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CHALLENGES OF ROAD TRANSPORT IN FINLAND

A case study of Ahola Transport Oy

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ABSTRACT

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Name of thesis CHALLENGES OF ROAD TRANSPORT IN FINLAND. A Case study of Ahola transport Oy		
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<p>Road transport in Finland is the most commonly used method of transporting goods, people and services from one point of location to the other. Finnish road transport industry boasts of 9,000 transport operators with 36,000 trucks in its capacity and generates a sum of 5 billion euros in a year which has served as a means of employment, means of economic boost and input, means of delivery of goods and services. Therefore, its challenges can't be overlooked.</p> <p>The research was done to address the main challenges of road transport in Finland as a country with sparse population, with its major population in the southern region which has a major impact on transport infrastructure and the Finnish transport system.</p> <p>The aim of this thesis is to identify the challenges of road transport because it's the most used form of transport in Finland, to present the models and structure of road transport in Finland, to analyze Finnish road transport policy.</p> <p>The major challenges of road transport are geographical challenges, strict EU rules, climatic challenges, environmental challenges and use of intelligent transportation (information technology).</p> <p>The research method used in this thesis research was qualitative research method in conjunction with semi structured interview to have a personal contact with the interviewee and to gain basic information on challenges confronting road transport in Finland. The internet was a primary source of information, journals, and articles on the thesis topic.</p> <p>In conclusion the basic solution to transport challenges is intelligent transport system, researchers are still studying the development of this unique system. This will pave way for a future of road transport where the challenges will be reduced to the barest minimum.</p>		
Key words Ahola transport, challenges, Finland, road transport.		

CONCEPT DEFINITIONS

EU- European Union

EC- European Commission

GHGs- Greenhouse gases

NASA- National aeronautics and space administration

UN- United Nations

ITS- Intelligent transport system

TRIMIS- Transport research and innovation monitoring information system

**ABSTRACT
CONTENTS**

1 INTRODUCTION.....	1
2 FINNISH TRANSPORT POLICIES	2
3 TRANSPORTATION	6
3.1 Forms of transportation	6
3.3 Traffic and transportation management	8
3.4 Transportation infrastructure and policies	9
4 ROAD TRANSPORTS	10
4.1 Advantages and disadvantages of road transport.....	10
4.2 Road transport network in Finland.....	11
4.3 Finnish road safety.....	11
4.4 Finnish road maintenance	13
5 CHALLENGES OF ROAD TRANSPORT IN FINLAND	15
5.1 Environmental challenges of road transport.....	15
5.2 Geographical challenges of road transport.....	16
5.3 Climatic challenges of road transport	16
5.4 Intelligent transport system	17
5.5 Strict EU rules	19
6 BACKGROUND OF THE STUDY AREA	21
6.1 About Ahola Transport	22
6.2 Ahola model on information system for road transport.....	23
6.3 Results of the interview conducted	24
6.4 Future implements of infrastructure for an ecofriendly environment	25
6.5 Role of technology on road transport.....	25
6.6 Climatic challenges of road transport in Finland	25
6.7 Environmental challenges of road transport.....	26
6.8 Intelligent transport system	26
6.9 Government policy towards road transportation	26
6.10 Government solutions towards road transport	27
6.11 Determined action to develop public transport	27
6.12 Environmental friendly transport	27
6.13 Future of road transport in Finland.....	27
7 CONCLUSION.....	29
REFERENCES.....	30
APPENDICES	

PICTURES

PICTURE 1. Finland road traffic control room	12
PICTURE 2. Finnish road maintenance	13
PICTURE 3. Intelligent transport providing for physical infrastructure and digital services	18
PICTURE 4. Intelligent road landmarks for automatic vehicles in extreme weather conditions With laser scanners	19
PICTURE 5. Ahola transport Oy	23

TABLES

TABLE 1. Sustainability goals	3
TABLE 2. Data of road accidents caused by extreme climatic conditions.....	17

1 INTRODUCTION

Road transport is an essential part of the transport system, and the most common form of transport. Road transport is vital to the economic development and social integration of the country. Easy accessibility, flexibility of operations, door to door service and reliability have earned road transport an increasingly higher share of both passenger and traffic vis a vis than other modes of transport.

Trucks are a cost-effective mode of distribution of valuable goods for short distance, their tariffs are competitive with high efficiency compared to railway transportation.

Nowadays, road transportation in Finland is currently faced with challenges due to climatic condition. Due to weather conditions roads during the winter period are slippery. Extra caution must be taken to avoid accidents.

The latest study conducted in Finland shows that an average Finn's travels a total of three journey per day totalling 66 minutes with an average distance covered to be approximately 15 kilometres. Finland is highly motorized due to its long distances in travelling and sparse population.

In 2013 the total number of registered vehicles was 3,654,489. Passenger cars accounted for 3,105,834 while 2,572,214 passenger cars commissioned to traffic, the data shows approximately that 1000 people accounts for 474 passenger cars (Autoalan tiedotuskeskus 2013).

Finnish road transport is more concentrated on the trunk roads of southern Finland, Traffic volumes are forecasted to increase in Finland by 24 % between 2002 and 2030. The concentration of population in towns and cities is expected to increase the use of trunk road at the expense of other roads thereby leading to emission of green house gases into the environment (Climate guide 2009).

The aim of the thesis basically is to analyse the challenges of road transport in Finland, to present the models and structure of road transport in Finland, to analyze Finnish road transport policy and the future of road transport through intelligent transport system.

2 FINNISH TRANSPORT POLICIES

Finnish road transport has faced many challenges through so many years. Road transport has been the major means of movement of product from one location or points to the other. The transportation of people, goods and services is increasing as population tends to grow in Finland. The Finnish road transport is the most used form of transport in the movement of goods and services from one location to the other due to its flexibility and easy conveyance of goods and services, it's also a means of revenue generation for Finnish economy and means of job creation.

There are three principal components to great transport policy in a country. To start with every individual of a country must be entitled to the following: Smooth and safe regular level of travel, policy to reinforce the conditions for monetary life and business, transport framework that gives due thought to natural perspectives and environmental change (The Finnish transport policy challenges and guidelines 2007.)

In maintaining and facing the challenge of road transport in Finland there must be a strategical approach towards the threats the problem of road transport poses towards a sustainable development. Sustainable development means meeting the needs of the present generations without compromising the ability of future generations to meet their own needs , such as economic sustainability, ecological sustainability, social sustainability (Schwaab & Thielmann 2001, 16.)

2.1 Economic sustainability

Economic sustainability in the road transport sector cannot be neglected as certain goals have to be set and achieved in order to have a swift and hitch free challenge in the road transport sector such as provision for Infrastructure for sound economic development and employment for individuals, provision for cheap fast and high volume transport, reduce multiple congestions in the transport industry, provision of proper linkage and strengthen rural and urban inter linkages, creation of sound financial basis for public transport, provision of revenue for infrastructure and transport facilities, setting up operations and maintenance (Schwaab & Thielmann 2001, 16.)

2.2 Ecological sustainability

The ecological sustainability requires that the ecological adjust change is not over burdened by human activities such as emission of CO₂ in order to keep in mind the futuristic goal to ensure the useful dependability of present ecological frameworks both on a local and global scale (Schwaab & Thielmann 2001, 16.)

Climate change poses challenges for road transport as road maintenance costs are rising. Climate change might well be a medium of cost reduction in repairing roads in some areas in Finland example in areas such as Southern Finland where mostly the method of decreasing the need of anti-icing, de-icing and snow removal through chemical and mechanical method which reduces the environmental impacts of de-icing the road. (Climate guide 2009.)

2.3 Social sustainability

Social sustainability refers to social and distributional needs (TABLE 1) that are met by guaranteeing a reasonable dissemination of resources, destitution diminishment, stable human development, public participation and democratic policy formation. (Schwaab & Thielmann 2001, 16.)

TABLE 1. Sustainability goals (Schwaab & Thielmann 2001, 16.)

Economic Goals	Ecological Goals	Social Goals
Provide infrastucture for sound economic development and employment	Improve health and safety in transport	Guarantee transport services and access to all social groups
Allow for cheap fast and high volume transport	Reduce pollution on local regional and global level contribute to climate stabilisation.	Focus on transport for the (urban) poor
Reduce congestion	Reduce land take	Improve methods of addressing transport problems of the poor.

Strengthen rural urban interlinkages	Integrate environmental and economic dimensions in transport planning and development	Protect poor against adverse changes in transport policies
Create sound financial basis for public transport	Develop environmentally sensitive framework	Ensure democratic participation in transport policy decision making
Allow for different transport options		
Raise revenue for infrastructure and transport facilities set up operations and maintenance		

The main aim of this thesis is to identify the current challenges of road transport in Finland, models and structure of road transport in Finland, Government policies towards road transport in Finland due to Finland's sparse population which has impact on its transport infrastructure and transport system. (The Finnish transport policy challenges and guidelines 2007.)

The research thesis about the challenges of road transport in Finland in order to obtain essential information, the research method used is semi structured interview which entails drafted research question used in getting the basic and required information on the current challenges of road transport.

The research was carried out in Kokkola in Finland through interviewing an employee of Ahola Transport. Ahola Transport company Oy, A road transport company in Kokkola, was selected as a case (which fits into the criteria as a road transport company in Finland). Finnish road transport is by far the most important form of transport in Finland.

In 2009, road transport accounted for 68 % of goods transport and 93% of passenger transport (Tietilasto. The number of cars relative to total population in Finland is consistent with European average. Road transport is concentrated on the trunk roads of southern Finland, where traffic jams resulting from commuter traffic are an almost daily occurrence. Almost all road transport, approximately 96 % takes place on paved and tarmac roads while gravel roads only account for 4 % of all road transport (Climate guide 2009.)

Traffic volumes on public roads in Finland are forecasted to increase by 24 % between 2002 and 2030. The concentration of population in towns and cities is expected to increase the use of trunk roads at the expense of other roads. Local and private roads will nevertheless remain important in sparsely populated areas (Climate guide 2009).

3 TRANSPORTATION

Transportation refers to the movement of products from one location to another as it makes from the beginning of a supply chain to the customer (Chopra & Meindl 2007, 385).

Webster (2017) describes transportation as an act, process or instance of transporting or being transported, means of conveyance or travel from one place to the other, public conveyance of passengers or goods especially as a commercial enterprise.

History of transportation dates back to the medieval period through the use of domestic animals which are used in transporting heavier loads or humans riding animals for easy conveyance and speed. The industrial revolution in the nineteenth century saw various inventions which changed the phase and means of transportation such as telegraphy. Means of communication became a necessity and independent of the transport of physical objects.

3.1 Forms of transportation

According to Stock & Lambert (2001, 322) there are five basic modes of transportation: motor, rail, air, water, and pipeline in the movement or transportation of goods, people and services.

Motor transportation is the most flexible means of transportation as it allows door to door delivery of goods and services between cities, towns, and where all other means or mode of transportation cannot access. The movement of bulky goods of various sizes associated with long distance journey can be done through road transport. The combinations of flexibility and versatility of motor transport has enable it to become the most preferred in the world (Stock & Lambert 2001, 326.)

Pipeline transport is used in the movement of products like liquid gas, petroleum products, water, chemicals and crude oil. The best method in transporting these products is through pipeline because of the rate at which it delivers these products with respect to time. The following are reasons why pipeline is used in transporting these products: The flows of this products are monitored and controlled by

computer, they do not require excess labor, the climatic conditions have little or no effect on it, Loss of the products are rare during transmission (Stock & Lambert 2001, 328.)

Water transportation can be in different categories such as rivers, canals, lakes, coastal and inter-coastal ocean and international deep sea.

It's the most used form of transport in Western Europe due to many navigable waterways and large populations also the most inexpensive means of transporting bulky goods water transportation plays a significant role in transporting of goods and services from different countries around the world. (Stock & Lambert 2001, 327.)

Air transport provides fast delivery of products, the most expensive means of transportation, the best preferred method of delivery of cargo products due to fast delivery of goods and services. Air craft and helicopters are the major sources of air transport. The disadvantages are that it's not the preferred means of transportation for short distance. Air transport provides rapid time in transit, but terminal and delivery delays and congestion may reduce some of these advantages. (Stock & Lambert 2001, 326.)

Rail transportation requires vehicles which are connected and operate on rails. The rail services are available in most cities and metropolitan areas around the world though they lack versatility and flexibility. Rail transport costs less compared to other modes of transport. The length of haul carriers is approximately 850 miles. (Stock & Lambert 2001, 327.)

3.2 Key factors in transport mode

The key factors in selecting a transport mode which which makes up the main reason why a mode of transport is chosen over the other are speed, accessibility, safety, reliability, capacity, fuel efficiency, privacy, comfort. (Vaddadi 2017.)

Accessibility deals with the swift ease of having an easy access to a transport mode without delay, not having an easy access to a transport mode then its usefulness.

Cost factor is one of the key strategic means of choosing a transport mode of transport. The affordability of a user towards a mode of transport system determines if the user is willing to pay for the urgency and need of the transport conveyance of goods and services.

Speed is a key determinant factor in choosing a type of transport, a fast mode of transport with high cost might make it less lucrative, while a cheap mode of transport might lead to delay of goods and services in cases of emergency speed are needed towards easy delivery of goods and services.

Capacity, in case of bulky goods, a preferred mode of transport should be the kind that is suitable for conveying large and bulky goods with regards to safety and security concerns. A vehicle with more carrying capacity will be preferred, in case of transporting goods the concept of scale of economies is best exploited for economic profit while dealing with bulky orders.

Considering the rate at which accidents occur when dealing with fragile goods, safety of the goods during transportation is important. This means a suitable and preferred option of transportation must be a major preference.

Carbon emission is of great concerns many people prefer cars with less carbon emissions to convey goods from location to the other.

A transport mode with higher frequency is needed as the waiting time for delivery of goods reduces thus saving time. Transport mode with good frequency helps in cases of delivery of goods and services.

Privacy is needed especially if the main reason of travelling is business trips with business clients this requires confidentiality during business conversation with business companions, public transport doesn't provide such means of privacy.

Comfort, this factor can be ignored at times if it deals with the movement of goods only, but when it requires the transportation of people from one location to the other then it's necessary due to long distance and comfortability during the journey. (Vaddadi 2017.)

3.3 Traffic and transportation management

Traffic management measures are used for enhancing the security and stream of movement, by reducing traffic emissions and making use of traffic artery or route. Traffic management is used to reduce or curb demand for selection of transport, route or selection of time of travel. The current implementation in traffic management towards strategic traffic management is traffic management plan which involves

equipping major critical road sections with information technology system which provides safety and road efficiency (European commission mobility and transport 2017).

3.4 Transportation infrastructure and policies

Roads, seaports, airports, rail and canals are major infrastructural properties of transport which exist in transportation network. Governments are in full possession of total responsibility in building, renovating, and managing the infrastructure.

Transportation infrastructures require government ownership or being regulated due to its monopolistic nature in the non-presence of monopoly deregulation and market attributes. When infrastructure is owned by private institution there are basic requirements for price settings to reflect marginal impact of the cost. (Chopra & Meindl 2007, 392-393.)

4 ROAD TRANSPORT

According to Economic times (2017) road transport is described as a means of transporting goods and personnel from one place to the other on roads. Road is a route between two destinations which has been either paved or worked on to enable transportation by way of motorized and carriages. Road transport can be classified as transporting or movements of either goods, materials or people.

The major advantage that road transport has over other means transportation is that it enables to deliver goods and services door-to-door of goods and materials or transporting of people. Road transport at times is the only medium of transportation of people and goods and services in rural areas where other means of transportation such as rail, water, and air don't have access to.

Delivery of goods and services between small villages, towns, and cities is made possible through road transport. Road transport also has its limitation which will be discussed properly in the next chapter. For instance, road transport has been attributed to road accidents which occur due to either man made fault or climatic conditions. Road transport isn't that safe compared to other means of transport, as it's irregular and undependable. Transporting of bulky goods through road transport over a long distance is unsuitable and costly. (Economic times 2017.)

4.1 Advantages and disadvantages of road transport

Road transport is the most popular mode of transport or use of transport in the movement of goods and services in Finland. Many transport companies are into delivery of goods during the schedule period depending on the customer needs and satisfaction (Next generation 2017).

The key advantages of road transport are the provision of door to door service which reduces cartage, loading and unloading which helps as a means of cost reduction. Road transport is the most suitable means of delivery of goods in rural, towns, villages where other means of transport are not reachable.

Road transport is a compound business which allows and requires most transport companies to own transport vehicle used in the transport business, it requires less capital.

The cost of operation, cost of maintenance is less compared to other modes of transport, it's the most suitable means of transport in delivering of bulky goods over long distance. It also has a lesser risk of damaging goods in transport and most suitable cheapest mode of transport for short distance in the delivery of goods and services. (Your article library 2017.)

The most challenging part of road transport is the accidents which occur on road, as road transport is prone to road accidents. It's not reliable as rail transport in the movement of goods. The movement of goods and services depends on the speed of the mode of transport, road transport is slow compared to other mode of transport, climatic conditions tend to dictate and create challenges for road transport. (Your article library 2017.)

4.2 Road transport network in Finland

Finnish road transport comprises of highways, municipal street networks and private roads, the Finnish transport agency has the sole responsibilities in maintenance and development of state owned roads network in Finland. There are about 78,000 km of highways which are maintained by the state in Finland, the road network which is about 454,000 km long in total which comprises of 350,000 km of private and forest roads and 26,000 km of Municipal Street. The Finnish highways or main roads are divided into class 1 and class 2 which have about 13,000 km including some 900 km of motorways, the connecting and regional roads have majority of 64,900 km which represent over a third of traffic (Finnish transport agency, Road network 2017.)

The pedestrians and walkway and bicycle routes are slightly above 5,000 km while the highways are approximately 65%. Some of these are paved with low traffic volumes, the section of about 41,000 km are in the lowest maintenance category (Finnish transport agency 2017).

4.3 Finnish road safety

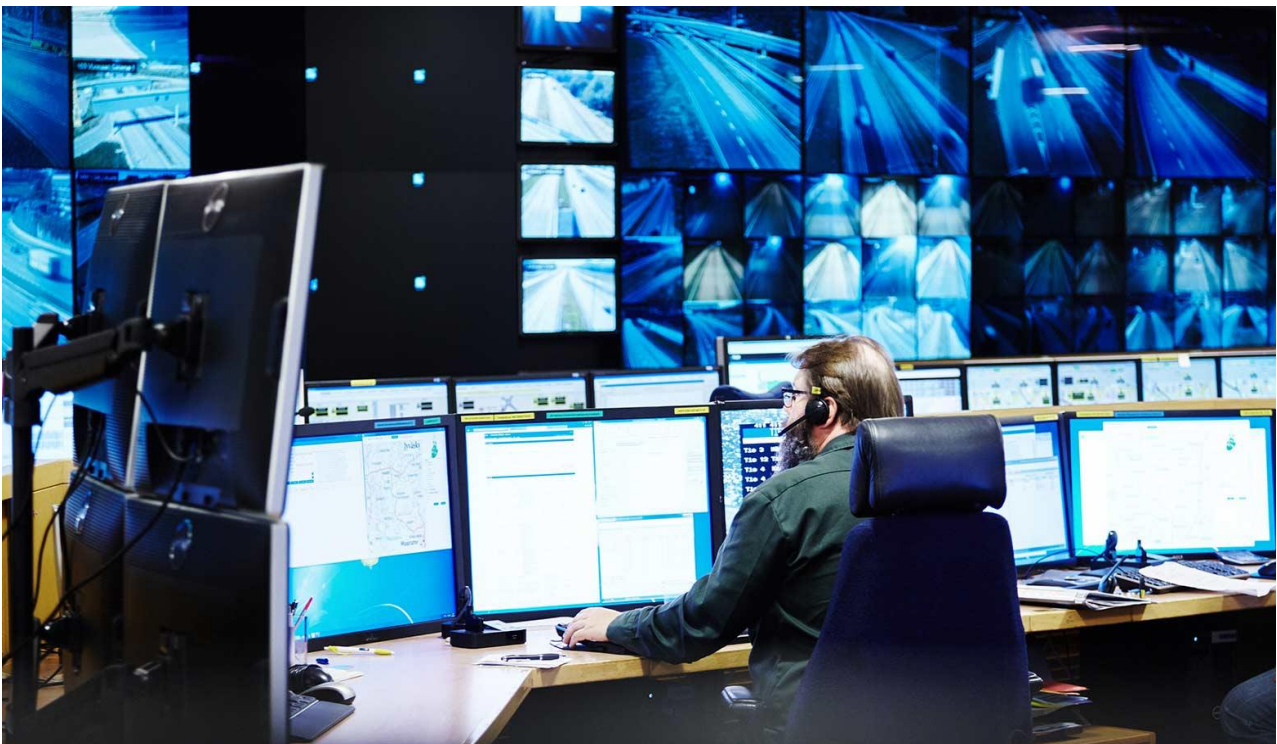
The safety of Finnish expressways has enhanced over the most recent ten years but still much must be done in improving it. The safety target set for road traffic (2010 - 2020) is to split the quantity of fatalities and reduce the number of fatalities in Finland drastically.

If these goals are achieved it means that the number of fatalities wouldn't be more than 136. The ministry of transport and communication in conjunction with the Finnish transport agency plays a major vital role towards safety which involves cooperation of regional and national level with other key authorities.

This covers traffic information such as traffic information, transport system planning, land use planning, mobility management, traffic control and traffic information (PICTURE 1).

The EU has provided strict laws with improvements on road safety, as its main goal with a target on its member states.

Quality requirements concerning the safety of road connections the authority in charge of this is the Finnish transport agency, Trafi (Finnish transport agency 2017).

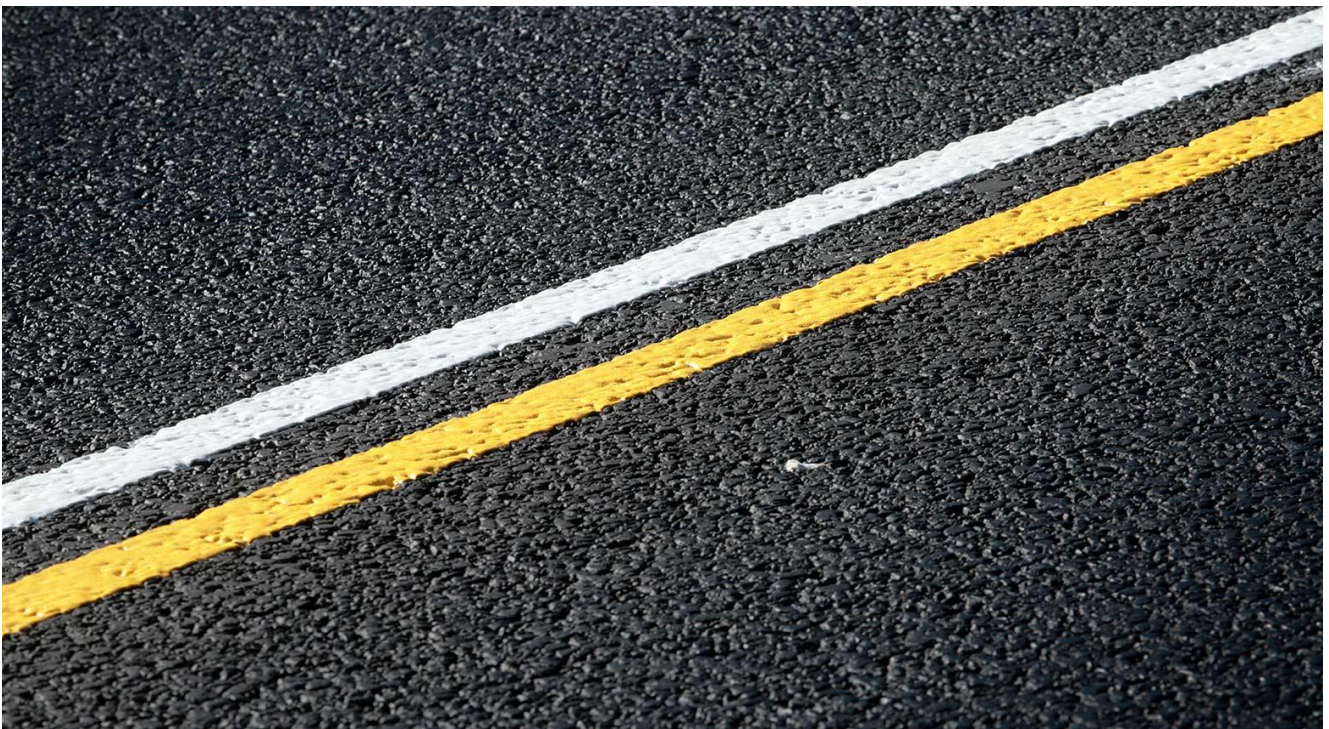


PICTURE 1. Finnish road traffic control room (adapted from Finnish transport agency homepage)

4.4 Finnish road maintenance

The Finnish road maintenance makes sure that the road network is safe and provides safety measures through its safety and trafficability. The maintenance of the road includes proper upkeep of paved roads, bridges, road environment, its equipment and structures of highways. Finland has approximately 52,000 km of paved highways. The paved roads play a key vital role in day-to-day activities and the Finnish competitiveness in trade and its industries.

The road network is divided into 80 contract districts where by the local contractors in charge of highway maintenance (PICTURE 2) which must follow the Finnish transport agency, the roads are maintained traffic and ensure traffic safety and this process includes condition of the road surface which protects the layer underneath the paving. (Finnish transport agency, Road maintenance 2017.)



PICTURE 2: Finnish road maintenance (adapted from Finnish transport agency homepage).

The maintenance of bridges ensures that there are structural safety and proper maintenance which are required. There are approximately 14,200 bridges in Finland highways, 5% of this are disrepair 180 are in poor conditions with the application of weight restrictions which are in effect to the affected bridges by 2020 according to Finnish transport agency 7,000 of these bridges will require renovation.

Despite the Finnish transport agency investment in road repairs the number of bridges to be repaired is increasing. The maintenance of gravel roads requires low bearing capacity compared to paved roads, frost actions cause damages to unpaved roads (Finnish transport agency 2017).

5 CHALLENGES OF ROAD TRANSPORT IN FINLAND

The most popular means of transport in Finland is road transport which moves or convey goods, people and services through vehicles and trucks. In 2009 road transport accounted for about 68% of goods which where been transported and 93% of passenger transport.

Road transport makes use of the trunk road of southern Finland because Finland is sparsely populated which is the reason why people migrate to southern Finland due to urban development, jobs availability. social life rate at which people move to the southern part is at alarming rate which will increase traffic volume and concentration of cities and towns which are expected to rise by year 2030 (Tietilasto 2009).

Road transport is vulnerable to challenges which have been affecting the conveyance of goods, people and services. The Finnish transport policy is drafting new measures towards a safe and smooth movement of people, goods and services towards everyday life of individuals in Finland, mostly the main challenges of road transport in Finland are geographical challenges, strict EU rules, environmental challenges, and climatic challenges.

5.1 Environmental challenges of road transport

In 2001 Finland was among top five CO₂ emitters in the world with United States ranking first 29 tonnes, Finland 5th position with 18 tonnes (Guardian 2011). Finland as a member of EU has set a target in reducing CO₂ emission from road transport.

There are strategic plans towards cutting down CO₂ emission towards its adverse effects on climatic conditions as it reduces ozone layer. As a result the average new car on the road in 2021 will produce 42% less CO₂ per kilometer compared to a new car purchased in 2005 (European council of spatial planners 2016). The road transport sector accounts for approximately one fifth of the emissions in Finland, Finland has set a target towards year 2020 by reducing its emission by 16% above the ETS and 34% with ETS compared to 2005. There are needs for energy efficiency of road transport with ecological fuels.

The traffic consistency in urban areas must be curbed towards emitting CO₂, while energy efficiency must be targeted in improving of fuels which are developed in a very low emission path (Niinistö 2005).

5.2 Geographical challenges of road transport

The geography of Finland combined with its road network and population drifting southwards affects the road transport system. Long distance kilometers are covered in delivering most of the items thus leading to emission of carbon into the environment.

The southern part of Finland is densely populated due to many reasons such as industrial location, availability of jobs, social life. The Finnish road transport system is taking advantage of this through developing its intelligent transport system towards delivery of people, goods and services in its advancement of its technological program.

The interviewee also confirmed that self-driven trucks have been developed by Scania, Volvo and Mercedes. These are heavy trucks which transport most of the finished goods through road transport from one location to the other with low emission and use of electric cars which is replacing the fuel and benzene consumption in order for green environment towards curbing the reduction of CO₂ into the environment.

5.3 Climatic challenges of road transport

National aeronautics and space agency (2011) describes climate as the average climatic condition over a long period of time. Climate change can therefore be a typical average weather condition of a region which could be a change in average annual rainfall or change in a city's average temperature for a given month or period or precipitation pattern.

Climate change is a global challenge not only to Finland alone as it affects road transportation. Weather conditions such as snow, wind, humidity, rain have so many adverse effects on conveyance of goods, people and products from one location to the other through road.

The most used form of transportation in Finland is road transport as it remains a major source of distribution. The increase in climatic change has posed a threat to road transport through rise in sea level and rainfall causing accidents and delays on roads in Finland. The climatic conditions in Finland are affected by its latitude position in the northern hemisphere. Extreme climatic conditions in Finland led to road accident and deaths in the year 2015 according to Finnish transport agency (2015). Climate conditions have led to death of both road motor users and passers on public highways, non-highways in Finland (TABLE 2), with national statistics showing details of deaths which occurred due to climatic conditions. (Climate guide 2009.)

TABLE 2. Data showing deaths occurred due to climatic conditions (adapted from Trafi publications on road accidents in Finland and Sweden. (Peltola & Luoma 2016, 3)

Road category	Number of accidents severity injury		persons involved
	Fatal	Injury	
Public highways	925	14,576	20,447
Non-highway	316	13,995	16,791
Total	1,241	28,571	37,238

5.4 Intelligent transport system

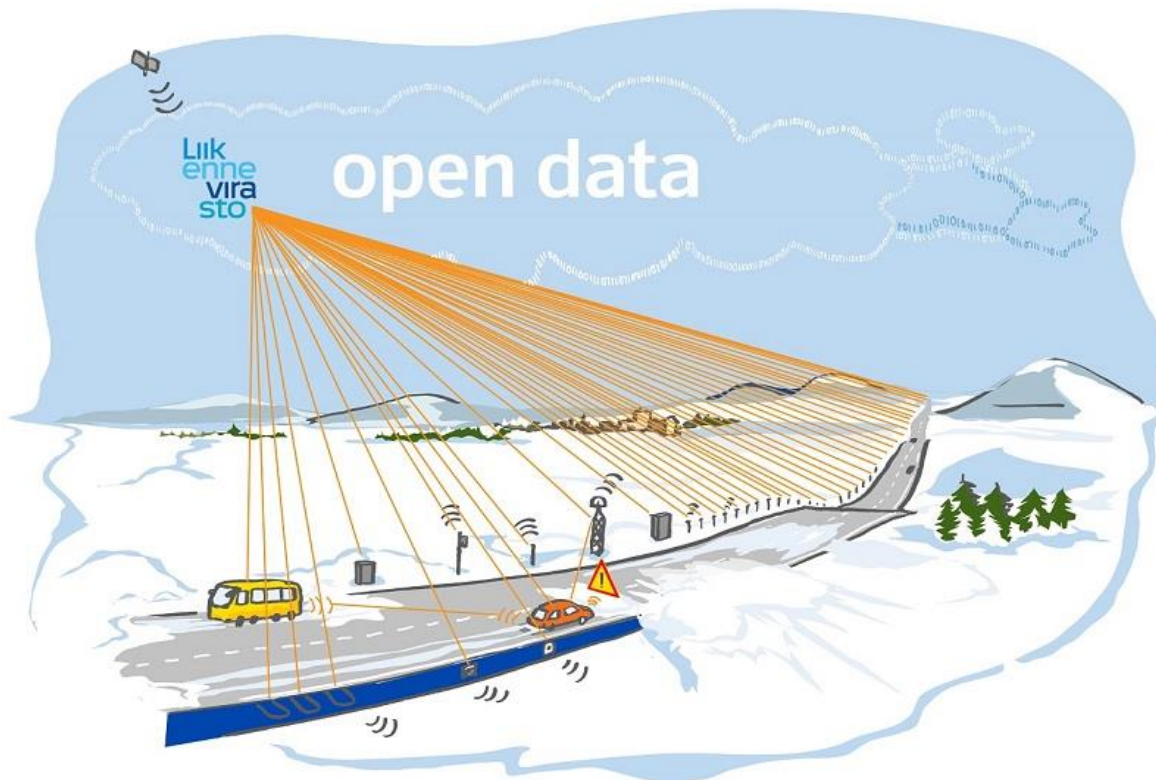
The Finnish transport policy has developed a meaningful way of curbing most traffic problems towards the direction of reducing emission of CO₂ through its intelligent transport system. The intelligent transport system will provide means for travelling of passengers, delivering of goods and services in an eco-friendlier way, which will also promote individual wellbeing.

The intelligent transport system is the future of road transport Figures 3 and 4 shows detailed information from visual view of what the future of road transport will look like.

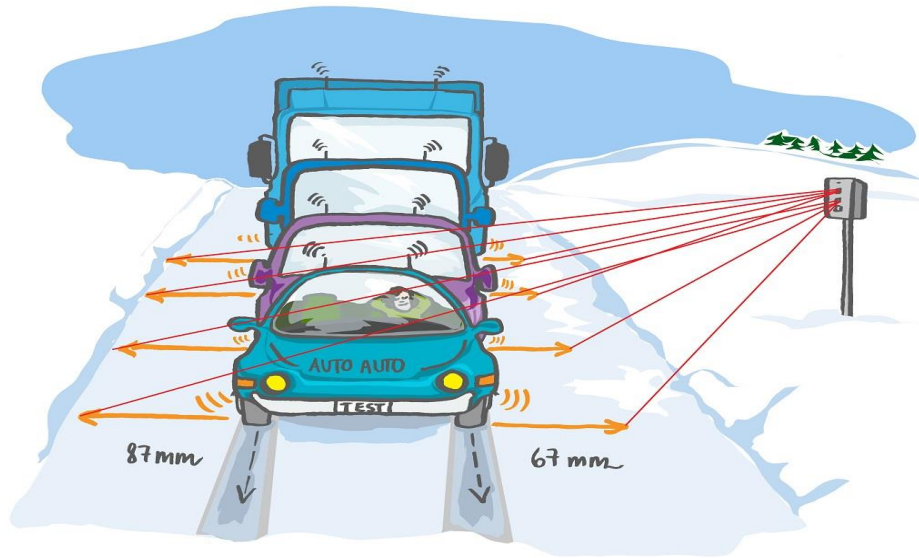
Test has been carried out concerning intelligent transport system with different and extreme weather conditions in Norway. The transport is code name Aurora E8, it's a public test ecosystem which ensures intelligent and automated transport and has a solution towards challenges of road transport in

developing both physical and digital infrastructure (Liikennevirasto, the arctic intelligent transport test ecosystem 2017).

The Aurora E8 test ecosystem will be undergoing test in Finland in 2018 on public road from Pahtonen to Muonio which is instrumented to support automated driving in real life traffic conditions.



PICTURE 3. Intelligent transport providing for physical infrastructure and digital services copied from Finnish transport agency (Liikennevirasto, Finnish transport agency infrastructure 2018.)



PICTURE 4. Intelligent road landmarks for automated vehicles in extreme weather conditions (adapted from Finnish transport agency (Liikennevirasto, Finnish transport agency infrastructure 2018).)

5.5 Strict EU rules

According to European commission every action taken by it is founded on treaties approved voluntarily and democratically by all EU member state (European Union 2018.)

The EU law has strategized and concluded with strict rules of law to have a sustainable low carbon economy by 2050, the EU member countries need to cut its emission from transport by 60% compared to 1990, which is approximately 70% compared to the recent emission which is a serious challenge to road transport which is the most used in the European member states through trucks and freights in delivering of people, goods and services in the last two decades.

The EU states that road transport is the major source of CO₂ emission which has increased by 26% between the year 1995 and 2010. In 2014 vans accounted for 9% of road transport emission in the European Union member states.

To improve fuel efficiency new technologies must be implemented to reduce the rate of emission by at least 40% between 2021 and 2030 with a target of 20% by allowing each member state to achieve its climate goals by 2030. (European commission 2018.)

6 BACKGROUND OF THE STUDY AREA

The method used during the research thesis was a qualitative approach (semi structured interview) in obtaining information about the challenges of road transport in Finland. During the interview 10 questions was drafted (APPENDIX 1) with regards to challenges of road transport in Finland. An interview was conducted with an employee in the logistic department of Ahola Transport in Kokkola. The interview took place in the company with the interviewee on Monday 13th November 2017. The respondent was contacted by an email. The respondent also has experience in road transport and logistics in Finland, Sweden and Baltic regions.

The increase in demand for road transport will be driven by increased economic activity, higher incomes, and improvements. Fuel cell technology could feasibly achieve 50% penetration of the road transport market by 2050 enabling a similar proportion of transport fuel to be sourced from renewable electricity which is used to produce hydrogen with zero green house emissions (Hamilton 2002).

Transport in the global world presently cannot be neglected as it plays a vital role both in the economy and the smooth operation of the movement of people, goods, and services. Climate change has been a challenge to road transport thereby compromising the easy and smooth operation of movement and the economy. In the global world, the transport is complexly ranging from road, air, pipeline.

The effect of climatic changes could cause a disruption which may or will delay the transport flow multi modal, complex transport chains and their associated productions could be delayed or changed.

Transport has caused interruptions and delays either through natural hazards or human impacts like accidents, loss of transmission of power. In April 2010 Iceland's volcano erupted thereby causing the ash cloud grounding of about 95,000 flights across Europe accounting for 48% of total air traffic and roughly 10 million passengers stranded in Europe and worldwide which lead to massive secondary and tertiary cost of businesses and people depending on the flight (Jeunemaitre & Johnsson 2010.)

The European commission has proposed a roadmap for a competitive low carbon economy 2050 which will foresee a reduction of an 80% reduction of GHGs (Green house gases) by 2050 compared to 1990.

It's an initiative on a resource efficient Europe, of the Europe 2020 programme, The European 2020 transport has set out a new guideline how the transport sector can also reduce its carbon emission by 60% towards a competitive and resourceful efficient transport system (European environment agency 2014, 12-13)

6.1 About Ahola Transport

Ahola Transport is a business oriented service which is established and run by the family. It's a logistic company with the sole aim of transporting goods and services. Its main operation is in the Nordic and Baltic region and countries such as Poland, the Czech republic, Slovakia. The company generates approximately 100 million euro per year.

At first, the business main focus has been on service production. The transport company has been able to provide transport solutions with a competitive edge with customer centred logistics solutions and its online concepts which put it at a top level in the transport industry in Finland (PICTURE 5 showing Ahola Transport Oy, transport vehicles). Its core value in road transport business has enabled it to take full responsibilities with its customers and partners.

The company mission is more efficient, reliable and environmentally friendly transport and logistics solution which requires systematic effort in operations and continuous improvement in the road transport industry. The company has certified quality (ISO 9001), environment (ISO 14001) and management (OHSAS 18001) which has been part of the Ahola management system (Ahola Transport Oy 2017).



PICTURE 5. Ahola Transport Oy, About Ahola transport (adapted from Ahola Transport Oy 2017)

6.2 Ahola model on information system for road transport

Ahola Transport company has been operating for 60 years in commerce and transport with the combination of its online concept which makes it a key transport company in the industry and one of the leading transport companies in the Nordic region. Ahola Transport and its information technology in the logistics services has provided modern solutions for logistical problems.

The information systems are: Attracs online ERP system & Attracs optimizer. Attracs online ERP system is an information technology system which has been reviewed and developed for a period of 15 years, which makes it one of the best in the transport management and ERP systems in the world.

The key implements of the information technology system are that it plans, coordinate and control the streams of goods in a cost efficient and environmental manner.

The Attracs optimizer is a computerised arranging system which can be incorporated into the client's own framework. It's the most advanced technology present. It helps to organize, coordinates routes and freights space in all forms of transport in Finland and overseas (Ahola Transport Oy 2017).

6.3 Results from the interview

The answers to the questions asked during the interview show the current challenges of road transport in Finland and these include geographical challenges, environmental challenges, intelligent transport system, climatic challenges, urban challenges, lack of young drivers. This also correspond with the interviewee response on the current challenges of road transport in Finland.

The challenges of road transport in Finland have been discuss in chapter 4 extensively with key points. In the first question the respondent was asked to tell about his position and working experience in the company.

The results of the discussion sheds more lights on challenges of road transport during operations of the movement of goods and services from one place to the other. The challenges highlighted during the discussion further share the same information from online information which is previously discussed chapter 4 of the main challenges of road transport in Finland.

Chapter 4 discussed the challenges of road transport in Finland and during the discussion this was also higlighted by the interviewee which these challenges are mentioned such as geographical location, climatic condition, environmental condition, strict European law, intelligent transportation as the solution to current challenges of road transport.

Geographical challenges are the main challenges of road transport in Finland. Finland is a sparsely populated country, the population of Finland is 5.5 million with people likely to move down south of Finland, more so the movement of goods and services through long distance journey in meeting the population of peole living in the south part of Finland is much compared to other parts in Finland. Reasons why people move towards the southern part are: job search, development of the southern part with basic infrastructure amenities, social life leading to the areas more densely populated.

In the second question the respondent was asked to define his own view of road transport. The interviewee describes road transport as the movement of goods and services by trucks from one location to the other. Furthermore, to the question on the advantages and disadvantages of road transport compared to other forms of transport the interviewee states the same answer which was also compared with the literature review (chapter 3.1) and also the main challenges of road transport in Finland (chapter 4).

6.4 Future implements of infrastructure for an eco friendly environment

Community structures are in the most important position to reduce transport emissions by practical measures. Compared to densely populated areas emissions per person can be up to three times higher in rural areas. Emissions can be reduced significantly by developing community structures. Towns should have a densely built centre as well as local shops and services. Large shopping centres which are erected out of the town should be rejected, as people travel to them by car, causing large amounts of emissions. Residential areas can be situated in the centre and satellite communities which have local services and good public transport links to the city centre. A good walking and cycling network is an important Infrastructure to be included in the master plan for a climate friendly urban structures in a community. (Climate guide 2012.)

6.5 Role of technology on road transport

The transportation systems around which the modern world only has been built are on the verge of a significant transformation by playing a significant role in the transport of the future by reducing carbon emissions, preventing road accidents, reducing cost and improve performance, and exchange of communication.

Intelligent transport has a key role of technology towards providing a safe driving and traffic management by creating a medium for self driving cars, autonomous and connected vehicles, driving data. These are new transportation technologies emerging to meet transportation challenges. New technology for road transportation will change how vehicles, trucks, cars operate by providing information and capabilities for better real time traffic management. (Government technology 2018.)

6.6 Climatic challenges of road transport

The climatic condition of Finland is affected by its position on the latitude. Finland is a cold country during the winter period, the country has 4 months or more of winter season, with weather condition as low as -27 degrees centigrade which has adverse effect on road during this period, roads are slippery. Extreme caution has to be applied when driving in order to avoid accidents.

6.7 Environmental challenges of road transport

As overall global freight increases, CO₂ emissions also increases due to the fact that road transport is a major user of energy. This creates air pollution including nitrous oxide and particulates and is significant contributor to global warming though emission of carbon dioxide.

The green house gases (GHG) is causing the atmosphere to warm, resulting in changes of the atmosphere.

6.8 Intelligent transport system

Intelligent transport system is a technical solution which aims at informing the drivers with up to date information concerning the weather condition and the best route for the distribution of goods and services.

Ahola Transport Oy as developed the information system used by the company for a span of years, the information systems which are attracts online erp system and attracts optimizer. The information system is designed to plan, manage and control the distribution of goods and services in a cost efficient and environmental friendly manner.

6.9 Government policy towards transportation

The Finnish government policy in Finland in the year 2012 - 2022 focuses on three focal points of transportation policy: the diminishment of poverty, inequality and social exclusion, merging of government funded finances and enhancing sustainable economic growth, employment and competitiveness. The Finnish transport policy attempts to advance Finnish transport markets and develop the infrastructure. (Transport policy Finland 2014.)

6.10 Government solutions towards road transport challenges

Finnish government has set up a master plan towards providing solutions to transportation challenges by shifting from new investment towards maintenance of existing transport network, such as determined action to develop public transport, environmental friendly transport (Liikenne ja viestintäministeriö 2012.)

6.11 Determined action to develop public transport

The popularity of public transport can be increased if large cities take action to invest in it. The government is committed to support light rail projects in Turku and Tampere by contributing with a 30% funding share. Cost savings can be achieved by combining transport services falling under different administrative branches, such as school transport services in the social and health sector and transport organised by the Finnish social insurance institution an action to safeguard future transport services. (Liikenne ja viestintäministeriö 2012.)

6.12 Environmental friendly transport

Finnish government has also established an annual emissions limit for organisations operating under it in order to guide vehicle procurement and transport arrangements. The state is also willing to promote the development of low carbon vehicle technologies through taxation measures. Taxation and charging policy together with new ways of transport pricing will help guide the sector towards increasingly sustainable solutions. (Liikenne ja viestintäministeriö 2012.)

6.13 Future of road transport in Finland

The future of road transport in Finland is through intelligent transport system. ITS technology enables the transport sector to provide essential tools for new transport policy through achieving its aims and objectives. The Finnish transport system should achieve the following objectives by 2020. Intelligent transport systems will save more lives, green house gas emissions caused by transport will have been reduced significantly, public transport, cyclists and pedestrians will make up a 20% larger share of all

trips than they do now, Finland will be a major hub centre and export of intelligent transport services to other countries, provision of up to date travel information to customers (TRIMIS 2010.)

7 CONCLUSION

Road transport is the most used form of transportation in Finland in the movement of goods, people and services from one location to the other. Finnish road transport is facing challenges due to Finland's sparse population and its climatic conditions.

There are also other challenges which pose a threat to the movement of people goods and services in Finland such as environmental challenges, strict EU laws on carbon emission, and the proposed intelligent transport system.

The thesis research on the challenges of road transport in Finland has been able to identify the critical challenges which the road transport system faces due to the stated reasons which has been highlighted and stated, and also been confirmed from the interviewee also stating this challenges, furthermore he concluded that challenges of road transport can't be totally eradicated but it can be reduced to the barest minimum by introducing the intelligent transport system and other advanced technologies into road transport such as the proposed electric cars that doesn't need bio fuel to power the engine due to CO₂ emission which causes the depletion of the ozone layer which later results to environmental and climatic challenges.

The intelligent transport system will be implemented for future use by reducing road transport challenges which are currently intercepting and causing delays in the delivery of goods and services. There are also proposals in having bigger trucks with increment in the sizes, the current size of trucks used is 25.25 m.

Still on intelligent transport system which is the future of transport trucks, cars will be powered by electricity with the latest advanced technology such as laser scanners, weather detector which prevents cars from road accidents.

REFERENCES

- Ahola Transport. 2017. About Ahola transport Oy. Available: <http://www.aholatransport.com/en/about-us/company.html>. Accessed 18 December 2017.
- Ahola Transport. 2017. Available: <http://www.aholatransport.com/en/services/it-and-logistics-services.html>. Accessed 18 February 2017.
- Autoalan tiedotuskeskus. 2013. Finnish road network and its uses. Available: http://www.aut.fi/en/road_transport/road_transport_in_finland. Accessed 19 February 2018.
- Chopra, S & Meindl, P. 2007, Supply chain management strategy planning, operation 3rd edition. New Jersey (USA); Prentice Hall April 7, 2016. 385, 392-393.
- Climate guide. 2009. Available: https://ilmasto-opas.fi/en/ilmastonmuutos/vaikutukset/-/artikkeli/11c9a295-4934-492b-afad-33ad270c75ad/maantieliikenne.html#ref_MGL05. Accessed 18 December 2017.
- Climate guide. 2009. Climate change poses challenges for road transport. Available: <https://ilmasto-opas.fi/en/ilmastonmuutos/vaikutukset/-/artikkeli/11c9a295-4934-492b-afad-33ad270c75ad/maantieliikenne.html>. Accessed 18 February 2018.
- Climate guide. 2012. Available: <https://ilmasto-opas.fi/en/ilmastonmuutos/hillinta/-/artikkeli/cd3c06f0-ddc2-4984-840f-c35a98daf01e/liikkuminen-ja-yhdyskuntarakenne.html>. Accessed 18 December 2017.
- Economic times road transport. 2017. Available: <https://economictimes.indiatimes.com/definition/road-transport>. Accessed 18 December 2017.
- European environment agency 2014, Adaptation to climate change 2014 in Europe. Challenges and options across transport modes and stakeholders, 12-13. Available: <file:///C:/Users/adeca/Downloads/08%202014%20Adaptation%20of%20transport%20to%20climate%20change.pdf>. Accessed 18 February 2018.
- European commission mobility and transport. 2017. Traffic & transportation management. Available https://ec.europa.eu/transport/themes/its_en. Accessed 18 February 2018.
- European commission mobility and transport. 2017. Available https://ec.europa.eu/transport/themes/its/road/application_areas/traffic_management_en. Accessed 18 December 2017.
- European transport policy. 2017. Available: <https://www.transportenvironment.org/what-we-do/eu-transport-policy>. Accessed 18 December 2017.
- European commission. 2018. Proposal for post 2020 CO₂ targets for cars and vans. Available: https://ec.europa.eu/clima/policies/transport/vehicles/proposal_en. Available 18 February 2018.

Finnish transport agency. 2015, Finnish road statistics 2014. Statistics Finnish transport agency 7/2015. Available: https://www.liikennevirasto.fi/julkaisut/pdf8/lti_2015-07_tietilasto_2014_web.pdf. Accessed 18 December 2017.

Finnish transport agency. 2017. Available: Road maintenance. Available: <https://www.liikennevirasto.fi/web/en/road-network/maintenance>. Accessed 18 December 2017.

Finnish transport agency. 2017. Available: Road network. Available: <https://www.liikennevirasto.fi/web/en/road-network#.WikncEqnHIU>. Accessed 18 December 2017.

Finnish transport agency. 2017. Road safety. Available: <https://www.liikennevirasto.fi/web/en/road-network/safety#.WikoGkqnHIU>. Accessed 18 December 2017.

Government technology. 2018. Available: <http://www.govtech.com/transportation/How-Transportation-Technologies-Will-Change-Everything-.html>. Accessed 17 February 2017.

Guardian. 2011. Available: which nation are mostly responsible for climate change <https://www.theguardian.com/environment/2011/apr/21/countries-responsible-climate-change>. Accessed 18 December 2017.

Hamilton, C. 2002. Determinants of emissions growth in OECD countries energy policy. Available: http://www.academia.edu/7943776/Determinants_of_emissions_growth_in_OECD_countries. Accessed 18 February 2018.

Jeunemaitre & Johnson, 2010, Future Directions for Contingency Planning in European Air Traffic Management. Available: A response to the April 2010 Eyjafjallajökull Volcano Eruption, SESAR Scientific. Available: <http://www.dcs.gla.ac.uk/~johnson/papers/SESAR/Ash.pdf>. Accessed 8 December 2017.

Liikenne ja viestintä ministeriö. 2012.

Available: <https://www.lvm.fi/-/finland-s-transport-policy-lines-for-the-future-set-out-789463>. Accessed 18 February 2018.

Liikenne ja viestintä ministeriö. 2012. Environmental friendly transport. Available: <http://valtioneuvosto.fi/en/about-the-site>. Accessed 18 February 2018.

Liikennevirasto 2014. Finnish transport agency, E8- Aurora, the Arctic intelligent transport test ecosystem. Available: <https://www.liikennevirasto.fi/web/en/e8-aurora#.WikviEqnHIU>. Accessed 18 December 2017.

Liikennevirasto, 2017. Finnish transport agency infrastructure 2018. Intelligent transport. Available: <https://www.liikennevirasto.fi/web/en/e8-aurora/test-ecosystem/instrumentation-and-services#.Wm4bVainHIU>. Accessed 18 February 2018.

National aeronautics and space agency. NASA 2011. What is climate change, Available: <https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-climate-change-58.html?>. Accessed 18 February 2018.

Next generation library. 2017. Available:

<http://www.yourarticlelibrary.com/geography/transportation/advantages-and-disadvantages-of-road-transport/42135>. Accessed 18 February 2018.

Niinistö, V. 2014, Finland creating a low carbon country. Available:

http://www.climateactionprogramme.org/climate-leader-papers/finland_creating_a_low_carbon_country. Accessed 18 February 2018.

Peltola, H. & Luoma, J. 2016. Road accidents in Finland and Sweden a comparison of associated factors, Available:

https://www.trafi.fi/filebank/a/1453805909/bf0e9e4f3f9492480bc0b561d4d99217/19608-Trafin_tutkimuksia_2-2016_-_FINENS_report_20_01_2016.pdf. Accessed 18 February 2018.

Schwaab, J.A & Thielmaan, S. 2001. Economic Instruments for sustainable road transport an over, 16.

Available: <https://www.scribd.com/document/8069837/Economic-Instruments-for-Sustainable-Road-Transport-an-Over>. Accessed 18 February 2018.

Stock, J. & Lambert, D. 2001. Strategic management 2001. Fourth edition. Boston (USA); Mc Graw-Hill / Irwin 2001. 321-326, 327, 328.

The Finnish transport policy challenges and guidelines. 2007. Major challenges- new direction. Available.

https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/78432/finnish_transport_policy_challenges_and_guidelines.pdf?sequence=1&isAllowed=y. Accessed 18 February 2018.

TRIMIS; 2010. Transport research and innovation monitoring and information system. Available

<https://trimis.ec.europa.eu/project/finland%E2%80%99s-strategy-intelligent-transport>. Accessed 18 February 2018.

Vaddadi, B. 2017, Factors to consider when choosing mode of transport. Available:

<https://planningtank.com/transportation/factors-to-consider-when-choosing-mode-of-transport>. Accessed 18 February 2018.

Webster. 2018. Available: Definition of transport; <https://www.merriam-webster.com/dictionary/transportation>. Accessed 18 February 2018.

Your article library 2017, Advantages and disadvantages of road transport. Available:

<http://www.yourarticlelibrary.com/geography/transportation/advantages-and-disadvantages-of-road-transport/42135>. Accessed 17 February 2018.

Interview questions

1. Could you please tell us about yourself? your position in this company and how long you have worked for this company
2. What do you understand by road transport
3. What are the advantages of road transport and disadvantages of road transport compared to other forms of transport
4. What are the current challenges of road transport
5. What are government solutions or collective solution towards this problem
6. What are government policy towards road transportation in Finland
7. What are the future implements on the rate of urbanization as it affects road transportation in Finland?
8. What's the future of road transportation in Finland as population increases in Finland
9. What do you think can be done in total eradication of this challenges of road transport in Finland?
10. What are the roles of technology in future of road transport?