Investigating Acceptance of Technology

Case: The Autonomous truck

MASTER'S DEGREE

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In Program	Service Management
Specialisation	Supply Chain Management
Credits	30 ECTS
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Lund 8th August 2020

Abstract

The autonomous truck is gradually making its way onto our roads, and the elimination of the truck driver implies a substantial social-technical transition for logistics companies. Specifically, transport managers who work closely with the drivers on a daily basis, will potentially see a significant change at work. The implementation of the autonomous trucks in logistical companies could cause frictions because of the transition. The purpose of this study is to examine acceptance of a forthcoming technology in organisational settings. This will be done by inspecting the attitudes transport managers have towards their current social and technical aspect of their work, and the prospective autonomous truck. A qualitative research approach is undertaken to investigate the topic. The chosen case study is transport managers working in Sweden in logistical companies. Data is collected through semi-structured interviews with 13 participants. A thematic analysis approach is used to interpret the gathered data. The low interest in the subject and scattered attitudes of the transport managers points towards a need for more research on the topic. Further studies on acceptance of the technology as we get closer to its reality would give a clearer picture of what frictions to expect and how to deal with the transition.

Keywords: Acceptance, Technology, Autonomous Truck, TAM, Transport Manager

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1. Introduction

This chapter introduces the thesis by first providing a background to the topic of the study. Subsequently, a problem is formulated, and from that the purpose and research are presented. The chapter ends with a section on assumptions and limitations of the study.

1.1 Background

The industrialisation of our societies has gone through significant milestones that have revolutionised many aspects of our world. First we mechanised, then we electrified, and subsequently we digitalised (Lasi et al., 2014). These revolutions changed the lives of many, as they brought great opportunities for us, both in the business world and in our everyday life. Today, however, we are in yet another industrial revolution which partly consists of automation of processes (Johnson et al., 2005). Whilst the developments that are taking place in the IT sector will lead to implications in the technological domain, it will also lead to significant consequences for the organisational world (Schwab, 2017; Tahitoe et al, 2019; Popkova et al., 2019).

Automation of processes, for example in logistics, is substituting for human labour, but it does more than just that. A synergy arises between the efficiency automation creates and the labour demand (David, 2015; Ford, 2015). Through automation organisations achieve higher output which increases demand for labour. This means that technological innovations of this kind change what jobs become available and the pay-checks that follow. In the context of logistics, the automation of the truck is eliminating the need for a truck driver but creates demand for labour that operates the systems by which the truck is managed.

As much as automation may increase efficiency and safety, it does not eradicate all errors and workload. Instead, it leads to a change in what types of mistakes can occur and where more attention must be allocated (Sarter et al, 1997; Parasuraman & Mouloua, 2018). New types of knowledge are required, and operators of the systems need to learn how they works. This technological transition can create frictions in the working place (Geels, 2005).

The paper seeks to explore the acceptance of technology, using fully autonomous trucks as a case. Technology is a vital part of many organisations (Lansbury & Bamber, 2013). Even though service organisations, such as logistics companies, do not produce tangible goods, they are highly dependent on technology. This study aims to contribute knowledge about technology acceptance to the service management field by investigating technology transition in an organisational setting.

1.2 Problematisation

How employees come to terms with an increase of automation in the working place has not been studied for a long time, relative to other sociological research fields (Heijden, 2004). An attempt to understand this phenomenon is the core of acceptance research (Taherdoost, 2018). Fraedrich and Lenz (2016, in Maurer et al., 2016) posit that the aim of acceptance research is to increase the understanding of a particular acceptance phenomena, but also to aid the development and design of specific technology so that acceptance takes place. The fundamental reasoning is that the faster workers adapt to or accept the technology, the lower the cost of such transition (Woods, 1996; Dillon et al., 1996). This paper seeks to explore acceptance of an advancing technology with a qualitative method.

A prominent theory in the acceptance research field is the Technology Acceptance Model (TAM). It has been used extensively in Information Systems research, with the aim of measuring acceptance of different technologies (Chen et al., 2011). The theory can be traced back to Fred Davis (1989) who argued that the two most important variables for determining user acceptance are *perceived usefulness* and *perceived ease of use*. He defined *perceived usefulness* as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989 p. 320), and *perceived ease of use* as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p.320).

Since its first appearance, many adaptations of TAM have emerged. However, TAM and its adaptations are inherently based on quantitative research approaches (Vogelsang et al., 2013). There are many advantages of TAM with this research orientation. For instance, it provides a thoroughly defined procedure and pre-defined measurement instruments, it is versatile, it can be applied to any kind of software, and the results of different studies using TAM are comparable because of the ability to generalise the survey instruments (Vogelsang et al., 2013). However, Venkatesh (2000) argues that TAM, because of its simplicity, is less suited for complex decision processes. This is highlighted by the tendencies of TAM papers being mostly concerned with generic software products, and not investigating IT for specific operational tasks (Bagozzi, 2007). TAM has also been criticised for lacking actionable guidance to practitioners (Venkatesh & Bala, 2008). Moreover, only short periods of time are examined in most TAM studies, where the acceptance is measured in the initial stage of implementation. When examining acceptance for longer periods of time, for example life cycles of software products, a quantitative method becomes a less suitable approach (Bagozzi, 2007).

Since its introduction, more models and theories have diverged from TAM, with added or changed variables, all trying to measure acceptance in different ways. However, these theories have shortcomings as well. As they grow in constructs or determinants, they become more complex and their determinants for acceptance are not always clearly defined (Vogelsang et al., 2013). It is also not always clear whether studies using these theories are concerned with technology that will replace other technologies that are already implemented in the organisation, in new technology that does not directly affect human relationships, or if the introduced technology will substitute for human labour altogether. In addition, Ittersum et al. (2006) point out that many technology acceptance studies, which used quantitative methods, did not actually measure acceptance, but instead precursors of acceptance (for example perceived usefulness or ease of use) which are indicators of one's belief in the ability to use the technology.

A remedy to these issues lies in the methodology. Unfortunately, there is a lack of qualitative approaches on acceptance within the TAM studies (Vogelsang et al., 2013). A qualitative method could aid in analysing complicated relationships, for instance between humans and machines, as it is more appropriate for such complex situations (Palvia et al., 2003).

Regarding the autonomous truck, which will be used as a case in this paper, Fagnant and Kockelman (2015) point out the research gap on the acceptance of this technology and the overall social aspect of it. Rosenzweig and Bartl (2015) confirmed this argument when they reviewed and analysed literature on the autonomous truck and found that there is a disparity of research done on certain topics of the phenomena. Up until 2015, when the review was conducted, most papers published in journals relating to the autonomous truck were about the technology development. This might be because the field which the autonomous truck has evolved around has mainly been technology driven (Maurer et al., 2016). Even though more research has been conducted in regard to the social aspect of the autonomous truck in recent years, researchers such as Bissell et al. (2020) argue that there is still a lack of studies on social implications that might stem from autonomous vehicles.

The elimination of the truck driver from the industry implies a reduction of social interactions for the transport manager, the person who manages the movement of trucks. It also implies an increase in IT practices (Alessandrini et al., 2015). This will shift the relationship between the workers and the machines. Therefore, given the potential effects the autonomous trucks might produce on the logistics industry, an examination of the interplay between the social actor and the technology, is justified (Fraedrich & Lenz, 2016, in Maurer et al., 2016; Richardson &

Bissell, 2019). This commotion serves as an appropriate case for investigating technology acceptance with a qualitative method.

1.3 Purpose and Research Questions

Given the gap of research on the potential social influence of the autonomous truck, and the lack of research on technology acceptance with qualitative methods, the following purpose is derived for this thesis:

- The purpose of this paper is to examine acceptance of a forthcoming technology in organisational settings with a qualitative method.

The autonomous truck will be used as a case to fulfil this purpose. Analogous to the truck driver, the transport manager, who is also working with trucks on a daily basis, and whose livelihood also depends on them, is an employee in the logistics industry who will face an arguably significant occupational change amidst the introduction of the autonomous truck. The transport manager is, therefore, of interest for the purpose of this study. Acceptance of the autonomous truck will be examined through transport managers' perception on their current social and technical aspect of work, of the fully autonomous truck itself, and of how the technology might impact their work. Their perceptions will be attained through semi-structured interviews.

The field of system innovations has high social relevance, due to the structural problems that we are facing in our society (Tukker et al., 2017). For instance, the transport sector faces problems in many dimensions. There are concerns regarding pollution, safety, energy consumption, and lack of qualified truck drivers (Geels, 2005). All these problems are rooted in more complex production and consumption patterns, and much effort has been put into solving these issues with innovations. The development of the truck to date has attempted to rectify several of the issues that the transport industry was facing, by implementing incremental technological innovations such as the cruise control, ABS (anti-lock braking system), and less emitting engines. It has been stated by experts and researchers that the autonomous truck aims to solve the safety issues caused by human error on the roads, and that there are economical gains that could come with its implementation. However, the question of what impact it will have for the people that are working with it daily remains unanswered.

By taking the driver out of the picture, one could argue that the change of autonomy of the truck is not as incremental and trivial as the past innovations. It could be interpreted as a bigger system innovation, because a whole set of a social aspect is replaced with artificial intelligence, and this has consequences not only for the driver, but for those who are in the social sphere of

that driver as well. What this change means to the people in the transport industry is also of significance, since managing a person and managing a robot is not the same thing (Woods, 1996). The research questions which this paper aims to answer are as follows:

I. How do transport managers perceive the current
   a) social and
   b) technical aspect of their work?

II. What do transport managers think about the autonomous truck?

III. What attitudes do they have towards a possible change in the
   a) social and
   b) technical aspect of their work?

The autonomous truck could influence how logistics companies are operated and what their business models look like. Likewise, a socio-technical system transition could have implications for the transport manager. The outlook transport managers have on the autonomous truck can be beneficial for their supervisors and those who will be responsible for the implementation of the technology. By knowing the transport managers' perception of the autonomous truck, what they think of it, what fears, doubts, optimism, or enthusiasm they have for the technology, the decision makers can gain insights into how the technology can be implemented more effectively (Taherdoost, 2018). Moreover, this knowledge can serve as a guideline for how the topic of autonomous trucks can be communicated to the workers in the future, in order to achieve a smoother technological transition, which is highly warranted (Lansbury & Bamber, 2013).

1.4 Assumptions and Limitations

There are several assumptions being made in this paper regarding the autonomous truck. It is assumed that the technological development of the truck will at some point in time reach a stage where the truck will be driven without a driver present. In addition, it is assumed that all necessary legal requisites in regard to the implementation of the autonomous truck on the roads will be fulfilled, and that the infrastructure which would allow the truck to operate is in place. Logistics service providing companies, and other parties in the logistics industry that manage fleet(s) of trucks, are assumed to eventually replace manually driven trucks with fully autonomous ones. The transport managers' occupation is also assumed to exist, with possible work changes, once the autonomous truck is implemented.

This paper is a qualitative organisational study which means that it investigates the organisational structure and how this shapes the social relationships within the organisation (Clegg & Bailey, 2007). It does not attempt to measure the acceptance or the transport managers' perceptions of the truck quantitatively. Instead, it aims to provide a broader picture of current acceptance for the technology by a qualitative method with semi-structured interviews.

Furthermore, the fully autonomous truck is examined as an independent technology. Specific technical developments that might gradually be implemented in the truck, such as electric engines, are not in focus. The social aspects of the transport managers are also not exclusively examined. Instead, the aim of this paper concerns the duality between the technological and social aspects of the advancing technological concept. It aims to explore how individuals in the logistics industry with specific occupational tasks perceive a certain technological artefact. Other modes of transport with fully autonomous machines, such as drones, trains, or ships, are not considered. Even though the concept of autonomous vehicles is mention throughout the paper, which includes private usage, only trucks that are used daily for business practises by logistics companies are in focus.

Lastly, transport managers working in Sweden have been chosen for interviews because Sweden is at the forefront of testing and developing autonomous vehicles. What this implies is that a developed country such as this, which is already implementing the latest technologies for trucks, will probably be among the first ones to actually deploy driverless trucks on the roads once the technology is ready for full scale implementation. The author of this paper is also resident in Sweden and speaks Swedish fluently, which is thought to facilitate the conduct of the interviews.

2. Theoretical Framework

In this chapter, the technology acceptance theory will be explained. Its roots and developments, and the conceptualisations of the terms "acceptance" and "technology" will be presented. Finally, with the theory and the two focal terms conceptualised, a theoretical framework for this paper is put together.

2.1 Technology Acceptance

The theory of technology acceptance can be traced back to Fred Davis (1989) who questioned which variables caused people to accept information technology. In his paper, Davis developed and validated scales for two variables as determinants for user acceptance. The measurement scales were used for predicting user acceptance of computers, and the two variables that Davis argued were of most importance were *perceived usefulness* and *perceived ease of use*. He defined *perceived usefulness* as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989 p. 320), and *perceived ease of use* as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989 p.320). The Technology Acceptance Model (TAM) was developed to predict adoption and use, on an individual level, of new information technologies and has been used extensively within the information system research field (Vogelsang et al., 2013).

TAM has its roots in the theory of reasoned action (TRA) (Lee et al., 2003; Taderhoost, 2019; Ghazizadeh et al., 2012), which comes from the social psychology research domain. According to TRA, a set of individual motivational factors are determining the likelihood of performing a specific behaviour (Fishbein & Ajzen, 1975; Montano & Kasprzyk, 2015). Social norms, beliefs, and attitudes towards a specific behaviour are determining the behavioural intention which is the best predictor for that specific behaviour. TAM diverged from this reasoning by introducing the two variables *perceived usefulness* and *perceived ease of use*, but also ignored the subjective norms as a determinant of behavioural intention (Chen et al., 2011). This modification of behavioural prediction variables allows TAM to be more appropriate for online contexts when determining user acceptance of technology, and is targeted specifically towards information system usage (Lee et al., 2003; Chen et al., 2011).

There were many papers published on technology acceptance after Davis' (1989) contribution. Several researchers developed the theory, adding and/or modifying the variables which are determining user technology acceptance for investigating acceptance in specific context. Many of them overlap each other and are very similar (Venkatesh, et al., 2003; Lee et al., 2003; Dillon & Morris, 1996; Chen et al., 2011; Momani et al., 2017). For instance, TAM was developed

into TAM2 where the subjective norm is included as an additional predictor of intention to use. Perceived enjoyment and fun have also been included in some versions (Chin et al., 2003).

One notable contribution to the fragmented theories of acceptance of technology came from Venkatesh et al. (2003), who reviewed eight models of user acceptance with different acceptance determinants and constructs. The aim of their research was to propose a unified technology acceptance model which integrates the elements of the eight models. The eight models that Venkatesh reviewed were the Theory of Reasoned Action, Technology Acceptance Model, the Motivational Model, the Theory of Planned Behaviour, the Combined model of Technology Acceptance Model and Theory of Planned Behaviour, the Model of PC Utilisation, the Innovation Diffusion Theory, and Social Cognitive Theory.

What Venkatesh et al. (2003) derived from their review of these eight models was that the four constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions are the most impactful determinants for user acceptance and usage. They defined performance expectancy as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p.447), effort expectancy as "the degree of ease associated with the use of the system" (Venkatesh et al., 2003, p.450), social influence as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2003 p.451), and facilitating conditions as "the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system" (Venkatesh et al., 2003 p.453). Four moderators for the independent variables, which they argued had most relevance, were age, gender, experience, and voluntariness of use. The model became known as the Unified Theory of Acceptance and Use of Technology (UTAUT).

As with TAM, the UTAUT was constructed for quantitative research purposes. The advantages of the quantitative approach of these acceptance theories is that they are proven and reliable, the findings offer much interpretation, and the results can be compared with other similar studies (Vogelsang et al., 2013). These models are also versatile, and since they carry pre-defined and tested measurement instruments, they are also manageable to carry out. Bagozzi (2007) points out, however, that the simplicity of TAM is also its limitation. One model cannot explain decisions and behaviour for all situations, all technologies, and for all kinds of decision making and makers. UTAUT is an attempt to make the explanation more robust, but there still might be important variables that have been left out (Bagozzi, 2007; Peek, et al, 2014).

In addition, the social aspect is not included in the original TAM, it is a framework for explaining decision making purely for individual users. The social aspect of decision making in UTAUT is limited to simplified social constructs. This is because "the perception of what other important people around the person thinks about the usage of the system", are social influences that are only either constraints or forces that affect the decision maker (Bagozzi, 2007). A simplified social aspect as this poses a problem for this paper because it aims to examine the perception of transport managers of the autonomous truck, which implies a reduction of human contact. This paper does not aim to measure the transport managers' acceptance quantitatively, but to explore how they perceive the technology. What the acceptance theories can offer is guidance for which individual aspects are important when examining acceptance.

Another problem with TAM and UTAUT is that the term acceptance is not appointed a specific meaning, it simply refers to the degree of willingness or unwillingness to use an IT system. The term technology refers to the IT system which is presented to the users. However, both terms are sensitive because they can have different implications on the relationship between the subject and the object depending on how they are conceptualised. This is an important aspect for this paper due to its purpose and the relation between the transport manager and the autonomous truck. The autonomous truck is a technology that has not yet been implemented and cannot be tested in organisational settings, so the two variables that Davis (1989) claimed to be most important to determine users' acceptance have to be adjusted for this context.

Lastly, since the transport managers are employees in an organisation, their acceptance of the system is not the same as acceptance in non-commercial settings. The choice of whether they will use the system or not is not in question because it is assumed that the transport manager will continue working regardless of their perception of the technology. This means that a conceptualisation of the terms acceptance and technology is necessary in order to construct a theoretical framework that makes sense for the context it will be used in.

2.2 Acceptance

The terms acceptance and adoption are sometimes used interchangeably in papers investigating confrontation or spread of new technology. However, Renaud and Biljon (2008) argue that there is an important distinction to be made when talking about acceptance and adoption of technology. They posit that adoption of technology is a process, where a person first becomes aware of the technology and then embraces it and makes use of it. Acceptance, on the other hand, is more of an attitude someone can have towards a technology, and this attitude can be

affected by many factors (Renaud & Biljon, 2008). However, even though acceptance has been perceived as a key factor when examining the introduction of technologies, there is currently no consensus on one definition of acceptance. (Adell et al., 2014).

Notwithstanding, in her examination of acceptance of IT systems, Adell (2009) identified different categories of defining acceptance. In the first category, acceptance is simply derived from the word accept, which is "the action of consenting to receive or undertake something offered" (Cambridge, 2020). The second category of acceptance definitions deals with requirements and needs of stakeholders, which can be translated into perceived usefulness (Adell, 2009). The third category is concerned with a deeper evaluation of the usefulness, were more attitudes of the person matter. In the fourth category, the acceptance definition is about the willingness to use the system, based on the perceived usefulness and all attitudes towards it. Finally, in the fifth category the actual use of a system is the main point. What can be deduced from the categorisation of the definition of acceptance is that the term acceptance can have several meanings that carry different implications for the relationship between the "accepting subject" and the "object" which the subject is confronted with (Adell, 2010).

Since the fully autonomous truck has not yet been implemented, it cannot be tested and the actual use of the system by which it will be managed cannot be assessed. Therefore, the definition of acceptance which falls under category five is not relevant for this paper. Furthermore, since the transport manager is assumed to continue working with trucks regardless of their perception of it, category four is also dismissed. The category which is left, that makes most sense to adhere to, is number three. Here, acceptance is composed by the attitudes the transport manager has towards the self-driving truck.

Similarly, Ittersum et al. (2006) argue that there are different acceptance types, namely attitudinal, intentional, and behavioural. These are much alike the different categories identified by Adell (2009). Attitudinal acceptance is when a person is accepting a technology in principle, intentional acceptance is when the person has accepted the technology to the degree that they form an intention (to use or not), and behavioural acceptance is when a person has fully accepted (or not) the technology and is behaving accordingly (Ittersum et al., 2006). Attitudinal acceptance is the most suitable type of acceptance to adhere to in this paper. This is because it is not possible to investigate intentions towards autonomous trucks, since the transport managers cannot, presumably, intend to buy/use the technology, and it is not known how the technology will specifically look like or how it will be used. Behavioural acceptance is defined

by the actions relating to the technology, which are also not possible to be investigated at this stage, because the transport managers cannot use the technology.

Fraedrich and Lenz (2016, in Maurer et al., 2016) argue that acceptance is relative to the subject, object, and context. In the present paper, the subject in question is the transport manager and the object is the autonomous truck. The context, which Fraedrich and Lenz (2016, in Maurer et al., 2016) define as the environment in which the subject relates to the object, is for the present paper the environment in which the transport manager operates.

Attitudes are defined as psychological constructs, they are evaluations of objects of thought (Bohner & Dickel, 2011), meaning feelings and opinions people hold about something or someone. Therefore, acceptance can be defined as a set of attitudes towards a specific thing, in this case the prospective self-driving truck, and these attitudes are contextualised in the relationships between the object, subject, and the environment.

2.3 Technology

Throughout this paper, the self-driving truck has been presented as the technological artefact that will affect the transport managers. As much as this might be the case, an implementation of this artefact implies an introduction of an IT system by which the truck will be managed. This is a technology itself, which the transport managers will have to come to terms with. Therefore, the truck can be seen as a conceptual proxy to how the transport manager perceives the technological change, because they will, presumably, be working with the IT system which will constitute the actual organisation change. Instead of using the telephone/mail/current IT system to communicate with the drivers, they will use the IT system to manage the movement of the truck. However, the IT system itself can also be seen as a conceptual proxy to how the transport managers perceive the technological change, because it is through the IT system that the truck is embedded in the transport managers' occupation. Therefore, the present paper is not concerned with the self-driving truck or the IT system as standalone technological artefacts. The focus is rather on the perception of both at the same time.

The trucks which are used in logistics service companies have undergone several technological developments throughout the years. In the next years, the autonomy of the truck is thought to gradually increase. The fact that the truck will not suddenly become completely self-driving, is of importance when conceptualising the technology since technology acceptance may fluctuate over time (Peek et al., 2014; Fraedrich & Lenz, 2016, in Maurer et al., 2016). Transport managers' perception of the issue may change as we get closer to the actual fully autonomous

transition. Therefore, the specific phenomenon which is in focus is the object which does not require any drivers to be present and an accompanying IT system.

Moreover, Ittersum et al. (2006) argues that properties of technologies can influence the acceptance of them. They write about two groups of technologies, evolutionary and disruptive innovations. The evolutionary technologies are those which are introduced to the markets in the same manner, meaning they follow a continuous or incremental innovation pattern. They have a lower uncertainty in outcomes and higher chances for success since their precedents succeeded. Disruptive technologies are more radical and discontinuous, their introduction causes major changes to markets or industries due to the large leap in advancement of the technology (Ittersum et al., 2006). What this classification means for this paper is not straight forward. The reason for this is the complexity of the conceptualisation of the autonomous truck. The autonomous truck could be interpreted as an incremental change because the truck itself has been, and is continuously, developed. Small changes to trucks over time have led to the efficient vehicle we have today. But on the other hand, the technology which this paper focuses on could also be interpreted as a disruptive technology, since a core component of the truck is eliminated. The elimination of the truck driver implies a big change to the logistics industry. However, before we reach the level of automation that would allow a completely self-driving truck, there might be technologies implemented along the way that are more incremental.

Lastly, Dewar and Dutton (1986) posit that acceptance towards technology may vary, depending on if it is more radical or incremental. Specifically, acceptance may be lower towards radical innovations, due to the perceived complexity of the technology. This needs to be taken into consideration when analysing the transport managers' attitudes towards the technology, because even though the autonomous truck will be presented as a disruptive technology, the transport managers might perceive it differently. A categorisation of technology in one of these terms is, therefore, not stringent. However, it can still serve as another analytical tool but both must be included.

2.4 Conceptual Framework

Together with the review of the technology acceptance model and the clarification of the terms "acceptance" and "technology", it is now possible to synthesise a theoretical framework that will allow an analysis of the transport managers' perception of the autonomous truck.

The two variables of TAM, *perceived usefulness* and *perceived ease of use* (Davis, 1989), lack depth and are too specific for this paper. The four constructs that Vankatesh et al. (2003) found through their review of acceptance models show that acceptance should not be investigated through one single aspect or variable. The four constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) from UTAUT (Vankatesh et al., 2003) are not entirely valid constructs for the purpose of this paper. They also either lack depth or are too specific for the present context. In addition, both TAM and UTAUT, as presented, consist of measurable variables. Such theorising is not appropriate under a qualitative approach. However, the variables and constructs of the models and theories reveal which elements are of importance when examining acceptance. Since UTAUT is a more comprehensive model that incorporates more components, and includes TAMs variables, it will serve as the basis for the framework of this study.

Due to the lack of possibility to assess the technology, UTAUT's *effort expectancy* and *performance expectancy* can be fused together into one dimension: the technical operation. Due to the conceptualisation of acceptance and technology, the dimension can consist of the transport managers' perceptions of and attitudes towards previous technical changes, current technical systems, and possible future ones.

The constructs *facilitating conditions* and *social influence* from UTAUT can be extended into broader dimensions as well. Facilitating conditions, as defined by Vankatesh et al., (2016), would be more appropriate to conceptualise as the *organisational environment* in which the transport manager works, which can include any element therein, both social and technical. Moreover, it does not need to be bound strictly to a belief of support from the existing organisational and technical infrastructure, like proposed by Vankatesh et al. (2016), but instead also include any personal attitudes towards those infrastructures.

The *social influence* can be conceptualised as a dimension that includes all social aspects of the transport managers' occupation. In addition, it is beneficial to expand the social dimension so that it includes more than the perception of what others believe and include any attitudes towards any possible social changes. Lastly, the three elements *technical operation*, *social*

influence, and *organisational environment* can be interlinked with each other, giving space for even more interpretation of the attitudes of the transport managers towards the technology. This is an important distinction because of the complexity of attitudes that can arise in some circumstances. For instance, some social aspects can be heavily influenced by the organisational environment, or the technical operation by social aspects etc. Figure 1 illustrates the model for this thesis.

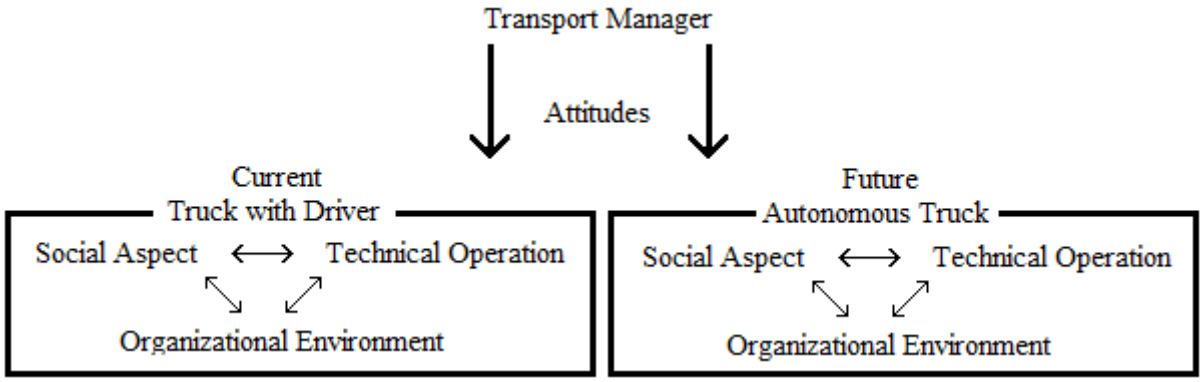

Figure 1. Conceptual model.

The conceptual model shows that the transport manager has certain attitudes towards the current situation with a driver and towards the future scenario with the autonomous truck. The model encapsulates the transport mangers perception of the truck, contextualised in the social aspects of their work, the organisational environment in which they work, and the technical operations that they conduct daily. The arrows between three elements indicate possible interactions between them. What the perceptions of the current scenario offers is context to the future scenario. The model also highlights acceptance as relative to the subject, object, and context (Fraedrich & Lenz, 2016, in Maurer et al., 2016), and allows an investigation into the broader socio-technical system of the autonomous truck from the transport managers' perspective. This means that the transport managers' perception of the autonomous truck being conceptualised as an incremental or disruptive technology can be attained.

The model above is an attempt to translate the quantitative theories into a suitable framework for a paper which undertakes a qualitative approach. Its constituents and their composition were formulated broadly for the sake of not relying too much on theory, as such conduct can limit the ability to see emergent findings in the empirical material (Collins & Stockton, 2018).

3. Case: the Autonomous Truck

In the advent of the fourth industrial revolution, the autonomous truck has made its way to the headlines and gathered much attention in recent years, even though the concept of an autonomous vehicle has been around for quite some time. A remotely controlled driverless car entered the streets during the 1920s', credited as "one of the most amazing products of modern science" (LaFrance, 2016). It was, however, impossible to ignore the dangers of driving and the many deaths caused by regular vehicles at that time. Further development for more secure vehicles was, therefore, naturally warranted (Kröger, 2016, in Maurer et al., 2016). In the following years many developments concerning the autonomy of the car began to emerge.

The notion of automated freeways was introduced during the 1930s' (Kröger, 2016, in Maurer et al., 2016) and pushed even further by General Motors in the 1950-60s' when they proposed a highway that had wires buried underneath it which communicated with the vehicle (Bartz, 2009). In the end, the automated freeway concept did not take off because of the economical infeasibility, but a by-product of the "technological utopia" from these times did, namely the cruise control function. The concept of the autonomous vehicle continued to experience developments from different parts of the world and for different purposes. Research on moon operations by robot navigation took place in the USA during the 1970s' (Kröger, 2016, in Maurer et al., 2016), and a first driverless car was presented in the 1980s' during the European EUREKA Prometheus project (Payre et al., 2014). However, this concept was only a prototype and it has not yet been commercialised.

To date, there have been many technology adoptions that have affected the state of autonomy of the car. For instance, lane keeping assistance, anti-lock brakes, rear view alarm system, parking sensors, and the cruise control function are part of the driver assistance system that gives the vehicle more control of its movement and less control is expected form the driver (Kröger, 2016, in Maurer et al., 2016; Fritschy & Spinler, 2019).

Nevertheless, the introduction of a fully autonomous truck is considered to have a disruptive effect on the logistics industry (Manyika et al., 2013; Bentenrieder, 2017; Hofmann & Osterwalder, 2017, Fritschy & Spinler, 2019). While the primary objective of autonomous cars is increased safety (VDA, 2015; Validakis, 2013), Fagnant and Kockelman (2015) highlight, in their study of possible impacts of the autonomous vehicles, that bringing high levels of computerisation into driving has potential to dramatically alter the transportation network. They point out that there is a possibility that the autonomous truck will reduce the number of

accidents, but also improve the fuel economy, allow higher levels of mobility for those who are unable to drive, and reduce parking needs. Other researchers also point out that once the autonomous vehicle has taken over the roads there will be a reduction in the environmental footprint (Khoury et al., 2019).

Clark et al. (2016) identified future challenges for the implementation of autonomous vehicles and suggested that the sociological environment will play a big role in the adoption of the technology. This challenge is highlighted in the study of Harrow et al. (2018) who investigated the public attitudes towards autonomous vehicles, and argued that the sociological perspective on the introduction of the autonomous vehicle is imperative for the future development of our cities. In the context of logistics, Hofmann and Osterwalder (2017) examine how the increasing digitalisation will affect logistics service providers and their business models. They argue that there is an increasing use of IT, and that the autonomous truck is a threat to traditional logistics service providers.

As much as driverless vehicles have played a major role in our imagination of technology (Kröger, 2016, in Maurer et al., 2016), there is currently no complete consensus on a definition of what constitutes an autonomous vehicle. However, comprehensive descriptions of different levels of autonomy have been presented. In previous years, The German Federal Highway Research Institute (BASt) and US National Highway Traffic Safety Administration (NHTSA) put forward their definitions of automation in vehicles. However, in 2014 SAE International, a global actor who has been developing standards for the mobility industry for many years, released an information report on the taxonomy for vehicle automation that is more detailed (SAE, 2014). They identify six levels of automation, ranging from zero to five. In the first three levels, “No Automation”, “Driver Assistance”, and “Partial Automation”, a human is needed for monitoring the environment, and in the next three “Conditional Automation”, “High Automation”, and “Full Automation” an automated driving system monitors the driving environment. There is a difference of who executes the steering, acceleration and deceleration, and fall-back performance between the levels. Simply put, the degree of automation increases with the levels. This paper only considers the last level of automation, where no driver is needed.

Our relationship with the car has been affected by the various technological developments that have been implemented in it (Flämig, 2016, in Maurer et al., 2016). However, other technological inventions that were developed parallel to the ones for the car, also had an impact on how we use the car. The connectivity, meaning the exchange of information between

vehicles and their surroundings (VDA, 2015), and the various technologies allowing this communication, changed the way we operate these machines. For instance, the invention of the cell phone, the World Wide Web, Bluetooth, and the smart phone integration has allowed for a more convenient, efficient, and effective use of the truck for commercial purposes (Gao et al., 2016). These inventions have not only affected us and how we use the vehicle, but also the development of the vehicle itself, as they are key ingredients for the future development of the autonomy of the car (VDA, 2015).

The truck has made a big impact on how our societies are constructed and on those who work with them daily. However, the development of the truck never stopped, and it is highly probable that there is a change coming. Many experts and researchers have speculated, putting forward their visions for the future of the truck, but what the future will look like regarding the autonomous trucks is still unclear. Big corporations are currently experimenting with the technology, and laws are being revised so that the self-driving vehicle can make its way on the roads.

4. Methodology

Saunders et al. (2019) proposed a model, the "research onion", which describes the different methodological levels of a study. The analogy of a multi-layered construct reflects the different methodological dimensions, which are abstract in the outer layer and more concrete in the core layer. The most outer layer is the philosophy which the study adheres to. Next is the approach which the study undertakes to develop theory, and after that the method choice. The following layer is concerned with the chosen strategy, and finally, the most inner layer is about data collection and analysis. This chapter will follow the structure of Saunders' et al. (2019) "research onion", and the different levels will be presented in that order as it provides a useful structure when presenting a methodology.

4.1 Research Philosophy

Identifying the philosophy of this paper is important because it contains the assumptions about how the nature of reality and knowledge is perceived, which influences the paper and the choices made along the way (Saunders et al., 2019). Regarding ontology, which is a philosophical branch that is concerned about the assumptions of the nature of reality (Easterby-Smith et al., 2015), a subjectivist position is adhered to in the present paper. Even though the focus is on technology, the main concern is the transport managers' perception of it. Bryman (2012) writes that from a subjectivist standpoint, social phenomena is created from the perceptions of the social actors. Subjectivism as ontology is an appropriate philosophy for the present paper's purpose because it aims to explore the subjective reality of transport managers. It seeks to investigate the relation between the transport manager and the truck driver, the IT systems, and their environment, with the aim to outline the perception transport managers have on a future technology.

The contrary view, an objectivistic one, would not allow to investigate the transport managers' perception of the truck in the same way. An objectivist stance would see transport managers as employees in an organisation with specific job descriptions that requires them to act in a certain way (Easterby-Smith et al., 2015). Even though this is the case, the autonomous trucks are perceived differently by different transport managers, and their attitudes towards social actors in their social sphere are different. Therefore, the ontological stance of subjectivism, which allows an understanding of transport managers' different realities, is more suitable.

Epistemology is a branch of philosophy that is concerned with the nature of knowledge (Bryman, 2012). An interpretivist epistemology is held for the present paper because the study is concerned with the perceptions and attitudes of transport managers towards a specific

technology. Easterby-Smith et al. (2015) write that interpretivism as an epistemology implies that human interests are the main drivers of science, and that the results of a study aim to extend the general understanding of a particular situation. Such implications fall in line with this study because the transport managers' interpretation of the autonomous truck is of interest, as well as their interpretation of its possible effects. In addition, the present study aims to explore the acceptance of transport managers towards the autonomous truck through semi-structured interviews in order to gain a deeper understanding of how the transport industry perceives the phenomena. Numbers and facts are not of interest, as they would be with a positivist epistemology (Saunders et al., 2019). Instead, the spoken accounts of the subjects constitute acceptable knowledge for this study.

An interpretivist stance allows for a deeper understanding of the problem, but it can also lead to personal and biased viewpoints which makes a study's results difficult to generalise (Saunders et al., 2019). The philosophical underpinnings of this study would be very different if the methodological choice would be to conduct surveys, which would presumably be based on TAM or UTAUT. If the purpose of this paper would be to measure the acceptance of transport managers, it would then be beneficial to adhere to a philosophy that sees the external world and observable facts in a different way.

4.2 Research Approach

The present study takes on a qualitative approach, which means it is concerned with a subjective assessment of the transport managers' attitudes towards autonomous trucks. Qualitative studies, such as this one, are interested in exploring the meanings people assign to certain phenomena (Creswell, 2014). By using this approach, the people conducting qualitative studies are situating themselves in the world, trying to study and interpret phenomena in a natural setting. This approach is quite different from a quantitative one, where the measurement of attributes or numbers is in focus.

Saunders et al. (2019) identify two approaches for reasoning the relationship between the world and theory. With an inductive approach a theory is developed, rather than tested (Saunders et al., 2019). With a deductive approach, hypotheses would need to be developed, based on a theory, and the study would aim to test the hypotheses. Deduction has its roots in the research field of natural sciences, where quantitative methods are most prevalent. However, with a quantitative approach an investigation of how people make sense of their social world becomes burdensome, if not impossible (Saunders et al., 2019). In addition, the rigidity of deductive methods limits the interpretation of the results. Inductive approaches, on the other hand, are

constructed for the purpose of investigating more complex situations, where qualitative data is of more interest. The role of the empirical data for this paper is to challenge the theoretical framework and its conceptualisation, and by doing so create new knowledge about the acceptance of autonomous trucks.

4.3 Strategy and Design

There are three main methodological approaches one can choose for a study, a quantitative, a qualitative, and a mix-method approach (Saunders et al., 2019). As mentioned in the previous section, this study takes on a qualitative method. It was considered as the most suitable method because of the complexity of the topic at hand. Moreover, the purpose of this paper was to study acceptance of technology by this method, given the criticism, stated in the problematisation chapter, towards quantitative approaches when investigating acceptance.

When it comes to the strategy, a case study strategy is adopted. Yin (2009) writes that certain conditions promote certain types of strategies. A case study is appropriate to use when the research questions of a study are of the "how" and "why" type, when the study does not require control over behavioural events, and when it focuses on contemporary events. The present study finds itself under all of these conditions. This paper looks into how and why the transport managers perceive the autonomous truck as they do, it does not require any control of the behaviour events, and it is focused on how the transport managers perceive the technology now. Eisenhardt and Graebner (2007) write that a case study is looking at specific phenomenon in real-world context which allows a rich understanding of the topic, unlike laboratory experiments where phenomena are isolated from their context. The chosen case group for this study are transport managers that work in Sweden.

4.4 Sampling and Choice of Interviews

Transport managers working in Sweden in logistics service providing companies were chosen for this study due to their connection to the autonomous truck and the level of their nationality's infrastructure development. A non-probability sampling method (Easterby-Smith et al., 2015) was chosen to reach out to the Swedish transport managers. Specifically, a convenience sampling method was carried out, by two different means. First, logistics companies located in Sweden were identified by searching for logistics related keywords in a search engine, then they were reached by telephone and asked if they wanted to participate in this study. The second method involved the use of the business and employment-oriented online service LinkedIn.

Before logistics companies were contacted by phone, different company sizes were identified in order to reach out to transport managers working under different organisational settings. This was thought to give a better representation of what transport managers think about the autonomous truck. The phone call to the companies started with the author identifying himself and presenting the study, then asking if they wanted to participate in the study.

A mention of the contemporaneous covid-19 pandemic is of importance, since several of the companies experienced a significant increase in workload, resulting in less time for collaboration. Moreover, the pandemic situation led to the choice of conducting phone interviews instead of face-to-face interviews. This affected the data collection and analysis.

With the second method, contacting transport managers on LinkedIn, a greater number of respondents were attained. The website offers a search function which allows to filter people by their occupation. Keywords such as "transport manager", "traffic planner, and "transport planner" were used in order to find suitable interviewees. Another filter was set to limit the search for people working in Sweden. A short message about the author and the study was sent to the transport managers.

Establishing eligibility criteria is an important aspect of any sampling method (Easterby-Smith et al., 2015). However, due to the difficulties in reaching transport managers, the criteria was broadened so that any transport manager working in Sweden was made eligible. Vankatesh et al. (2003) mention in their review of technology acceptance models that there are certain moderators for measuring technology acceptance that they found important. They argue that age, gender, experience, and voluntariness of use are the most important ones. Since this present study does not aim to measure acceptance quantitatively, and due to the difficulty of reaching transport managers, none of these four moderators were taken into consideration as eligibility criteria. Nevertheless, the interviewees' age and experience were brought up and noted during the interview.

There are certain downsides with the non-probability convenience sampling method. Firstly, it is impossible to guarantee that the sample of this study is representative of the transport manager population (Easterby-Smith et al., 2015). The samples for this study were mostly restricted to transport managers using LinkedIn, which could affect the data collected. Certain age groups, or other demographics, might not use the website.

4.5 Interview Structure

Since this is more of an exploratory study, the interview guide followed a non-standardised structure (Saunders et al., 2019). The interview guide was structured around the core themes of the research questions. Hesse-Biber and Leavy (2010) posit that in-depth interviews allow the respondents to express their opinions and perspectives to a great extent. The outlook transport managers had on the autonomous truck required the interview to be somewhat open-ended. However, in order to answer the research questions and gain relevant information some structure in the interview guide was needed as well. Therefore, the interview contained predefined questions to guide the conversation.

The interview started with an introduction of the author, followed by a short presentation of the topic and the purpose of the paper. Then, the interviewees were assured that data will be handled confidentially and that their responses would be noted by pen. Lastly, the interviewees were asked if any clarification was needed about the study or the interview. Hesse-Biber and Leavy (2010) write that such transparency allows trust to be built between interviewer and interviewee, which increases the richness and quality of the interview.

The interview questions were based on the themes of the three research questions, divided into three parts. The first part of the interview revolved around the interviewee, specifically their education, working experiences, and daily working routines. The second part focused on social relations and technology. Here, transport managers were asked how they perceive their current relationships with bosses, clients, co-workers, and most importantly – truck drivers. Regarding IT, questions on what they think of IT at work were brought up. One main aspect that was focused on was IT changes and introductions of new technologies. The reason for investigating the perceptions on current social and technical aspects was that it paves the way for an understanding of the perception on the future social and technical aspects. Martin (2020, p. 13) writes that "…*if we are to speak of a future "revolution" brought on by increasingly autonomous forms of vehicles it is important to understand how driving is experienced at present*". This statement resonates well with the present thesis and the first research question. If the perceptions of future social and technical aspects of the workplace are to be investigated, then it would only be reasonable to also understand how transport managers perceive current social and technical aspects of their work.

The third part of the interview was about the transport managers' thoughts on the autonomous truck and on its influence on their work. The first question in this part, which was "What is the first thing you think of when you hear the words autonomous truck?" (see Appendix 1 for the

complete interview guide), steered the conversations into various directions. Lastly, the interviewees were asked how they would feel if there was a decrease in social interactions and an increase in technical work. After all topics had been covered the interviewees were asked if they would like to add something to what they had said earlier or if they had any questions.

4.6 Data Collection and Analysis

Many of the transport managers that were contacted hesitated to participate in the study, saying that they do not know anything about autonomous trucks. After some clarification and persuasion some chose to participate. The message which was sent to transport managers on LinkedIn was reconstructed several times to achieve higher response rate. However, the response rate was overall very low. Luckily, 13 transport managers chose to participate. All 13 interviews were conducted between 1st April and 1st July 2020 and on average took 37 minutes each. Table 1 shows the information about each interview.

ID	Age	Company Size	Lenght of Interview (min)	Date
TM1	25	L	40	2020-04-01
TM2	47	S	30	2020-04-06
TM3	25	S	28	2020-04-07
TM4	44	S	31	2020-04-08
TM5	45	M	35	2020-04-09
TM6	36	L	41	2020-04-10
TM7	26	L	38	2020-04-14
TM8	32	L	37	2020-04-16
TM9	54	L	40	2020-04-17
TM10	26	L	37	2020-04-17
TM11	34	S	35	2020-04-24
TM12	36	M	45	2020-06-30
TM13	33	S	40	2020-07-01

Table 1. List of interviews.

All interviews were conducted via telephone in Swedish, except two which were in English. The subjects were not chosen based on any gender specifications, and this variable is not being taken into consideration in the analysis. The age of the interviewees was recorded and is included in the table, as it was thought to potentially have influence on the transport managers' views. The company sizes were also noted down as it might have an influence on the transport managers' perception of the autonomous truck. Companies having less than 20 employees were considered as small logistics companies, 21-150 as medium, and the large ones were global or international logistics companies with thousand or more employees.

The analysis of the data was undertaken with a thematic approach. Braun and Clarke (2012, p.57) describe thematic analyses as "methods for systematically identifying, organising, and offering insights into patterns of themes across data sets". This type of analysis was chosen for this paper as it offers a logical way to analyse the qualitative data which was collected through the interviews (Saunders et al., 2019).

The thematic analysis approach can be used in several different ways (Braun & Clarke, 2012). The one thought to be most appropriate to use in this study was the "bottom-up" approach. This means that instead of bringing themes from existing literature and using them to analyse, themes are derived from the content in the data (Saunders et al., 2019). However, Braun and Clarke (2012) argue that it is not feasible to only adhere to one type of thematic analysis approach. Even though the themes are derived from the content in the data, there still needs to be some verification as to whether the codes, which make up themes, are relevant for the study.

Therefore, there was some influence as to which themes were deemed more appropriate in this study. This was because of the nature of the qualitative data which was collected (Saunders et al., 2019). The data which was collected consisted of written notes from the interviews. The notes represented what was thought to be of most importance to collect during the interviews, and as there was some structure in the interview guide, which was a predetermined set of ideas and topics, the thematic approach undertaken is not a purely "bottom up" approach.

Nevertheless, the aim of a thematic approach is to create themes and sub-themes out of codes (Bryman, 2012). Saunders et al. (2019) describe codes as building blocks of the analysis, which are used to label data at word or sentence level. Themes are the patterns which the blocks create, and contain something important about the data which can answer the research questions (Braun & Clarke, 2012). To conduct a thematic analysis of qualitative data one can follow the six steps proposed by Braun and Clarke (2012);

1. Get to know the data.
2. Create codes.
3. Identify themes.
4. Review themes which were found.
5. Define themes and relationships.
6. Produce a story from propositions.

Familiarisation with the data begun during the interview when the interviewees' responses were written down on paper. The notes were subsequently transcribed to the computer and read

thoroughly several times. For step two, codes were created for each data item (transcript). As mentioned earlier a "bottom up" approach was used, which means that the codes that were created were derived from the dataset itself and not based on theoretical literature. However, these codes were guided by the research questions so that relevant information that could aid in answering the research questions could be attained (Braun & Clarke, 2012). The amount of codes was limited since the transcripts were of concentrated data (the notes taken were mostly of things that seemed relevant, so there was only little irrelevant data to begin with).

After the data had been coded, the codes were reviewed and compared so that themes could be identified. The main themes were related to the research questions of this study. Later, these themes were scrutinised, and their quality was assessed. With coherent themes, relationships could then be identified between them. The last step in the analysis consisted of laying out propositions, which could be derived from the patterns found in the themes, and then testing if the propositions were solid. The propositions were tested against the initial data set to make sure that they do not have negative examples or alternative explanations (Saunders et al., 2019). Finally, with the valid propositions the analysis was written.

4.7 Ethics

By integrating ethics into the entire research process, one can certify that one has taken ethical principles into consideration, beyond informed consent (Hesse-Biber & Leavy, 2010). Bell and Bryman (2007) identified categories of ethical principles which are thought to be beneficial for both the researcher conducting research and the management field as a whole. They mention categories such as harm to participants, dignity, deception, and more. Ethics and its contribution to social sciences have been identified by many scholars and institutions throughout the years, and many different perspectives, rules, codes, and frameworks have been produced. The Swedish Research Council (Vetenskapsrådet, 2002) is one of the actors that have outlined several principles which they argue that ought to be considered when conducting social science research. The structured ethical framework which The Swedish Research Council produced shaped the present thesis and its methodology.

The Swedish Research Council (Vetenskapsrådet, 2002) condensed different ethical aspects of research into four main categories of individual protection requirements that should be taken into consideration when doing research. These four fundamental requirements are information, consent, confidentiality, and utilisation.

The information requirement is about informing the participants of the study about what its purpose is and what conditions apply for the participants to be a part of the study (Vetenskapsrådet, 2002). Moreover, it must be made clear for the participants that the participation in the study is voluntary and that they can opt out if they want to. In the present study interviewees were informed about the purpose of the study at first contact. When the author of this paper reached out to transport managers by telephone or via LinkedIn, the transport managers were informed that this is a Master's thesis which requires interviewing people, and subsequently they were asked if they wanted (voluntarily) to participate. At the beginning of all phone interviews, after an introduction of the topic of the thesis and its purpose, the interviewees were informed that they could choose to not answer any questions they did not feel like answering. Accordingly, it is thought that this paper followed the information requirement.

The second requirement is about consent. Specifically, participants should have the right to decide whether they want to participate in the study or not, and to what extent and under what conditions (Vetenskapsrådet, 2002). Moreover, the requirement also states that participants are not to be influenced or pressured in an undue manner when they decide to participate or cancel their participation in the study. The transport managers interviewed for this study were aware that their participation was voluntary, since they were asked openly and clearly if they would like to help a student with their paper. Regarding influence and pressure, the inquiry for cooperation in the study was not persuasive in any excessive way (see appendix for message which was sent to transport managers on LinkedIn). No interviewee decided to opt out of the interview during its course of action. However, some transport managers decided that they did not want to participate, even after a further clarification of what the study was about. This happened twice when logistics companies were contacted via telephone.

When it comes to confidentiality, the third requirement, anonymity of the transport managers was set from start. No names of the persons or the names of the companies they worked in were noted down. The transport managers were given IDs, such as TM1, and the company size was marked as either S, M, or L. In addition, it was mentioned in the beginning of each interview that no questions on sensitive company information would be asked, such as, information about intellectual property, plans for organisational mergers, or trade secrets etc. The Swedish Research Council (Vetenskapsrådet, 2002) writes that all data on identifiable people should be stored so that no outsider of the study can access it. This was the case for the present study; all data was stored on the personal computer of the author and was not shared with anyone. The

finalised version of the paper was submitted to the person responsible for grading, and drafts were sent to a mentor for feedback, but no version contained any information that would make interviewees identifiable. By doing this, the last requirement, which is about proper utilisation of the collected material and results (Vetenskapsrådet, 2002), was also fulfilled.

4.8 Reflection

The idea of investigating acceptance with a qualitative method poses a certain challenge. It is unreasonable and unproductive to ask someone directly whether they accept a technology or not. What can be done instead, is to examine people's attitudes towards the technology, since people's attitudes tend to affect what they think about the technology (Renaud & Biljon, 2008).

Getting hold of people's attitudes towards a forthcoming technology required a broad set of questions with different themes. This is reflected in the three research questions for the thesis. By acquiring information about how the transport managers perceive their current workplace, in terms of social and technical aspects, what they think of the technology in general terms, and how they think the technology might affect the social and technical aspect of their work, their attitudes towards the technology and the context to those attitudes could be attained. Context to the transport managers' attitudes was thought to give more information on why they might have felt the way they felt, and why they said the things they said. This felt like an important part of the interview guide since the autonomous truck is still in its early stage of development.

The Corona virus pandemic, which took place during the data collection phase of this study, not only affected the data collection method, but also the case group. It was found that some logistics companies experienced higher workloads during this time, leaving less time for interviews and an overall change in atmosphere. Some transport managers started working from home. This might have affected their perception of the social aspects of their work, which was one of the main themes investigated in this thesis. Moreover, the fact that the interviews were conducted via phone, and not audio recorded, was thought to have influenced the data collection process and subsequently results and analysis of this study. However, the notetaking still enabled a documentation of what the respondents said.

Saunders et al. (2019) write that a mixed or multimethod approach can help increase the credibility and validity of research. There was no triangulation done in this thesis because the whole purpose of it was to examine acceptance of a forthcoming technology with a qualitative method. Document analysis was considered as a complementary method at first, but there was

not much data on transport managers' perception of the autonomous truck, so this method was not used.

Lastly, conducting this study alone somewhat limited the collection of material, and subsequently interpretation of the transport managers' attitudes towards the technology, since documentation was done by note-taking. It would have been beneficial to work in a group, where one person could focus on taking notes and the other one on leading the interview.

5. Findings

A summary of the conducted interviews is presented in this chapter. The chapter is divided into three sections: perceptions of current social and technical aspects, perceptions of the autonomous truck, and attitudes towards social and technical changes. These sections are taken from the interview guide which was used for the interviews.

5.1 Perceptions of Current Social and Technical Aspects

5.1.1 Social Aspects

The educational background of the interviewed transport managers was quite similar; most of them had some kind of college degree in transport or logistics. Their experience in the logistics industry varied more, some having recently graduated from college and having spent a year or two in the company they were working in, others having worked for a longer time and with various jobs in transport companies. Some of the transport managers had driven trucks themselves before working as transport managers. The workplaces varied a lot, both in terms of number of people working in the office and the age differences between the transport managers.

Daily routines were very similar for all transport managers. Almost all started by interacting with some kind of IT system, to check for updates or news about transports. Some indicated that there is a lot to do in the morning. TM10 and TM6 mentioned the amount of IT systems they need to keep track of and expressed frustration towards this. TM10 stated that "*When you start the computer… so many programs and systems start all at once…it makes you dizzy in your head, you have to keep track of so much…*".

Relations and communication with the drivers differed a lot among the transport managers. Most of the transport managers said something positive about the truck drivers, specifically they mentioned that the drivers are the core of the firm. However, not everyone meets with their drivers face-to-face. Those who do not, communicated via phone, SMS, or IT system. TM7 said "*Our relation is bad… we have mostly contact with the hauliers* [the drivers' bosses]*… I never meet the drivers face-to-face… it is bad because it is better to talk directly with the drivers…but I don't have any deeper relation with them…"*. TM8 also pointed out the organisational structure, "*we do not have any drivers ourselves, we hire trailers…but it does not matter that they are not employed by us…it is still professional* [their relationship and communication via phone or SMS]*"*. However, the transport managers also said that *"they are an important part of the company…when we say that we offer high quality services to our customers, we include the drivers*" (TM12). One aspect of the organisational structure and how it affects the logistics operations was mentioned by TM8 who pointed out that the nationality

of the drivers affects the work. TM8 said that it is of importance sometimes because when an entire fleet of drivers from the same nation goes on holiday the company can be in trouble.

The transport managers who met the drivers face-to-face did so but rarely. The idea of the drivers technically being the transport managers' bosses was also raised by TM2, who said "*I decide where they drive…but they are technically my bosses because of the structure of the firm"*. TM1 was referring to the logistics company's structure, which is different from other logistics companies. TM1 said that truck drivers formed a company, and then transport mangers were hired to handle the office work. When asked about the relation to the truck drivers TM1 said "*Our conversations are mostly professional…sometimes there is informal talk, like we small talk"*, adding later "*some of the drivers are more open than others*". TM1 also pointed out that the conversations are influenced by how well the drivers perform, saying that if a driver makes more mistakes the conversations are stiffer and less personal. Teamwork was only mentioned by one transport manager, who said that they "*help each other out, they see things out there, we see it on the computer…it's about keeping a dialogue*" (TM3).

Some transport managers spoke about the drivers on a more personal level. TM6 pointed out that the relationship to the drivers is special due to the fundamental difference in occupational tasks. TM6 said that "*we have to be professional, but at the same time show empathy. Some of them are away from their families for a week… this affects them…"*. This was also highlighted by TM12 who said that the drivers do not live a luxurious life, adding "*only our warehouse personnel talk to them…but they don't have personal conversations…"*. When asked about the relation to the drivers, TM11 said that "*they are good if you don't stress them… as long as you don't force them to work, everything is fine… it is possible to have a good relationship, but you need to understand them. I know how they think… they want it served to them* (TM11 was referring to information about the transport mission). TM11 later mentioned that their father is a truck driver.

Regarding social problems, several transport managers mentioned frictions between themselves and their drivers. However, most who did, also pointed out in one way or another that "*…it's nothing severe…"* (TM2), and that there are "*…no problems that we can't solve… some fussing with the drivers, but that's standard*" (TM5). When talking about the frictions with drivers, TM4 spoke similarly about there being some tension sometimes, and added that friction arises when the driver does not do as TM4 instructs them. Sometimes when this happens, TM4 said that the drivers' bosses are contacted via mail if the problem at hand requires it. This was also mentioned by another transport manager, TM6, who said in frustration "*sometimes I contact*

their bosses, sometimes I need to tell them what my expectations are... I have to repeat it several times…". Communication with the drivers' bosses was mentioned by TM1 as well, who said that "*I sometimes get mail from their bosses, regarding few driving hours…*". TM1 said this when talking about drivers wanting to work as much as possible to get paid more. Frictions arising due to age and experience differences was mentioned by TM10, who said that "[the relationship] *is better than I thought…but they had problems accepting me in the beginning, since I am young and they are a lot older…but it became a lot better later, I showed them that they can trust me*". This was the only time trust was mentioned.

When asked about their relation to their bosses, all transport managers said positive things. For instance, they said things like "*we are like a small family*" (TM5) and that "*we do not see each other as bosses/workers, but as teammates*" (TM3). The amount of people working together varied among the interviewees. Some transport managers had colleagues working with similar tasks, while others either did not have any colleagues or they were working with other things. However, most of the transport managers had around 4-8 colleagues. The transport managers' perception of their relation to their colleagues was different from that of their bosses. Age and experience differences were mentioned several times by the younger transport managers. TM6 said that "*when I was new, I had to adjust to my colleagues*". TM7 spoke similarly about colleagues at the workplace, saying "*I am the youngest one at work… have to take shit for that sometimes…but it's not unusual that the youngest is treated like this*". TM1 was a bit more positive towards the age differences, saying that "*being the youngest affects the relationship, colleagues know what I am going through, they can help a lot…*", and later added that some of the colleagues used to work as truck drivers prior to their current job.

5.1.2 Technical Aspects

The majority of the interviewees had a positive attitude towards technology in a general sense. Most of them pointed out the importance of IT, saying "*software is the most important technology at work…*" (TM7), and "*I can't believe how they worked before without all of this…* (referring to technologies like phones, computers, IT-systems, etc.) (TM11). Many other transport managers said that IT systems are at the core of their job, and that software programs, such as excel, allow them to do their work. However, TM10 and TM6 pointed out that it is sometimes frustrating to deal with many systems which they need to keep track of. A negative aspect of IT was brought up by TM12, who said that using the computer to communicate with the drivers, via mail or IT system, is effective, but that "*…you lose the personal touch*" (TM12).

When asked about issues with technology some transport managers said that there is always something wrong with the technical stuff, and it was also mentioned by some that they have back-up systems in case something goes wrong. When TM1 was asked about technical problems and how it affects their work, TM1 said "*If there is a mistake somewhere, then someone will notice. There are many people involved in the chain, so a mistake is easy to spot*". TM8 also felt safe regarding errors but in a different way, saying "…*we mostly use basic IT systems, so we are not worried about major failures…*". Regarding the cause of errors, TM7 said that "*I mostly trust the systems, but the human factor can cause more errors. I have to double check the work sometimes to see if there are any mistakes done, and I wish I did not have to do that*".

When the transport managers were asked about how they solve IT problems and deal with IT support, most of them were satisfied with the help that is available to them at work. Quite expectedly, the transport managers who worked in smaller organisations did not have an internal IT support. This was the case for TM11, who said "*I fix problems myself… I have to, there is no one here… after a while you know how to fix things…*". Most of the transport managers had access to IT support through external third-party companies. TM1, TM2, and TM13 mentioned that they had a person in the office who was good with computers, and this person was contacted first before the IT support. Regarding help from IT support, whether internal or external, no one said anything negative. TM8 felt confident about this, saying "*the IT support is very helpful, any errors are fixed promptly… it needs to be fixed right away, otherwise it costs a lot of money*". Several transport managers pointed out that they receive help fast.

Many of the interviewed transport managers had experienced some kind of new technology being introduced to the workplace. The greatest technology shift was experienced by TM9 who is 54 years old and had worked for many years at the company. When asked about previous technology implementations, TM9 said "…*previously, drivers were without phones and needed to borrow one in the office…*". TM9 was reflecting on how technology had changed the workplace and said, "*for better and worse…the way we communicate with the driver has developed a lot… the accessibility and availability has facilitated the work so much…*". TM9 was referring to the telephone, saying that it was the most revolutionary piece of technology, when it comes to truck driving.

Most of the introductions were about software updates or completely new IT systems. The transport managers who had experienced new IT at work had do go through some kind of

learning program. For instance, TM3 said that "*…we had to take courses in the evening to learn the program…*". Feedback was given back to bosses and *"almost everyone in the office felt okay with it, so it stayed* [the IT system]" (TM1). TM8 and TM4 talked about how the people responsible for the new technology first investigated the market, looking at competitors to see which systems they use, and also speaking with clients and other parties in the industry, to see whether the chosen system would be optimal. However, TM4 also mentioned that "*everyone* (in the office) *got to take it as it came*", indicating that opinions of TM4 and other colleagues were not taken into consideration when this new IT was introduced. TM9's stance on new IT was quite different from TM4's. TM9 said that they have IT departments that deal with IT, and sounded surprised that this question was even asked, making it sound like "*it is their job*". It is worth mentioning that TM4 works in a smaller organisation and TM9 in a large one.

Many of the interviewees had proposed smaller changes to existing IT systems. TM10 was one of those who had proposed a change of an entire IT system, which they had been working with in another company. TM10, who talked about this advanced system to colleagues, stated "*they did not believe me when I told them about it…but I was also young you know, which affected it…but later they started to believe me… but I wished they listened to me. The colleagues had also proposed changes, but they are veterans… they have different perspectives…*".

There were two transport managers who did not seem interested in new technologies, TM6 and TM12. TM6 explicitly stated "*…I'm not interested in technology and IT systems that much…*". When asked how TM6 felt about previous changes, they could not recall any change, saying "*…it feels like the same system… but everyday there is some kind of update, ha-ha*". TM12's lack of interest seemed to be related to their current IT system, which made them not very optimistic for any improvements. TM12 said "*any change to our system would take a lot of time and resources because of its complexity…*". TM11 sat at the other end of the table, working with no IT system, only independent smaller software programs. TM11 expressed frustration when we talked about this, saying "*I told my boss that it would be beneficial to have a system that integrates everything I do, a program that would make my work easier*".

Integration of systems was a reoccurring theme throughout the interviews when we spoke about new technologies. In addition, all interviewees spoke positively about technological developments in the truck to date. One negative thing which was mentioned was the digital tachograph, which the drivers use to keep track of how many hours they have driven. TM12 said that this has made it more difficult for drivers to find a safe parking spot when their driving time has run out.

5.2 Perceptions of the Autonomous Truck

The first question regarding the autonomous truck was about the transport managers' first thoughts upon hearing the word "autonomous truck". Most of the interviewees expressed either scepticism, doubt, or rejection towards the concept. Five of the transport managers held either a positive or mixed attitude towards the concept. The main topics which were brought up for this question were safety, drivers, and vehicle manufacturers.

Many of the transport managers who spoke with optimism and positivity mentioned that the autonomous truck will lead to increased safety on the roads. TM7 was optimistic, saying that it is a "*smart*" innovation, adding "*it will lower the amount of accidents, it will be more effective at the same time… drivers require rest and sleep after some working hours… the autonomous truck would drive all the time and get more done*. TM10 was initially disheartened and made a case for how much the drivers mean to them, saying "*I will miss the drivers… I love them*". TM10 later changed perspective and praised the technological developments in the truck to date, and was eager to talk about the future and said that "*it would be very cool… if we get it* (the autonomous truck) *to work*".´TM8 was one of the few transport managers who was neutral. When TM8 spoke about the first thing that comes to mind, safety and better communication with the truck was mentioned.

Contrary to TM7 and TM8, TM1 stated that autonomous trucks will lead to poorer safety on the roads, saying "*the drivers have common sense… there are mistakes the human can detect but a computer can't… it's dangerous. It can't see, it can't react the same way…the autonomous truck is impossible, it has to be developed more*". TM1 sounded confident when stating this.

The first thought that came to TM11's mind when asked about autonomous truck, was a driverless vehicle, and that there are currently organisations that are experimenting with it. TM11 was equally positive towards the technology as TM7, saying that "*a machine cannot make mistakes… hopefully, ha-ha… the best thing about it is that it will avoid accidents and take the best routes*" (TM11). TM11 had also communicated their views on the autonomous truck to the drivers. TM11 said that they have joked with the drivers at work about it, saying "*when they make a mistake, I sometimes joke and say that a machine would not make this mistake…"*. TM11 later elaborated that mistakes that can happen today (regarding transport) are more serious and minimised the truck drivers' competence by saying "*everyone can drive a truck…*".

Several transport managers were highly doubtful of the technology. Some of them were specific regarding what they thought was a major issue. TM5 raised the question of the responsibility of un/loading the trucks, saying "*who the hell will load and unload the trucks?!*". TM2 and TM13 were directly opposing the thought of the technology. When asked what comes to mind TM2 said "*something that is wrong… there will be many unemployed drivers*", but later added "*…but it is the future*". TM13 was also opposing the technology, belittling it by calling it "*science fiction*", later adding "*I honestly don't like technology that replaces man, that reduces people's jobs…*".

TM3 held a mixed attitude towards the phenomena by both expressing the outcome of autonomous trucks negatively, saying that the technology will take away a big portion of the workforce, and also stating that the technology will allow logistics companies to gain competitive advantage. TM3 also raised the issue of the drivers' wage being a big part of the transportation cost and said that "…*the technology will change how prices are set*". TM3 validated the possibility of the autonomous truck by saying "*I will see it before I retire*", and later said with a somewhat antagonistic voice "*the developments of the truck to date has made the drivers more and more lazy… The GPS for instance, the drivers don't need to know the roads or anything, they just follow the map, which is not always a good thing, can't trust it all the time…*".

TM4 was one of those who mentioned marketing. With a lot of mistrust in the voice, TM4 said that there are big organisations that are experimenting, but that it is more of an environmental marketing strategy rather than efficient transport. TM4 was indicating that the current state of the autonomous trucks is not a viable option for logistics companies. However, many transport managers, even though some of them were doubtful, sceptical, or against it at first, spoke about different possibilities in respect to what it could look like in the future.

The interviewed transport mangers saw different future possibilities regarding the autonomous truck. TM4, who manages drivers that drive internationally, said that there is a "*long bureaucratic way ahead*" when it comes to implementing an advanced technology like the autonomous truck given the differences in policies and regulations between countries. TM9, who works with intermodal transport, was very doubtful about autonomous trucks being a possibility. However, TM9 was also concerned about the shortages of drivers, saying that "*that's why we need new solutions… I am thinking about the trains and railways, there are no driverless trains… how come? We do not dare to do that yet… Maybe on specific routes it will work, between our warehouses*". TM9 went on about the truck driving occupation not being

popular among young people nowadays, arguing that being away from home Monday to Friday is not highly sought-after.

Few of the interviewed transport managers had read anything about the autonomous truck. Generally, they had not thought about it, and the topic of the autonomous truck had not been brought up at work. The statement from TM5 regarding this topic, "*I don't think anyone thinks about it*", is a good reflection on how little the technology had been discussed among the transport managers and their co-workers. Only TM8 had "*talked about it over coffee*" with colleagues. However, TM12 and TM13 said explicitly that the autonomous truck is of interest. TM12 made it sound like it was obvious by saying "*...it is of interest… since I work in the industry…*". TM13 commented less emotionally when asked, saying "*I want to stay updated*".

The perception of the proximity to the introduction of the autonomous truck varied among the interviewees to some degree and it was expressed in different ways. It ranged from "*it feels a bit diffuse…it feels like you cannot implement it yet…*" (TM8) to "*I will see it before I retire*" (TM2, age 47) and "*in one hundred years the truck will be more automated*" (TM1). Some of the transport mangers felt too unsure and did not want to say anything specific or speculate, as it is not possible to predict the future. Though, TM12 was confident that the truck will be electric powered before it becomes autonomous.

5.3 Attitudes Towards Social and Technical Changes

The last topic which was covered was about the transport managers' perception of social and technical changes in their work. The transport managers expressed different attitudes when asked how they would feel if there was an increase in technical work and decrease in social interactions at work. However, none of them expressed any concern, or even raised the idea, about the autonomous truck eliminating their own occupation.

Why this was the case could be derived from TM1's and TM2's response. They both explicitly stated that transport managers do more than just manage the truck. TM1 said that steering the autonomous truck themselves would not be possible, because TM1 already has a lot of other things to do. The driver is facilitating TM1's job by "*micromanaging the truck*", while TM1 does everything else. TM2 pointed out that the transport managers' job includes taking orders and, most importantly, being in contact with the clients.

There were also those who said explicitly that an autonomous truck would make their work easier. TM4 thought so because it would decrease errors stemming from the human factor. TM6 and TM13 held similar opinions, saying that "*it would make it easier…*". Regarding workload

and stress, TM11 said that an autonomous truck would be a relief, saying that "*it would be nice to get some help…*". Out of the 13 interviewees, only TM7 said, with confidence, that the autonomous truck would not affect their work. However, TM7 was quite dismissive of the truck driver while talking about this topic, saying that "*instead of talking to the drivers I would talk to the computer… I would be more time efficient for sure…with the driver anything can happen*". TM7 was referring to mistakes that the driver can make, and later pointed out that the autonomous truck would lead to better communications with the customers and they would get more precise time estimates of arrival of goods.

There were a few who said that a decrease in social interactions would have a negative effect on them. TM6 gave the most in-depth response as to why it would have a great effect by saying that "*... it is fun to hear their stories sometimes, what they are going through and what they see out there… It is the small moments… it helps create trust and self-confidence*". TM6 sounded very emotional, there was a lot of sadness in their voice. Later, TM6 said that there is a mutual respect between the transport managers and the drivers, and that the respect between them is an important social aspect for it all to work. TM2 spoke similarly, saying "*it would be boring without the drivers… I need to have someone to nag with, can't only have colleagues to talk to…*". TM2 pointed out that the drivers constitute a lot of the social interactions due to the small size of the company, where TM2 has more drivers in the social sphere than colleagues.

TM4 and TM12 held the opposite, although slightly different, attitudes towards a reduction of the social sphere. TM4 said that less social interactions would not affect work negatively, because there is nothing personal between them and the drivers: they are not social with the drivers to begin with. Later TM4 mentioned that "*the occupation of the driver is asocial in itself…*", which explains their attitude toward the hypothetical social change. TM12, on the other hand, did not seem to care about being social with the drivers, or that the social interactions between warehouse workers and drivers matter. As TM12 was speculating what changes might happen, they said "*warehouse workers might have more to do* (was referring to un/loading trucks)*… but yeah you know… less social is…fuck that… the warehouse people don't talk much to* [the drivers] *anyway…*".

The last part of the discourse with the transport managers was focused on how they feel about a hypothetical increase in IT at work amid the introduction of an autonomous truck. Most of the interviewees did not seem to mind another IT system which they would have to operate. They were "*overall positive*" (TM4) because they "*…have to learn new things all the time anyways…*" (TM7), and that it is reasonable "*as long as it is useful*" (TM6) because "*IT is at*

the core of the company" (TM4). However, there was also some suspicion as to whether another IT system would lead to the same amount of people in the businesses. TM8 said that it would not make any sense for the transport organisation to hire a person to steer the trucks from the office, since the same amount of people would be required as it is currently with the driver present. Another point made about the autonomous truck not decreasing the amount of people working with trucks was that there needs to be someone un/loading the trucks. TM5 said that this is "*a major problem with autonomous trucks…*", but later said that it might lead to something positive; more group work among those who would manage the autonomous trucks.

Nonetheless, there were also those who did not seem very happy about more IT systems. This was derived more from the expressions than the words spoken by the interviewees. TM2 said that "*I am not against IT systems, as long as they are useful*", but in an exhausted voice. TM9 also spoke positively about it: "*IT is a must…we have to take advantage of it…*", but sounded more lethargic compared to the other interviewees who said positive things. Both TM2 and TM9 were in the "older" age group of the interviewed transport managers. TM13 made it sound like it was not optimal to have more IT systems as well, saying "*it will be ok for me if we do not have a choice… we will take the other IT system and we will adapt*". TM6, who was not interested in IT, said that "*it would make it easier*", but later asked if they could speak from the heart and said "*but I would probably think: what the fuck?! Another IT system?!*". TM6 was the only one who expressed this kind of attitude towards new IT explicitly.

6. Interpretation and Analysis

The structure of this chapter is composed by three sections. In the first part, the perceptions of the social aspects in the current and the hypothetical future scenario have been fused together. Similarly, in the second section, the perceptions of the technical aspects in the current and the hypothetical future have been integrated. The third part comprises the analysis of the general perceptions of the autonomous truck.

This combination serves a specific purpose. The idea of asking the transport managers about what they think of their current situation regarding social and technical aspects, was based on the notion that the data would give more contexts to what they think of the hypothetical future scenario, and thereby provide a clearer picture of the acceptance towards the autonomous truck. Concluding, part one of this chapter focuses on research question **I** a) and **III** a), part two on research question **I** b) and **III** b), and part three on research question **II**.

6.1 Transport Managers' Perceptions of Social Aspects

The thematic analysis showed that there is a common acknowledgement by the transport mangers of the importance of the driver in the logistical companies. This is the case regardless of how the relationship looks like between the two parties. Even those who are not in direct contact with the driver appoint the driver's role as vital for the organisation to function. This was communicated in different ways. For example, the drivers were seen as the face of the company or they were considered as much part of the organisation as the transport managers. Moreover, the analysis revealed interesting differences in how the transport managers perceive their relationship to the drivers. On some accounts, personal relationships are established while others see their relationship as strictly professional.

However, this is not particularly surprising as the case group consisted of different people with different age, experience, and time spent in the company. Even though transport managers have similar daily routines, the organisational structures and business models of the companies can be different. There are those who do not even talk to the drivers, while others meet them face-to-face on a regular basis. In addition, the drivers constitute different parts of the social sphere of the transport managers. While some interviewees have many colleagues, others have very few or even none. This could be an explanation as to why there is a fundamental difference in what transport managers think of the truck driver occupation and what the truck driver means to them.

The differentiation between the driver and the truck driving occupation was also highlighted by the way problems are solved. General fussing between the two parties can be solved, like two teammates working together on a project that have a difference in opinion and come to an agreement. Everyone can make mistakes every now and then, but there was no mention of the transport managers being responsible for mistakes during the interviews. In cases where sub-contracted drivers had not done as the transport manager instructed them, the drivers' "actual" boss was sometimes contacted, and the drivers' performance was discussed. The driver being in a position of having two people managing them shows that their role in the logistics organisation is less of the teammate sort and more of an external aid in servicing the customers who need goods delivered. However, this is most likely not a unique issue for the logistics companies.

The analysis of the hypothetical future scenario without the driver is in line with this reasoning. When the transport managers express their thoughts on how they feel it might be working without the driver, the driver is painted as a source of errors. By having the attitude of feeling more effective without the driver, the driver becomes belittled. Seeing it as the job of the transport manager "*would become easier*" (TM13) also shows that the transport manager's main concern is orchestrating transport by IT, and that the driver's objective is simply to transport shipment from point A to B. One thing that stood out was that it was not mentioned that the drivers might have their own social network. A network of truck drivers talking with each other during their journeys was not acknowledged by any transport manager. If the autonomous truck would be implemented in some logistical organisations but not all, and thus eliminating a portion of the drivers, it could influence the truck drivers' social sphere. This does not seem to bother the transport managers.

The set of positive attitudes towards the elimination of the truck driver is contested heavily with negative feelings about the driver not being in the picture anymore. The analysis shows that the drivers constitute a social group that acknowledges the transport managers, and their presence allows trust and respect to be created in the workplace. The disapproval of losing a source of respect, confidence, and overall human connection with an implementation of the autonomous truck appeared to be related to the size of the logistics company the transport manager was working in. This seems like a reasonable conclusion to draw considering that in smaller organisations, where there are fewer colleagues or people in general, the driver has more influence regarding the social interactions that the transport managers have.

One intriguing insight that can be drawn from the results on the future scenario, regarding other social groups besides the drivers, is that colleagues and bosses of the transport managers are not mentioned in any significant way. An increase of teamwork was mentioned once, when a transport manager was speculating about how it might affect their work. The lack of attitudes towards team composition, or colleagues in general, can be related to something which was not picked up during the interviews, which is the perturbation of the autonomous truck being a potential threat to the transport manager's own occupation. The analysis shows that the transport managers perceive their job as more than managing the truck. This could be an explanation to why they do not anticipate the autonomous truck to rival their occupation.

To summarise this part of the analysis, the attitudes which transport managers have towards the driver are positive in that the driver is a core part of the logistics operations and needed in several aspects. Their disappearance amidst the hypothetical future scenario with the autonomous truck is seen as negative or even detrimental. However, this is constrained to those relationships which are more personal. The transport managers who do not work closely with the drivers, seeing them as an extension to the organisation, are more indifferent towards their imagined disappearance or even have a positive attitude towards it.

6.2 Transport Managers' Perceptions of Technical Aspects

The analysis of the perceptions and attitudes towards IT showed that IT is perceived generally well among transport managers. However, the amount of IT systems which the transport managers need to deal with can sometimes feel overwhelming. Considering that their work is fundamentally dependant on IT and that they are in contact with it throughout the whole day, it is not surprising that disharmony might arise at some point. The analysis also showed that integrated systems are highly sought after, and that a lack of them is a source of frustration.

Whether feeling overwhelmed by the amount of IT to keep track of and lacking an integrated IT system is related or not, is unclear. On a related note, however, the available technological infrastructure differs among transport managers' offices. But this is naturally the case, as bigger corporations invest in technological infrastructure more than the smaller ones.

One thing which was not mentioned or expressed in any way by the interviewees was enjoyment, something that Chin et al. (2003) points out affects the acceptance of technology. Although, the lack of expressions of enjoyment does not seem to be related to errors involving IT. This is shown in the analysis, where the transport managers do not express any greater concern for defects in technology. As a matter of fact, they are quite satisfied with the way IT

support aids them when there is something wrong with the computers. The reason for not expressing enjoyment is not clear from the data.

Previous developments in the truck are seen as extremely useful for managing the truck and orchestrating transport in general. There is a lot of gratitude towards how the technologies have made it easier to communicate with the driver. While most transport managers have experienced the introduction of some kind of technology, and even proposed changes themselves, there are some who have experienced more radical innovations. These transport managers are mainly those who were around when the telephone became a common technological artefact in the workplace. Nonetheless, the developments in the truck to date are praised also from the environmental perspective. Regarding incremental innovations, which mostly revolve around IT-systems, the analysis shows that the transport managers do not have much to say about what stays and what does not. The attitudes towards this are mixed, on one hand the responsibility is put on the IT department, and on the other the transport managers feel like their opinion should be taken into consideration more.

The analysis of the hypothetical future scenario, where an additional IT system will be introduced along with the autonomous truck, confirmed the attitudes transport managers have towards IT. The transport managers do not seem to mind an additional IT system, in fact they have an overall positive attitude toward it, under the conditions that it proves to be more effective and not overwhelming. The age of the transport managers seems to be related to how excited they are towards potentially having another IT system introduced, where older transport managers speak about the hypothetical scenario with a distance.

Nevertheless, even though they embrace the fact that IT develops all the time and that they work in an ever-changing environment, there is a lot of suspicion towards the core idea of replacing the driver with technology. The introduction of new IT with the autonomous truck is not perceived well if there will be the same amount of people working in the organisation. One could interpret this as the transport managers not wanting to replace the driver with another person, due to their relationships. However, the analysis shows that the transport managers are more concerned about the effectiveness the autonomous truck would bring. This could be derived from the acknowledgement of potential operational flaws, specifically regarding un/loading the trucks. The transport managers see it as a core part of transportation, and if the autonomous truck does not solve this problem, then the additional IT they would need to handle is not perceived well. This illuminates the duality of technology that is the autonomous truck.

It consists of the IT system and the autonomous truck itself, and there are different attitudes towards the two elements.

In summary, the perceptions and attitudes towards the technical aspect of the hypothetical introduction of the autonomous truck are mostly positive. Technological development is seen as an inevitable part of the industry, and changes which increase effectiveness and efficiency are highly regarded. However, there is some concern towards what part the assumed IT system will play in the organisation. This highlights different attitudes towards the autonomous truck as a technological innovation and the accompanying IT system by which it is managed. The transport managers do not seem worried about operating a hypothetical IT system for the autonomous truck, which could be attributed by their attitudes towards working with IT and the available assistance that they can get from IT support.

6.3 Transport Managers' Perception of the Autonomous Truck

When the topic of the autonomous truck was brought up, each transport manager expressed their first thoughts upon hearing the word autonomous truck. This steered the conversations in different directions, allowing different perspectives to surface. However, the analysis shows that many of these perspectives and attitudes are parallel to the results from the analysis of the two previous parts.

The fact that the autonomous truck implies a disappearance of the driver fosters negative attitudes in transport managers, but it is not only limited to the personal connection. The transport managers are, to some degree, rejecting the idea of technology eliminating a big portion of the work force, which would affect society in a bigger way than their own organisation. It would create a lot of unemployment, which is something that is generally perceived as a bad thing.

A main attitude towards the autonomous truck was scepticism. The transport managers see potential operational flaws with the autonomous truck. They spoke about is as being non-sufficient for implementation since the driver is currently responsible for loading and unloading goods from the truck upon arrival at destinations. This could be interpreted as the transport managers perceiving the self-driving truck as a radical innovation. Dewar and Dutton (1986) posit that such innovations have less likelihood of being accepted because of their complexity. However, it can also be interpreted as the transport managers seeing the autonomous truck as gradual increase in technological, political, and social development. This is somewhat a mismatch of what is propagated in media and news today. News of big tech-companies testing

completely self-driving trucks on the roads are getting plenty of attention. Some transport managers associate the autonomous truck with these corporations but are sceptical towards their intentions. Efficient transportation is something that the transport managers are welcoming with open arms, but the autonomous truck as seen in news today is perceived as a marketing strategy that is focusing on environmental issues rather than efficient transport and a feasible practical solution. Nevertheless, environmental issues are important to the transport managers. They are happy about an autonomous truck being more efficient on the roads, picking better routes and decreasing the amount of accidents and pollution.

Positive attitudes towards the autonomous truck which are associated with the technology being less prone to do mistakes, show that the transport manager perceives the technology with a lot of trust. The autonomous truck is associated with improved communication with the truck itself, which the transport managers see as a step in the right direction. The transport managers associate competitive advantage for logistics companies with this. There are also some contesting attitudes regarding the competence of the artificial intelligence that would operate in the autonomous truck. While some see it as a "*smart innovation*" (TM7) others cannot see an autonomous truck driving itself better than the driver. Consequently, the transport managers who do not think the autonomous truck could drive itself have negative attitudes towards it.

The debate regarding whether the autonomous truck could possibly drive itself better than the drivers or not, is related to the knowledge the transport managers have of the autonomous truck, and this is associated with their interest of the topic. Not many transport managers are interested in autonomous trucks, and even fewer have read anything about them. The analysis shows that this could be because the transport managers do not see the autonomous truck entering the industry on a bigger scale anytime soon. They are aware that the development takes place, and that some organisations are experimenting with it, but their perception of the closeness to the introduction of the self-driving truck paints a rather vague picture.

One thing that stood out from the analysis was that there was not much anxiety about the technology. The transport managers are indeed unsure how it will all look like, but their uncertainty is not embedded in perturbation but rather indifference, and some circumstances curiosity. The analysis shows two reasonable explanations for this. The autonomous truck is seen a technological artefact which will require smaller developments along the way before it becomes completely self-driving. This gives the transport managers more latitude towards the significance of the autonomous truck and the effects it could have on their work. Further, the transport managers' perception of their own work is not limited to the management of the truck

and the driver. They see themselves as a part of a logistics company that offers transport services which involves more than sending trucks from point A to B. This could again be a reason why they do not feel particularly worried about it.

The analysis shows that the transport managers have different perceptions and attitudes toward the autonomous truck regarding social, technical, and organisational aspects of their work. The first part of this chapter presented the analysis of the attitudes toward social aspects of their work, in the second part the technical aspects, and in this part more general views. The results from the analyses show that the attitudes the transport managers have are not stringent towards one aspect. Within the analysis of one aspect, many links to the other ones were found. However, what the conceptual model for this thesis showed was that the perceptions and attitudes towards the autonomous truck go beyond the scope of its three elements: *social aspects*, *organisational environment*, and *technical operation*. The transport managers also express various attitudes towards broader elements beyond the organisational world. Societal and economic problems are brought up, there are different time perspectives regarding the autonomous truck's reality, and the transport managers also speak of inter-organisational relationships.

7. Conclusion

The purpose of this study was to examine acceptance of a forthcoming technology in organisational settings with a qualitative method. For this reason, the autonomous truck was chosen as the case study and the transport managers as the case group. Semi-structured interviews were conducted with transport managers. Three research questions were constructed to fulfil the aim of the study,

I. How do transport managers perceive the current social and technical aspect of their work?

II. What do transport managers think about the autonomous truck?

III. What attitudes do they have towards a possible change in the social and technical aspect of their work?

By analysing data from the interviews, answers to these questions could be obtained.

Transport managers have different relationships with different social groups in the workplace. The relationships with the drivers are the most distinctive ones when it comes to the autonomous truck. Drivers are seen as a core part of the logistics companies, but the type of relationships transport managers have with them differs a lot. This is because of the different organisational structures and business models of the logistics companies the transport managers work in. Some transport managers are closer to their drivers and they perceive the relationship as more valuable, others are not in contact with them at all and see them more as an extension to the organisation.

The transport managers are mostly satisfied with how the IT systems operate, and they are content with the assistance they can get from IT-support. Technological development is praised upon and transport managers are enthusiastic about more efficient IT. Again, the perceptions and attitudes towards technology is different among some transport managers, which could be because they do not all have the same IT infrastructure. Some transport managers who work with less integrated systems have less positive views on the technological aspect of their work.

Perceptions of the autonomous truck are heterogeneous. The main negatively inclined attitudes towards the innovation are doubt about its viability in terms of logistical practicality, scepticism towards reduction of people working with the trucks, and dissatisfaction with the reduction of human contact. The more positively inclined attitudes revolved around excitement for more efficient and safer transportation, and relief of dealing with less mistakes and less workload.

When it comes to working with more IT and having fewer social interactions at work, the attitudes of transport managers were parallel to the current scenario. Transport managers who have a close relationship with the drivers expressed sadness and discomfort when asked how they feel about such hypothetical scenario. On the other hand, those who do not work closely with the drivers were more indifferent towards their disappearance. Attitudes towards an increase of IT at work were more homogeneous, and the transport managers did not seem to mind learning and working with another IT system.

Not many transport managers had invested any time in reading, or even thinking, about the technology, which means that these thoughts which they expressed were somewhat intuitive. However, since no one knows with certainty what the future holds, the uneasiness for speculation and expressing thoughts is justified.

Some of the feelings were expressed in respect to elements beyond the organisational world, which means that transport managers perceive the autonomous truck from more than their occupational perspective. In addition, the study also shows that transport managers have different attitudes towards four different dimensions of the autonomous truck; the truck as a technological artefact which moves goods, the management of it by IT, the IT itself, and the social aspect of the truck driver. The heterogeneous attitudes toward the different dimensions can be attributed to different things, such as organisational structures and business models, and difference in demographics of the case group. However, the mixture of attitudes towards different dimensions of the phenomenon can also be attributed to the fact that it is not yet clearly defined and conceptualised. The contradictory attitudes transport managers have towards the autonomous truck make it impossible to conclude the acceptance of it in binary terms; that they are either in favour of it or against it.

This thesis contributes to existing literature because it offers an insight into possible future scenarios regarding the social impact of the autonomous truck. Even though the acceptance is not homogeneous, it reveals different insights into what is of importance to transport managers, where they find meaning, and what frictions might appear during a technological transition as significant as the autonomous truck. In addition, this thesis attempted to use a qualitative method to study acceptance of a forthcoming technology, and the results from using this method can serve as a steppingstone for studies investigating acceptance of anticipatory technologies by qualitative means.

8. Discussion and Reflection

The study attempted to investigate acceptance towards the self-driving truck, a complex phenomenon which entails more changes than eliminating the driver. The autonomous truck is embedded in both social and technical aspects of the transport managers' work. This led to the conversations about the two main aspects overlapping many times. The assumption of an IT system being implemented along with the autonomous truck, could have been a whole study itself. However, it would then bypass an important part of the transport managers' work, the social aspect.

Another predicament was the fact that the technology is not here yet and that it is a diffuse phenomenon. It seemed too far into the future for transport managers to care about. Many of the interviewees had not spend much time thinking about it. Unsurprisingly, there was a lot of uncertainty, some of the transport managers said that they do not even want to speculate because we know so little of how it will look like, so they kept their opinions to themselves. In comparison, TAM studies, or other acceptance studies measuring the acceptance of technology, focus more on technologies which people can test and observe. Nevertheless, this made it difficult to gather data, specifically figure out what attitudes the transport managers have towards the technology. Although, their lack of interest and inattentive attitude towards the autonomous truck was a result which was attained. This study, therefore, also contributes to the technology acceptance and service management field by giving indication to how these future technologies are perceived while not being observable and testable.

While this study's result gave insight into what attitudes transport managers have towards the autonomous truck, more studies need to be conducted in order to give a clearer picture of their acceptance towards it. More importantly, as acceptance towards a technology changes over time (Peek et al., 2014), studies investigating how transport managers' attitudes towards the autonomous truck changes as we get closer to its reality could both give valuable knowledge about transport managers' acceptance, and how to smoothen the socio-technical transition, but also produce knowledge about how acceptance of technologies changes in general. It would be interesting to see if other forthcoming technologies are perceived similarly by employees of organisations that are expecting a technology to replace some part of the human workforce.

It would be beneficial to reconstruct the interview guides so that it focuses more on the autonomous truck and try to dig deeper into the attitudes of the transport managers. The interview guide used for this thesis included questions about the transport managers' relation

to their bosses and colleagues, which turned out to be not very useful. Face-to-face interviews would probably also be a preferred method since it would be easier to connect with the interviewees. Other methods could also produce interesting results. For instance, group interviews with several transport managers would allow a capture of the groups' emotions. This is particularly interesting since the topic encompasses social aspects of the work.

The investigation of the acceptance of the autonomous truck produced insights into the transport managers' attitudes towards a probable future, which makes it possible to conclude certain implications for management decisions in logistics companies which might find it possible to implement autonomous trucks in the future. The study showed that the attitudes transport managers have seem to be related to the type of organisational structures and business models logistics companies have. Therefore, delineating the relationship transport managers have with their drivers would be a vital part in constructing a smooth transition. Where the elimination of the social interactions with drivers is perceived negatively, and the transport managers feel like there would be something missing, a strengthening in the prevailing social relationships is called for.

Likewise, mapping the IT's role in the transport managers' work, to see whether there is room for another IT system to be implemented and how well equipped they are with handling IT, is of importance. The autonomous truck implies a potential big change in the logistics industry and the individual companies therein. Being up to date with the latest developments of autonomous truck would give decision makers a head start for how to communicate this phenomenon with their workers.

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APPENDIX 1 – Interview Guide and LinkedIn Message

Intro

- Introducing myself
- Presenting the research topic
- Explaining the purpose of the study and the interview structure
- Asking if they have any questions
- Informing that their identity is not to be disclosed with anyone
- Informing that notes will be taken

Part one

About the interviewees

- Age
- Education
- Time spent in company
- Time spent in that position
- Time spent in the logistics industry overall
- Daily tasks/routines, what do they do, with who

Part two

What do the social relations look like?

- Driver
- Co-workers
- Bosses
- Clients

What does their relationship look like? How do they feel about that?

Any relationship that stands out from the rest?

How are they in contact, what is being said? How do they feel about this communication?

How is IT manifested in their work?

- How do they feel about working with computers?
- Have they had any changes to any IT system?
- How did they feel about the change?
- How was it to learn it?
- How was the change conducted?

- Do they have an IT support in the office? How do they feel about that?
- Do they communicate, how, how often, about what?
- Have they ever proposed any changes themselves? Is so, what? Why?

Part three

What is the first thing they think of when they hear autonomous truck?

What is autonomous driving for them?

What does innovation mean to them, in the context of the truck?

What impact did the previous technological developments in the truck have on their work?

How is the topic of autonomous trucks communicated to them?

What opinions do the other employees have? Bosses?

Are they interested in the subject? Why, why not?

Do they think the autonomous truck has a future?

How do they think a fully autonomous truck could impact their work?

How would they feel about an increase in technical work? Why?

How would they feel about a decrease in social interactions? Why?

LinkedIn Message:

Hey!

I found you on LinkedIn when I was searching for transport planners / managers. The reason I write is because I am looking for transport managers who work with trucks for interviews for my master's thesis at Lund University. My thesis is about self-driving trucks, and how transport managers perceive the phenomenon.

Would you possibly be interested in helping me? I am asking for a phone interview that will last about 30min. Date and time when it suits you.

Sincerely,

Filip