were detected. The themes ranged from the perception of drivers' ability to learn new things and new driving style in particular, to exhibiting personality through driving style. Various stereotypical beliefs were identified such as superiority of Western practices to local practices, ease of acquiring new skills, and the importance of improving environmental situation. The drivers also talked about their attitudes towards new programs initiated by their managers and the importance of colleague opinions. Finally, perception of external trainers was discussed. In the following section, each of the themes will be presented in great detail.

1. Welcoming new programs

When asked whether the drivers were interested in learning eco-driving style, they generally were perceptive to the idea. Most respondents answered that they were "interested in" or "not opposed to" learning eco-driving. Only a few were straightforward in expressing negative attitudes towards learning the practice.

On the other hand, when asked what the reaction would be of their colleagues the answers diverted. Equal number of respondents answered that the reaction would be negative and equal number said that reaction would be positive. Those who responded against eco-driving reacted mostly emotionally, displaying a range of feelings: anger, frustration and resentment.

When asked whether eco-driving was effective as a practice, most common response was: "It is unreal to change driving style". One driver presented an example of how ABS system was implemented in Russian companies. When the system was first introduced, drivers agreed to use it. However, some time later the drivers started throwing it away, because they had learnt to drive without it earlier. The point of the story was that

habits are very prevalent and that sometimes they are stronger than the benefits from new technologies.

2. Importance of eco-driving

A common answer to the question, whether the drivers were interested in applying eco-driving methods and saving fuel while driving was “Of course!”. One responded said: “Every driver is interested in less fuel consumed. Every driver.” In KURS, unlike in most Belarusian transportation companies, drivers are free to drive without a norm. It means that every driver uses as much fuel as he needs for the route. Norms are usually established by the companies individually. For example, in “Trans SM”, another trucking service company in Brest, Belarus, a summer norm is 27 liters per 100 kilometers, and winter norm is 28.5 liters per 100 kilometers. A cargo coefficient is 0.35 liters per 1 tonne of cargo. Despite the fact that KURS works without the norm, almost all the respondents were very positive that eco-driving is a much needed practice.

The primary reason that has been mentioned the most times in favor of eco-driving is increasing fuel price. The drivers see the fact, that fuel price is increasing 5-10% every half-year as a strong motivational signal. Respondents said that the less fuel they consume on the route, the better the company is financially and the better compensation employees get. International agreement with Russia for cheap oil imports was mentioned as a reason for lack of fuel saving habit.

On the other hand, only a few respondents have mentioned improving environment as a benefit and motivation for eco-driving. Moreover, environmental factors were brought up very casually: the drivers most often just agreed when I mentioned it.

3. Ease of acquiring new skills

During the discussion about eco-driving training process the most recurring theme was unease of acquiring new skills. The drivers expressed

concern that training is not enough to build necessary skills. As one respondent put it: “If they show a driver how to drive one time, you think that he will learn to drive that way … never!”. Others said that even in Belarusian driving schools 5 lessons that they get is not enough to acquire necessary skills to drive efficiently. Some respondents answered that young drivers learn faster than old ones, which was perceived as a stumbling block to adopting eco-driving behavior.

They further discussed the difference between training test-drive and actual real-life driving. Test-drive, to their opinion, is very different from actual road conditions, which influence the way they drive. What they learn on test-drive might not be applicable to their day-to-day road experiences. Thus training exclusively on a test drive was not perceived as effective way of teaching.

The drivers have also discussed their working conditions. Intense work load was one of the reasons why drivers fear it would be hard to implement skills acquired during eco-driving training. As one respondent put it: “We have so much to think about, and then look at the tachometer and think how to switch gears, it’s too much!”.

Discussion about changing the driving style produced the most heated debate during the group discussion. Respondents reacted very emotionally to the idea of learning new driving style. One of the drivers asked me if I could change my writing style. For the sake of the debate, I answered yes. That resulted in a very expressive criticism of my answer.

4. Defending individual driving style

Most drivers were in one or the other ways defending their individual driving style. Quite a few simply said: “I’m driving the way I’m driving”. Most have referred to many years of working experience as an indicator of their expertise. “I have working experience, what can he [the eco-driving trainer] teach me?” – was a common response. A few drivers have

indicated that it might be possible to teach a young driver something new, but hardly possible to teach a more experienced one. One respondent added: “He might suggest some things, but he will not teach me anything new”.

However, respondents acknowledged that drivers differ in their driving style. For example, a young driver starts the car faster than the old one, some are more aggressive in traffic, and others are very subtle. An assumption has been voiced that it is possible to teach one person to drive efficiently, but it’s impossible to teach everyone in a company. One driver said it very bluntly: “A driver will drive the way he always drives”.

Respondents further stressed that not only every driver differs in the fuel consumption norm, but also every vehicle demands different amount of fuel on the same route. An example of a professional driver competition was presented. Among other things, approximately 30 drivers were competing for the most efficient driving style. The difference between the most and the least fuel efficient driver was 2.5 times.

5. Inconsistency with local conditions

Generally, drivers were emphasizing the difference between Western practices and local (Belarusian and Russian) practices. A common opinion was that Western practices are superior to the local ones. One driver said: “Europe is one thing and Russia is another” and most replied: “Eco-driving can only be achieved in Western Europe”.

When asked what it means, respondents mentioned many different factors. Among the most common factors were the quality of the roads, initial driver education, quality of truck fuel and general management style. The common association was that quality of roads was a major detrimental factor of applying a different driving style. In Europe the quality of roads is considered significantly better than in Belarus or in Russia. European highways are wider and have better road surface coating. One of the

drivers said: “If the roads will meet the same quality measures as in Europe, as in Germany or Belgium, then it will be possible to talk about eco-driving”.

Quite a few respondents have contrasted driver education of Western European drivers, saying that they receive better initial schooling than themselves. They reported that Belarusian driving schools do not have an interest in teaching quality driving, but instead are interested in a student passing the examination sooner.

Also the nature of traffic was mentioned as the difference between European and Russian driving patterns. In Russia, the common driving pattern is fairly chaotic because many different vehicles are on the road with inconsistent speeds. That makes driving very unstable. One respondent put it in the following way: “You enter Russia - you speed up, break, then speed up, break again, outrace, then break again and so it is 2500 km in one way”.

6. Trusting an external trainer

During the discussion about the role that external trainers play in teaching eco-driving skills, respondents were skeptical about their ability to teach anything new. ‘What can he teach me? I have practice.” Few respondents were straight in saying that the trainers don’t understand what they are teaching anyways, because they don’t have regular practice. They are bad drivers themselves. The claim was supported by jokes and laughter. Saying that if the trainer will arrive from some European country and will drive the route to Russia, they will see that eco-driving doesn’t work. Respondents said that trainers would themselves be surprised about their driving style – it would not be fuel efficient.

However, the respondents were not denying the ability of professional trainers to teach a driver a new driving style. “They have taught a bear to ride a bicycle, same here - it’s possible to teach, but very hard”. Their

solution was to teach eco-driving in the initial driving schools instead of trying to teach working truck drivers a new driving style. Then it would be possible to see the expected results of eco-driving.

5.3 Survey results

The survey was intended to measure the prevalence of beliefs about eco-driving identified during the interview phase. Completed surveys were returned by 32 drivers, which yielded a response rate of 42%. The first four questions contained demographical data about the drivers (Table 8).

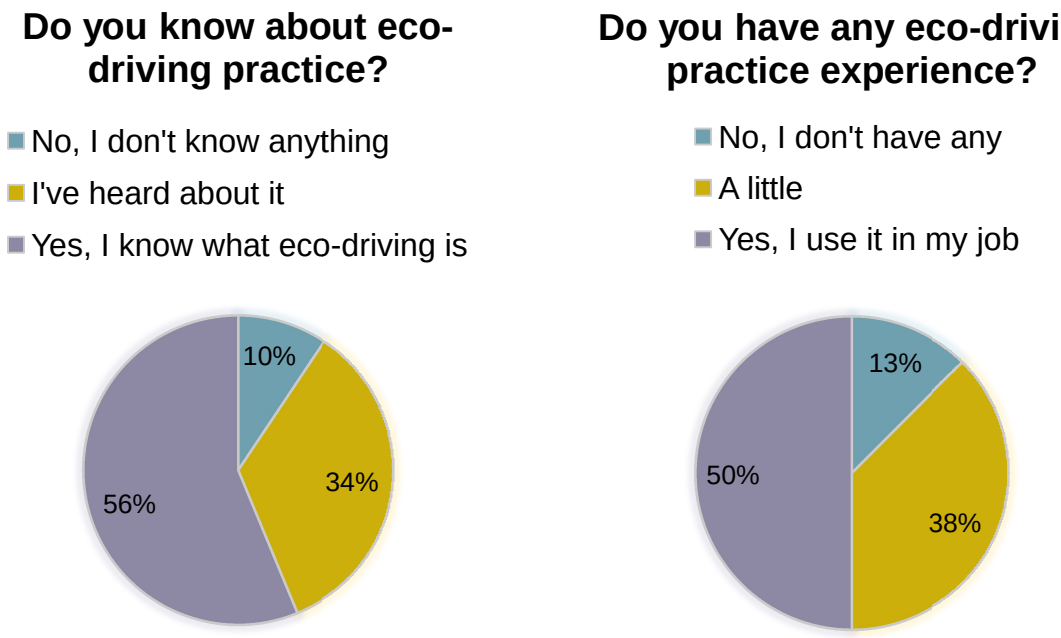
Table 5: Surveyed drivers' demographics

	Less than 25	**25-34**	**35-44**	**45-54**	**55-64**	
Age (years)	9%	9%	25%	38%	19%	
	Less than 5	**5-9**	**10-14**	**15-19**	**20-24**	**More than 25**
Trucking experience (yrs)	16%	9%	9%	16%	19%	31%
	Less than 20	**20-29**	**30-39**	**40-49**	**50-59**	**More than 60**
Working hours per week	n/a	13%	13%	28%	34%	13%
	Yes	**No**				
Truck owner	38%	63%				

More than half of the surveyed drivers were older than 45 years – 57% of the total sample; and half of the respondents have worked as truck drivers for over 15 years. 31 per cent of the drivers answered that they had trucking experience of more than 25 years. Majority of the respondents (62%) answered that they were working between 40 and 59 hours a week. 38 per cent have identified themselves as truck owners and the rest drove corporate trucks.

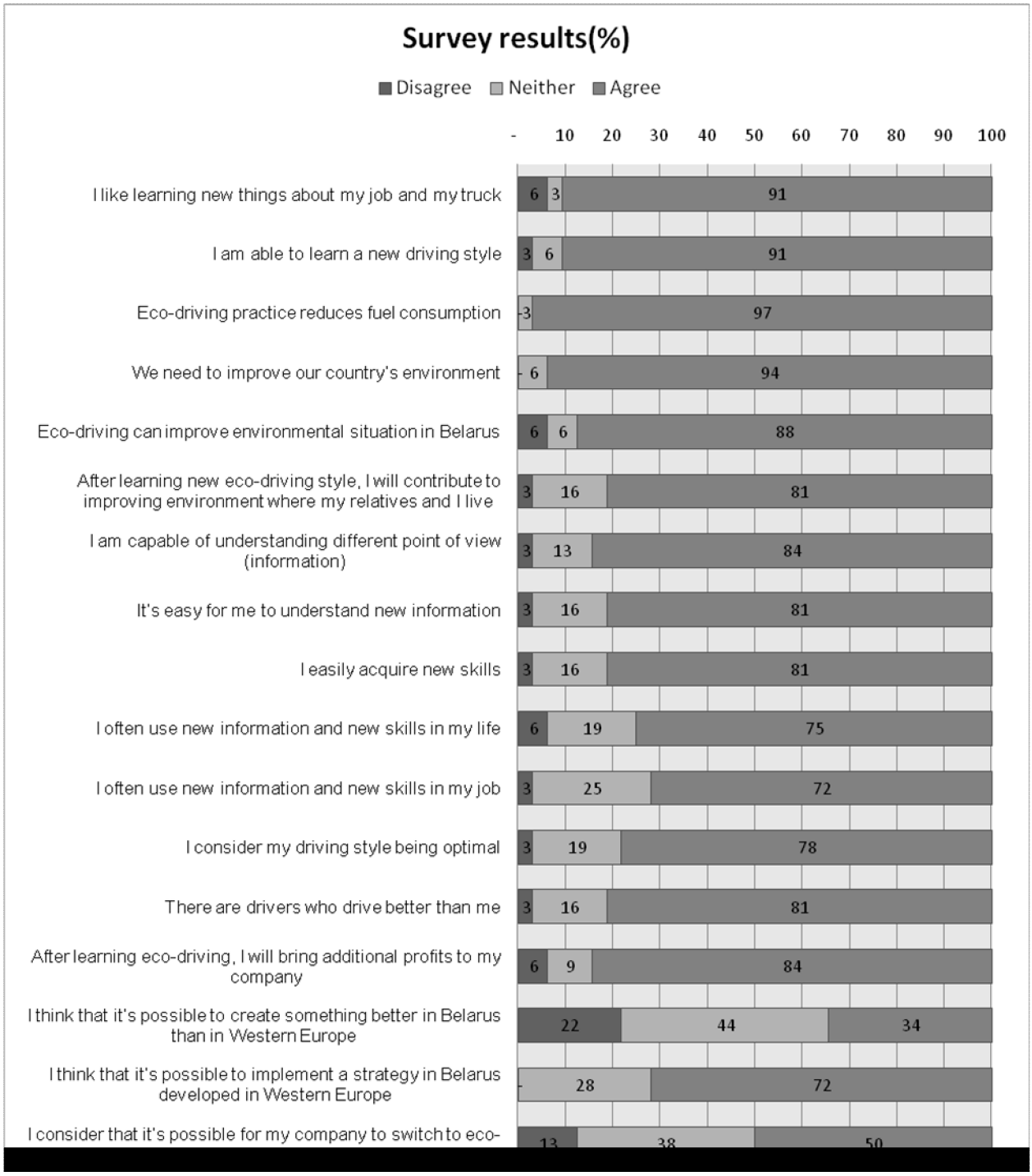
The next two questions were asking about respondents' previous experience with eco-driving. Question #5 was: Do you know about eco-driving practice?, and question #6 was: Do you have any eco-driving practice experience? According to the results of the survey, majority of the drivers knew what eco-driving is and were practicing it in their jobs (Figure 7). Only 10 and 12 per cent of the respondents answered that they do not know anything about eco-driving and do not use it in their practice accordingly.

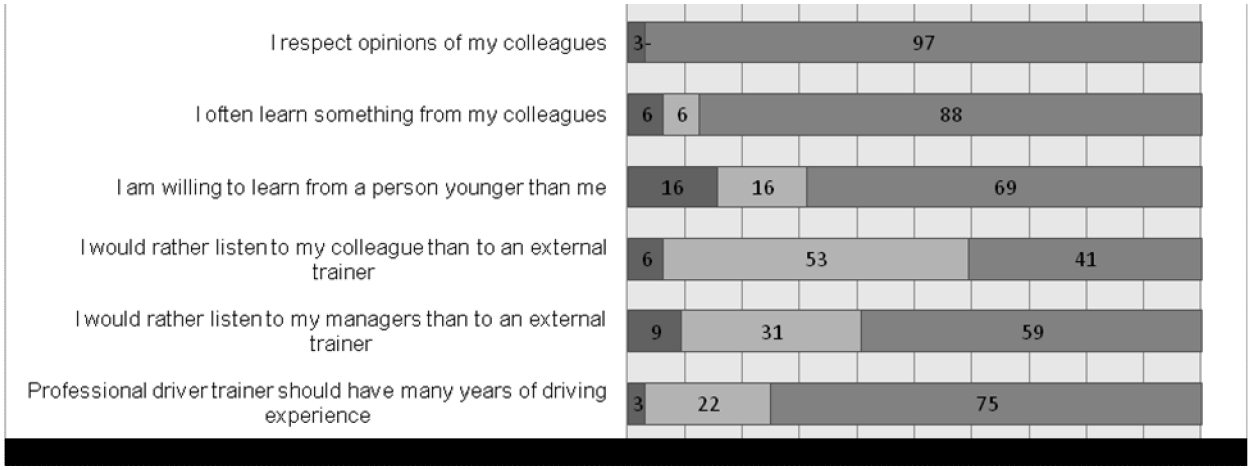
FIGURE 9: PREVIOUS EXPERIENCE WITH ECO-DRIVING



The next section will present survey results organized according to the six themes identified during the interview phase. Each theme contained several 5-point Likert type questions with 'Strongly Disagree', 'Disagree', 'Neither Agree Nor Disagree', 'Agree', and 'Strongly Agree' response options. For convenience reasons and to make the results more readable, 'Strongly Disagree' and 'Strongly Agree' responses have been combined with 'Disagree' and 'Agree' respectfully.

FIGURE 10: SURVEY RESULTS IN PERCENTAGES




I respect opinions of my colleagues
3-
97
I often learn something from my colleagues
6
6
88
I am willing to learn from a person younger than me
16
16
69
I would rather listen to my colleague than to an external trainer
6
53
41
I would rather listen to my managers than to an external trainer
9
31
59
Professional driver trainer should have many years of driving experience
3
22
75

CHAPTER 6: ANALYSIS

6.1 GROUP THINKING VS. INDIVIDUAL THINKING

The purpose of this research was to find forces that would resist implementing eco-driving among long-haul truck drivers making it a short-lived initiative, which does not yield expected fuel-saving results. In Chapter 3 I have investigated theoretical foundations for what are the restraining forces and how can a manager or a researcher find them out. I came to a conclusion that driving and restraining forces are on the belief level of the group thinking. Both individual interviews and surveys were chosen as a method of collecting data about driver beliefs and attitudes towards eco-driving.

Since, according to Lewin, the group should be the main focus of change, it is more likely that the resisting forces would be found in the group thinking. The results confirm this assumption, elucidating beliefs that hinder individual drivers from producing a long-standing change in driving behavior. The group beliefs carry significance to the drivers: 97% of the survey respondents have agreed to the statement "I respect my colleague opinions" and 88% have agreed that they often learn something new from their colleagues.

Since the interviews were conducted on-site when the colleagues and other employees were present, they represent drivers' group thinking. The surveys have been done anonymously by individual drivers, thus it is safe to assume that they represent their individual opinions. The difference between the group thinking and the individual thinking has been discussed in Chapter 3.

6.2 Analysis of interview themes

1. **Welcoming new programs**

Most drivers have said that they are interested in eco-driving and would like to learn economical driving style. However, they voiced out their belief that it's impossible to learn to drive differently. The survey results have shown that vast majority of drivers (91%) agreed to the statement "I like to learn new things about my job and my truck". The survey findings are in line with the interview results, which mean that there is no conflict between the individual and group thinking in that respect. The fact that drivers like learning new things about their job and about their vehicles acts as a motivational force, because genuine interest in eco-driving makes it easier for the training to run smoothly.

The second question in the survey asked if the drivers agreed to the statement: "I am able to learn a new driving style". 91% of the respondents have answered that they Agree or Strongly Agree. This finding is opposite to what has been said in the interview. This means that individuals can be pressured by the group thinking that it's impossible to learn to drive differently, which might inhibit them from being actually motivated to learn eco-driving. This belief acts as a restraining force.

2. **Importance of eco-driving**

The interview and survey results are consistent in Importance of eco-driving theme. During the interview the drivers were saying they are interested in adopting eco-driving because it brings cost savings. In survey, 97% of respondents agreed to the statement that eco-driving reduces fuel consumption. When asked about motivational factors, majority agreed that eco-driving helps improve environment and brings financial profits. Eighty-eight per cent agreed to the statement that eco-driving can improve environment in Belarus and eighty-one per cent agreed to the statement: "After learning a new eco-driving style I will contribute to improving environment where my relatives and I live".

Moreover, 94% of the drivers agreed to the statement that environment in Belarus needs improvement. Driver agreement with the importance of eco-driving for both financial and environmental reasons acts as motivational force for implementing the scheme.

The interview finding that the drivers put more emphasis on cost saving as motivation for adopting eco-driving than on improving environment is consistent with previous findings on the effect of pro-environmental attitudes on idle-reducing behavior. Schweitzer, Brodrick, & Spivey (2008) have found that cost concerns were the primary motivator for adopting idle-reducing technologies among US drivers.

3. Ease of acquiring new skills

During the interview the main message that the drivers were sending was that it is hard for them to acquire new skills. They gave various reasons for that: only a few hours of training, difference in test-drive conditions and actual road conditions and intense work-load. Respondents even had a very strong emotional reaction to the idea that it is easy to change a writing style. The survey results, on the other hand, reveal that majority of drivers reported that it is easy for them to acquire new skills and use them in their daily life and on the job. Eighty-one per cent of respondents agreed to statements that it is easy for them to understand new information and that they easily acquire new skills. Seventy-five per cent agreed to the statement “I often use new skills in my life” and 19% were undecided. Seventy-two per cent agreed to the statement “I often use new skills in my job” and 25% answered Neither Agree Nor Disagree.

The group belief that it is difficult to acquire new skills, including eco-driving, is a resisting force to change that requires learning. Even though the drivers are generally perceptive to the idea of learning and using their knowledge and skills, the fact that difficulty idea is widely accepted in their group will keep them from using the skills acquired during the eco-driving training. Emotional reaction sends a signal that this idea is quite

strong and that it will require a substantial management efforts in order to disconfirm it.

The findings are consistent with previous research about ecological driving. Vandenbrgh (2005) identified a deeply rooted skepticism about ability to change driving behavior (Barkenbus, 2010). Such belief can contribute to low constructiveness during the training sessions and subsequent low fuel saving results.

4. Defending individual driving style

The interview results reveal that most drivers consider themselves experts in driving. They have many years of experience and have been in many road situations, which have blended into a certain driving style individual to every driver. Respondents have provided examples of the difference in the driving style and consequently in fuel consumption between drivers.

The survey results confirm the interview finding. Eighty-four per cent of respondents answered that they consider their driving style as optimal. This belief is a resisting force in persuading them to drive differently. Drivers who believe such a thing do not have a motive to change their driving style. On the other hand, 81% per cent agreed to the statement "There are drivers who drive better than me". This finding means that drivers would most likely be perceptive to the idea that it is possible for them to drive better than they do now.

5. Inconsistency with local conditions

"Eco-driving can only be achieved in Western Europe" sums up the main finding of the interview phase. The respondents were giving different reasons for that statement: quality of the roads, driver education, traffic, etc. The emphasis was put on the fact that Western Europe is superior to Belarus on a range of objective issues. Survey results confirm that: 22% of respondents disagreed with the statement "I think it is possible to make something better in Belarus than in Western Europe" and 44% were

undecided. In other words, they were saying that significant fuel savings can only be achieved when there is a combination of factors is already present. Even though it might be true, this belief is dangerous because the drivers see eco-driving as a next step after all other improvements are made. This makes learning and applying new skills difficult due to lack of belief in their significance. However, majority (72%) agreed to the statement that it is possible to implement a strategy in Belarus developed in Western Europe. This sends a signal that not the drivers believe that eco-driving can also be achieved in Belarus.

An interesting finding is that the drivers emphasized what local conditions are missing, as opposed to for example, saying that the program should be designed with local conditions in mind.

6. Trusting an external trainer

The interview data has revealed that respondents believe that an eco-driving trainer has no real expertise. An assumption has been voiced out that the trainers are most likely to be much younger and with much less experience. This finding is closely related to the *Defending individual driving style* theme. The drivers strongly believe in their professional expertise and would not want to hear otherwise. When a trainer comes in teaching a new driving style and explaining how every driver can achieve fuel savings produces a threat to drivers' self-worth. The fear of expertise disconfirmation is a resisting force and can overrule any motivation to use eco-driving skills.

This group fear is not what most drivers believe in on the individual level. Sixty-nine per cent agreed to the statement "I am willing to learn from a person younger than me". To identify how highly the drivers value trainer's word stands in relation to the colleagues' and the managers', two questions were developed in the survey. The results show that respondents would value trainers' opinion higher than their colleagues', but less than that of their managers. And majority of the respondents (75%) agreed that

professional driving trainer should have many years of driving experience to establish credibility.

All the forces identified earlier can be combined together in a Force-Field diagram (Figure 10).

FIGURE 11: ECO-DRIVING FORCE FIELD DIAGRAM AT JC KURS LTD

Driving forces	**Resisting forces**
We like learning new things about our job and about our trucks	It is impossible to learn a new driving style
Eco-driving is important and useful for improving environment and company profitability	It's difficult to build new driving skills
	Driving style is a driver 'signature'
	Eco-driving can only be achieved in Western Europe or after other improvements are already in place
	The trainer has little expertise in teaching truck drivers

The diagram illustrates which forces resist implementing eco-driving practice and areas where there is already motivation to adopt new driving style. These forces are driver group norms and they are different from drivers' personal beliefs and attitudes. In order to change, the company needs to cultivate different group norms; for example, 'it is easy for us to change' or 'we can achieve ecological driving in Belarus'. Although the company managers cannot enter drivers' minds and change their beliefs at once, they can send proper signals that disconfirm resisting group norms and build up new ones. The next chapter will outline a three step process

that will help KURS to unfreeze current driver behavior by removing resisting forces, change it using eco-driving training and then refreeze new group norms. After the company will go through the change process, a sustained change in driving style should be attained.

CHAPTER 7: DISCUSSION

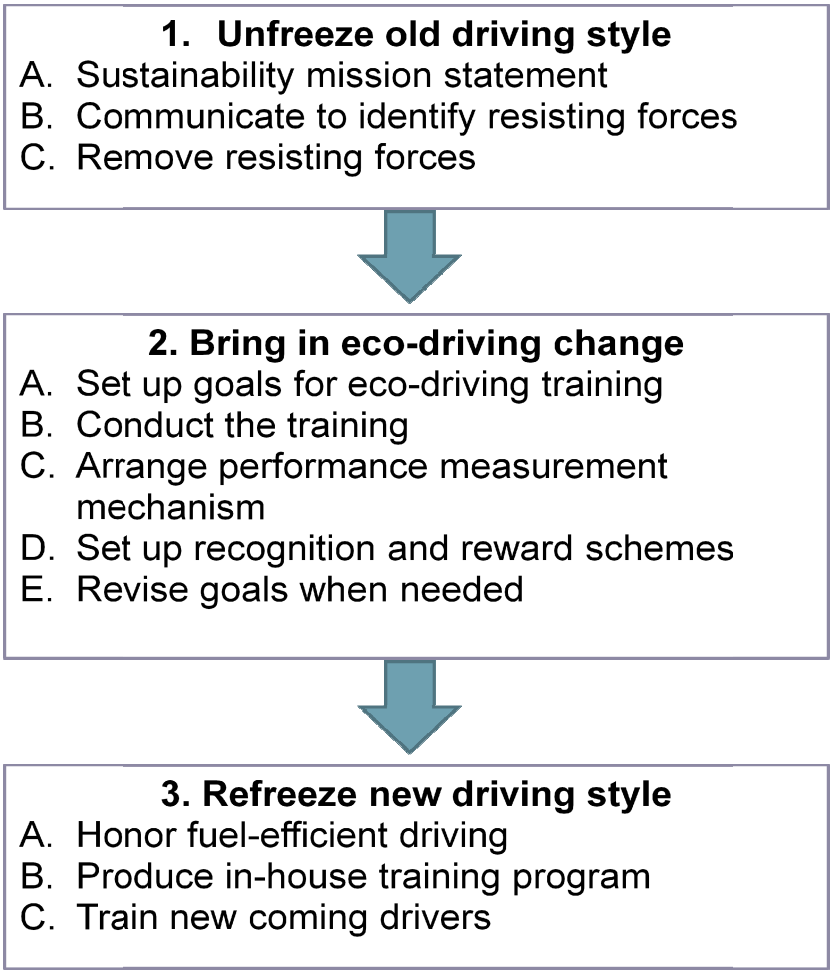
Implementing eco-driving among truck drivers requires them to acquire new eco-driving skills and then change their driving behavior in conjunction with the new skills. Up to date, eco-driving training alone did not bring the expected fuel saving results of 10-30%, nor did offering feedback and rewards to the drivers. Research has found that drivers soon lose interest and stop using their eco-driving skills (Chapter 2). According to the Planned Approach to change theorized by Kurt Lewin, sustained change in group behavior is not achieved unless forces resisting the change are removed. Only after that, the group can build up new skills and use them on a continuous basis.

In change, organizational efforts oriented at strengthening employee motivation only produce additional motivation. Offering monetary and non-monetary rewards, providing feedback on positive performance, giving autonomy to employees, and creating 'warm' caring working environment add additional driving forces to changing behavior. However, such actions do not address resisting forces. A successful planned change process acts on both frontiers: it adds driving forces while removing resisting ones.

An extended eco-driving implementation strategy is needed that will lead the truck drivers through the three stages: unfreezing, change and refreezing. The first stage sets the background for the change, discovers and addresses resisting forces. The second step executes eco-driving training and redesigns driver compensation schemes. And finally, the third step expands the boundaries of eco-driving and puts them into a wider context of company existence. Following these three stages should produce long-term change in driving behavior and would most likely increase fuel saving results.

Figure 12 illustrates a 3-Step strategy that can be used to change the driving style of truck drivers. This model is produced based upon the work of Lewin and Lueneburger & Goleman presented in Chapter 3 and based upon the study findings presented in Chapter 6.

FIGURE 12: ECO-DRIVING 3-STEP IMPLEMENTATION STRATEGY



1. Unfreeze old driving style

Lueneburger & Goleman suggest that process of bringing in sustainability to the company starts with creating sustainability vision. The vision is created at the highest level of the organization, its mission statement. The mission statement should reflect the company's move towards greater

sustainability. Then various communication instruments that are used within the company, such as memos, weekly briefings, and other documents should make the mission statement visible to the whole organization. For example, the mission statement in KURS is *"Delivering cargo safe and on time"*. This statement doesn't reflect the company's intentions to become sustainable. The mission should be changed to include sustainability intentions. An example could be: *"Delivering cargo safe, on time and with low burden to Nature"*. Sustainability is already on the company radar and changing the company mission statement sends a signal that leaders will be committed to achieving it.

The next move is communicating with the truck drivers about the sustainability vision. The goal of such communication is to understand what resisting forces within the driver group exist. Since resisting forces are often times group norms or generally accepted beliefs, they can be discovered only by the means of discussion. Managers need to carefully listen to what their employees are saying about the sustainability vision.

At KURS the resisting forces that have been identified among the truck drivers are beliefs that it is impossible to change driving style, that the driving style is a driver's 'signature', that eco-driving is not suited for local conditions and that the trainer does not really have a hands-on real life experience.

The forces that are discovered should be addressed depending on what they are. Presenting examples of local companies that have adopted eco-driving can disconfirm the belief that eco-driving is not suited for Belarusian conditions. Inviting truck drivers who are trained in eco-driving to show their skills and speak about their experience with eco-driving will show the drivers that 'signature' driving style can be altered.

Finally, a couple of drivers should be sent to learn eco-driving in other facilities. The inflow of information will acquaint the rest of the drivers with the concept of eco-driving and how the training is conducted. When

those already trained drivers will be showing fuel saving results, which are rewarded by the company, will create a favorable learning environment.

2. Bring in eco-driving change

Once the driver field has been destabilized, it is time to bring in eco-driving change. This is the phase when specific change programs are planned and executed. Implementation strategies, such as RECODRIVE capture the purpose of this process, which is to translate vision into actions (Lueneburger & Goleman, 2010). RECODRIVE strategy (Figure 4) is a set of four tasks: setting eco-driving goals, training the drivers, measuring performance, and recognizing and rewarding employees for their results.

Tangible goals for eco-driving will help the companies identify results that must be delivered. Once the target savings are identified, it is time to conduct the training. The important thing to keep in mind at this stage for KURS managers is to set the trainer expertise high and emphasize the successes that have been achieved already. This is done to revisit the resisting forces and to disconfirm the group belief that trainers do not have a hands-on real experience.

Again the managers should be very attentive to their employees and listen to their questions and concerns, because other resisting forces can be voiced out during this stage. Lewin has warned that when people are changing they are constantly searching for meanings (Action Research). It is crucial for managers to provide new meanings for ecological driving techniques and vehicle maintenance for the drivers, which is aligned with the company goals and the vision.

Sustainability performance should be accurately measured and drivers should be rewarded for using their skills. Lueneburger & Goleman cautioned that it is often times companies have no sustainability metrics prior to the changes. For example, KURS has not been measuring fuel savings before, but will have to start doing so after training the drivers.

That is done to reward employees according to their performance, to align project results with eco-driving goals, and to make better future decisions regarding company sustainability.

RECODRIVE strategy also calls for revision of the project goals according to the performance. Measuring performance and comparing it to the project's results will help companies to stay on track with the sustainability results.

3. Refreeze new driving style

The refreezing step involves a lock-in of newly learnt behavior by aligning it with the group norms. Sustainability should become a new norm among the company drivers. The goal at this stage is to embed fuel efficient driving at the company's DNA (Lueneburger & Goleman, 2010). In other words, the company should become known for its fuel efficiency and for honoring eco-driving skills. It can go as far as making JC KURS LTD and eco-driving synonymous to prospective driver candidates.

Developing an in-house training program for prospective truck drivers can help expand the boundaries of eco-driving role in the company. Such program will not only help to refreeze the new group norms and enable drivers to revise their driving skills, but can also leverage sustainability to create new competitive advantage (Lueneburger & Goleman, 2010). Selling training services to other haul carriers can become a new business opportunity for the company. At such level of commitment, a new group field will be created where eco-driving is a new group norm.

CHAPTER 8: CONCLUSION

This project has looked at a specific problem that road transportation industry is now facing. Increased transport activities have placed increased burden on the environment. Namely, incomplete fuel combustion process produces tail-pipe emissions. Heavier greenhouse gases such as MH4, NOx, HFC, etc. have been greatly limited on the policy level by introducing EURO standards for heavy-duty diesel engines. However, the policy has not yet addressed CO2 emissions well enough to meet international environmental goals.

Different technical and non-technical measures have been developed by the industry to tackle the problem of high CO2 emission levels, such as engine and vehicle developments, lightweight construction, hybrid propulsion and low air resistance tires. Eco-driving is one of the non-technical measures that aim to reduce fuel consumption levels by altering driving behavior. This measure offers a potential of reducing fuel use up to 30%, which is more than any other industry measures mentioned earlier. However, actual results of implementing eco-driving scheme did not live up to the potential. The drivers soon lose interest and the savings crawl down to 5-6% per driver.

The research was intended to investigate possible reasons for the failure. Theoretical framework has offered an insight that training might not be enough to produce sustained change.

Sustainability initiatives often times hit strong unconscious reactivity from employees, because such projects have high levels of risk and benefit uncertainty. Employee reactivity is not exclusive for sustainability projects though; almost any organizational or group change faces resisting forces. Kurt Lewin hypothesized that all social group behavior is a quasi-stationary equilibrium of driving and restraining forces, and that restraining forces have to be removed or diminished for change to occur.

The research question was identified as: What are the resisting forces to implementing eco-driving among Belarusian truck drivers? The research was carried in a case road haulage company in Belarus.

The analysis of data collected revealed that truck drivers indeed possess certain group beliefs that would most likely resist implementing the scheme. A 3-Step implementation strategy was then identified that addresses the forces and offers a way to guide drivers through the process of unfreezing, change and refreezing.

Although the primary aim of this research was to identify the resisting forces, it is not claiming that those forces would be found in all transportation companies that are wishing to implement eco-driving. Every case demands careful diagnosis; and every manager will have to discover the forces separately for each change project. Review of theoretical underpinnings and careful analysis of findings do, however, suggest that eco-driving implementation strategy can be improved. The process of bringing in sustained fuel efficient driving starts prior to the eco-driving training and does not end with reward systems. Only when eco-driving becomes a new ‘normal’ driving, companies will be able to see expected fuel saving results.

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APPENDIX 1

FORCE FIELD ANALYSIS

1.) Define the desired change or action (agree on a simple statement).
2.) Brainstorm the driving forces & restraining forces
3.) Prioritize the driving forces & restraining forces (identify the critical few- rank order the top 3)
4.) List actions to be taken (focusing on the critical few driving & restraining forces)

Desired Change:

Driving Forces (Those which currently exist & support or drive the desired change)	**Restraining Forces** (Forces that may inhibit the implementation of the desired change.)

Actions To Be Taken:

Source: Janet A. Means, Tammy Adams, and Michael S. Spivey at www.facilitatingprojects.com

APPENDIX 2

IDENTIFYING THE LEVELS IN LOGICAL LEVELS MODEL

Level	Language Indicators	If not supported by level directly above
Spirit *For Whom?*	Vision, purpose in bigger picture, community, transmission, beyond self, global systems, interconnectedness, unconditional regard, transpersonal, spirituality, social responsibility	?
Identity *Who?*	Mission, roles, self, sum of parts, personality, purpose I am, existential verbs, me, ego Complex equivalence (me=...), x means y, x Is like y	Individual, Independent, Alone, isolated, egoic, selfish, lack of connection
Beliefs/Values *Why?*	Motivation, Permission, meanings, willingness, desire, important, reinforcement Should, ought, must, judgements, evaluations, comparisons Generalisations, rules, attitudes, confidence Cause – effect "if... then..."	"It's not really me!" "I really should/ought to..." Split parts Conflicting priorities/values
Capability *How?*	Mental models/maps, plans, strategies, states, memory, imagination, innovation, adaptation, skills, abilities, knowledge, thoughts, direction, self talk, power, authority, tools, equipment, objectives Can/can't	"I can but don't want to" Demotivated, bored, lack of drive
Behaviour *What?*	Actions, reactions, responses, interactions, movements Do, activate, use, utilise, activate, implement. Active verbs	Random behaviours, habits, Repeating old behaviours even though they don't work. Paralysis/freeze. Procrastination. Knee jerk reaction rather than response
Environment *Where/When?*	Location, place, space, time, external conditions, surroundings Here, now, opportunities, constraints See, hear, feel, taste, smell, sense	Empty environment Nothing happens or gets done.

Source: (Cheal, 2008)

APPENDIX 3

QUESTIONS FOR THE LONG-HAUL DRIVERS AT JC KURS LTD

1. *How long have you been working as a truck driver?*
2. *What is your knowledge about eco-driving practice?*
3. *How effective is eco-driving at cutting down tail-pipe emissions? Why?*
4. *What is the biggest reason for its effectiveness/ineffectiveness?*
5. *Is your company interested in implementing eco-driving? Why?*
6. *What would be the reaction of your colleagues if your company started implementing eco-driving?*
7. *What would be the reaction of your colleagues to the external trainer?*
8. *What needs to be done to change the driving style?*

APPENDIX 4

ORIGINAL SURVEY IN RUSSIAN

The next two pages contain the original survey that was handed in to the truck drivers at JC KURS LTD.

APPENDIX 5

INTERVIEW TRANSCRIPT

- The trucks never work in a single regime, because the roads are different. In Germany we can use cruise-control.
- There is a big difference between a highway and city roads. If you drive to Smolensk, there is a straight road. If you go further in Russia, there is a traffic that cannot be overridden.
- Eco-driving can only be implemented when the roads will have European standards. Then we'll speak about savings.
- I don't think we can save fuel.
- In Russia, there are one-way roads. And there are old trucks that are very slow.
- There can be different norms of fuel consumption on different parts of the route.
- We are very interested in saving fuel, because the company profitability improves and we get higher salaries.
- It's an interest of truck producers to design ecological trucks, then it would be a popular design.
- Fuel price is increasing 5-10% every half a year. We can't buy Belarusian fuel only, because there is an 'export' quota. The difference in price between European fuel and domestic is very significant.
- Driving style also contributes to fuel saving.
- If you take for example 5 drivers: every one of them will have different fuel consumption rate on a same road.
- We had professional competition once. Out of 30 drivers, the difference between the first one and the last one was 2.5 times.
- It's impossible to teach a driver to drive differently by showing it once on a test drive.
- You don't start driving after seeing it once.
- You drive differently on different roads. In Europe, you don't shift gears as often. In Russia, you speed up, break, then speed, break again, outrace, then break again and so it is 2500 km in one way.

- Fuel quality is different in different countries. It yields different fuel consumption rates. They even have different smells.
- What needs to be done to change a driving style? There has to be a different driving school to begin with.
- We have too much to take care of to be driving and looking at a tachometer to check fuel consumption rates.
- Different people eat different amounts of food: same with the drivers. One needs that much fuel and another that much.
- There has to be a different driving school. If a person comes in for only 5 lessons, he will not learn anything. There is a big difference between Belarusian and Dutch driving schools, for example. They teach driving there, but they don't teach it here.
- It won't be possible to change a driving style unless the road conditions are changed.
- Different roads yield different fuel consumption rates.
- It might be possible to teach eco-driving to one truck driver, but not to all.
- Why should I puzzle myself over eco-driving? I drive as I drive, that's it!
- Everyone drives differently
- It might be possible to teach, but only if there is a different primary driver education.
- What can trainer do? He might be able to teach the young ones, but he won't teach me! He might suggest a few things, but he will not say anything new to me.
- I myself feel when I should shift gears.
- Every driver is interested in reducing fuel consumption. Every!
- If you compare a truck that is from 2011 and the truck from 1995, there is a significant difference in fuel consumption. Older trucks take more fuel, and practically impossible to reduce any further.
- The drivers will drive as they like anyways!
- If a trainer comes in from Norway or Denmark, for example, and will drive to Nizhniy Novgorod himself, he will be surprised at his own fuel rates. There they cheat you and fill in the gas tank 95 or 90 liters, instead of 100. And even if he will be trying his best, he'll see that he has high consumption rates
- It should be possible to teach eco-driving to a truck driver, but it would be very hard.

- In Europe, it might be possible, but here no
- I can change no problem, but I don't think it will be possible for others to adopt eco-driving. The drivers are too used to their habits.
- It's hard to tell if the director will implement eco-driving. He has a mind of his own.
- The quality of roads should be different.