Truck driver shortage in EU and a possible solution

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Abstract:

Trucker driver shortage is a big issue in Europe. The purpose of this study was to find what are the reasons behind truck driver shortage and to find a solution by benchmarking American licensing system on European licensing system. This thesis does not cover solutions other than the one through licensing system and the old, uncommon, or historic reasons behind shortage. Only common reasons along with COVID and Ukraine crises are discussed. The theory is made up of 5 things, modes of transportation and their role, key legislations, different organizations involved in representation of the industry at global and European scale and the key elements of truck driver's life. The method of qualitative documentary research was used by taking 40 sources ranging from documents to videos and webpages. The results from the research show that the reasons behind shortage are minimum age being high, image of the industry, lower number of female drivers, lack of facilities for the truck drivers, lack of skilled drivers, ageing and COVID 19 and Ukraine crisis denting the workforce where already working people have left the workforce. These issues were divided into common, worsening, long standing and the ones related to pandemic and Ukraine crisis. For the second question Pestle analysis of European and American heavy licensing systems was conducted and 4 key areas were selected for benchmarking, streamlining the system, providing job placement and financial assistance, easing requirements of language and image building of the profession.

Key words:

trucker, drivers, shortage, licensing, reasons, solutions, benchmarking

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1. Introduction

The economic growth in every sector has led to increased reliance on road transport. Road haulage is a part of every supply chain and is used independently and in combination with other modes of transportation (Ji-Hyland & Allen, 2022). Businesses and other organizations are greatly reliant on road transport, so much so that it is viewed as an extended part of the assembly line (Ji-Hyland & Allen, 2022). In Finland alone 90% of goods are transported by road which is a huge ratio compared to other modes of transportation (Logistiikan Maailma, n.d). In the European union (EU) around 77% of inland transport of goods was carried out by road, which is three quarters of all inland transport in EU (Eurostat, 2022).

The road transport industry is increasingly reliant on professional heavy vehicle drivers to operate vehicles to transport goods from one place to another, despite the technological advancements are considered the backbone of cargo (González, 2022). President Joe Biden when he was speaking to American trucker in white house said "All of you here today are people our economy should be built around, because you all are the people who literally make it run. I have nothing against investment bankers. They could all retire and nothing much would change. Y'all quit? Everything comes to a halt" (Schulz, 2022). In Europe, International Road transport union has proposed changes into licensing laws to lower the age limit for heavy vehicles drivers to 18 years to make it possible to fill the vacant positions in bus operations (International Road Transport Union [IRU], 2020).

1.1 Problem statement

Shortage of professional truck drivers is a long-standing issue within the transportation industry. Analysts say that this problem has been persistent since the early 2000s. (Dempsey et al., 2021). According to a survey conducted by international road Transport Union (IRU) just last year there were more than 400,000 Truck driver positions were vacant in Europe and the shortage is projected to worsen in coming years (International Road Transport Union [IRU], 2022b).

1.2 Research aim

The aim of this study is to find reasons behind truck driver shortage in Europe and to find a solution by benchmarking American licensing system. Although it is a major issue, there is very little academic work done in terms of books, thesis, dissertations, or academic research. Previous studies are generally limited to scholarly articles, statistical surveys, and newspaper blogs.

There are mainly two research questions. Firstly, what are the reason behind transport vehicle operator shortage of Europe in 2023 and secondly, to benchmark the American licensing and the Finnish/European licensing system to find suggestions (or opportunities) for improvements to attract new talent.

1.3 Demarcation

It is important to note that this dissertation, when it comes to reasons behind the shortage of truck drivers, only discusses highly relevant long going reason and the exploration is not made deeply into the past. Focus is on the recent years by bringing into light the effects of recent geopolitical events such as the COVID-19 pandemic and the Russian invasion of Ukraine, consequences of whom are economic recessions and hike in fuel prices etc. Moreover, this research does not cover in detail trucking industry i.e., nature of work wages and goods transportation in United states of America or places other than Europe. Moreover, solutions to trucker shortage, other than the licensing system i.e., information technology (IT) based solutions etc. are not researched about and in the possible solution.

2. Theory

This chapter is a build-up of the theoretical framework of this study. All critical factors and theories deducted from previous research done around the topic of truck driver shortage in Europe are discussed under this heading. Topics like the modes of transportation and their significance in logistics, the legislative and legal factors in road transport around Europe and

major organizations involved and the role they play in international trade and commerce and those working within European Union and finally the employment in logistics sector and the thing that are attached with it.

2.1 Role of modes of transportation

Transportation plays a unifying role at every step of the supply chain (Tseng et al., 2005). From when the raw material is extracted or grown, it gets transported to processing plants, then to factories, and finally, finished goods are delivered to customers and even after in reverse logistics. There is a lot of planning that goes into this process to make it cost-efficient.

In the traditional sense production, storage, transportation, wholesale, and retail are looked at as separate entities in the world of commerce however if we look closely, they are basically all doing transportation of goods and services and work in close coordination (Tseng et al., 2005). Manufacturers need transport for assembly and maintenance of plants as well as the safekeeping of processed goods which they do not keep at site and usually transport to warehouses. Warehouses use their own type of transportation and finally, wholesalers and retailers finally deliver to the customer. In today's market the manufacturers have sole focus on production, and they leave marketing and distribution to other firms. The warehouse service providers are no longer single-user service providers, but they work in coordination providing consolidation services and act as a go-through channel, hence the concept of distribution centers. The developments in these systems reflect the importance of robust transportation systems (Tseng et al., 2005).

2.1.1 Modes of transportation

There are three major modes of transportation; water, land, and air and these can be broken down into five or more, where water transport can be divided into sea and inland water transport, and land can be divided into rail, road, and pipelines. Only the major modes with the most impact on an international scale are discussed below.

2.1.2 Sea Freight

Sea transport or maritime transport is one of the most important modes of transportation in international trade and logistics. It has a crucial role in the lifeline goods such as crude oil and grain as it provides the cheapest and the highest capacity for consumers. The maritime industry can be divided into three main types: (1) liner shipping: This line of shipping is a regular route, schedules, and voyages. (2) Tramp Shipping: This line of shipping is based on irregular work schedules, voyages, and routes and it is mostly used to carry cargo in dry bulk and crude oil. (3) Industry shipping: To maintain the constant supply of raw materials and requires special kind of containers and ships (Tseng et al., 2005).

2.1.3 Air Freight

Air Freight is the fastest mode of transportation and is crucial in the completion and availability of supply lines and services. Air cargo is a faster, safer, more convenient, more flexible, and more frequent way to send goods from one place to another. Air transport is a choice for moving goods when time is of the essence and faster delivery of products is a requirement. Like other modes of transport, the trends in air transport are changing which means more cooperation and the use of an aircraft in combination with other modes throughout the supply chain is seen to keep up with today's fast and door-to-door delivery world (Tseng et al., 2005).

2.1.4 Land Transport

Land transport often works as a glue that binds together different logistics operations. It's the most accessible form of transport and it often acts as an extension to other modes of transportation like air and sea in the completion of delivery service (Tseng et al., 2005). The main forms of land transportation are road, rail, and pipeline (Tseng et al., 2005). Railroad transport is an important mode on land as it offers higher capacity and lower energy consumption but requires complex infrastructure development and maintenance. Similarly, Pipelines offer faster, continues flow of raw material such as natural gas and oil but the cost to build and maintain them is very high. On the contrary, Road transport offers movement of

goods at a cheaper cost with more flexibility in types of goods transported as well as the vehicles used for transport (Tseng et al., 2005). But it is highly dependent on the human factor which is the availability and training of truck drivers and provides very little in terms of safety.

2.2 Legislations

In Legislations, the important points of legal relevance in international road transport in the light of the United Nations agreements are discussed as well as the Agreements signed and laws in force within the European Union (EU) and European economic area (EEA) are also discussed.

2.2.1 United Nations road safety conventions

United nations road safety conventions contain a legal framework on which legislations can be made in all member countries to avoid accidents, injuries, and loss of life (United Nations Road Safety Conventions, n.d.). These conventions are considered to be a political willingness to initiate changes and programs for developments in legislations safety infrastructure, programs and strategies for promotion of safe transportation at national level in member countries. There are 59 conventions in total, of which seven are considered to be most important, and are discussed below (The United Nations Economic Commission for Europe [UNECE], 2020).

1968 convention on road traffic concerns the bases of all regulations on every aspect of road safety and traffic. It is a guideline for member countries based on which legislation can be done on a national level. The reason for this convention was to provide a foundation for behavior of drivers and pedestrians to encourage a culture of safety in member nations. (The United Nations Economic Commission for Europe [UNECE], 2020)

1968 convention on road signs and signals provides guidelines on road signs, traffic signals and road markings in member countries. It provides a guideline for markings, shapes, and sizes and divides road signs into three categories i.e., warning, informative and regulatory signs. All in all, there are 250 different road signs commonly agreed in this convention. (The United Nations Economic Commission for Europe [UNECE], 2020)

Under the 1958 agreement, harmony in terms of technical rules concerning vehicles, safety equipment and parts used on wheeled vehicles. There are in total 140 regulations that concern safety equipment i.e., safety belts, helmets, brakes, tires etc. Under 1958 agreement, all parts and protective gear needs to be tested on very high-quality standard and the equipment that passes such rigorous testing can qualify to receive the special E. Marking and this marking is received as a symbol of high quality and standard in many industries that produces these goods and equipment related to wheeled vehicles. (The United Nations Economic Commission for Europe [UNECE], 2020)

An agreement was signed and adopted in 1997 to pave way for uniformity in requirements for technical inspections of wheeled vehicles. This agreement pushes for legislation towards such similarities in inspections across member countries, that it is possible to use the documentation of inspection in cross bordar use of wheeled vehicles whereby one member country accepts and recognizes the inspection conducted in another member country making transportation easier when crossing land borders. On top of that, the agreement provides guidelines for environmental compliance and safety throughout the life of a motor vehicle. (The United Nations Economic Commission for Europe [UNECE], 2020)

Under the 1998 agreement, the guidelines providing legal framework for establishment for uniform technical regulations for wheeled vehicles concerning parts, equipment and technology were revisited. This was done to achieve compliance with newer safety and environmental standards. The rapid advancement in vehicle manufacturing technology also required a new and evolving approach to keep up with the rules and regulations with this

change. New safety technologies like electronic stability control, protection measures in case of side impact and emission testing are part of this agreement. (The United Nations Economic Commission for Europe [UNECE], 2020)

1957 agreement deals with the international transport of hazardous goods by road. Every two years the agreement is updated due to the nature of goods and regulations dealt with under this agreement. This agreement outlines extremely high standards of safety to be observed by all parties involved in transport of dangerous goods and laws for the conduct of authorities in the countries and regions these goods are transported to, from and through. This agreement includes the guidelines for cost and safety benefits, definition of hazardous goods, conditions for transport, operational requirements like training of drivers, certification, vehicle inspections and designs of vehicles. There is a huge emphasis on vehicle safety, frequent and rigorous inspections, highly trained drivers and operators, and a safe environment to operate. This agreement also pushes for an efficient communication channel to be established with first responders to ensure the safer roads for both transporters and other road users. (The United Nations Economic Commission for Europe [UNECE], 2020)

Lastly, in 1970 a European agreement for regulation for drivers involved in transport of goods across international borders was concluded. According to this agreement the working hours of drivers were regulated to specify driving and resting time for professional drivers. It provides instructions on hour calculation devices and rules on how these devices should be designed, installed, and checked. This agreement urges law enforcement agencies to inspect the working hours of drivers to make sure safety on the roads is ensured and accidents due to over driving are prevented. On top of that, fixed working and rest times pave the way for fair competition in the transportation sector. (The United Nations Economic Commission for Europe [UNECE], 2020)

2.2.2 European Union Mobility Package I

European union mobility package is new set of rules and regulation that apply to transportation sector as of 2020. The legislation package presents new rules concerning different aspects regarding the working condition of truck drivers and the road transport sector within the EU. This initiative was introduced to create harmony and bring fair work and wage practices for drivers doing transport work within the EU, outside the borders of the country their firm is established in. These rules specifically concern posting rules which are when a driver performs transport operation outside the country of origin of the company they work for, under certain conditions. Package also includes rules regarding cabotage (performing loading and unloading operation in such a way that both operations are done outside the country of origin of firm performing these operations). The rules also include new conditions for the return of transport vehicles to the country where transport firms are established. Lasty, there are new conditions on recording of border crossing in tachographs and also the rules regarding rest and working times and leaves are updated. (European Commission, n.d.)

An employee is considered posted if he or she is sent by the company to provide services outside the EU country where his firm is established, to another EU country in which case that employee gets wages or salary and some other rights according to the laws of the host country. Now as per EU rules there are two amendments in cross-trade where driver performs transport operation between two countries other than the country his transport company is established and in cabotage (explained in the next paragraph) is to be considered as posted. Transit where no loading or unloading is performed and bilateral trade where operations are conducted between the origin country and another EU country are exempt from posting rules. (European Union [EU], n.d.-b)

Cabotage is where multiple loading and unloading operations are conducted within a country different from the origin country of the operator. Additional rules apply to cabotage operation in which any transport company performing operation can only do three operations in seven

days and after which they will have to take a four day cool off period in which they have to leave the country in which they were performing cabotage operations. Only leaving the country where cabotage operations are performed and immediately returning is now considered illegal to avoid systemic cabotage operation. (European Union [EU], n.d.-d)

Under the return of vehicle act, the transport companies must have their vehicles returned to the country in which the company is established every eight weeks. This law is put in place to avoid the so-called mailbox companies (companies only having a mailing address in one EU country but running all operation in another to avoid regulations and trick the system). (European Union [EU], n.d.-d)

It is recommended in the legislation that the work of a driver involved in transport in the EU region outside his country of origin is arranged in such a way that the driver can return to his or her home at the time when they start their regular weekly rest-time of more than 45 hours. Drivers can take two reduced weekly holidays of less than 45 hours followed by two regular weekly holidays within the period of 4 weeks. A weekly rest period of more than 45 hours cannot be taken in the vehicle and appropriate accommodation needs to be arranged for the driver and paid for by the transport company. Long ferry and train rides can be used for a full weekly rest period only if proper services for accommodation other than the truck itself are provided. The daily driving limit can be extended from a normal eight hours by adding 1 or 2 hours extra if the driver is returning home only if the driver wants to but cannot be pre-planned into the work schedule. (European Union [EU], n.d.-c)

Tachographs are devices used to record bordar crossings, driving time and rest periods on road vehicles involved in transportation across national borders. Under new rules all drivers operating vehicles equipped with digital or manual tachographs are required to record in tachographs when crossing borders between EU countries. It is also made obligatory that all new vehicles entering service after august 2023 must be equipped with new smart digital tachographs that automatically record border crossing and all vehicles currently in service

equipped with digital or manual tachographs will be have to be fitted with smart tachographs by December 2024 and finally by August 2025 all vehicles above 2.5 tons of dry weight involved in transport across national borders within EU will have to be equipped with smart tachographs as these vehicles currently operate without tachographs of any sort. (European Union [EU], n.d.-a)

2.3 Organizations

Different organizations involved in international trade are discussed below.

2.3.1 International Road Transport Union (IRU)

International road transport union (IRU) is a global transport organization which represents the entirety of global transportation industry which includes all players transporting goods and passengers on land. The members include players from cargo industry hauling heavy loads by roads to bus services and even taxi companies. It plays three major roles in the transportation sector. Firstly, IRU works as a representation of transport sector in negotiations on global scale for legislations and dialog for the development and support of road transportation industry. Secondly, they help facilitate trade activities by introducing and advocating for systems like TIR (Transports Internationaux Routiers) which allow quick movement of goods through borders. Thirdly, the organization helps the private sector to improve by introducing and providing guidance and training for high standards and awarding companies for keeping up with those standards. In the following paragraphs the author tried to explain IRUs role in global transportation development in historic light to explain the key initiatives taken in different periods of its history, that still hold their relevance in the modern times. (International Road Transport organization [IRU], 2023)

IRU was established in the late 1940s for the support of the transportation sector in war-torn Europe when national transport organizations from eight European countries joined hands to form this union. IRUs earliest contribution to the transport sector was the introduction of TIR system through the first TIR convention in 1949 between a small number of European

countries at the United Nations table under United nations economic commission for Europe (UNESC) to facilitate the flow of goods transport through unstable borders in post- second world war Europe. This convention was later revised multiple times to include more regions and sectors due to the success of the TIR system. (International Road Transport Union [IRU], n.d.-a)

Through the 1950s IRU initiated and facilitated the negotiations for key future legislation and initiatives which helped change the rules in the transport sector for decades to come. To complement TIR system, The convention on contract of international carriage of goods by road (CMR) was signed which clarified the liabilities of all private parties involved in transport of goods. Now CMR and TIR are the most widely used documents in international goods movement by road. Subsequently, through the 1960s IRU adopted standards for professionalism and safety, and it started to recognize the maintenance of standards by its members and introduced two different awards. (International Road Transport Union [IRU], n.d.-a)

The decade of 1970s saw a change in the transport market where shipping containers were introduced and standardized which required new policies and systems to be implemented in the road transport sector. IRU helped renegotiate TIR convention in 1975 which was designed in a way that TIR becomes the best tool in intermodal transport. TIR was redesigned in such a way that it allowed for internode transport effective with one leg of transport of goods carried by road. In 1980s due to the permanent headquarters of IRU in Brussels, the organization was able to play a major role in EU wide legislation and help represent road transport sector in building legal framework for single market policy, equal opportunities, and legislations for uniform laws regarding working and rest times for drivers within EU. IRU's role in Europe is expanded even more after issues like Brexit and Mobility Package. (International Road Transport Union [IRU], n.d.-a)

In the 1990s IRU became the first transport organization to recognize UN sustainable development plans and later adopted the so called 30 by 30 resolution which visioned to cut 30 percent of co2 emissions by 2030. IRU runs different training programs that help the players in the sector to understand their responsibilities for the environment. From the start of the new century IRU started the expansion eastwards with initiative like Silk Road foundation and new Eurasian land transport initiative (NELTI) in Asia. This was done to facilitate the reach of goods from Asian markets to Europe and vice versa with ease. China also joined TIR due to its relevance with China's one belt one road program. Later in 2010 and onward till now new digital changes were made at IRU due to the need of the time. TIR and CMR are being digitalized with TIR have full digital capabilities and e-CMR resolution adopted by UN and implemented in transportation. The use of TIR in Asia is also increasing because India and Pakistan along with China are among the recent countries to join TIR network and they represent 40% of the global population. (International Road Transport Union [IRU], n.d.-a)

2.3.2 European Road Hauliers Association (UETR)

European road hauliers' association is a trade association established in 1998 and it's headquartered in Brussels. The organization has 200,000 members in 25 European countries. UETR is the representative of the interests of national road hauliers' associations in Europe. The focus of this organization is to protect the interests of the transport industry within the EU. It pushes for favorable legislation for regulations in the transport sector at the European Union level to promote fair and level playing field for all operators. The other obligations of UETR include support services for its members by running training programs, providing information, and aiding in networking and negotiations. (European Road Hauliers Association [UETR], n.d.)

The most important issue for UETR is truck drivers. UETR supports and focuses on improvement in working conditions of road haulage drivers. The work includes initiatives to push for better wages, reasonable working hours and a safe working environment for commercial drivers. UETR also works for the promotion of environmentally sustainable

working practices in the transport industry. It calls for intermodal transport solutions to avoid empty running (running without load) and calls for EU policies to support green deal and smart mobility strategies. (European Road Hauliers Association [UETR], n.d.)

To achieve the above-mentioned objectives, UETR engages in lobbying efforts and works with policy makers and stakeholders for key objectives. It also engages in dialogue and cooperation with stakeholders and organizations from other industries to achieve common agreement on key issues to ensure best practices in road transport. (European Road Hauliers Association [UETR], n.d.)

2.4 Employment as a truck driver

Shortage of workers has been a long-standing issue within the EU and outside; businesses struggle to find workers and staff and keep them employed. Many possible reasons and solutions have been given in this regard but the part with least studies is the human aspect of this shortage i.e., what are the reasons for choosing this line of work, culture within the industry, lifestyle and why people drive away from this line of work (Ji-Hyland & Allen, 2022). The area in this line of work most affected by the shortage of staff is that of truck drivers. Below are some points regarding employment conditions of truck drivers.

2.4.1 Working environment

The main reason for people selecting this line of work is autonomy and freedom (Ji-Hyland & Allen, 2022). However, that part of the job has pretty much faded away because of e-commerce and the shift towards fast delivery. These days in most places the drivers work overtime to meet the schedules of delivery which makes their job hectic. On top of that, drivers face a lot of challenges related to the environment they perform their jobs in. These challenges can come in the form of navigation, routes, traffic, and delivery locations (Reiman, 2020). Specially in the northern hemisphere where mercury falls below zero, the weather can multiply challenges of a trucker where he or she as to perform multiples tasks outside the cabin of the truck in cold weather and at the same time inside the truck in warm

environments (Reiman, 2020). Added to that, these days traffic is increasing on the roads which makes it challenging for drivers to navigate safely to loading and unloading locations while they are handling big rigs.

2.4.2 Being away and health concerns

Being away from home is a very much dominant aspect of this line of work, as drivers travel long distances and spend most of their time on the road and not with their families. This decreases the turnover of young workforce in the industry (Ji-Hyland & Allen, 2022). Drivers who frequently do long distance hauling face a lot of problems with regards to their families and being away from family increases loneliness, lack of communication and time spent with family, absence from important life events and at the same time put more strain on a parent back home if the driver has children (Johnson & Martin, 2001).

Moreover, the heath of the truck drivers gets severely affected due to the lifestyle practiced in this line of work as they have inadequate quality rest-time, unhealthy eating habits, noisy and uncomfortable work environments which all leads to many of them developing chronic health problems including heart diseases, sinus problems, indigestions, hypertension, and sleep deprivation (Crizzle et al., 2018). Long-time truckers start to develop concentration problems due to the deterioration in their metal compatibilities which is due to the natural process of ageing which makes a driving truck harder because it requires a lot of concentration (Sousa & Ramos, 2018).

2.4.3 Male dominated Industry.

The total representation of women among truck driver is negligible as compared their male counterparts. As the industry struggles to find drivers, it totally failed to achieve its goals of attracting women. This trend is similar across the world with China and USA doing slightly better than other countries at 5% and 8% of their heavy transport vehicles operator positions filled by women. The hole continent of Europe having 3.2 of its truck drivers consist of women which combined with bus driver goes up to 12%. Security concerns, treatment of

driver at loading and unloading locations and poor infrastructure to accommodate women in this line of work is the reason these low numbers of females in this line of work. Moreover, the perception of this job and being away from home are also major contributing factors. (International Road Transport Union [IRU], 2022a)

3. Method

This chapter specifies the methodology to collect and analyze data for this study. Since the topic of this thesis and research questions focus on finding the reasons behind truck driver shortage in Europe and finding solutions for this problem by benchmarking American licensing system, the most logical stream to choose was automatically a qualitative one. However, the problem was to find a way to collect the qualitative data, the topic indeed is the most talked about and relevant in European transportation and logistics sector, but it is studied more in the North America as compared to Europe.

Added to that, there was a fear that talking directly to people in the industry might open the door for more personalized opinions which might steer the conversation in a direction that is far away from the topic at hand. The issue at hand is greatly discussed in higher echelons of the European governments, trade unions and business sector and the documents from those meeting as well as official public documents regarding the issues within the industry are easily accessible.

Finally, the method of the so-called documentary analysis was chosen for this study which is done by using the repository of available documents, videos and audio archives of government agencies, public sectors, and international organizations, this is the data that is readily available on the internet due to digitalization of information. This data can be divided into two categories. (Saunders, 2019)

Textual documents are interactions between individuals or among organizations, such as email, letters, social media, and blog entries. Individual records include diaries, electronic calendars, and notes. Organizational documents include agendas and minutes of meetings, agreements, contracts, memos, personnel records, plans, policy statements, press releases, reports, and strategy statements. Government documents include publications, reports, and national statistics data sets and media documents include printed and online articles and other data. (Saunders, 2019)

Advertising posters, artifacts, audio recordings, audio-visual corporate communications, digital recordings, DVDs, films, pictures, goods, promotional advertisements and recordings, television and radio programs, and online images are examples of visual and audio documents. (Saunders, 2019)

3.1 Data sources

Due to the broadness of the topic, there was a need to expand the search for possible sources to answer the research questions more effectively. Consequently, it was not possible to get the answers from one web source, government website or an annual report of a private company. The author therefore selected multiple different streams of information; a list of those sources is given below.

3.1.1 List of sourced Items

A detailed list of all documents, reports, case studies, webpages and news channels selected for this study are presented below.

Table 1 List of sourced data

Name	Type	Author	Relevance
1. Driver Shortage European Report 2022	Document	IRU	Reasons for shortage of HGV driver shortage.
2. Driver Shortage Global Report 2022	Document	IRU	Reasons for shortage of HGV driver shortage on global level.
3. IRU vision and action plan on improving attractiveness of the driver's profession in the EU 2022	Document	IRU	Long term and short-term problems and solutions.
4. IRU Emergency Call – Supply Chain Disruptions 2021	Document	IRU	Policy document containing important issues of working condition and shortage.
5. Ten actions to remove key barriers to professional driver training and access to the profession and adapt the minimum age for professional drivers 2020	Document	IRU	Licensing system.
6. IRU Annual Report 2021	Document	IRU	Annual report has brief of what happened in the transport sector in that year.
7. IRU Annual Report 2020	Document	IRU	Annual report has brief of what happened in the transport sector in that year.

8. IRU Annual Report 2019	Document	IRU	Annual report has brief of what happened in the transport sector in that year.
9. Tackling Driver Shortage in Europe 2019	Document	IRU	Barriers and proposals.
10. The future of road transport 2018	Document	IRU	Analysis on future so what will happen in terms of shortage in the future.
11. Report: Managing the Transition to Driverless Road Freight Transport 2017	Document	IRU	Impact on jobs.
12. IRU intelligence briefing - Ease access and attract drivers to the profession - Full webinar replay 2022	Video	IRU	Discussion on issues relevant to first and second research questions.
13. *EUR-Lex - 32020L1057 - EN - EUR-Lex* 14. *EUR-Lex - 32020R1055 - EN - EUR-Lex* 15. *EUR-Lex - 32020R1054 - EN - EUR-Lex* 16. *EUR-Lex - 32014R0165 - EN - EUR-Lex*	Documents	European Union	Legal documents containing relevance for both research questions.
17. News Page	Press releases	UETR	Relevant News
18. News Page	Press releases	IRU	Relevant News
19. Professional drivers page	Webpage	Traficom	Instructions on obtaining driver license and more details relevant to second question

20. Licensing and testing information page	Web Page	Ajovarma	Relevance to both question
21. Working conditions, health, and retirement intentions: a case study of truck drivers 2018.	Case Study	Sousa, Inês C; Ramos, Sara / International Journal of Workplace Health Management; Bingley	Life of a truck driver. Relevant to first question.
22. Health and wellness of Canadian commercial motor vehicle drivers: Stakeholders perspectives for action 2018.	Case Study	Crizzle, Alexander; Larijani; Myers, Anita; McCrory, Cassondra; Thiffault, Pierre; Bigelow, Philip / International Journal of Workplace Health Management; Bingley	Relevant to question one because of heath research on truck drivers.
23. Work and family issues among over -the -road and local truck drivers 2001	Case Study	Johnson, Thomas M / Texas Woman's University	Relevant to question one because of important research on family life of truck driver.
24. Human factors and maintenance in delivery transportation: drivers' work outside the cab in focus 2021	Case Study	Reiman, Arto / Journal of Quality in Maintenance Engineering; Bradford	European study in Finland relevant to question one.
25. Rules for licensing	Webpage	Department of motor vehicles California	Needed in analysis for question two.
26. Rules for licensing	Webpage	Department of motor vehicles New York	Needed in analysis for question two.
27. Rules for licensing	Webpage	Department of motor vehicles Virginia	Needed in analysis for question two.
28. Why The Trucking Industry Is So Fragmented and Chaotic 2021	Video	CNBC / YouTube	Needed in analysis for question two.
29. How Truck Driving Became	Video	Insider New / YouTube	Needed in analysis for question two.

One of The Worst Jobs in The US 2022			
30. Politics around European road laws	Webpage	European Commission	Relevant to second question
31. EU's transport policy	Webpage	European Union	Relevant to second question
32. Legislations	Webpage	European Parliament	Relevant to second question
33. Environmental Initiatives and framework	Webpage	European Environmental Agency	Relevant to second question
34. Three Keys to zero emission road transport	Webpage	European Automobile manufacturers association	Relevant to second question
35. Safety framework of US heavy traffic	Webpage	Federal Motor Carrier Safety Administration	Relevant to second question
36. American Roads and transport system	Webpage	US department of transportation	Relevant to second question
37. Truckers' advocacy	Webpage	American trucking association	Relevant to second question
38. Environmental Initiative in America	Webpage	US environmental protection agency	Relevant to second question
39. Safety technicality in vehicle design	Webpage	National Highway Traffic Safety Administration	Relevant to second question
40. School transport affairs	Webpage	National Association of State Directors of Pupil Transportation Services	Relevant to second question

3.2 Data Analysis

The data used in this research is secondary data, so it requires an analysis accordingly. It is important that data selected for research have authenticity, which means the sourced document has no obvious errors or inconsistencies (Ahmed, 2010). Secondly, the sources have credibility, which for the author means established reliability in terms of finding sources which do not deliberately distort information and are not known to mislead the readers (Ahmed, 2010).Thirdly, the sources used are conducted with representative fact finding and

for this research a lot of documents come from internationally reputed organizations like the International Transport Union and other governmental bodies, so the representative part was strived for (Ahmed, 2010).

Lastly, the document must have meaning for the research that is being conducted and all the sources used are meaningful because they have up to date information that can be looked at in a different way other than their intended purpose for finding answers for the research question asked in this study (Ahmed, 2010). In this study the documents, reports, case studies, web pages and videos mentioned in Table 1 are diversified for covering a wide range of topics from well reputed institutions and researchers, around the research question asked by this study. The Author is confident that they fulfill all the criteria of the documentary research.

Because the data was not collected for the purpose of this research it was important to re-analyze the data from these sources using the research questions. So firstly, two Microsoft word documents were compiled because of the two research questions that need to be answered, what are the reasons behind truck driver shortage in Europe? And is there a possibility of a solution by bringing changes to the licensing system? Having these questions in mind all the sources were studied carefully and information relevant to the question was compiled separately. When sufficient data was collected, Excel tables were used again separately for both questions.

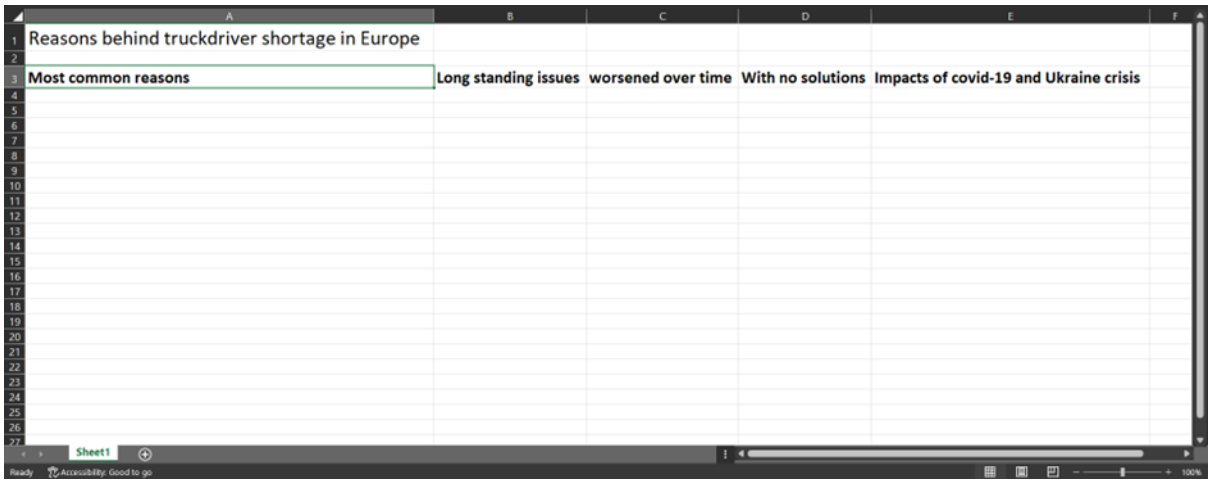

Figure 1 Coding scheme for research question 1

As seen in Figure 1, the coding scheme for analysis of research question one presented in excel.

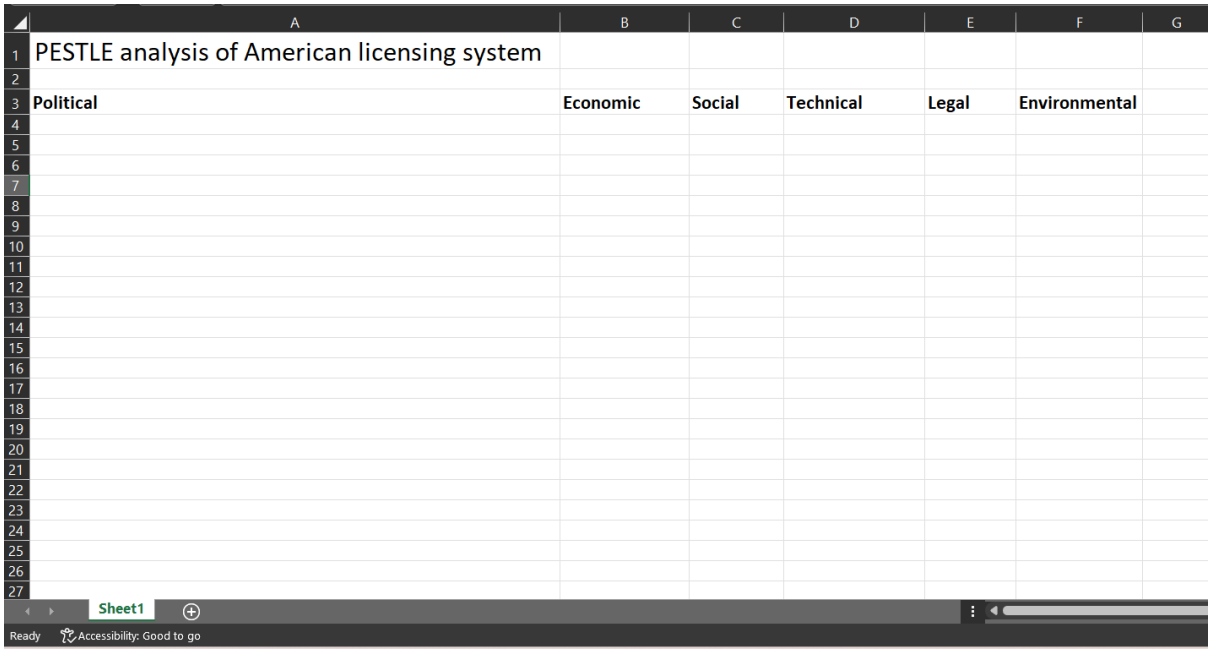

Figure 2 Coding scheme for research question 2

In Figure 2, the coding scheme for research question two is mentioned as the research question two is about benchmarking of American with Finnish/European licensing system to find solutions, the coding scheme is a very natural one for PESTLE analysis containing separations based on political, economic, social, technical and environment aspects of both licensing systems. PESTLE analysis is a strategic tool used to measure external factors that

cause an impact on organizations or businesses, this is one of the most comprehensive analyses of this sort in business studies covering all factors from political effects, economic impacts, societal function, advancement in technology, how law works, and even the environment of a particular market (White, 2021).

3.3 Validity and credibility

In secondary research, validity and credibility of a research conducted is as good as the sources used for the said research (Saunders, 2019). If the sources of documents used for the research are from well reputed authors and agencies it is easy to assume that the information collected during the process of primary research conducted in those documents sourced for the secondary research is credible (Saunders, 2019). In the case of this study, most of the documents collected are from the international road transport association (IRU) and are available in the library section of their website. IRU is a well-regarded organization in international transport matters. Thirdly, legal documents are sourced from the website of the European Union (EU

Lastly, all other sources are either government websites or well reputed studies conducted by academics of well reputed institutions of health and academic research. Moreover, all the sourced documents are available on their respective websites and were easily accessible without any restriction by the author during the process of writing this thesis. Lastly, the pool of documents, webpages and legal papers, videos and news sources were intentionally made large enough to cover all aspects near and around the research questions asked by this study. All the sources and relevant information for verification are also provided in Table 1 for readers interested in looking up the sources themselves.

3.4 Ethical considerations

This study was conducted from credible documents, webpages, and videos available online and most of the documents can be accessed by anyone without any restrictions. Secondly, no sensitive information about a company or individual was used during the process of research

of this study. Thirdly, the question of personal bias is eliminated because the author has never been a truck driver or does not personally know anyone in the industry which can influence this study. Lasty, the purpose of this study is to unbiasedly find reasons behind truck driver shortage in Europe and to find a solution by benchmarking licensing American licensing system. Both these research questions are approached with neutrality and academic curiosity and at no point in this study, any sort of manipulation of data is practiced reaching any specific outcome. All of this explains that all possible ethical problems of bias, manipulation, privacy, informant consent and confidentiality are avoided by choosing a certain method using certain data in certain quantity all explained in detail in chapters above (Saunders, 2019).

4. Results

In the results section, findings pertaining to the questions raised by this study are presented. Since all the relevant pieces of information found in the documents are in such a huge number that it is impossible to present everything here. So only the most important and unique findings are produced below to avoid repetition of information. This part is divided into two chapters with chapters 4.1 and 4.2 dealing with findings related to both research questions.

4.1 Reasons behind driver shortage

The findings related to reasons behind truck driver shortage are presented below in such a way that different factors causing truck driver shortage are shown according to the coding scheme presented earlier. In the following table, instead of repeating the name of the document the source number from the original list in Table 1 were added along with findings related to those documents.

Table 2 Reasons behind truck driver shortage

Source Number	Common	Worsened	Longstanding	COVID 19 and Ukraine War
1.	Age limit, lack of Skill, and working conditions	Working Conditions	Age limit, Lack of female workforce	COVID 19 related layoffs
2.	Lack of skill, Working Conditions	Working conditions	Working conditions, Lack of female workforce	COVID 19 related layoffs, Ukraine War related Job losses and resignations
3.	Age limit, working conditions	Working Conditions	Age limit, working conditions	
4.	Working conditions	Working Conditions	Working conditions	
5.	Age limit, Working conditions	Working Conditions	Age limit, Working conditions	
6.	Image of the Industry			
7.	Image of the Industry			
8.	Image of the Industry			
9.	Age limit, Working conditions, Image of the Industry, Health	Working Conditions, Ageing workforce	Age limit, Working conditions, Lack of female workforce	
10.	Working Conditions, Image of the Industry	Working Conditions	Working conditions	
11.	Working conditions, Image of the Industry	Working Conditions	Working conditions,	
12.	Working conditions	Working Conditions, Ageing workforce	Working conditions	
18.				COVID 19 related layoffs, Ukraine War related Job losses and resignations.
21.	Health, Working conditions	Working Conditions	Working conditions	
22.	Health, working conditions, age limit	Working Conditions	Working conditions	

4.1.1 Most common reasons

The first common cause cited in IRU documents was the rules and regulation barrier to enter the profession of trucking. In most European countries, to apply for a trucker license, one must be at least 18 years of age and in some cases even 21. Added to that is the fact that one must go through training to obtain professional qualification and certification with makes an entry to the profession age as high as 21 or 24 because the training time is usually three years. Plus, it was mentioned that companies prefer not to hire young drivers because companies consider them inexperienced and not skilled enough and have a view that a company would have to invest in further training. This factor combined with the cost of entry into this profession leads to the young people steering away from choosing truck driving as a career. (International Road Transport Union [IRU], 2019b, 2020b, 2022a, 2022b, 2022d)

Secondly, citing from the medical research included in the sourced documents as well as the IRU documents that health and ageing of workforce makes the profession harder and eventually drives people out of the trucking profession. The average age of truck drivers across Europe is 50 years and at this age doing such work exacerbates multitude of health problems from cardiac, back pains, fatigue, diabetes, vision, and mental health. This not just leads the active workforce to retire but also hinders the entry of new workers to this line of work. (Crizzle et al., 2018; International Road Transport Union [IRU], 2019b; Sousa & Ramos, 2018)

Thirdly, the image of the sector is also to blame because there is a large portion of people have a negative image of the profession. According to a survey done by IRU in 2012 in France 44% of people see the profession of trucking in negative light even though 98% consider it to be essential for French economy. Moreover, the worsening shortage of truck drivers has led to further worsening of the image of truck driving professions even though adequate amount of truck drivers feels satisfied from their job and majority of those satisfied

with their work are young drivers between the ages of 18-24. (European Automobile Manufacturers Association [ACEA] et al., 2017; International Road Transport Union [IRU], 2018, 2019a, 2019b, 2020a, 2021)

Lastly, the factors commonly cited in almost all documents were the working conditions, safety, and parking spaces. Driving trucks puts one away from home for long periods of time, in split shifts, disturbed sleep cycles, driving on unfamiliar roads, long hours, less rest times and difficulty finding safe and good parking spaces. This keeps a lot of young people away from this field specially women. (Crizzle et al., 2018; European Automobile Manufacturers Association [ACEA] et al., 2017; International Road Transport Union [IRU], 2018, 2019b, 2020b, 2021a, 2022c, 2022d, 2022a, 2022b; Sousa & Ramos, 2018)

4.1.2 Long standing issues

Most of the factors pinned to the categories of long standing are same as the previous chapter of common issues. Issues like the age barrier to entry, working conditions though better from the past still are a major factor, parking spaces, ageing workforce, and lack of young drivers. However, the new thing in this category is situation around female drivers in the profession. Even though both male and female drivers agree that bringing more balance in terms of gender will improve the image of the industry and address the shortage, women only account for only two percent of the workforce. The main reason for this is lack of security, rest areas with inadequate arrangements for healthy food, unsafe spaces to sleep and lack of personal hygiene facilities to cater the needs of female drivers. This is also leading to male shortage as well because these issue effect to a great extent male drivers as well. (Crizzle et al., 2018; European Automobile Manufacturers Association [ACEA] et al., 2017; International Road Transport Union [IRU], 2018, 2019b, 2019a, 2020b, 2020a, 2021b, 2021a, 2022c, 2022d, 2022a, 2022b; Sousa & Ramos, 2018)

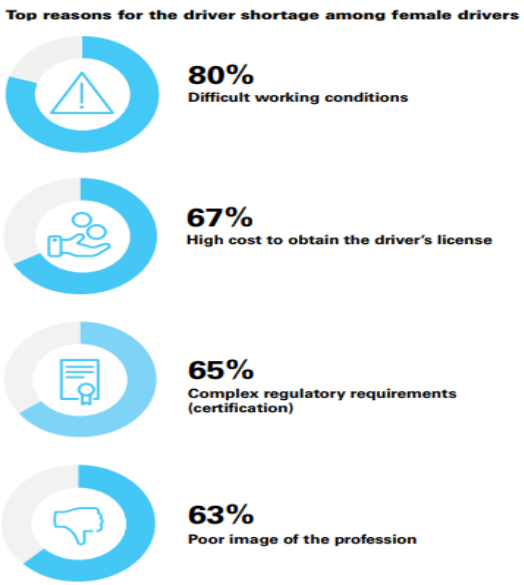

Figure 3 IRU survey

(From Tackling Driver Shortage in Europe, by International Road Transport Union [IRU], 2019b)

4.1.3 Worsened over time.

There are some factors that were always there but have worsened over time. These factors include the image of the profession which has worsened due to the shortage of labor force in all the logistics sectors. Now a days drivers are performing loading and unloading duties on top of their regular job, which some workers might appreciate but some find a negative factor. However, it was not pointed if it specifically effects women, but it was pointed out to be a general cause worsening the working conditions. Lastly, with higher levels of youth unemployment people still choose to opt out of this profession. (International Road Transport Union [IRU], 2022c; Reiman, 2020)

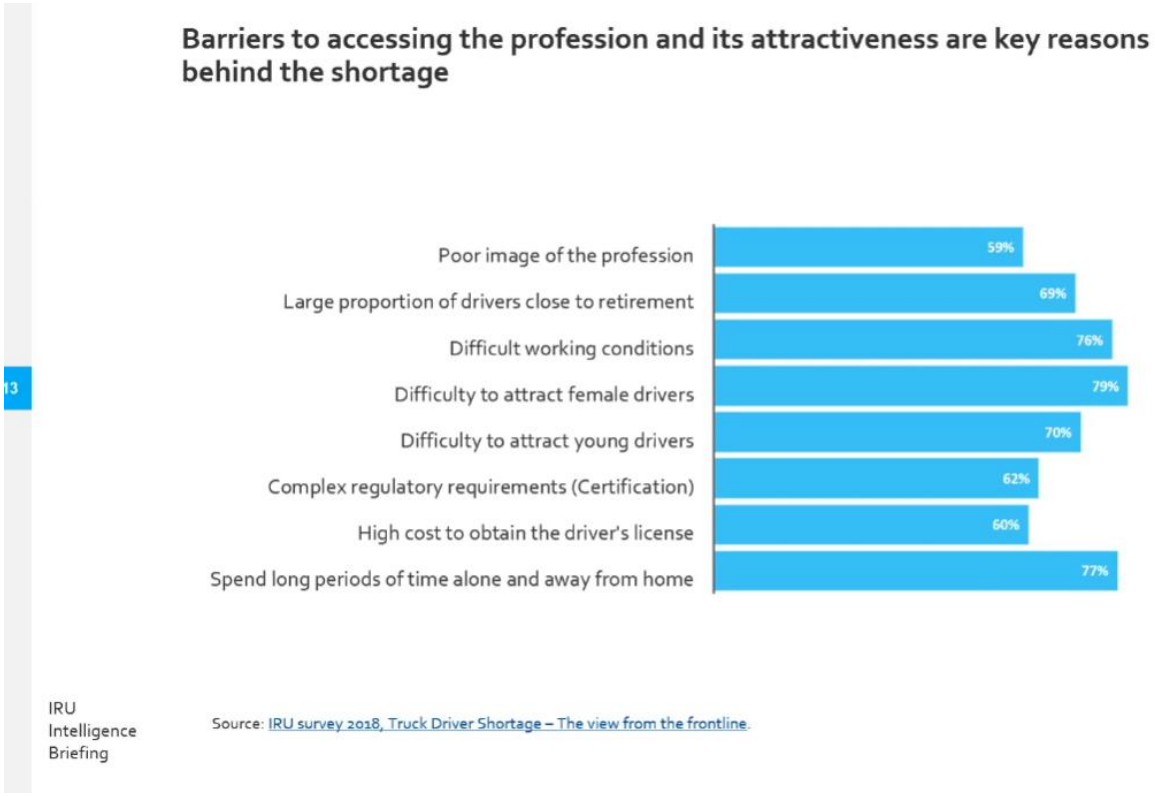

Figure 4 IRU Survey

(From IRU intelligence briefing: Ease access and attract drivers to the profession – Full webinar replay – YouTube by International Road Transport Union [IRU], 2022c)

Added to that is the aging of the workforce which is set to get worse. There are very few young drivers replacing the existing workforce, making the average age of workers between 50 and 55. In places like Germany people already set their stream for career at the ages of 16 and 17 but one must wait until 21 to become a trucker. Added to legal age is the cost which was upward of 3000 pounds back in 2019 and with inflation economy, it is even more expensive now a days. (International Road Transport Union [IRU], 2019b, 2022c)

4.1.4 COVID-19 and Russian Invasion of Ukraine

Two massive international crises occurred one after the other, both having massive implications for global economy, health, and security. One being the COVID-19 pandemic and the other being the ongoing Russian invasion of Ukraine. As a result of COVID-19

pandemic there were huge disruptions in the tourism sector because of lockdowns which left a lot of bus and coach drivers out of job and made them switch careers and with the restrictions easing and demand increasing now the industry has even more shortage because the drivers did not return to their original job. There was an opposite effect on cargo industry in terms of demand, but it still created effects similar to bus drivers. Due to high demand the wages of truckers increased which led them to work less, increasing shortage in the trucking sector as well. Moreover, due to the lockdown there was a decrease in facilities to train new drivers which led to few new drivers being trained in the year 2020. (International Road Transport Union [IRU], n.d.-b, 2022b, 2022a)

Secondly, the Ukraine crisis has caused dual effect in terms of driver shortage. Even though both Ukraine and Russia are not part of the EU, a lot of the drivers working in the EU are from Ukraine and Russia. Ukrainian government on 24th of February 2022 declared a state of military emergency which imposed a ban on men from the ages of 1 to 60 from exiting the country. This included men working as truck driver who were present in the country at that time and added to that were Ukrainian men working and living in EU countries who returned to join the fight in their country. (International Road Transport Union [IRU], n.d.-b, 2022a)

The other side of the conflict were Russians and Belarusian drivers also working in the EU, in some case faced problems like their work visas not getting extended and some employers terminating their contracts. This means that there is a possibility that 166,000 Ukrainian, Russian and Belarusian drivers working in the EU may have left or lost their job due war by the end of 2022. This has furthered the crisis of driver shortage in Europe. (International Road Transport Union [IRU], n.d.-b, 2022a)

4.2 PESTLE analysis and Benchmarking

Pestle analysis of both America and European licensing is conducted to find out the key differences between both systems and find solutions for Europe. Later, benchmarking is

conducted to find the possibility of solutions in the European Licensing system to improve the conditions of truck driver shortage in Europe.

4.2.1 American Licensing System

Political

The licensing system to issue heavy vehicle licenses to people is administered at the federal level by Federal motor carrier safety administration (FMCSA) which comes under the department of transportation (DOT). The federal government issues guidelines for laws and enforces a major portion of laws regarding heavy vehicle licensing. But each state government plays its role in legislation and administration of licensing in their area of jurisdiction. Regulations, enforcement, funding, and legislation can be deeply impacted by political decisions which in term result in the development of policies. But in general, the laws regarding licensing stay similar and there is a uniformity in licensing throughout the United States. (American Trucking Association [ATA], n.d.; Federal Motor Carrier Safety Administration [FMCSA], n.d.; NASDPTS, n.d.; National Highway Traffic Safety Administration [NHTSA], n.d.; U.S Department of Transportation [DOT], n.d.; U.S. Environmental Protection Agency [USEPA], n.d.)

Economic

American trucking industry is highly fragmented, to a larger extent de-regulated economy of 800 billion dollars and barriers to entry are quite low for new players to join. The average income of a trucker is 50,000 dollars a year and it is typical for companies to hire new and cheaper labor since they are easy to replace with employ turnover reaching a staggering 90% a year. With 350 thousand truckers in the country though supply and capacity bring down prices and trucking industry goes through a periodic boom and bust cycles there are still 80 thousand vacancies of truckers in the country. (American Trucking Association [ATA], n.d.; 'Consumer News and Business Channel [CNBC], 2021; Federal Motor Carrier Safety Administration [FMCSA], n.d.; Insider News, 2021; International Road Transport Union [IRU], 2022a; NASDPTS, n.d.; National Highway Traffic Safety Administration [NHTSA], n.d.; U.S Department of Transportation [DOT], n.d.; U.S. Environmental Protection Agency [USEPA], n.d.)

The licensing system plays a key role in making of this highly competitive environment in the trucking industry in the United States which in turn makes the industry a significant contributor to the American economy. The current licensing system, if looked at in the historical context seems greatly influenced by external factors such as the fuel costs, labor costs and the availability of truckers. Since America is a leader in international trade policies these policies also have an impact on the home soil. (American Trucking Association [ATA], n.d.; Federal Motor Carrier Safety Administration [FMCSA], n.d.; NASDPTS, n.d.; National Highway Traffic Safety Administration [NHTSA], n.d.; U.S Department of Transportation [DOT], n.d.; U.S. Environmental Protection Agency [USEPA], n.d.)

Social

There is a mixed social perception about truckers and cargo industry. To the point that when truck drivers were protesting Covid restrictions people were supporting them, and they were deemed as front-line workers. But at the same time the government or private sector seem disinterested in solving issues truckers face such as the parking spaces. The licensing system is greatly affected by safety culture, the level of environmental concern and the role of trucking in the American society. But in general, trucking profession was seen historically as way to quickly make a lot of money but due to de-regulations in the 80s and recent years because of the pandemic with problems in the supply chain, the public perception seem to be shifting towards the opposite direction. (American Trucking Association [ATA], n.d.; 'Consumer News and Business Channel [CNBC], 2021; Federal Motor Carrier Safety Administration [FMCSA], n.d.; Insider News, 2021; NASDPTS, n.d.; National Highway Traffic Safety Administration [NHTSA], n.d.; U.S Department of Transportation [DOT], n.d.; U.S. Environmental Protection Agency [USEPA], n.d.)

Technical

Technological advancement such as autonomous vehicles can cause a shift in regulations around licensing system and heavy vehicles but there are many legal hurdles in the near future to achieve such a change. Even the use of electronic logbooks and tachographs impacts the licensing system in terms of training among other things. But the use of technology creates regulatory challenges for legislative and regulative agencies who need to update in the

light of new technological developments. However, there are many companies investing in new technologies but the road to this development will however be slow and there is no major change to come soon. (American Trucking Association [ATA], n.d.; 'Consumer News and Business Channel [CNBC], 2021; Federal Motor Carrier Safety Administration [FMCSA], n.d.; Insider News, 2021; NASDPTS, n.d.; National Highway Traffic Safety Administration [NHTSA], n.d.; U.S Department of Transportation [DOT], n.d.; U.S. Environmental Protection Agency [USEPA], n.d.)

Legal

American heavy vehicle licensing system is subjected to two streams of regulations, one from the federal government and the other being the state government. The regulations generally do not seem to vary much in terms of minimum age to health and fitness requirements to becoming a truck driver. Law suites and judicial decisions can also influence the regulations around licensing like other departments and aspects of the society in the USA. Whereas the legal system can be influenced by political and economic influence as both major political parties hold different views on different issues. General requirement including age limit of 18 to 21 to obtain a Commercial driving license (CDL), a high school diploma, passing medical exam and training to start working in as a truck driver and the only language proficiency requirement is English language. Generally, the legal system around licensing seems to be uniform across the USA. (American Trucking Association [ATA], n.d.; California Department of Motor Vehicles [DMV], n.d.; Federal Motor Carrier Safety Administration [FMCSA], n.d.; NASDPTS, n.d.; National Highway Traffic Safety Administration [NHTSA], n.d.; New York Department of Motor Vehicles [DMV], n.d.; U.S Department of Transportation [DOT], n.d.; U.S. Environmental Protection Agency [USEPA], n.d.; Virginia Department of Motor Vehicles [DMV], n.d.)

Environmental

The American heavy vehicles are subjected to multiple regulations in the scope of emissions and noise limits which in turn regulate the flow and behavior of heavy traffic operations on the roads. There is a mounting pressure by various organizations from civil society on regulatory bodies to reduce the environmental impact of heavy vehicles. This will have an impact on the licensing system and requirements from the drivers and operators. On the flip

side this will bring significant challenges in terms of compliance because of the higher costs of change and may reduce the competitiveness of many operators in America and has the potential to even change the profitability of the entire industry. Multiple governmental and environmental agencies work towards de-carbonization in the USA, but their role is affected by politics because both major political parties have different views on environmental affairs. (American Trucking Association [ATA], n.d.; Federal Motor Carrier Safety Administration [FMCSA], n.d.; NASDPTS, n.d.; National Highway Traffic Safety Administration [NHTSA], n.d.; U.S Department of Transportation [DOT], n.d.; U.S. Environmental Protection Agency [USEPA], n.d.)

4.2.2 European Licensing System

Political

In Europe the licensing for heavy gauge vehicles is defined by European Union under the guidance of the European commission and European parliament but regulatory matters are decided by each government within each country as they set standards themselves and EU commission tries to achieve compliance. However, political changes at the level of the EU can impact the regulations on all aspects of the licensing systems all over EU. The EU also maintains discussions and cooperation efforts with all EU states regarding various issues, among which is the licensing system. (European Automobile Manufacturers' Association [ACSA], n.d.; European Commission, n.d.; European Environmental Agency [EEA], n.d.; European Parliament, n.d.; European Union [EU], n.d.-e)

Economic

The size of the European trucking economy is 469 billion USD with 602 thousand road freight companies, 3 million truck drivers, 7 million heavy trucks and follow road transport at roughly 16 billion tons a year. COVID-19 pandemic did cause a 6.8 percent decrease in revenue with the recovery of 2.4 percent in 2021. The road to recovery will be long and slow because of the repercussion of pandemic and lockdowns with global chip shortage. In addition, the truck driver shortage which has reached 425,000 in the year 2022 and is set to reach a million in the coming year will have an impact on costs in the coming future. (European Automobile Manufacturers' Association [ACSA], n.d.; European Commission,

n.d.; European Environmental Agency [EEA], n.d.; European Parliament, n.d.; European Union [EU], n.d.-e; International Road Transport Union [IRU], 2022b)

Social

Truck driving generally as a career has a negative perception among outsiders and has even lost its attractiveness among people. On top of that, the licensing system has received negative feedback from major players in the industry which has led to many organizations like IRU and UETR supporting reform in the system and issuing multiple calls. The social effect is felt by the EU government and initiatives like mobility package I are passed on the floor of the European parliament. But the EU is not one country or a homogeneous territory, so the licensing laws are socially taken differently in different places in the EU. (International Road Transport Union [IRU], 2019b, 2020b, 2022b)

Technical

The adaptation of different technologies has and, in the future, will further impact the licensing system. There are ideas about the driving profession becoming higher tech with the advent of semi-autonomous and fully autonomous vehicles. The manufacturers of trucks are generally supporting the goals of fossil free by 2040 and battery power. Governments around EU are showing willingness in terms of development. Overall, the licensing has already changed a lot with the advent of new technology like digital tachographs and them being mandatory under new laws, the change is further expected but the catch is the willingness of investors and the demand of technology development in the future as well as the policy makers and their willingness. (European Road Hauliers Association [UETR], n.d.; International Road Transport Union [IRU], 2018, 2019b)

Legal

Generally, in Europe the legal barrier is quite high in terms of entry to the profession of truck drivers. The minimum age to apply for a learners permit of a truck driver ranges from 18 to 21 and after training and getting a driver's license one must do a professional qualification of 2 to 3 years making the age to professionally start the career ranging from 21 to 24. Added to that, with different countries within the EU having their own language, one must be proficient in that language to even get trained or pass the test. In addition, with a lot of different

countries and governments there is some variation in testing and licensing rules and policies. (Ajovarma, n.d.; Finnish Transport and Communications Agency [TRAFICOM], n.d.; International Road Transport Union [IRU], 2019b, 2022b)

Environmental

The environment is taken more seriously in Europe than the rest of the world where organizations like IRU are invited to debate and discuss environmental goals of European commission. Thereby a lot of issues regarding emission, de-carbonizations, alternative fuels are discussed with emphasis also the provisions and considerations for transport operators and drivers. A lot of the programs are also run by these organizations to train drivers and freight companies for more environmental responsibility and there are already tough laws on emission and usage life of vehicles. This in turn brings the impact of licensing systems in one way or another. (European Road Hauliers Association [UETR], n.d.; International Road Transport Union [IRU], n.d.-b; U.S. Environmental Protection Agency [USEPA], n.d.)

4.2.3 Benchmarking Possibilities

The analysis and research to find answers for the first question has pointed out some key areas in the European licensing system that can be improved to address the situation of driver shortage in the EU. In the table below benchmarking possibilities are highlighted with source numbers from the source list given in Table 1.

Table 3 Benchmarking

Source Number	**Benchmarking**
25.	Licensing process
26.	Licensing process
27.	Licensing process
28.	Industry perception
29.	Industry perception
35.	Licensing process, Age limit, financial assistance, and job placement, skill building, language
36.	Licensing process, Age limit, financial assistance, and job placement, skill building, language

Licensing process

In the United States, there are relatively less bureaucratic hurdles for aspiring trucker and there is more uniformity in laws and regulations throughout the country. This makes the process a lot easier and straight forward. Moreover, the author found the websites of Departments of motor vehicles (DMV) of states to be straight forward with easy instruction and even the FMCSA websites maintain directories of training schools to direct people to registered and reliable training programs across the country. So European legislators can try to make a uniform system and create harmony in terms of instruction and legal requirement throughout the EU to make it easier for new entrants to pursue their career in trucking. (California Department of Motor Vehicles [DMV], n.d.; 'Consumer News and Business Channel [CNBC], 2021; Federal Motor Carrier Safety Administration [FMCSA], n.d.; Insider News, 2021; New York Department of Motor Vehicles [DMV], n.d.; U.S Department of Transportation [DOT], n.d.; Virginia Department of Motor Vehicles [DMV], n.d.)

Age requirement

In the US the legal age to apply for CDL is 18 for intrastate and 21 for interstate driving. However, in Europe the legal age in some countries is 18 and some it can be 21, which combined with bureaucratic hurdles can even make the age to legally enter the profession reach as high as 24. So, lowering the age requirement can also work to attract more drivers. (Federal Motor Carrier Safety Administration [FMCSA], n.d.; U.S Department of Transportation [DOT], n.d.)

Financial Assistance and Job placement

In the USA the government and private sector work to provide various programs to provide grants, loans, and scholarships to aspirants of trucking profession. This helps cover the cost of obtaining CDL and helps a lot of people who cannot afford the upfront costs of licensing and training. Moreover, most private sector training schools work with many freight operators and give job placement guaranties to the students. In Europe, similar programs can be run by the government and the private sector can be incentivized to similar programs. (Federal Motor Carrier Safety Administration [FMCSA], n.d.; U.S Department of Transportation [DOT], n.d.)

Enhancing skills through training

In the US, the driver training programs run more practically with hands on training and field training which they run jointly with freight operators. This makes it easier to get job placement and provides practical skills to young drivers. In Europe the haulage operators often complain about the lack of skills among young drivers and are reluctant to hire them because they fear than the companies will have to invest in further training so European governments can work with the private sector to develop more skill building programs for young drivers in the region. (Federal Motor Carrier Safety Administration [FMCSA], n.d.; U.S Department of Transportation [DOT], n.d.)

Industry Perceptions and learning language.

In America, trucking is seen as a viable career for many young people to earn decent wages and to get into this profession one does not need to do separate language courses since everything is in English. So, in Europe, parallel to running image building campaigns, educational programs, and financial incentives the access to train in English language should be provided to people in all EU countries. This will open doors for many people and give access to a new pool of drivers to many companies. (Federal Motor Carrier Safety Administration [FMCSA], n.d.; U.S Department of Transportation [DOT], n.d.)

5. Discussion

This part includes further discussion on results and application of the method.

5.1 Discussion of results

To further the discussion on the results firstly various reasons behind truck driver shortage were found and presented. The regulatory hurdle such as the legal age, cost, and the licensing process to be the main reason behind heavy vehicle driver shortage in Europe was cited in almost all IRU documents. The second big reason lack of skilled workforce with companies unwilling to invest in training of young workers which was also cited again in IRU documents. Thirdly the concern around family, mental and physical health concerns was cited

by almost all medical studies included in the sources and even by the IRU documents. The negligible presence of female drivers in the workforce was also cited as something adding to the distortion of image of the trucking profession by almost all documentation linked with IRU and the reasons for low number of women truckers was safety, lifestyle, and family. the factors commonly cited in almost all documents were the working conditions, safety, and parking spaces. Driving trucks puts one away from home for long periods of time, in split shifts, disturbed sleep cycles, driving on unfamiliar roads, long hours, less rest times and difficulty finding safe and good parking spaces was also cited by IRU. Lasty, though not studied in detail was the negative impact of COVID and Ukraine crisis and how it drove out a lot of the workforce with no replacement matching the pace of people leaving, again cited mostly in IRU in documents, pressers, and meetings. Secondly, this study looked at the realm of possibility in benchmarks of American licensing system to solve this very issue. The Pestle analysis was conducted to explore different aspects of both American and European licensing systems.

Overall, the European system has a lot of decentralization due to the independent countries being part of the union and the variation in their political, economic, social, technical, legal, and environmental, goal, development, and leanings. This sometimes led to disputes in policy acceptance at the EU level. Generally, the EU is highly regulated in terms of licensing and barriers to entry are quite high but there is a lot of understanding and responsibility when it comes to things like environmental responsibility in general at the EU level.

While the licensing system in practice in the United States of America is to a large extent highly regulated from the federal government which brings uniformity to the rule, regulations, and requirements but like the European system to the great extend is impacted by external factors ranging from economic, political, and legal changes in and out of America. Changes in these factors have impacted evolution of the American commercial driver license (CDL) system.

Considering the findings of this analysis and further studying the topic, the four areas make American system are slightly better than Europe in terms of attracting new drivers, the uniformity in regulations, the age limit, financing of training, job placement and skill development. Europe seem to be lagging in this regard but organizations like IRU have already proposed a lot of solutions like the benchmarking done in this study. Working on similar kinds of voices coming from the industry the European commission on 1 March 2023 tabled a proposal to lower the age requirement to 17 years for heavy vehicle driver and to make ways for third country drivers to work in the EU. This proposal was welcomed by the industry according to IRU (International Road Transport Union [IRU], n.d.-b).

5.2 Discussion of Method

In practice the documentary analysis method was effective in finding representative data because multiple documents, websites and video data was acquired for analysis. When conducting research in all sourced document multiple key words were used like trucks, drivers, licensing, age, shortage etc to get to relevant sections. The relevant information was copied to a word document and later sorted out in the excel file according to the coding schemes of both research questions as presented in Appendix 1 and 2, same method was applied in webpages, but videos were watched completely, and notes were taken on paper and were later added to the excel spreadsheet in the same way mentioned above.

The application of the method was for the most part straight forward, but few difficulties were faced. Main difficulty was finding the relevant sources and then extracting relevant pieces of information from the sources. As the major portion of the sources are from international road transport union (IRU) there is a possibility that the result might reflect the narrative of IRU more in few places in the results, such as the driver age limit in the factors leading to driver shortage. Moreover, when conducting secondary research from sourced documents not made for this purpose it was difficult in many documents specially the EU legal documents to interpret the data to find answers to questions raised by this study as plenty of IRU and EU documents present solutions to research questions one, so the author

had to assume that there must be a certain problem which initiated reports giving a certain solution. For example, legal changes presented in EU mobility package documents.

As mentioned in section 3.3, IRU is a responsible well reputed organization and can be trusted for presenting credible date in their documents and this can be backed by the fact their IRU data matched with date collected from EU websites and documents. So, to answer the question of credibility and the secondary research being as good as its sources, the author considers IRU to be a credible source. Moreover, there was a total of 40 documents from governmental websites to videos and medical research documents from credible academic journals. So, the research questions were approached from multiple angles by using multiple credible sources. Lastly, there general imperfections in the secondary research and the fact that not a lot of well researched studies covering this topic were accessible to the author. So, an alternative method could have been a qualitative interview combined with a quantitative survey could have been a better choice to find a more representative and current up to date information on phenomenon like COVID-19 and Ukraine war effecting the trucker shortage these issue are relatively new in 2023.

6. Conclusion

The aim of the study was to find the reasons behind truck driver shortage and benchmarking American licensing system on Finnish/European Licensing system to find solutions. Trucker driver shortage is a big issue in Europe. This thesis is demarcated, so it does not cover solutions other than the one through licensing system and the old, uncommon, or historic reasons behind shortage. Only common reasons along with COVID and Ukraine crises are discussed. The theory consists of modes of transportation and their role, key legislations, different organizations involved in representation of the industry at global and European scale and the key elements of truck driver's life. The method of qualitative documentary research was used by taking 40 sources ranging from documents to videos and webpages. The results from this research show that the reasons behind shortage are minimum age being high, image of the industry, lower number of female drivers, lack of facilities for the truck drivers, lack of skilled drivers, ageing and COVID 19 and Ukraine crisis denting the workforce where already working

people have left the workforce. For the second question Pestle analysis of European and American heavy licensing systems was conducted. Overall American licensing system is centralized contrary to European licensing system which is decentralized. Based on the analysis 4 key areas were selected for benchmarking, streamlining the system, providing job placement and financial assistance, easing requirements of language and image building of the profession.

6.1 Limitations and future research

This study was conducted as documentary research and to find more representative data research involving surveys and interviews can be made involving different players from the industry ranging from truckers and freight operators to policy makers at the EU table to better understand the root cause of many issues highlighted in this study. Moreover, the Ukraine crisis and Covid 19 pandemic are relatively new at the point of writing of this thesis. So, bigger in-depth research can be made in that regard. This study superficially touched the issue of bus driver shortage so that can be researched further as well. Lastly, the question of why the policies not being made to address this issue of the economy or the slow pace of legislations can also be looked at using different tools of research.

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Appendix

Appendix 1: Excel data for research question 1

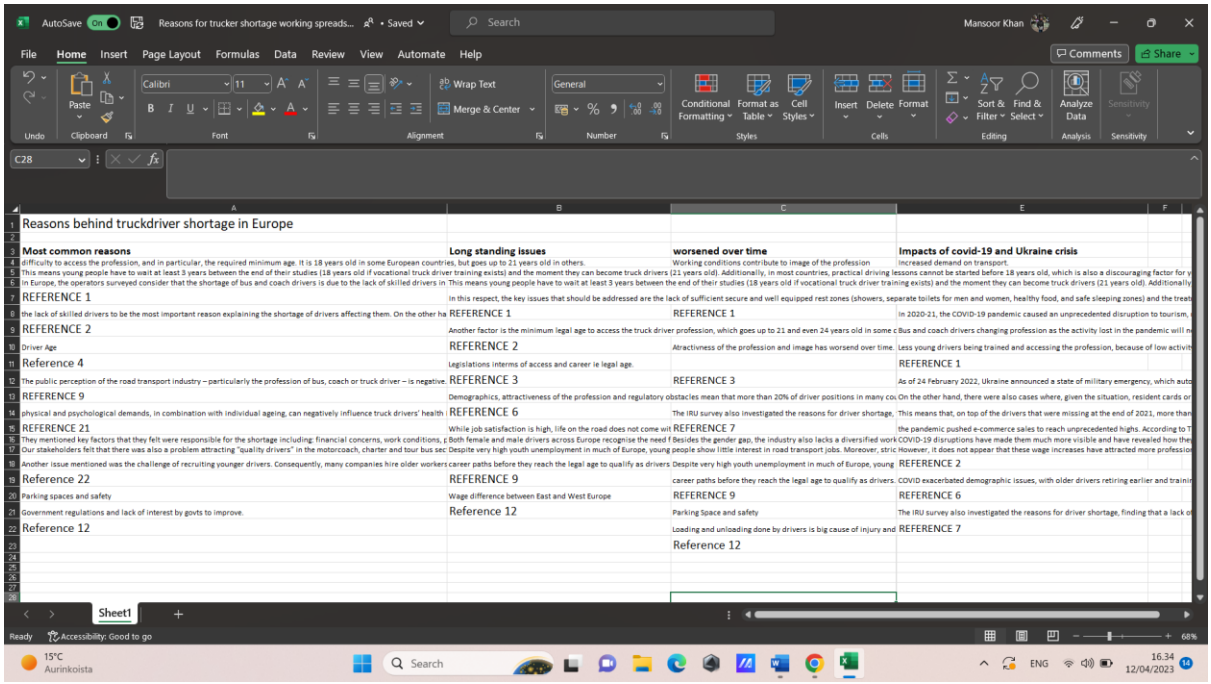

Figure 5 Appendix 1: Excel data for research question 1

Appendix 2: Excel data for research question 2

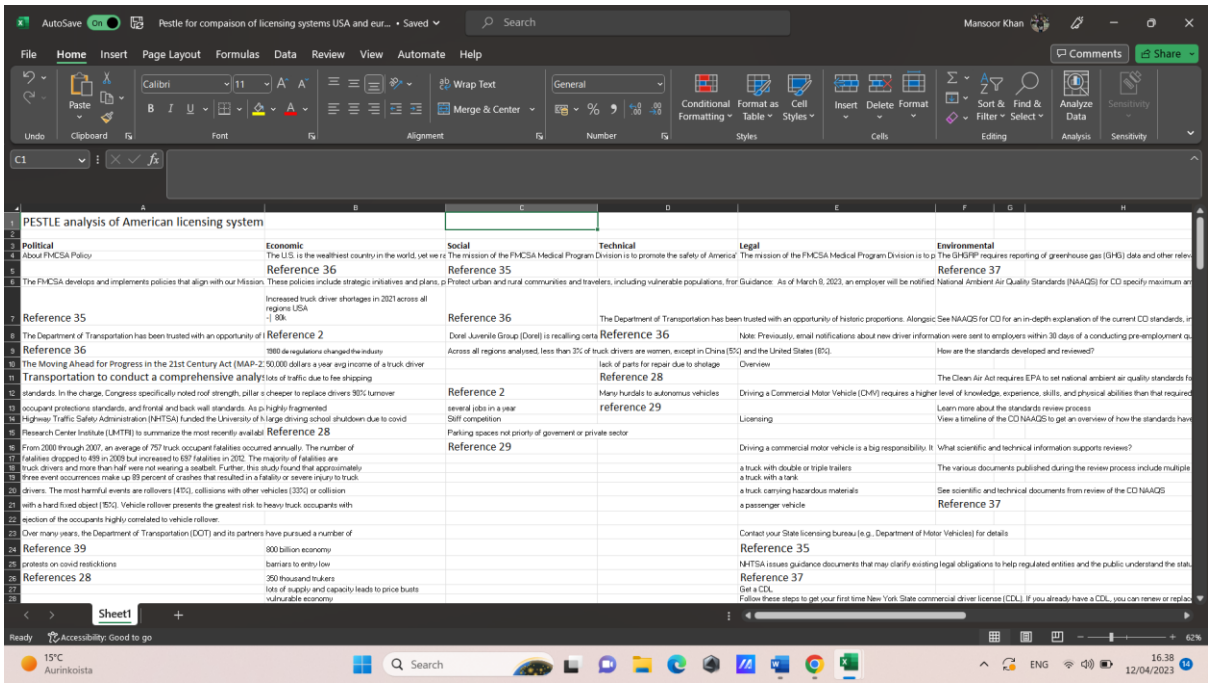

Figure 6 Excel data for research question 2

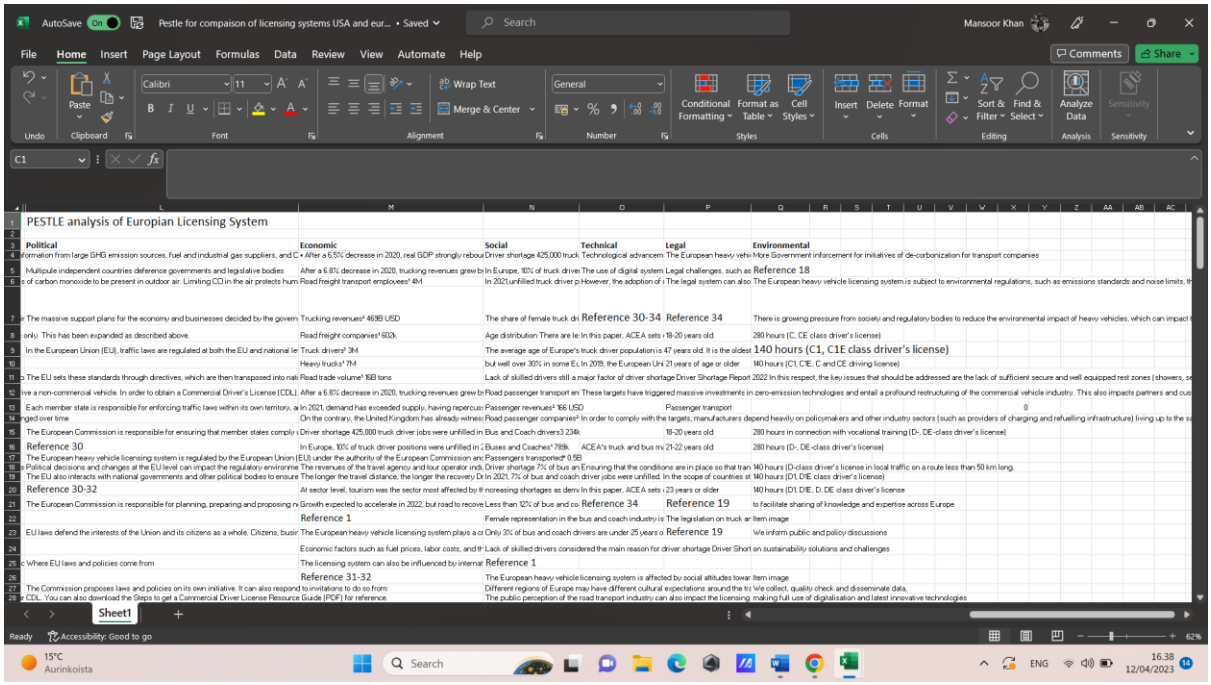

Figure 7 Excel data for research question 2