FACULTY OF TECHNOLOGY

Successfulness of logistics and mobility piloting and innovation in Finland

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TIIVISTELMÄ

Liikkumisen ja logistiikan pilottien ja innovaatioiden onnistuneisuus Suomessa

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Tämä työ on esitys siitä, miten pilotointi hoidetaan Suomessa, varsinkin harvaan asutuilla alueilla sekä kaupunkiympäristössä. Pilotointia tehdään laajasti ympäri maailmaa sekä myös suomessa, jonka vuoksi pilottiprojektien ja innovaatioiden tutkiminen on läsnä tässä työssä. Pilotoinnilla on suora yhteys innovaatiotoimintaan. Vaikkakin innovaatio ja pilotointi eroavat toisistaan, yhteneväisyyksiä on silti läsnä. Tämä työ alkaa kirjallisuuskatsauksella innovaatioihin sekä niiden kategorisointiin, josta seuraa empiirinen tutkimus Suomen pilottiprojekteista ja lopuksi johtopäätökset.

Tässä työssä tavoitteena oli löytää kriteerit niille tekijöille, jotka varmistavat tai auttavat pilottien ja innovaatioiden onnistumista liikkumisen ja logistiikan alalla. Tämän työn tarkoituksena oli oppia ymmärtämään pilotoinnin ja innovoinnin luonnetta erityisesti Suomessa. Työ käsittelee myös innovaation ja onnistuneisuuden määritelmää sekä onko mahdollista määrittää onnistuneisuutta ja jatkuvuutta innovaatiolle ja piloteille. Tärkeimpiä havaintoja oli huomata pilottien laaja jakautuminen Suomessa sekä niistä kerätyn datan saatavuus. Pääpainona oli kriittiset onnistuneisuustekijät sekä suorituskyvyn mittarit, joilla ensin määriteltiin pilotin onnistuneisuus sekä mitkä tekijät edesauttoivat onnistumisessa. Lopputulemana pidettäköön sitä, että pilottien ja innovaatioiden onnistuneisuutta on mahdollista määrittää suorituskyvyn mittareilla sekä on mahdollista löytää ne kriittiset onnistuneisuustekijät, jotka mahdollistavat projektien ja pilottien onnistumisen.

Asiasanat: innovaatio, pilotti, kriittinen onnistuneisuustekijä, suorituskyvyn mittari

ABSTRACT

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This thesis is a representation on how piloting in the field of mobility and logistics is done in Finland in rural and urban areas. The piloting is done vastly around the world and in Finland, and therefore the examination of pilot projects and innovations is going to take place in this thesis. With piloting there is a clear path to innovation. While piloting and innovation do differ, the resemblance is present. This thesis begins with literature review of innovation and the categorization of innovation which continues to empirical study about pilot projects in Finland and finally to conclusion.

The main goal in this thesis was to find the criteria which ensure or help the successfulness of pilots and innovation in the field of mobility and logistic. The goal of this thesis is to understand the nature of piloting and innovation especially, piloting and innovation in Finland. This thesis consists of definition of innovation, definition of successfulness and the possibility of defining successfulness and continuity for innovations and pilots. Main observations were the vast spread of pilots in Finland and how the amount of data was available in those pilots. The focus was to find critical success factors and key performance indicators to firstly discover if the pilot was indeed successful and then what were the factors that were done well and helped the pilot to be successful. The conclusion of this thesis was that it can be possible to estimate successfulness of pilots and innovations with KPIs and it could be possible to have a clear view with CSFs what are the subjects that can ensure projects and pilots to succeed.

Keywords: innovation, pilot, critical success factor, key performance indicator

FOREWORD

I would like to point out that even though this thesis was made by one person, the support and background work from other people made the work possible. The ideology behind this thesis comes from a bigger project and therefore I believe that this effort will bring some help for the future researchers that are working with this topic in some scale. I am truly grateful for the passion and effort that the people around this thesis have put in.

I would like to thank the University of Oulu, for providing me this opportunity to work for them and see the culture behind research. It is an honor to see how some of the smartest and most talented people I have met do the work behind their own research and puttime into into my thesis. Special thanks to Pekka Leviäkangas, Virve Merisalo, Veikko Pekkala and Valtteri Ahonen for putting in the time and effort for helping and guiding this process. I would also like to thank the University of Oulu for providing the fabulous education and tools for my future.

Oulu, 26.3.2022

Ville Virtanen
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1 INTRODUCTION

It has been recognized in Finland that the development of rural areas is lacking speed i.e., compared to urban areas. The development of rural areas is more and more a rising feature in Finland's policy. Rural areas cover 68 % of the entire area of Finland and the areas provide home to 5 % of all Finland's population (Finnish ministry of agriculture and forestry, 2020). This theme is highly noted in the Europe as well and therefore to be researched around Europe. Horizon 2020-project is based on this phenomenon and its focus is completely to bring connectivity and digitalisation with different platforms to rural areas. AURORAL (Architecture for Unified Regional and Open digital ecosystems for Smart communities and wider Rural areas Large scale application) is a Europe-scale project, and it includes 10 countries where Finland is one of them. (AURORAL, 2021) Yet rural areas are a key point in this thesis it is highly recommendable to consider pilots outside rural areas. Infrastructure of cities are developing to a direction where people are focusing their migration towards urban areas and therefore focusing on the pilots in urban areas is important also.

Finland's strategy for sparsely populated countryside for years 2017 – 2020 notes variety of different solutions to enhance rural areas and their accessibility. For this research the most relevant part of the of the strategy is the infrastructure and its solutions to bring rural areas more to life. Mobility and logistics are key solutions to include rural areas to the strategy and therefore to achieve more liveable outcome of the strategy. County centres and their functionality is highly dependable of mobility and logistics, for example public transportation is key to achieve development in sparsely populated areas. For vast amount of people personal car is the only option of transportation in rural areas in Finland. Logistic point of view its necessary to have roads which can provide the needed performance for instance large vehicles in order the roads to function properly. In the strategy there rises one feature very often and it is accessability. This feature is very important to rural areas and needs to be considered. Achievability can be accomplished through well executed infrastructure. Operative infrastructure is one key factor to have a functional society in every area. Shortcoming in infrastructure is much more commanding than a small fix in the long run. (Lukkari, 2017)

Digitalisation is one key feature to achieve progress in sparsely populated areas and to achieve functionality in infrastructure. In Finland, broadband of 100 Mbit/s is available

for approximately 50 % of all households. (Lukkari, 2017) AURORAL-project is based on building digitalization platforms for different subject areas; therefore, broadbands and their accessibility are key to executing digitalisation in rural areas. In modern society, digitalisation is affecting our everyday lives and spreading to field of mobility and logistics.

In this concept of attacking rural areas and bringing them into modern state it's relevant to see innovations of mobility and logistics from sparsely populated areas. With this link it is inevitable to have a specific survey on how different innovations are defined as successful. This research is going to be an empiric study of population of instances where innovations are implemented. Variety of innovations are executed in the field of mobility and logistics which gives us a vast spectrum of data. However, innovations are going to be delimited to innovations in rural areas. The main reason for the pilots selected from rural and urban areas is because of the AURORAL-project. The project mainly focuses on bringing rural areas more and more achievable. (AURORAL, 2021)

The goal of this thesis is to understand the nature of piloting and innovation and especially piloting and innovation in Finland. To achieve the true understanding behind the piloting and innovation, we need to consider which factors different innovations have in common. The factors can be negative or positive, because the more we know about the successfulness the more we can label different innovations and how have they succeeded. The structure of the evaluation is going to be based on few key topics which are objective survey for the innovation projects. From the main topics the study deepens to nine (9) different sub-categories where critical success factors and key performance indicators are used to evaluate pilots. In order the critical success factors or key performance indicators to be noted in the pilot, it must be certain that the given factor or indicator is present at the given pilot.

The study starts with background check to evaluate the field of study and to see where in the research area the study settles. After the background check, literature review takes place. Purpose of the literature review is to create an idea of the successfulness through critical success factors (CSFs) and key performance indicators (KPIs) based on literature. The review will focus mainly on building this theory and creating a tool of some sort for assessment of innovations.

With the created tool from literature review the study takes place in evaluating the study subject which in this case is the entire population of innovations collected from rural and urban areas in Finland. All the innovation projects that are suitable for this study are taken under consideration and therefore the study subject is the entire population of cases. Because the area consists of logistics and mobility, objective point of view is needed. The biggest challenge of this thesis is to have a proper way of evaluating the pilots which can determine different types of innovations objectively. Understanding the distribution of CSFs, KPIs and pilots regarding to innovation categories is essential and probably the hardest thing to encounter in this thesis.

2 GENERAL BACKGROUND

In this chapter, a survey to the background of this thesis is done. The chapter goes through the scope of research in a more detailed manner than in the introduction. Detailed plans on how the thesis is structured will be gone through and the different steps that are included in the thesis. How the data is collected is one key part of the research to have the correct and wanted results from the complete study. Also, innovation in the field of mobility and logistics is viewed and discussed with the life cycle of innovation.

2.1 Scope of research

The scope of this research can be determined with ease. The main goal is to have a deep understanding of innovations and especially innovations from the field of mobility and logistics. The scope is narrowed quite much because only innovations of mobility and logistics in Finland and in rural and urban areas.

Thesis is done under the genre of theoretical research. This meaning that the goal is to define innovation and successfulness of pilots as a concept and phenomenon. With some questions that work as guideline for this study we can begin to direct towards the objective of this thesis. Research questions that are answered in this research are as follows:

1. How to define innovation?
2. How to define successfulness of innovations in the field of mobility and logistics?
3. Is it possible to define successfulness and continuity with critical success factors?

The goal is also to create a theory of successfulness for the pilots and projects that are going to be taken under consideration. To define innovations and pilots and how they have succeeded it is important to have a frame in which different parameters are set. In this study evaluation frame consists of critical success factors and key performance indicators. These factors indicate objectively how innovation is succeeded. With the evaluation we can get a touch on how the launch of innovation or pilot succeeded and what are the factors that combine successful innovations.

Analysis method for this thesis is categorization analysis. The analysis method has been selected to simplify the research and to get a clear tool on how the data is processed. With

this analysis method, we can outline and assort the innovations likewise the nature of innovations can be explained.

2.2 Structure of thesis

The research begins with introducing the outline and idea of the study. The first chapter is simply a preface for the upcoming and detailed scope of the whole research. The second chapter which includes general background is based on the pre-knowledge on this research. In the second chapter a detailed dip into the work is done by going through the scope of research. Scope of research outlines the research questions and gives an idea on the tool that is going be used to solve these questions. Structure of research is gone through as concept of how the study is executed step by step. In the second chapter the manners of data collection will be gone over also. The last part of second chapter speaks out for innovation as concept in the field of mobility and logistics and touches shortly the life cycle of innovation. The third chapter is the literature review. The whole concept of reviewing literature is to create the tool for assessment of pilots based on literature review. First the chapter takes innovation under consideration from theoretical point of view. After defining innovation, different innovation projects are discussed. With the knowledge of innovation and pilot projects we can consider the tool becoming concrete with the help of critical success factor and key performance indicators. After the tool for defining successful launching of mobility and logistics innovations has been created, the study focuses on given data of innovations in rural and urban areas in Finland. Therefore, we determine the successfulness of Finnish innovation projects and define the validity of our theory on successfulness. Chapters five and six go through the process as a whole and discusses the successfulness of the study. Also, recommendations on how to proceed from here is discussed in the final chapter.

2.3 Research structure

In this thesis the main goal for the research is to have a step-by-step approach to an evaluation on successfulness of pilots which is the outcome for the thesis. In *figure 1* the outlines and structure for this research. As in most of the cases, the structure starts with defining the problem. Through the definition of the research problem, the reviewing of literature can take place. In the literature review section, the main topics such as critical success factors (CSFs), critical success criteria (CSC), success factors (SFs), and key

performance indicators (KPIs). With the concept of things to evaluate, the evaluation process can take place in the empirical part. The successfulness of this thesis, future of the subject, and the used procedures are discussed eventually in the form of conclusion and recommendation.

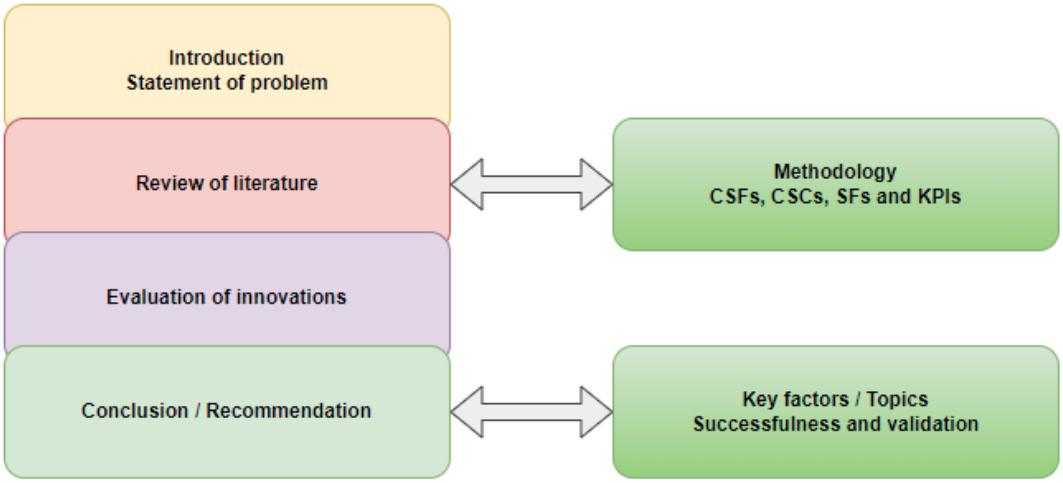

Figure 1. Research structure

2.4 Data collection

In every research, data collection should be reliable and done with such precision that the outcome of the research is valid. Farquhar, (2014) notes the importance of consistency in your data collection. Data collection should be embedded through various methods of data collection. To do consistent data gathering, it is important to have consistent line of writing in order the reader to have a clear view of the collected data and research.

This research is done with the nature of case study, yet not entirely in the terms of a case study. This can be explained because the cases that are selected in this research are all the cases available in the field of mobility and logistics in rural areas and in Finland. The cases have been selected forehand and are only the cases that are suitable to further investigation in this study. To have a clear view of this research, we can determine that the nature of this study echoes a case study but varies in terms of selected cases. The devised cases are in this situation the entire population of innovations in the field of mobility and logistics.

The study consists of 58 cases which 54 are in the field of mobility and 4 are in the field of logistics. Pilots from the field of mobility have been gathered from the internet sources from the regional council web pages. Different regions have made listings regarding to projects that are in the making or already executed, and from those listings it is able to have access to pilots that are planned to do, unfinished or finished. The pilots from the field of logistics are gathered by first doing a search from the internet with a keyword and after the search the hits are bracketed to a point where the final pilots have been discovered.

The reason for this type of data gathering is the research objective. The main purpose of this research is to have a clear vision of the critical success factors that combine or separate the studied innovations from each other. We must build the evaluation on theory and use it to the population and therefore we can find the functioning tools for evaluating as intended.

2.5 Innovation in the field of mobility and logistics

Innovation is a feature of developing sparsely populated areas in Finland. Finland's policy to bring more vitality to rural areas is very simple. Finnish ministry of agriculture and forestry has concluded that in the years of 2020 – 2023 they will provide additional 8 million euros to the budget of improving the vitality of rural areas. The main idea to enhance the rural areas is to do pilot projects and therefore bring the rural areas available. (Finnish ministry of agriculture and forestry, 2020) Considering rural areas especially in Finland, one of the biggest obstacles is distances. Distance is one of the key problems when figuring out the solutions to rural areas. To have a successful innovation, the problem of distance needs to be solved.

Innovation projects in the field of mobility and logistics are a huge opportunity to enter new line of actions. Endless possibilities to create innovations are available. In the modern day where digitalization, information, new technology, AI (artificial intelligence) etc. bring us unending options to create innovations and new business. Traffics sustainable growth program 2021–2023 (Fin. *Liikenteen kestävän kasvun ohjelma*) has a focus point on developing innovation. Focus is to contribute developing innovation, globalization, and sustainable export-focused growth. Digitalization and growth in services are one key to develop mobility and logistics solutions in rural areas. Traffics sustainable growth

programme refers not only to bring more options and supply to rural areas but bringing other sectors to play and find solutions to decrease the need for mobility, in other words increasing the option to operate remotely. (Eiro et al., 2021)

To have a comprehensive view of mobility and logistics and the innovation projects in these fields. We need to consider the area in which we are currently operating. Mobility can be described as a form of movement. Mobility can be divided to several subcategories and other metaphorical terms. Mobility in these subcategories and definitions does not always mean in this case the physical act of movement but more of social phenomena. (Høyer, 2000) Mobility can be described as a positive phenomenon in this thesis. The fact that mobility is considered a social phenomenon and physical act of movement offers a range of understandable explanations when the mobility term is used. In this thesis it is important to understand that when discussing mobility innovations, the focus point is the transportation of people and the need of mobility in rural and urban areas.

The concept of logistics is in this thesis referred as a positive phenomenon. The council of Supply Chain Management Professionals CSCMP, (2013) have defined in their glossary the term of logistics to be the process that plans, implements, and controls the efficient and effective flow of goods, services and information from the origin point to the point of consumption to conform customer requirements. In this thesis the concept of logistics refers to innovations of logistic. Through this conceptual origination we can define that logistic as concept is simplified to the flow of goods and services and especially flow of goods and services in rural areas.

As in many situations where implementing innovations to everyday consumers, it is rather hard to provide the change for infrastructure, public party, consumers, and the executioner of the innovation. We can consider the world getting smaller and rural areas getting more distant. One way to decrease this everlasting gap of society's is to create innovations and to change the way we think and approach rural areas in Finland. To have a working society, we must bring sparsely populated areas closer in other manners than physically. To make rural areas more attainable we can figure out the ways to bring the knowledge and solutions that are i.e., working in urban areas and to find out can we implement those solutions to rural areas.

To discover innovations in the field of mobility, the cooperation of public and private sector needs to work correctly. From public sector comes the solutions to achieve the

customers in rural areas. To address the issue on how innovations can be implemented, we must know on how the innovation process and pilot projects are done. (Terrien, Maniak, & Chen, 2016) There are various innovations that are executed in Finland and in rural areas, but there are not many assessment tools that can give us the information on how mobility innovations have succeeded in the past. There are various operational challenges when considering innovations in the field of mobility. These challenges need to take under consideration when defining the problem which is going to be solved with the innovation.

In terms of logistics innovations, the problems do not emerge the same way as perhaps in mobility innovations. There are few issues that differ from mobility innovations and cannot be categorized in the same way. In mobility innovations the main goal is to transport people in some new and better way from point A to point B. In the field of logistics, the transportation is done as in the field of mobility, but the cargo is something that is aimed to transport more efficiently. Grawe, (2009) states that logistic innovations are something that improve logistics operations. Grawe also speaks about the long history of logistics and the nature of moving products in a better and more efficient way. One thing that drives logistic innovations and their development more and more from the private sector is the fact that the outcome of these innovations is usually somehow beneficial to firms that are in some way supportive to these innovation projects. One thing more that separates logistic innovations from mobility innovations is the cost-cutting nature that drives most of the logistics innovations.

It is important to realize the difference between mobility and logistics to have a clear vision of the innovations that are related to them. In this text the comparison of these innovations and their nature is not done, but the same evaluation frame is going to be used whether the innovation is from the field of logistics or mobility. To understand the nature of innovation we cannot create more than one evaluation frame for different types of innovations. Logistics and mobility can be seen as in the same field but not completely in the same subcategory.

2.6 Life cycle of innovation

Many companies, projects, public sectors etc. have their own policy on how innovation is seen in the organization. Innovation is usually seen as a process that has a life cycle

throughout the entire life span of the product. Many companies are innovation orientated and the idea of innovating all the time is encouraged. Employers usually give the idea to employees to innovate all the time and the company's nature can be so that the ethics are so that the innovativeness can take place. Company's policy about innovation can be seen always a bit different than from a company in the same field. This can be explained with the fact that in most companies the need for economic value of innovation is needed. (Tenera, 2009) Without the economic value of innovation, value of something else can be desired when executing innovations.

Innovation policy in Finland is well executed and noted amongst other countries. The innovation policies are driven by the competitive factors and with this mindset the competitiveness comes to play. In terms of competitiveness the basic ideology is to ensure profit through the innovation, but this is not always the case. Many factors affect the nature of the pilot and what is the area where the innovation or pilot is operating. One heavily affecting aspect of innovation are the technology-based innovations. Through the idea of using technology in innovations gives room for competitiveness and profit-making. (Pelkonen, 2009)

Pursuing competitive advantage in the field of business is very hard to achieve and strategies to accomplish this goal are various. Figuring out the companies that can achieve this competitive advantage are the companies that are timely responsive and rapid, have flexible product innovation, coupled with management capability to have a working solution with internal and external competences. (Teece, Pisanos, & Shuen, 1997)

While the competitiveness brings the profit factor into play it is not always a bad thing. Competitive mindset brings out the innovativeness. For example, in the public or private sector competition thrives the parties into solutions and decisions where something could be done better and therefore enhancing the business or some part of the organisation somehow. Finnish innovation policy has been using incentives as a tool for inspiring innovations yet in the recent times this has been decreasing. The benefits from these incentives are often seen as minimal and more of a way of marketing the provider of the incentive. (Takalo, 2014)

3 LITERATURE REVIEW

This research and the evaluation of pilots and innovation are done with a literature review which is presented in this chapter. Literature review as a research method is commonly used and therefore quite hard to accomplish in the best possible way. Existing knowledge is the foundation of every good literature review. This may cause pros and cons to the writer in modern day of research.

The amount of information available is vastly increasing and therefore the responsibility of the researcher is increasing concurrently. The ability to have a critical perspective to all available data in one's research needs to be prioritized to have a valid outcome of the literature review. To have a well-executed literature review access to the newest information and knowledge needs to be available to consider the research to be accurate. With the best possible information and knowledge and the proper way of analysing the data, a firm and reliable foundation to literature review can be done. Because the literature review is such a great tool to examine previous knowledge and research, it is exceptional tool to build theoretical evaluation on successfulness which in this thesis is one key feature. To execute literature review well one needs to have a systematic approach to the available knowledge and to have a clear vision of what is the main goal of what the research points or says. Doing a literature review can be fertile when done correctly. Yet, it is not recommended to do a literature review without a vision of how the data is collected or how i.e., articles and papers reviewed in the study. Therefore, a literature review can follow a guideline to have a systematic outcome of the research. (Snyder, 2019)

As a literature review it is natural to have information from various sources and therefore to have a broad spectrum of knowledge considering the subject of this thesis. Therefore, it is very relevant to understand the nature of a literature review and how the research questions are going to be answered through this type of work. The main idea of a literature review is to have a broad look on the existing data that's available and to implement the answers gotten to the research questions.

In modern day research the amount of knowledge available is enormous and somehow disorganized. The writer's responsibility is to have a critical point of view when reviewing all the available information. In this thesis the review is going to be done as an

integrative literature review. The nature of integrative review as of any literature review is to have clear steps on how to execute the review in a way that for the writer the goal of the review is clear. As a natural way of integrative review, the goal is to have critical, assessable and in such manor that the knowledge and information can be brought together with tools that are fertile to the research. With integrative review this thesis has a goal of creating new theoretical framework which is key feature for the literature review of this sort. One thing to notice when executing an integrative literature review is that one must be careful to not simply have an overview of literature but to do more integrative research and to have a valid contribution to this research field which in this case is the evaluation framework. (Snyder, 2019)

In the following chapters I will discuss the main points of this literature review with each different topic went through with the purpose of their origin. To have a systematic overview of the research and the goal it is relevant to go through the topics carefully and in such order that the research can maintain reasonable figure. The next chapters will go through innovation as a term and subject following the definitive review of innovation types. After the definitions and survey to the concept of innovation it is important to see the innovation in our modern-day society and more precise, our modern rural society retaining the topic of logistics and mobility. Innovation process is one factor that relies on how innovations can be defined and how the innovations have succeeded and therefore, it is highly noted in the literature review. After the innovation and its' nuances have been gone through, we will speak out about the critical success factors and how the evaluation of innovations is considered as a process.

3.1 Definition of innovation

In modern society, innovation can be described in a controversial manner. Often innovation is seen as an occurrence of something positive to happen. This is not entirely false information, but a critical approach to this term needs to be taken. In this chapter I am going to discuss the concept of innovation and how the term is explained in literature. In this study the history of innovation term is not going to be gone through, but the concept itself needs to be explained to understand the successfulness of innovations. This research will address innovation concept as a non-dependable term and therefore sweeping tone of innovation definition is used. Although, innovations that are considered in this research

are precisely from the field of mobility and logistics and that is why innovation cannot be defined in any manner but so that it can be used in this research.

Gault, (2018) states that to measure the innovation it needs to be defined. Yet in this thesis innovation is not measured but instead evaluated. Many organisations and journals have provided various definitions of innovations and therefore the definition of one sector cannot perhaps be accurate on others. That is why defining innovation generally can be better because the probabilities of getting consistent results in research are higher.

Innovation is not easily defined because of how different sectors define innovation and the innovation process. Innovation can be described as dynamic activity, due to its' nature of being available to almost everyone. Innovations can be divided into systems which in this case is relevant. When dividing innovations into systems the main categories are industry, technology, and geography. To have a clear view on which system the innovation can be placed one needs to know the system that each individual innovation is working. The reason for knowing innovation systems is simply to know how the innovation policies work in the system and how the goal of innovation can affect the societal challenges in a positive manner. (OECD/Eurostat, 2018)

To continue innovation definition, innovation goals and aims need to be considered. To know how innovation phenomena, work and how one can objectify innovation in our modern-day society. OECD/Eurostat, (2018) states that innovation is something that creates value for the party that is behind the innovation. Also, innovation can be described something that is new or enhanced from previous product or process. In section 3.2 I will discuss more deeply on different types of innovations and how they are explained.

To ensure the scope of this thesis is going to be narrowed to a point where empirical part can be done precisely, the concept of innovation needs to be done so that innovations are considered only the innovations of logistics and mobility and more particular the innovations that are considered in rural areas. To figure out how different fields have their inherent innovations we need to see how innovations appear and what are their natural features.

In section 2.4 the shallow categorization of logistics and mobility innovations was done. This section provides a bit detailed point of view to the innovations and how these two completely different types of movement can be defined. To know how these two concepts

differ from each other we can find out, what are the issues and things where these innovations bring value to the customer or the provider of the service.

The point of evaluating mobility challenges of rural areas is to figure out how the accessibility of those areas can be enhanced in some way. Many studies have dealt the mobility and their effects in urban environment. This thesis can refine these studies a bit and determine the challenges that occur when implementing the knowledge of these studies to the rural environment. A few key elements can be seen that are taken into consideration when mobility and logistics occurs in research which is the prices of trips in the field of mobility, and profits that are made by logistic operators.

Rezende Amaral et al., (2018) states that when trying to grab the modern-day challenges of mobility the usual aspect is to see how economic challenges are situated in the field of mobility. Also, one belief that has been risen in the research is that externalities should be avoided to minimize the external impact in costs or benefits. With this logic the usage of network becomes more rational. With this strategy of eliminating externalities for example the promotion of bringing transportation in the public sector, abate traffic and parking costs and many other elements regarding to mobility. The search of equilibrium with the aspect of not completely chasing the lowest point of costs for each stakeholder but in a way that the external and internal costs can meet somewhere in the middle. To see the motivation on developing the logistic sector, a different way of approach needs to be implemented. First thing that needs to be considered is the difference between logistics movement and purpose compared to the movement and purpose of mobility movement and more of all the transportation of people instead of goods.

To see how logistics operators work inside the urban area but also in the rural areas, different things need to be considered. For example, logistic operators do not focus on minimizing the costs of each of their trip but instead maximizing the profit each trip can make. This state of mind is far more different from the ideology of transportation of people. The idea of decreasing the available options of different transportation devices when transporting people is rising and therefore the options to move from one place to another needs to be considered. One option for people to do their trips is to simply do them with public transport. This is a rising trend in urban areas. Yet this trend or solution cannot be implemented in the field of logistics. The idea on logistics operator relies on the delivery of goods or services and this cannot be done with alternative options and

therefore in some cases can cause the rise of vehicles travelling to do the deliveries To accomplish all the wanted deliveries and to manage time and costs, logistics operators are not completely doing the finest job with the global costs and costs in general because the final payer of these complex logistic chain is the customer. states this as a lose-lose situation. (Rezende Amaral et al., 2018)

After defining the nature and need of innovations in the field of mobility and logistics, we need to see the innovation concept and how the innovation can be implemented as way that it is needed and wanted. The generalization of the term 'innovation' is needed to understand the basic nature of each innovation. OECD/Eurostat, (2018) describes innovation as a new or improved product or process that clearly differs from the original product or process and is available to potential users. Innovation can be more than just one singular innovation that has been launched to markets. Innovation can be process in business, activities regarding innovation, business innovation and product innovation. Many definitions have been used and still the evolution of defining innovations is still active. Modern day definition is bordered to *product innovation* and *business process innovation*. The reason for narrowing the definition is simply to make a clearer scope and definition to reduce the misleading and false information in innovations.

To ensure innovations under consideration are understood properly and the basic nature of every innovation is noted, the sector in which each innovation is in needs to be defined. Innovations can be labeled in many different sectors and therefore their nature can be a bit different than in one other innovation. To know which sector every innovation is in, different policies, strategies, processes, and funding for example, can be determined and therefore we can have a vision on how the innovation process has been executed. Although, innovations and their heritage can be from various sectors and that is why their definition is not always the simplest task.

OECD/Eurostat, (2018) has divided innovations and sectors into four different categories regarding to the nature of each different sector. To every sector there has been made a characterization to have a clear view what different sectors represent and therefore how the innovations can be categorized in the absolute sector. Reasoning the sector definition in the measurement of innovation can be done by having the urge to understand how data and research can be done in each different sector to have understanding how innovations

can be measured if their heritage is from one sector or another. Categorization is done as follows:

Corporation sector or business sector can be defined in this case regarding to the manual as a party who oversees bringing products and goods to the market and the responsibility of delivering product to customers is one of their main responsibilities.

Government sector brings more straight-forward and disciplined point of view to the table. The key feature in government sector is that the ideology does not simply rely on profits made with the goods and products. Public corporations in this case have been categorized into government sector just because of the pricing of their products. The reason of pricing their products, services and goods are from the social reasons rather than doing the maximum profit.

Non-profit institutions have a clear vision on making services, goods, or products to the third party but does not seek the profit for the funding party that is behind their operation. In many cases government or businesses take place of funding and decision making regarding the innovations, but not steering the process to profit-making.

Households and individuals play a key role in the field of innovation. Usually, the demand and interest are developed from the 'customer' point of view and therefore it is highly important to know on innovation what derives the innovations and what is the heritage. Households and individuals have a high rate of creating new innovations and being the user group for them and that is why individuals and households are very important

3.2 Types of innovations

To have a vision on how innovations can be divided into different categories it is highly important to know how different innovations have different nature and therefore cannot be categorized in the same way. To know how innovations can be separated into categories we can begin the process by characterizing the field in which the innovation is. All innovations follow the same basic concept of bringing something new and possibly valuable to the company or party who oversees the innovation. The main point of characterizing innovation is how the innovation process is going to go through and what is the main goal of the innovation. Many organizations and parties have made definitions

on different types of innovation and therefore various methods bring various definitions. In this thesis innovation is going to be defined based on literature and the best possible way of defining innovation as it should be in the field of mobility and logistics.

Many research and publications define innovation types in three or more subcategories. This happens often and seems to be the way of characterizing innovation types. In many cases, economist Joseph A. Schumpeter brings the definition to a place where five types of innovations are considered. Kogabayev & Maziliauskas, (2017) states the Schumpeter's five innovation types can be described as:

- Completely new product, process, or service to consumers/markets
- New market gap to product, process, or service that are already known well in their own markets
- New way of producing already known product, process, or service
- New materials that can enhance the product, process, or service or discovery of some semi-finished product
- New methodology in production that has originated somewhere else than from scientific discovery

Innovations can be described and defined more various ways than mentioned but also in a more narrowed manner. In terms of defining innovation types, it seems to be more common way of characterizing innovation into three or less different types. In the following paragraphs one or two different sources are surveyed and analysed on how they have succeeded to define innovation types.

OECD/Eurostat, (2018) has more complex way of defining innovations and their nature but still somehow quite simple in terms of the result of definition. The innovation types have been categorized roughly into two different categories where one stands for *product innovations* and the other is representing *business process innovations*. These two are quite simple to define as they are, but the business sector is far more complex than it seems and therefore more detailed definition of these terms are needed.

Product innovation can be described in the simplest way as goods or services that are significantly different than the previous goods or services that have been provided by the firm and launched in the markets. This is a simple way of defining the product innovation but in the manual, the innovation type has been defined in a more detailed manner. The

definition is a detailed plan on how product innovation is made and can be accepted as an innovation. First the innovation needs to show improvements in a scale that at least one spec of the product needs to be improved. Also, OECD/Eurostat, (2018) states that quality, durability, technical specifications, reliability, economic efficiency (in use), convenience, usability, and user friendliness are the topics and specs that need to be taken under consideration when defining product innovation and the enhancement of this innovation type. More contrasting point of view in enhancing a product innovation is the improvement of the design which can affect the appearance and therefore can be more agreeable to the eye. One and probably the most important thing as a product innovation is that it needs to be available to the user group that the innovation is purposed, but the innovation does not need to be making more and more sales. If the innovations are thriving towards bigger and bigger sales it can cause the innovation philosophy to suffer.

Business process innovation can be defined as process inside the firm that has been improved from the previous process or that is completely new compared to the old process, and this business process needs to be taken to use in the firm. Mostly the separation of product innovation and business process innovation becomes from the customer or party that the innovation is directed. Typical way of seeing the business process innovation is the improvement of already known business function. The improve can touch efficacy, efficiency of resources, resilience and or reliability, affordability, convenience, and common usability. All process enhancements can be considered as a part of business process innovation and by improving one of these sections, innovation has been acted. Whether the innovation of business process is new or improved, it is highly important to know the goals of the innovation. Usually, business process innovations aim to do and build higher value to the process itself in the firm. Therefore, reducing of costs could be one example that suits business process innovation very well. To have improve a process more than money can be discussed, because in many situations product improvement or new regulations need to be considered to improve or create business processes. As mentioned, the business process innovation can be called innovation after the process, new or improved, has been taken to use. As in all companies the implementation of a new process is not always given as the simplest project. In many companies, many steps and phases need to go first before the innovation can be taken into the everyday life of the company. These steps can consist of initial development, pilot testing and then the implementation to the business function. When considering innovation in businesses and the modern day, it is helpless to see that innovations are

thrived by the fast growth of digitalisation. The digitalization and new digital technologies are one way to see the business processes to be enhanced and therefore are highly important to the development of innovations. Business process innovations can be divided into six different subcategories regarding to their functions and role inside the firm. The six different subcategories where innovations stand are production of goods and services, distribution and logistics, marketing and sales, information and communication systems, administration and management, and product and business development. (OECD/Eurostat, 2018) The definitions provided by Oslo Manual are very detailed and cut into pieces to understand businesses and their operations better. This work is highly dependable on the knowledge of the business where innovations take place and most of all the understanding of the firm in which the innovations are done.

Innovations and their subcategories can be defined in various ways and that is why various outcomes are more than likely to happen. Innovation and their definition do not always have to be the most accurate, because innovation and their nature is not always the easiest way to define. That is why other definitions in a broader way has been made.

Innovations as a concept are rather hard to define and to have all-purpose definitions, it is impossible. That is why in this thesis innovation and its' definition has been taken under consideration in several ways to have a broad aspect on innovations and how different parties and researchers have defined innovations with their knowledge and expertise.

Harvard Business School has been working on innovations and their nature for a long time and with their knowledge and expertise. Innovation through the article can be seen to be focused on growth of companies through innovation. This is the usual way of seeing innovations and their impact. In table 1, Christensen & van Bever, (2014) have categorized innovations into three different types as follows:

Table 1. Innovation categorization (Modified from: Christensen & van Bever, 2014)

Performance improving innovations	Replacing old products with new design with the result of improved models.
Efficiency innovations	To sell old and already established ideas to customers with lower price.
Market-creating innovations	Creating complicated or costly products to such form that new customers or market is attainable.

To identify the best innovation types for this thesis and for the character of innovations in the field of mobility and logistics it is keen to have various definitions to see how different innovation types have been defined and how the definition has been made in different sectors of industry, technology, and business.

Two different types of innovation definition have been seen in the previous paragraphs and one more is important to go through as a variant. According to Davila, Epstein, & Shelton, (2005), innovations can be defined based on the innovation and how it affects the business regarding to the old business model or old technology that the company already possesses. Innovation strategy has been said to be the key point when defining innovations, for example Davila et al. described two different strategies which hold two different ways of seeing the innovation. The strategies are *Play To Win* and *Play Not To Lose* which indicate two completely different ways of thinking innovation. Playing to win is the way of seeing innovation as a channel of growth and therefore more aggressive way of approaching innovation. Playing not to lose in the other hand keeps the company in a safer place regarding to innovation, while still operating innovation and making

something new to the company the basic idea is to keep the existing market shares and trying to maintain the erosion of margin.

Through the idea on innovation strategies in companies, Davila et al., (2005) has made a definition on innovations and the outcome is three definitions, breakthrough, radical, and incremental innovations. The concept and strategy behind breakthrough innovations is to implement these innovations into strategies that are more aggressive and are keen on growing the company or in other words playing to win, therefore breakthrough innovations consist of new business models and new technology see *figure 2.* To have a business strategy of playing not to lose, or in other words staying in more of a managing place of the business margin, incremental innovations are needed and more less of the radical or breakthrough innovations, see *figure 2.* To have a completely new business model with a completely new technology, the company thrives to radical innovations, in other words playing to win in a more aggressive way, see *figure 2.*

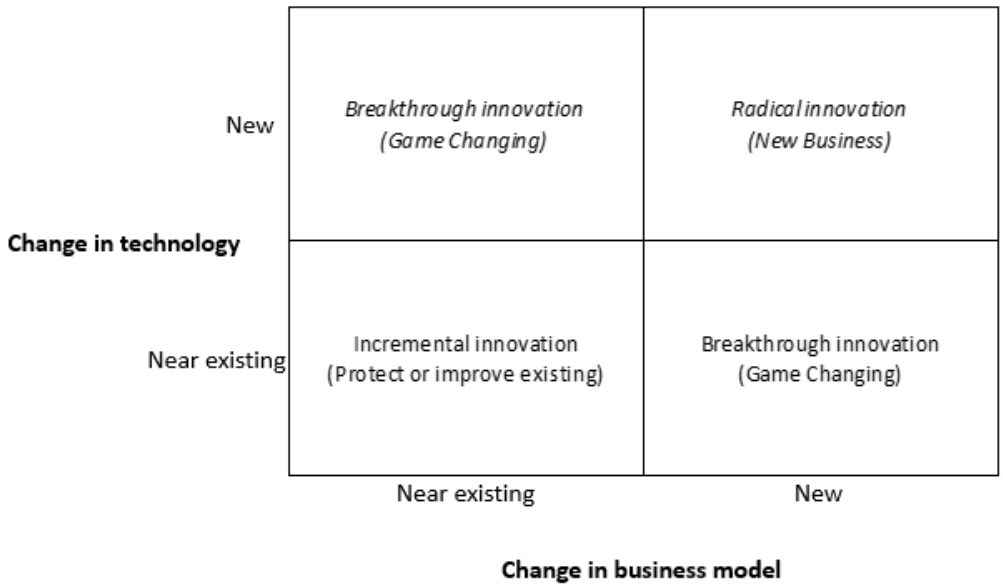

Figure 2. Matrix of innovation types (Modified from: Davila et al., 2005)

The innovation types given before having offered quite broad aspect in the world of innovation and the aspect on defining and understanding variables of innovation. Yet, many definitive sources have not been discovered and not all can be explored. In previous paragraphs eleven (11) somehow different innovation types have been went through and

explained in a manner that their own unique way can be seen. Although, there is one innovation that differs quite much from the previously researched innovations and needs to be taken under survey.

It has risen as a concerned topic of false use of the phrase ‘disruptive innovation’ regarding to Christensen, Raynor, & Mcdonald, (2015), and the usage of the term is somehow getting out of hands. The usage of the term can be easily misdone because the word ‘disruptive’ is quite broadly determined. The concept of disruption is determined with the idea of shaking the existing markets or businesses. Also, the idea of disruption can be explained with an example of a smaller company creating products or services such that they are able to challenge businesses that are incumbent.

Disruptive innovations can be defined a bit different than the term ‘disruption’ itself. For disruptive innovations it is natural to take place markets that are considered in the low end of markets or completely new footholds. With this type of approach, disruptive innovations can shake the markets and threaten the incumbents. Also, the idea on customers they are approaching is different than the approach that the bigger businesses and companies that already have strong footholds possess. (Christensen et al., 2015)

To understand disruptive innovations better, a figure on the common way of thinking about innovation compared to disruptive way of innovating is necessary. As in any other case the high-end customers are willing to pay more in the high-end markets and low-end markets in the other hand are formed from the customers that are willing to pay a bit less, and that is way disruptive innovations can take place to markets of less profit but customers those high-end markets do not reach.

3.3 Innovation in renewing the economy and society

Innovation as a thriving force in the society and economy can be a complex subject. Innovations and innovative actions are not going to take place if the surrounding infrastructure of innovation is not handled properly. Innovation hub is a place where innovations can take place with a higher amount of knowledge and innovativeness than a normal centred area of innovation. This term also requires the area to have global networks and bring value to the economy globally. (Hautamäki, 2014)

Innovations can be a lot more than just a concept of innovating and gathering all the innovation information in to one place. Through the global economy and the competence of markets, innovations are key parts to compete with. To ensure a place in the markets and in the race of the best solutions of one's business is tough and therefore important part of the market competence. Usually, technological innovations and the idea of innovating in the field of technology, are working as boosters to ensure a place in the race of economy enhancement. (Diaconu & Asachi, 2011)

Innovations can create positive effect on society without focusing entirely on the profitable idea of innovation. Many innovations are done to enhance procedures to decrease the amount of waste, consumption of resources and lowering the environmental impacts. These features are increasing in the field of innovation. Environmental protection is a trend which needs to be noted when innovation is discussed. (Diaconu & Asachi, 2011)

In Finland the concept of *green economy* is highly noted and is a result of implementing various sectors into the battle of climate change and trying to make these different sectors and the entire country carbon neutral. Innovations and innovation technologies are key part in this ever-ending battle against climate change. The political point of view in the green economy of Finland is to have a clear alignment to the operators on how different steps are executed and how the innovations are going to affect the economy and society. The main strategy of changing the infrastructure of economy and society is to first implement small (*incremental)* innovations and do the quickest change with these and to have the fastest impact. Bigger (*radical*) innovations need to take place as much as smaller ones but need to be done in a more broader time window. (Antikainen, Lähtinen, Leppänen, & Furman, 2013)

Innovations and their relations to economy and society are not easily explained because the fact that economy and society are broadly explained. Although, innovation work and innovations themselves are a small part of these concepts they play a key role in the dynamics. Legislation in Finland is relatively precise and regulates major companies and operators, and therefore government can steer the innovation process in many places. This is one reason Finland's way of implementing innovation process and innovations in the towards the green solutions.

In Finland there is the National Innovation System (NIS) which indicates the collaboration among the biggest organisations and how they all connect to each other. One of the biggest advantages from the field of innovation in Finland is the vast collaboration and coordination that begins from the government and continues into industry. The biggest money flow regarding to innovation is happening in the private sector, for example, in the companies. Public sector in the other hand is providing 30 % of Finland expenditure on innovation practices. One thing that is really considered to be working in the field of innovation is the collaboration between companies and universities. It is seen that 40 % of the companies do indeed collaborate with universities or some other public research institution. (Fernström, Gupta, & Roos, 2005)

3.4 Innovation process

Innovation process is something that each company and public or private sector operators do with different capacities and different interests in the final product or service. Innovation process can be highly dependable of the legislation from the country that the operating is happening. In Finland the *Sustainable growth program 2021-2023* (Kestävän kasvun ohjelma 2021-2023) is organizing the innovation process and the whole concept of innovation to enhance the growth of green solutions regarding to logistics and mobility. The programs main topics and key-points are company driven innovation, globalization, and sustainable export-driven growth. As the economy is strongly related to transportation and logistics the process of innovation needs to be considered and somehow managed by the government. (Eiro et al., 2021)

Although innovations are in many ways guided by the legislation and politics, the process of innovations in companies and outside companies can be different. Innovation process is much more than just steps that one takes every time when innovation and the need of innovation is at hands. Innovation process is a phenomenon that can live throughout the procedure. Because of the innovation projects and processes are broadly researched topic the knowledge in the process has somehow ossified to a place where process-steps are relatively same in many sources. Innovation process can be described to begin with the first step of defining the idea of innovation and the proven product or service that is needed or is going to be executed. After the original idea or agenda has been settled the definition of problem and the process of solving it can begin this can be also seen as the definition of concept. Usually after the idea of concept has launched and the idea is seen

clearly, calibration and redefinition can, and should be necessary to modify the innovation more. From the process of innovating in a theoretical level, the idea needs to be taken into use and testing the original concept. The last part is where the innovation and the concept has been settled and qualified as a concept that is working and can be used in a vaster way. This usually means that the innovation can be put to further use and to have more value from the innovation itself. (Rice & Rogers, 1980) & (du Preez & Louw, 2008) In figure 3 the innovation process is laid out step by step.

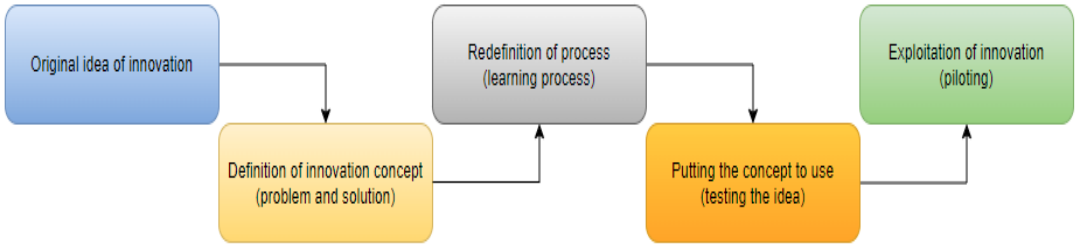

Figure 3. Innovation process step-by-step. (Modified from: du Preez & Louw, 2008)

3.4.1 Pilot projects as a vessel for innovations

As in many cases, pilot projects are very common way to think of launching new projects and new products or services to the public or inside a company. To the company or business to achieve something new or launching new process ways or completely new products, piloting is one of the most common ways to do so. Pilot projects are usually done when the final product of study, experiment, process, or product is something completely new and not yet seen before.

Pilot projects differ from the regular projects in various ways. The common way of defining pilot projects is that they are a platform and most of all a temporary platform where innovations can take place and experiment under the term of 'piloting'. As in many projects there are many ways to operate and coordinate pilot projects as well as routine projects. This can be explained with the various industries and various companies inside the industries and each of them have a unique way of executing project inside the companies. (Van Popering-Verkerk & van Buuren, 2017)

Van Popering-Verkerk & Van Buuren, (2017) states that one of the biggest differences between pilot projects and ordinary projects is the outsourcing in a manner that pilot projects are usually done distant from the company's original project policies. One thing that drives the difference of pilot projects regarding to original or routine projects is the 'freedom' that is given to the pilot projects inside companies. This freedom is the key to innovative actions inside the companies and should be valued.

The basic ideology of project management is to get the first idea of project to goal. This seems to be the ideology behind piloting in Finland. Although it seems that many of the pilots that were under the scope was executed with the basic philosophy which consist of start and finish. There is a way of rethinking the project management where idea-to-launch factor is categorized into seven (7) pieces which holds: idea, scoping, business case build, development, testing and validation, launch, and post-launch review. This is the basic ideology and foundation when project is to be executed. Due to different phases, it is essential to understand the transition from one phase to another. One thing that is almost as important as the start of the project is the finish, and by finish it is meant as the post-project time where the continuity of project is taken under consideration. (R. Cooper, 2009)

3.4.2 Public and private sector projects

Innovation projects and processes are easily explained as one concept and under the big explanation of the whole idea of innovation for example. In modern society innovation and innovation projects are driven by the public and private sectors. Both sectors have their own individual way of executing innovation projects and innovations themselves.

Innovation as explained is the driving force of creating something new and better and somehow improving the performance of some aspect. Innovation as a concept relatively little differs when scouting innovation through public and private sector, but there are some differences that divide innovation practices in public and in private sector. When innovations are going under the scope of need, many driving factors are essential through both public and private sector innovations. These factors can be divided into internal and external factors. Internal factors for private sector can be for example structure of the company, culture of innovation, organisation process and many more factors that affect innovation and innovativeness. External factors are for example government policies, situation regarding to economics, collaboration with stakeholders of innovation project

and many other external factors that are in relation with the innovation process or project. In public sector these factors can be divided as in private sector to internal and external but in addition there is politics that play a significant role when considering innovations practices in public sector. Political factors are factors that are driven the politics and the nature of political impacts that enhances or slows down the innovation process. Political factor can be for example incentives that drive public organizations to create innovations and to increase innovative actions. (Cankar & Petkovšek, 2013)

Private sectors tend to innovate in a much clearer vision of the markets and targeted customers that the innovation is aimed. Private sectors are more market and profit orientated in terms of innovation. By the fact that private sectors innovate to ensure profits and to have a hold on markets, more of short-term innovations are usually done and therefore the planning and executing time is reduced more than in the public sector. Innovations in private sector are usually very well-known who the owner of the project is and that the main target is to create value through the innovation. Private sectors are also given the luxury of not having the media overseeing their actions and progress and private sectors can in most cases decide the out delivery to the media. (Tan, 2004)

As a contrast, public sectors tend to be much more external from the market sector and therefore not also entirely dependable from the profits. That is one main reason of public sectors to have more conservative way of executing innovations and directing them to the customers or users. Through the political point of view of public sectors, incentives are often quite necessary to have a working and motivated innovation process in the public sector. Few things that public sectors hold that differs from private sector are trust, innovation through service and legitimacy. One and probably the most important thing that public sector innovations hold that are very common to innovations in this sector is the public value created. (Bloch & Bugge, 2013)

Through the aspect of innovations in different sectors many noticeable differences and similarities can be seen. Although private sectors are more profit-based and customer orientated they have the vision of creating value through the innovation whether it is from profit or through process in the company. When public sector creates innovation, the value is usually created for the public.

3.4.3 Logistics and mobility (projects) in Finland

To know how mobility and logistics can take place in our society the underlining of needs in this field is necessary. In Finland mobility and logistics can be considered to take place through three different levels and with them the idea of mobility and logistics can be explained properly. In *figure 4*, three levels of logistics and mobility network consists of physical structures, places of habitation and production, and finally the transportation of information, supplies and people. (Alarinta et al., 2016)

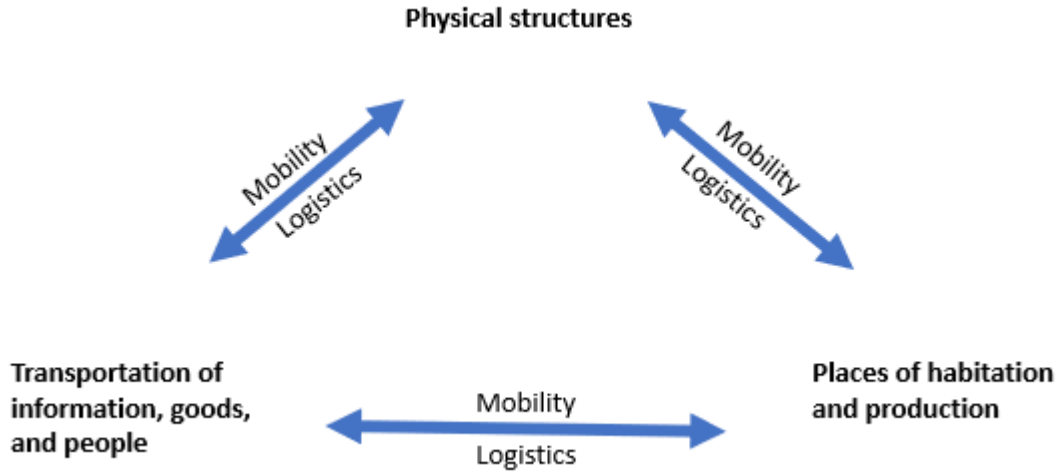

Figure 4. Mobility and logistics and their relevance in our society (Modified from: Alarinta et al., 2016)

In this case the foundation of infrastructure has been laid out and the knowledge on relevance between each level has been noticed. To attack the problems of rural and urban areas, many innovations has been made and executed. Such projects that issue this type of integration of mobility to urban and rural areas are various. One project example could be MaaS-project (Mobility as a Service) where customers' needs are the first that need to be achieved. (Eckhardt, Nykänen, Aapaoja, & Niemi, 2018) In a more detailed way logistics and mobility projects can be seen. For example, autonomic train (SmartRail) is a part of MaaS-project. By achieving autonomy, more sustainable mobility solution can be done, more user centric services and more safe ways to travel. (Hautala et al., 2021)

3.5 Critical success factors (CSFs)

Success factors or critical success factors can be seen as a frame to categorize and analyse the wanted subject through given factors that the researcher considers valid or necessary. When success factors are the way of investigating successfulness of innovation in the field of mobility and logistics it is necessary to have a broad view on success factors and to choose the most important ones to the framework to achieve the wanted and valid definition of success. Success is a vast term and needs to be explained so that the validation of success factors can be done correctly. Success can be seen in many writings and research defined as how good the subject has succeeded financially. This although is not the best or most important parameter when defining success. If the product, service, or process does not achieve the most financial incomes it is not always considered to be a failure, success can be seen in various field for example opening new markets, creating new technology, socioeconomic factors etc. (Cooper, & Kleinschmidt, 1987)

Innovation can be seen many times as something almost supernatural and unachievable. First and foremost, innovation should be handled as projects are handled. That is why many innovations are considered as projects and treated as projects are usually treated. To know and understand the factors that drive innovation projects, information and knowledge can be attained from projects of the past. Clarke, (1999) states that projects have various success factors that are in harmony and bring fuel to each other. Finding critical or key success factors from the sea of factors is not an easy task to do.

Project success is not directly comparable to success factors. Success factors are simply an estimation of the subjects that may or may not help the project to finish in a desired way. Critical success factors simply present the more likely factors to drive the project to finish successfully. (Müller & Jugdev, 2012)

In this thesis the successfulness of mobility and logistics innovation projects are going to be dealt with the determination of critical success factors through key performance indicatiors. To understand and recognize the critical success factors of innovation projects and innovations, the successfulness of the whole project or innovation needs to be defined.

3.6 Key performance indicators (KPIs)

Key performance indicators (KPIs) can be described as the indicators that are important to the organization and its' performance. KPIs are usually known as the factors or the most critical aspects to the company's current or future performance. In a simpler way the KPIs can be explained as a tool to steer and affect the organizations current way of working in a rather short period of time. (Parmenter, 2010) This thesis relies on KPIs as a tool for defining of the successfulness of the innovation project and not as a tool for evaluating current performance.

As well as success factors, KPIs are very related to project management and that is why a great way to implement this knowledge into innovation projects. In this thesis the KPI framework created is simply to underline the common criteria in innovation projects that represent that the project has succeeded. The usual aspect on project successfulness is the "iron triangle" where results of *time*, *money*, and *quality* are taken under consideration. (Westerveld, 2003) The iron triangle is not a bad way of measuring and scoring the successfulness of innovation projects, but somehow it can be considered as an indicator of progress and profit which is not always the case when innovations are made. Although the iron triangle is somehow considered to be outdated way of measuring success, it still covers key parts of projects and therefore needs to be included into the research.

Innovation project performance can be measured in various methods and in this thesis the following factors that Westerveld, (2003) & Zolin, (1999) provided are going to measure innovation projects and their successfulness:

- Iron triangle
    - Costs
    - Time
    - Quality
- Positive effects on projects visibility
- Production or delivery costs reduced
- Environmental impacts reduced
- Increased health and safety factors

3.6.1 Characterizing critical success factors

When considering CSFs as a vessel for defining the successfulness of innovation project the importance of these factors is rather high. Success factors (SFs) in any organization and project can be from 20 – 30 factors. Critical success factors in the other hand are basically just more important success factors and that is why there are much fewer CSFs than SFs. (Parmenter, 2010) In this thesis the amount of CFSs is going to be limited to 4 depending on the similarity of the innovation projects.

Critical success factors and their definition can be done by exploring previous research and their takes on the CSFs. Before the evaluation of previously defined CSFs the understanding of logistics and mobility projects and their innovation needs to be considered. As logistics and mobility innovations act, usually the main goal is to provide new ways to move people or goods from one place to another. This leads to the conclusion where almost every time a several parties are involved when logistics and mobility innovations are considered.

Griffin & Hauser, (1996), R. G. Cooper, (1999), Wagner et al., (2021), Govindarajan, (2011) and Dennison, (2014) have made vast research on successfulness of innovations. With the research and conclusion critical success factors for this thesis and further investigation can be determined as follows:

- Cross-functional team
- Customer / stakeholder involvement
- Culture of innovation
- Availability of technology

Because the CSFs are usually given and thought before the project launch the evaluation of CSFs in this thesis is going to be reversed in a way. In this thesis the population of subjects are going to be evaluated first by the critical success criteria (KPIs) which indicates the total successfulness of the projects. After the evaluation of successfulness, the CSFs can be determined.

3.7 Categorization of pilots

Understanding the variety of objects that need to be evaluated is very important and plays a key part throughout this thesis. The fact that many of the given pilots in this thesis has similarities which makes it harder to evaluate them as one. The unity of this categorization is that the 9 given categories can have same pilots noted under them. Therefore, the categorization of these 9 topics can take place for further understanding. The following paragraphs will discuss the explanation of these 9 categories which hold the pilot projects in this study.

Demand responsive transport is quite simply explained as transport service which is provided on demand. The basic idea is that passengers or customers decide or give the service provider a signal of need which will be followed by the providers answer of offering wanted form of transport. Demand responsive transport is a great way of implementing digital platforms and bringing new ways of experiencing the services through mobile applications for example. (Mageean & Nelson, 2003)

Digital route guides are in this thesis seen as a form of mobile application which provides digital mapping and route guides to customers. Digital route guide is seen as a tool for further and larger routing options made by the user of these digital route guides. The digital support that these route guides provide will give the customers more options of the routes they will be taking. (Ma et al., 2020)

CCAM (Cooperative, Connected and Automated Mobility) stands in this thesis for pilots and projects which are somehow connected to CCAM ideology where car users or vehicles to share data or information and with this data to make actions or decisions. Also, automated vehicles and the testing of these is playing a big role in the future of mobility. The basic idea behind CCAM is that vehicles and road users are somehow connected to the surrounding infrastructure and sharing information. (European Comission, 2021)

Combining logistics and mobility is discussed in this thesis simply pilot projects which hold the idea of combining logistics to mobility or the other way around. To be in this category, the following two main characteristics must be fulfilled. For example, a bus which is providing transportation can also provide library services.

Sustainable mobility refers to such actions in pilot projects which are going to reduce the carbon dioxide emissions or some other way making the carbon footprint smaller. Sustainable mobility is continuum to sustainable development and therefore not a new way of seeing sustainability. Sustainable mobility and its' achievability can be divided into three different main categories which indicate the main steps regarding to sustainability. The three milestones to achieve sustainable mobility can be seen as travelling more efficiently, travelling differently, and travelling less if possible. (Holden et al, 2020)

General improvement or experiment on transportation in this thesis is referred to some form of service or product that is already existing and therefore enhanced in some way. Incremental innovations are examples that can be aligned with this category. Also, pilots and projects that are not going directly into some other categories are placed in this one.

Shared mobility is seen as a phenomenon which provides short-term availability of vehicle or transportation that to consumer. The main reasoning that car-sharing is taken to the field of transportation is that all consumers are not going to be able or willing to pay the full costs that owning a car will bring. Therefore, car-sharing is a fantastic way to allow consumers to have the benefits of a car with less expenses. (Agatz et al, 2012)

Inclusive mobility refers in this case to a phenomenon which includes customers or users directly in the pilots. The pilot categorization can be relatively large because many of the pilots include customers directly in some way or another and therefore this category can grow to be much larger than the others. Customer inclusion is usually seen as a strategy which will strengthen the customer relationship to the company or project. In this case customer inclusion is also seen as a way of developing the pilot to a state which could serve the customers in the best way possible (Béal & Sabadie, 2018).

Mobility data methods are seen in this thesis as a form of data collection where data is gathered through an application or collecting the data in some other manner. Data collection is simply done by various methods that are somehow natural for the given pilot project.

Through all this categorization and explanation of the categories of the evaluation of pilots can take place. The basic idea of this categorization is to create a chart where different pilots are going to be mapped and then evaluated and analysed how many pilots

are in which category. Through this mapping we can tell the nature of new pilots taken under the experiment and how CSFs and KPIs are in relation with these pilots.

3.8 Evaluation of pilots and innovation

In this thesis the evaluation framework is outlined in *figure 5* and consists of three base topics where on the top lies the result of each innovation project. The framework then goes downwards to CSFs and all the way to SFs. The basic idea is to see the differences in each project and that is why the arrows are pointing up and down. The evaluation framework is an everchanging tool for understanding the factors that affect in the framework. In the process of implementing the gathered data of innovation projects in Finland the framework can get its' complete form.

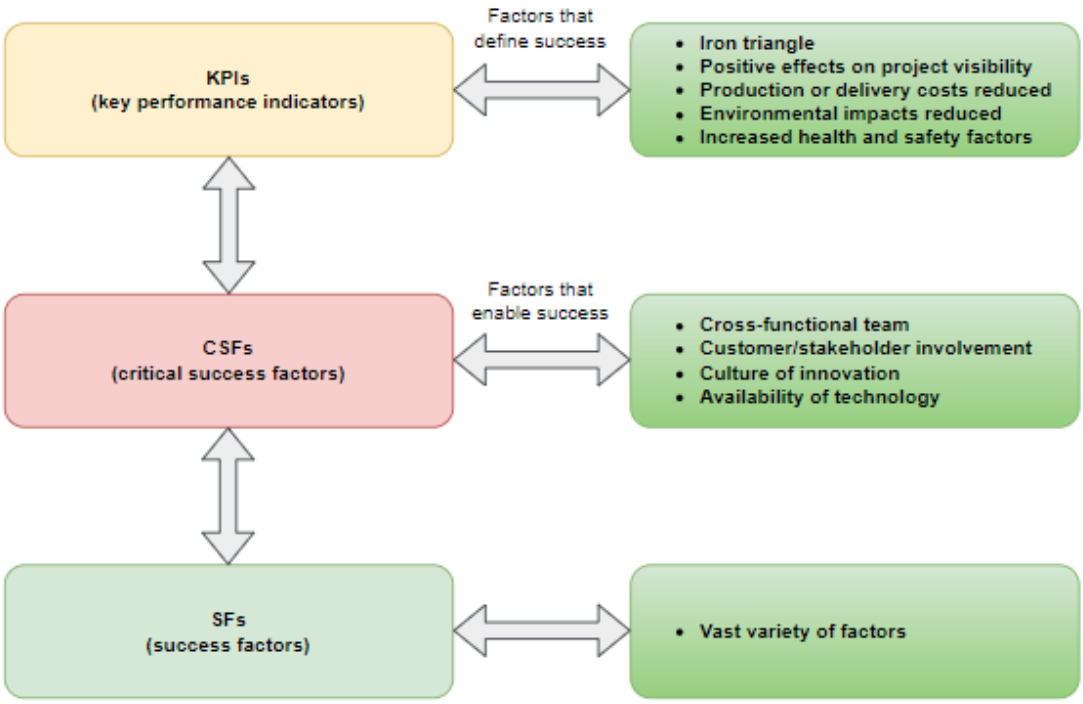

Figure 5. Evaluation framework structure simplified

After the base of the evaluation framework and the most important part for this thesis can be noticed, description of the process needs to be done. The importance in describing the evaluation is very high. To understand the reasoning behind evaluation, the process can be explained as follows:

- Objects to be evaluated
- Purpose of the evaluation
- Evaluation object

3.9 Evaluation process

Objects to be evaluated: The evaluation happens to all the gathered data on innovations and innovation projects in Finland. The subjects are in urban and rural areas all around Finland.

Purpose of the evaluation: The main goal for this evaluation process and evaluation framework is to understand the nature of innovations in the field of mobility and logistics. Through a process such as evaluation with the tool of evaluation framework, much knowledge can be attained. This tool provides information which may not show itself when examining the innovation projects and innovations without it.

Evaluation object: Object for this evaluation framework is to outline the factors that affect innovations and innovation projects. The most important thing is to realize the effect on success and failure and the contrast between these two.

As evaluation takes place in this thesis the work is going to begin with gathering all the possible data that is going to be evaluated. In this thesis the amount of innovation projects or innovations is rather high and not all can be evaluated the same way. Lack of information in some of the projects can occur and therefore decrease the accuracy of this evaluation process.

The process begins with evaluation the results in every innovation or innovation project. The outcome determines how vast the successfulness can be determined. If the sample ticks all boxes and can be evaluated widely, it can be considered a good thing for the evaluation process because the amount of data increases. After the results of innovations or innovation projects are determined the success factors can be evaluated. The number

of SFs is high, and this is a good thing because the more success factors is recognized the more CSFs are noticed in the results.

In this thesis the amount of success is not evaluated exclusively, but also failure is one important part when evaluating innovation. Innovation is a thing where sometimes the amount of success is not the absolute truth about innovations. Sometimes 100 attempts can consist of 1 success which can be the table-turning outcome and the holy grail of the research. (Perrin, 2010)

The result of this evaluation framework and process is going to be the factors and causes of the innovations to succeed and to fail. The real value is to understand how innovations differ and how the public information of these projects has been executed.

4 EMPIRICAL STUDY

This chapter presents the outcome of evaluating innovation projects and innovations in the field of mobility and logistics. The following topics will present the evaluation framework which in the end indicates the successfulness of each innovation project. Evaluation framework will be determined completely as it will complete during the evaluation process.

In this chapter the outcome will be presented as in a form of table that gives the entire character and details of each innovation and innovation project. The original and base of the evaluation framework is discussed in the chapter 3.5.3. The knowledge from different innovation projects is reviewed and more detailed look to innovation projects in Finland is discussed.

4.1 Review of mobility and logistics innovation background

To understand logistics and mobility innovations better, the reasoning behind every innovation and innovation project should be defined. There are plenty of factors in the world which affect the innovativeness and the motivation to innovate. Every country and communities have their own special needs regarding to innovation and therefore the innovations are more channelled towards to those special needs.

In Finland one of the biggest factors that affect innovation process is the distribution of population. There are many big city centres that create the need for urban innovations and more modern solutions. One could say that a trademark for Finland is the sparsely populated areas. The Finland's demographics are always changing and therefore room for new innovations and innovative projects is available. In the year 1980, Finland's population consisted of roughly 1,2 million people in the sparsely populated areas and around 3,3 million people living in densely populated areas. In the year 2005, the amount of people living in sparsely populated areas was roughly 0,95 million and in the densely populated areas around 4,2 million people. (Helminen & Ristimäki, 2007)

Through the fact that the structure of Finland's demographic is always changing and seems to be going towards a place where people are slowly moving towards city centres and away from the sparsely populated areas. Yet the structure of where people are living

is changing so slow that when creating new innovations, the sparsely populated areas need to be considered by creating new ways to reach the people and bringing them closer to the modern-day services through innovations.

In urban areas and communities, there has been some notable change in the population density. In the denser areas such as Helsinki the population density has been increasing slowly. Also, some other large and semi-large communities have been showing signs of increasing population density. There has been evaluation of the growth of dense cities and that the density will increase in the future. This can result to denser areas becoming more densely populated and sparsely populated areas sparser. (Rehunen, et al. 2018)

4.2 Evaluation of logistics and mobility projects in Finland

The total amount of innovation projects consists of 58 cases which include innovations and innovation projects and pilot projects. The main defining and categorization of projects is done by the nature of innovation and therefore divided into subcategories where more detailed view of the innovation can be seen.

The process of evaluation can begin by dividing the innovations by the nature of each innovation. Many of the innovations and pilots that are going to be evaluated in this thesis has similarities in them and layered natures and simplification of division is needed. The pilots that are somewhere in the same category are simply just put under the main innovative category. The main categories in this thesis for the innovations are as presented in *figure 6*.

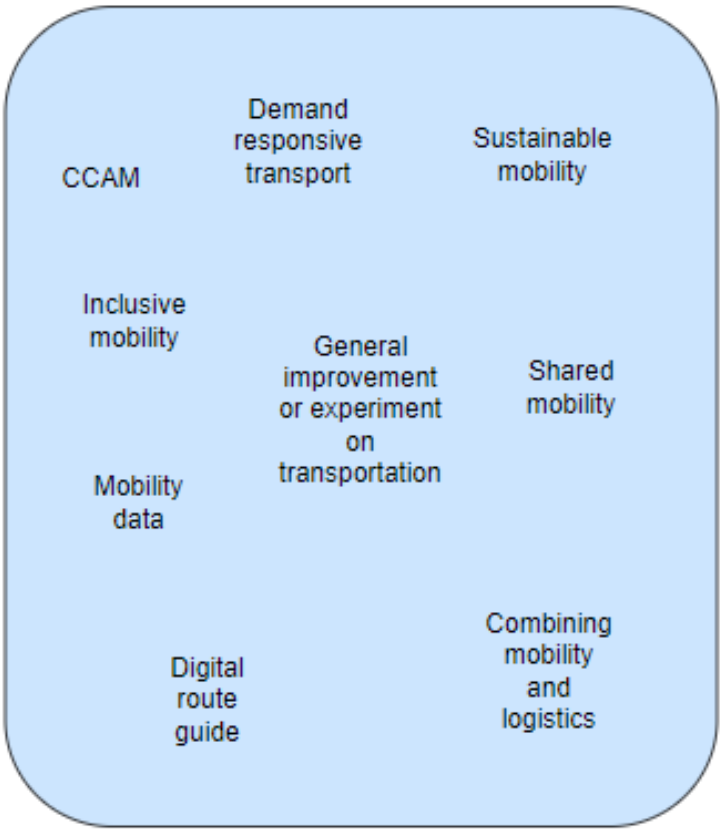

Figure 6. Categorization of pilot projects

The pilot projects are divided into 9 different categories in which everyone differs somehow from each other. The main purpose of this dividing action is to have more vast point of view into different types of mobility and logistics pilot projects and how their CSFs and KPIs are distributed throughout the categories.

In all these 9 categories, pilots, and projects that suite the best of the description is gathered. The reality is that there are pilots, projects and innovation project that can be put in few of the same categories, but such uncertainty is removed by simply putting the uncertain project, pilot or innovation project into a category which describes it the best.

To understand the nature of innovations and the effects of KPIs and CSFs in this study the availability of data for each individual pilot or project is rather important. The reality of this is that there is not the amount of data provided that is wanted. This is not certainly a bad thing because information from this can be taken and analysed. Although, there are not all the reports available in every pilot or project some many assumptions can be made

especially when evaluating the CSFs that are in the pilot or project. Because every project has a nature of going towards a main goal and some data from this project is provided if the final report is not available. For example, if the project or pilot has a sequel from the first one, and the final report has not been provided in the secondary pilot and the nature and execution of the project is similar, an assumption that the CSFs that are taking effect in the first project are also happening in the next one.

4.3 Evaluating the pilots

To study the amount of KPIs and CSFs that are visible in the pilots, the usage of framework is done. The study of pilots starts with counting the pilots that have the report or some information that will allow to gather the data about CSFs and KPIs.

The start of this section is going to be the visible look through of the data and how much information there is available. To ensure the best possible outcome from this study, there should be as much information from each pilot as possible. To have the best possible look through from the pilots in Finland more information and more end reports should be available.

This part of the study begins with analysing the pilots through the point of view of KPIs and how they are going to be placed through each pilot. The ideology behind the evaluation of each pilot KPI is that if there is some form of data or information available that indicates the appearance some of the five KPIs, it is then decided that it attends the pilot. Through this mindset the entire data of pilots is went through and analysed and then put up to a table where the category in which the pilot is, is then given the amount of KPIs that are in each category (*table 2).* For example, in the table there can be seen that for the category of *demand responsive transport* the KPI of “environmental impacts” there has been four (4) pilots where environmental impacts and their enhancement somehow has been present etc.

Table 2. Number of pilots per KPI category

	Demand responsive transport
Environmental impacts	4
Positive effects on project delivery	4
Quality and health factors increased	0
Iron triangle	1
Production or delivery costs reduced	1

The second part of the analysis of the data is to figure out the number of CSFs through the entire data. The idea behind CSFs is basically the same as when evaluating the amount of KPIs. Through the pilots if there can be some form of appearance in some of the pilots, it means that the CSF in question can be seen as taking attendance in the pilot. For example, in *table 3* for *demand responsive transport* there has been five (5) pilots where cross-functional team has been present in the pilot or can be seen as attendant somehow in the pilot.

Table 3. Number of pilots per CSF category

	Demand responsive transport
Cross-functional team	5
Customer/stakeholder involvement	7
Culture of innovation	3
Availability of technology	5

4.4 Validation of success with empirical cases

As the process of evaluation of the logistics and mobility cases proceeds the idea of validating the method evolves. In this thesis the number of cases is rather small and therefore the deviation can be quite high.

The fact is that every one of the selected projects, pilots and innovation projects are in some way different from each other except few cases where the project is simply a sequel from the previous one. In Finland the way of processing projects in public sector or in private sector can differ quite much even if the project is executed in the same sector. For example, the differences can be caused by the way of operating in different cities. In bigger cities the bureaucracy and the project execution are far heavier and more time consuming regarding to smaller cities where projects and actions are in a much smaller scale and therefore the time consumed is also smaller.

The outcome of this process of evaluation is the validation of success. Therefore, the amount of success factors that are considered to happen in the selected cases needs to be taken under consideration. The fact that the cases in this thesis are all the available cases in the field of mobility in Finland but the not all the cases in the field of logistics. With the assumption that the cases from the field mobility is the entire population of specimen, the validity and outcome of this study is rather trustworthy. Yet the situation in the field of logistics is not the same. The amount of logistics pilots, projects and innovation

projects is four (4) and cannot be considered as a big number of cases and therefore not as valid as the field of mobility.

One thing to be considered in the validation of this study is the amount of data that is available in each of the provided project, pilot, or innovation project. It is essential for the evaluation of innovation that the reports or some other data where KPIs or CSFs can be found and therefore the assumption of successfulness can be made. The number of cases was 58 and the number of reports or some other data where assumptions of CSFs and KPIs could be made was 57 and yet not all the KPIs and CSFs were not available to categorize for each pilot.

The concept of *success* in this case could be determined by the amount of KPIs which could be seen in the pilots, and through the KPIs it was able to find the highest ranked category of pilots which indicates information through the KPIs and their distribution through the pilot categories.

As presented in the *figure 7*, the KPI distribution can be seen clearly leaning towards *shared mobility, sustainable mobility* and *general improvement or experiment on transportation*. This occurrence could be explained with the nature of the pilots. In this study the number of pilots was 58 in which there was only 4 logistics pilots and therefore the whole data of mobility pilots was 54. Through the 58 pilots there can be seen that the number of pilots that were under the study was not large and therefore room for misleading analysis is present.

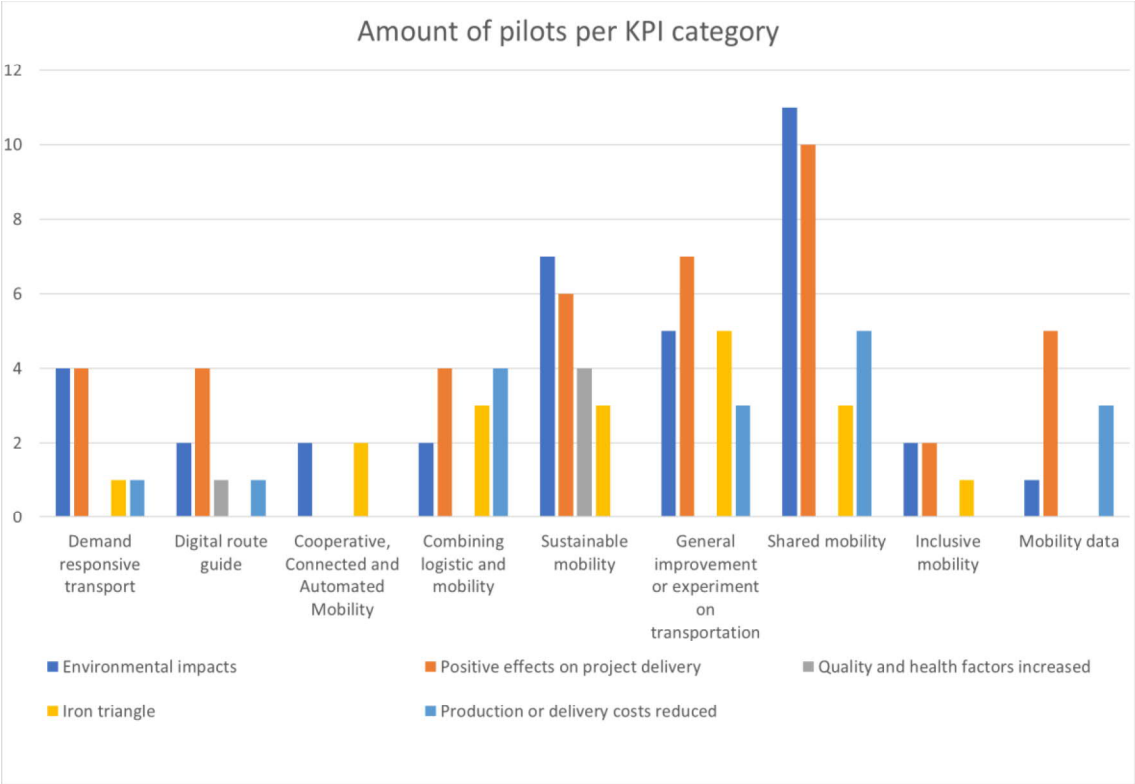

Figure 7. KPIs regarding to pilot category

If the data is handled simply as it is and not focusing on the number of pilots that were available in this study, we can estimate the direction where Finnish innovation and piloting is heading. With this mindset the main path where innovations and piloting are heading is towards more sustainable solutions and more focused on environment. With the information that this gives us, we can make a statement where the likelihood of successfulness lies when the innovation and piloting is leaning towards environment or actions that are going to be more sustainable.

This can be seen as a trending phenomenon in the field of innovation because information and knowledge from the state of environment is increasing all the time and it could be that people want to do more for our environment. Although this is just an assumption and simply the data and the spread of the KPIs in this study can be based on pure coincidence.

4.5 Validating critical success factors with empirical cases

In this thesis the CSFs were part of the process of analysing the successfulness of the pilots from Finland and therefore the successfulness of innovations. Through the mindset

of learning the successfulness of an individual pilot from the KPIs, we could analyse the factors that are somehow enabling the successfulness of these pilots.

In this thesis the number of CSFs that were able to be in one pilot was four (4). And the given factors were *cross-functional team, customer / stakeholder involvement, culture of innovation* and *availability of technology*. The basic ideology of this analysis is that from each pilot was gone through and evaluated the attendance of each CSFs and then marked to be present in that pilot. From this evaluation frame it was possible to determine the number of CSFs from all the pilots and to see the CSFs that were present and available the most, see *figure 8*.

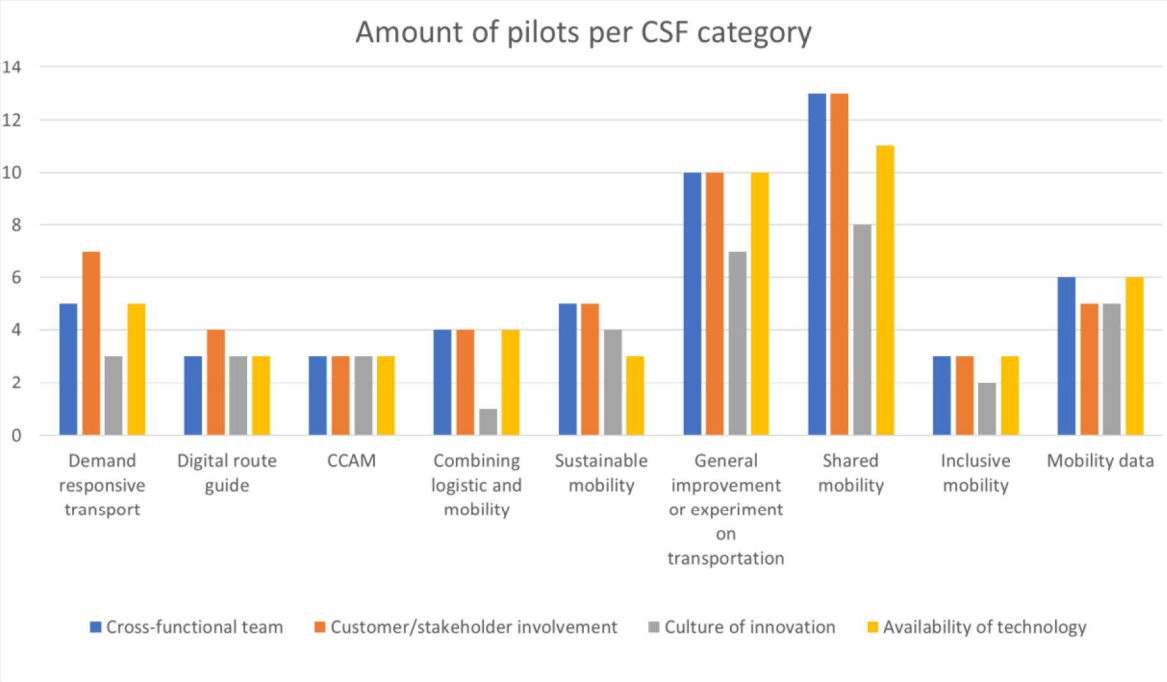

Figure 8. CSFs regarding to pilot category

From the given diagram it is quite easy to see where the most CSFs stand in this analysis. In the categories of *general improvement or experiment on transportation* and *shared mobility* the number of CSFs are seemingly higher than in the other categories. This still can be the outcome of the categorization and its accuracy. The number of pilots in the category of *shared mobility* is a little higher than in the other categories and therefore can effect on the outcome and the number of CSFs in each category.

4.6 Distribution of empirical cases

One part of this thesis was the distribution of pilots regarding to their category and the ideology behind the categorization. In the beginning of this thesis there was noted that many of the given pilots can be put into various categories because the nature of the pilots was multidimensional and therefore the possibility of distribution was present.

The start of this so-called mapping of the pilots begins with exploring each pilot as an individual and therefore investigating the possible categories in which the given pilot can be placed. In *figure 9* the placement of pilots is done with the base of original categorization of pilots which was the base for the analysis of KPIs and CSFs.

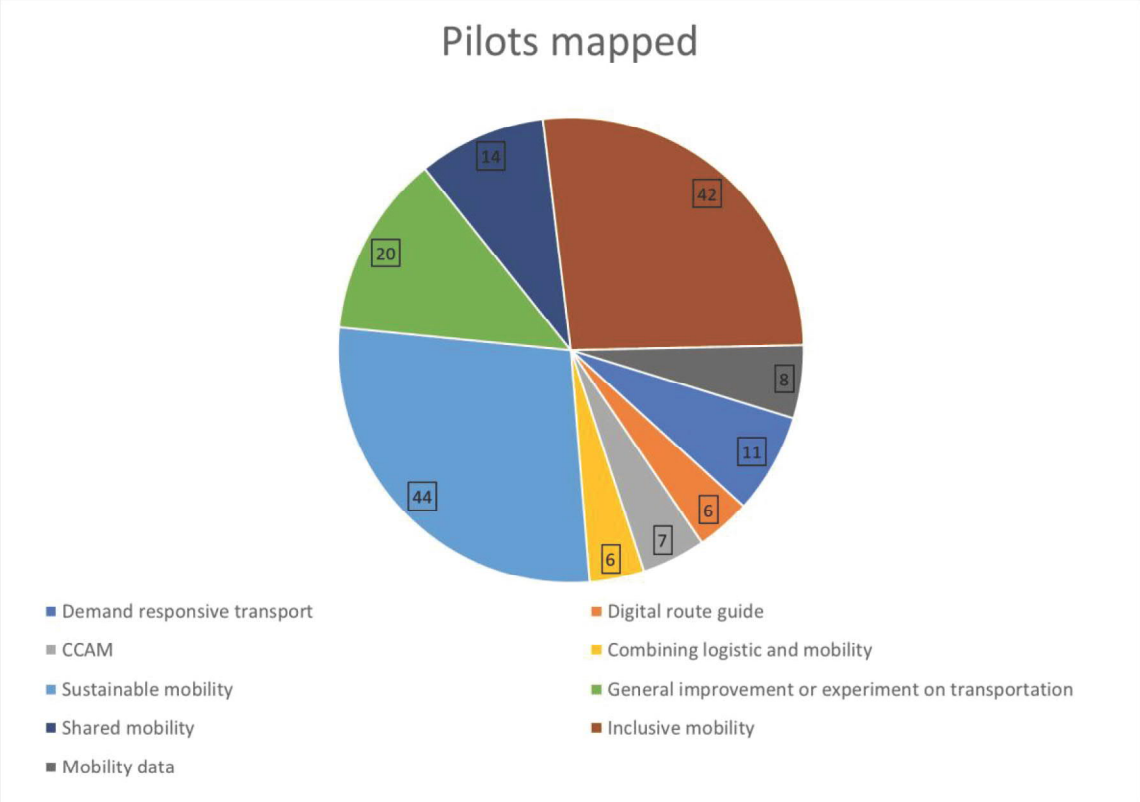

Figure 9. Pilots mapped by multidimensional categorization

The mapping of pilots is going to give us valuable information about the distribution of pilots and the interest in different fields of innovation. Through the concept of mapping of pilots, it is important to realize that the sorting has happened entirely by the writer of this thesis and that is why the mapping is completely done from a subjective point of view and leaves room for variance.

5 DISCUSSION

In this chapter the evaluation of methods used in this thesis is going to take place. With the information that was available, and the methods used, a finished product of analysis was made. The evaluation process of methods will be straight forward and going to question a lot of objects that were present in this thesis.

5.1 Evaluation process as a validation of successfulness

In this thesis the evaluation of pilots and the categories that the pilots were in began by simply learning the theory behind innovation and innovation projects in common. The focus of this thesis was to see how the pilots and projects were distributed in Finland and what are the factors that enable the successfulness of the pilots.

The point of KPIs in this thesis was the evaluation of successfulness of the pilot. Parmenter, (2010) states that KPIs are used as a tool for the measurement of performance during the project. In this thesis the KPIs are used as a tool for evaluating the entire successfulness of the given pilot. With this ideology the amount of KPIs that are present in the pilot the indicates the complete successfulness. For example, a pilot with a low amount of KPIs present is going to be seen as a not so successful pilot and in the other way around a pilot with a high amount of KPIs is a successful one. Parmenter, (2010) speaks much about using also RIs (result indicators) and KRIs (Key result indicators) which usually indicate the profitability of the project. The profitability aspect was not relevant for this thesis because the nature of innovations and the pilots that were under consideration is not focused on the aspect of how much money the given pilot has made or lost. Although, one of the KPIs was the *iron triangle* and one of its sub-categories was indeed “costs”. Whilst saying that the aspect of money is not relevant it is still one major part of many projects and therefore seen as one part that needs to consider having as valuable results as possible.

KPIs are vastly researched and used method for evaluating project performance and therefore a very good way to implement it in this thesis as a tool to see how well the project has executed. There is room for errors simply because the original purpose of KPIs is not planned to use in a situation like this. Accuracy of the analysis with KPIs is

still quite good because the evaluation of the pilots was done so that the pilots were dealt individually and the amount of KPIs that were present is quite accurate.

CSFs were a tool for the evaluation of the parts that were enabling the successfulness of the pilots. In this thesis the chosen CSFs were *cross-functional team*, *customer / stakeholder involvement*, *culture of innovation* and *availability of technology*. All these CSFs were relevant for the pilots and therefore it can be said that the selection of CSFs in this case was successful.

To ensure and analyse the validity of the chosen CSFs it is important to see how the distribution of CSFs is going to go throughout the categorization and single pilots. In this thesis the distribution went quite evenly which can indicate the successfulness of selection for the CSFs. With the knowledge that every CSF were present quite evenly throughout the pilots, it is safe to say that they are valid in that area. This can be explained so that if one CSF had zero (0) attendance in one or more of the categories, it would have us question the relevance of this individual CSF.

The evaluation tool for successfulness and the accuracy is similar with the KPIs. The biggest issue when evaluating successfulness is the number of pilots that were available for analysis. With higher number of pilots would give us much more reliable image of how the distribution of CSFs is going to go. With a lower number of cases, we can only assume the results are accurate. The current distribution of CSFs is done with the available data and knowledge and with the best possible assumptions.

CSFs are also highly studied subject and the information with this area is vast. One main problem for this thesis was to find the correct CSFs that suit for the pilots of this nature. The biggest issue was that the pilots were not considered entirely as projects, but something separate from that. CSFs are usually connected strongly to project management and projects by themselves. To find the best possible CSFs, lots of qualification and pruning had to be made to find the CSFs that are present in this thesis.

There is room for a larger study for the same subject, because there is high number of CSFs and KPIs that would suit for a study of this nature. The consensus of this chapter is that the used KPIs and CSFs were the best assumptions and options available for this case and there is room for improvement always.

When looking over the data that the CSF and KPI distribution provides, some assumptions could be made. As in the CSFs the categories of *shared mobility* and *general improvement or experimentation on transportation* provide the data of where in the field of innovation the pilots have executed most successfully. KPIs and their most successful areas are also in the field of *shared mobility* and *general improvement or experiment on transportation*. Other aspect of information which will give us more deeper understanding of KPIs, and CSFs are the non-successful categories of this study.

The information that we want is what are the fields of innovation which can be seen as the biggest failures regarding to the KPI evaluation. Looking through the diagrams where KPIs are distributed the reality comes clear. The lowest scoring innovation categories are *CCAM* (cooperative, connected, and automated mobility), and *inclusive mobility*. In the CCAM category there can be seen that the absence of KPIs such as *positive effects on project delivery*, *quality and health factors increased*, and *production and delivery costs reduced* are noticeable. One thing that could be explaining some absences of individual KPIs throughout the category of CCAM is the fact that category only includes three (3) pilots which are fairly like each other. For example, KPI *production or delivery cost reduced* is not something that is present in pilots of this nature. With this ideology this reveals lack of accuracy in this study. By adding KPIs of some other nature it would be possible that CCAM would rise to be in a much better position amongst other innovation categories.

Other noticeable feature that can be seen is that there are some other innovation categories that do hold various KPIs and still fail to rise to be more successful than the other categories. For example, *digital route guide, demand responsive transport* and *combining logistic and mobility* keep four out of five factors in them and yet still are not able to rise as much as the other categories. This could be explained with the nature of pilots and the multi-dimensional outcome of the categorization of pilots. It is obvious that KPIs of a certain sort cannot be present in each category.

This can be mirrored to CSFs and see how these effect to the success factors in this case. The noticeable feature is that in every category there are all the CSFs present which can indicate a well-chosen CSFs or just pure coincidence that there can be seen CSFs in all the categories.

5.2 Reliability

When doing a study like this, there is always room for errors and mistakes. The study itself is as reliable as it gets with the assumptions made and the data that was available. The assumptions that were made when figuring out the number of CSFs or KPIs for each pilot, were made simply by one person. The fact that will the study be reliable if one person sees or not sees if a CSF or KPI is present in one of the pilots.

Second part that should be considered is the amount of data that was available. The full list of pilots consisted of 58 pilots which is all the data available but still not in a scale where the distribution of cases can be said to set evenly. For example, in this thesis the biggest category with KPIs and CSFs was *shared mobility*. If there would have been double the number of pilots, the results could have been completely different. Second thing would be that if the KPIs and CSFs that were chosen in this thesis would have been chosen differently, there is a possibility that the distribution could have been entirely different also. Third part that rises questions is that if the handler of data would have been some other person and if that person would have seen that CSFs were or were not present in the given pilots the outcome could have been completely different also. When doing thesis with the nature of assuming things and the given data is not broad the analysis is very exposed to errors and simple mistakes when one person is doing the entire analysis.

5.3 Obstacles

One of the biggest issues in this thesis could be the fact that dividing pilots into categories was done very roughly and as mentioned in the beginning the distribution is not fair in any means and there is room for dissent. With the fact that the pilots could have been divided differently brings many questions if the distribution and results of KPIs and CSFs could have been different and are the results as accurate as they could have been.

Second obstacle that was present during the evaluation of the pilots was that when doing evaluation where one needs to decide if the given KPI or CSF is present in the pilot, gives the opportunity for errors and in this case if the if the decision was made by some other person, perhaps some other outcome of the CSFs or KPIs would have been done. This is more of a philosophic question of if the distribution and decision making have been done correctly and with such accuracy that the best possible outcome can be reached.

5.4 Answering to research questions

In this thesis the research questions were different from each other. The first research question asked how innovation is defined. The question itself is broad and it needed to be cut down into smaller pieces to understand innovation in the concept of mobility and logistic. In this case the innovation was defined to be suitable first in the field of technology. Because mobility and logistics can be contrasted heavily to technology innovations it was easy to use and apply the innovation theory behind the innovations from the field of technology. The definition of innovation was done so that the innovation itself would be one of the three main categories that based the knowledge from literature review. The main categories which came out to be *radical innovation* which stands for a completely new business model through innovation, *breakthrough innovation* where technology or business model is done in some completely new way or *incremental innovation* where old technology, or old business model is enhanced. With these explanations of innovation that suit the for the pilots in this thesis the first research question is answered.

The second part to be answered was the definition of successfulness in the field of mobility and logistics. The definition of successfulness is not an easy thing to do because the answer will have multidimensional aspects. First the definition of success needs to be explained. In this thesis the definition of success is not seen as the factor of how well the project has executed financially. The ideology behind the project or pilot execution is how well the project or pilot has executed for example socioeconomically, brought out new markets or perhaps has the project or pilot done something beneficial to environment in some way. These are the main aspects which compose the main frame for KPIs in this thesis. The KPIs are consensus of the few topics which have been combined for the evaluation of pilots in this case. Through the topics of KPIs it was able to determine the successfulness of the pilot regarding to those specific KPIs that were selected in this thesis. As discussed in the reliability section *5.2* with different KPIs a different outcome could have been possible. Yet the results are considered quite accurate with the KPIs that were chosen in this case.

The third and final question was is it possible to define successful and continuity with critical success factors. The nature of critical success factors or CSFs, as they are referred in this thesis, is more of an information source of what are the factors that have been

enabling the successfulness in that specific pilot that is under consideration. One aspect was also the continuity which stands for if there can be seen that the pilot is leading somewhere after the project has ended. Many of the pilots in this case has the nature of simply experimenting something and then finishing the entire project. This is very natural for pilots in this area. When deciding whether the pilot has succeeded or not, critical success factors are giving us the information have the factors been present in those pilots which have succeeded. This can be seen as a success because it clearly indicates the parts of the pilot that have enabled the successfulness of the individual pilot.

The aspect of continuity it was not measured in this thesis in any particular manner but simply just briefly glancing through the list of pilots and going through the reports to get an understanding about the continuity amongst the pilots. As mentioned before the continuity is quite restricted as the nature of the pilots is very linear from point A to point B and point B meaning the end of the pilot or innovation experiment.

6 RECOMMENDATION

With interesting subject as the one that is taken under consideration in this thesis, it is obvious that further investigation for this subject could be fertile. In this chapter the main concept is going to be gone through and examined as it would lay out if the study would continue in the future. The main factors that need to be noted is the innovation policy in Finland and how the current policies enhance the innovation culture and the projects that are based on innovation. The policies are surrounding the world of corporation as well as the world of public projects.

One main subject for recommendation is the ideology of how well the CSFs and KPIs have worked in this thesis and how would they be used in the future research. As this thesis was done by doing some assumptions with CSFs and KPIs the knowledge and learning experience will help in the future with CSFs and KPIs. The chapter will consist of putting the CSFs and KPIs into a scale where they could be used in a larger scale and how the accuracy of them could be enhanced.

Project launching and the life cycle of projects are very important due to piloting. All the pilots are somehow similar to projects and have the nature of project closely. Through the ideology of project management, piloting is going to be gone through and questioned how the project management have been executed in the pilots and how it would have changed the outcome if the management and reporting would have been made more precisely. Also, the future of piloting will be discussed as the constant flow of innovations will continue and the future of investigating innovation will also continue.

Last the discussion of culture and especially the culture of innovation in Finland is going to be analysed. As the concept of innovation and innovation culture is multidimensional the evaluation of this concept is very challenging. The discussion is going to focus on innovation culture in Finnish companies and the culture of innovation in the public sector and how it is affecting the piloting and innovations.

6.1 Innovation policy in Finland

Many objects are affecting innovations and their appearance in Finland. To understand innovations and how they are becoming reality in way that the outcome is a complete

project or experiment that can be seen, touched, or heard. Innovation and piloting consist of vast variety of procedures that take place long before the actual piloting phase where the pilot or innovation is tested and used.

In this thesis it was clear to see that innovations and pilots were not mainly focusing the competitiveness and making profit. This can be explained by the nature of innovations that were under consideration in this case. It was clear that some of the pilots were thriving towards a place where profit of the project was a key factor. This bifurcation can be explained with the differences in mobility and logistics. While mobility innovations are usually going towards better transportation system and in this case, better systems where somehow the trips are enhanced whether they are made easier or the passengers from rural areas are somehow included. Logistics pilots and innovations are usually working in way where the delivery costs are reduced somehow, and the products are delivered in a more efficient way. One factor that can be seen rising above all is that even mobility and logistics are different ways of moving people or products they tend to be driving innovations and their services into a more sustainable outcome.

One thing that could be increasing innovation action and piloting in Finland is improving the ideology behind incentives. As the incentives are usually used as a tool for marketing and as commercial object, perhaps the mindset should be changed to a point where incentives are used as truly a way of encouraging factor and as an object which provides the operator a trophy of some sort as a prize for the project operator to do work in a field where there is very little knowledge and a possibility to improve the field somehow.

There are many possibilities where innovation policy could be modified to extents where innovations and pilots are truly encouraged to execute. Finland's innovation policy is in a good place because the fact that innovations and their existence and the discussion is heavily taking place. Through incentives and further discussion about how the public and private sector could ensure the continuity of innovations a brighter future for innovations and piloting is at hand.

6.2 CSFs and KPIs

In this thesis the ideology of CSFs and KPIs where slightly different than the one that was found through literature. Only the estimation of successfulness of pilots was done with

the help of KPIs and through the estimation an idea of the factors that were enabling the success was done through CSFs. To be discussed in this chapter are the variables in the CSFs and KPIs and how the modification of them in further research could turn out to be something very fertile.

The conclusion of this thesis was that it can be possible to estimate successfulness of pilots and innovations with KPIs and it could be possible to have a clear view with CSFs what are the subjects that can ensure projects and pilots to succeed. As mentioned in the previous chapters, one of the biggest issues that affected the outcome of the distribution of KPIs and CSFs was the number of pilots, distribution of pilots into different categories and the number of CSFs and KPIs.

Increased number of CSFs of the study would change the outcome significantly. For example, the CSFs that were chosen for this thesis were quite conservative and comprehensive in a way. This was simply done this way because the knowledge of the pilots and doing a study like this was minimal. There was a possibility to choose CSFs that would have described project successfulness in a more specific manner, but it would have not been as accurate because the data that each pilot held was multidimensional, this meaning that all the pilots had different amount of information provided and the results would have been more blatant than they were now. It was perhaps the best way to use CSFs that were conservative and gave the most information in this case.

With KPIs the ideology was somehow very similar. The biggest issues came out to be the lack of information that the pilots provided. With vast reports it was able to see all the chosen KPIs and therefore to see the pilots that were succeeded regarding to this methodology. As with the CSFs very conservative KPIs were used also to have the most describing outcome from the study. And as with the CSFs if the KPIs were chosen to be a more detailed the outcome would not perhaps be wanted.

To change the methodology completely, a different point of view should be taken under consideration. For example, in this thesis the ideology is based on finding the success factors and performance indicators before the actual pilot is examined. One thing that could be fertile is to turn the whole concept upside down and see how the study would evolve from there. Our societies consist of critical functions which all touch one another. One thing could be that the distribution of pilots is not done due to innovation category but in way that we do the mapping or distribution based on the critical functions of our

society. Linturi & Kuittinen, (2014) state that from the point of view of our society the critical functions are:

- Cargo transport
- Energy production
- Energy distribution
- Telecommunication
- Passenger traffic
- Grocery maintenance
- Health care
- National defence and police forces

If somehow the distribution is possible to make under these categories, a new way of thinking is allowed, and possibly new outcomes of the study could be possible. This still is possible if the number of pilots or projects was significantly larger.

6.3 Pilot projects

In this thesis the pilots that were under consideration were looked through very precisely. With the knowledge from each pilot multidimensional data was available and with the nature of this research, multidimensional data is not the best possible case. While figuring out the KPIs and CSFs that are highly dependent of the data that is provided by the pilots it is relevant to have as much information as possible to know and see how the pilot has executed.

Project management and project execution have been under research for a very long time. Information and data from projects and project management is available from almost every industry and therefore variety of styles to execute a project from start to finish. To understand the nature of project execution from the field of mobility and logistics it is essential to understand project management from the base source of project management.

As mentioned before the nature of pilot projects is gone through with a mindset where the project is executed in the usual way where the project has a start and a finish. As the piloting is a project of its' own nature the project length should exceed even further than

the finish line. As project management is very researched area the knowledge is available and that is why should be refined into piloting.

In most of the projects and pilots that were discussed in this thesis the basic ideology of project management was present. Yet the basics of project execution was taking place the ideology of continuity and different phases was not present in almost every pilot. Some of the pilots had vast reports on how the pilot project has finished and how the life cycle of the complete project has gone, but the lack of categorization of different phases was very common to see amongst the pilots. The lack of information of how the project had moved from one phase to another found lacking and there were only a few projects from which it was able to see how the project continued and how it had affected stakeholders, customers, businesses, cities etc.

To recommend future project leaders in the field of mobility and logistics and especially the people and institutions who organize piloting and innovations, the implementation of basic project management and its phases would be fertile. It would be beneficial to both parties, stakeholders, and the project providers, to have serious focus on the various steps that every project include. Yet the time after the project is very important, because the ideology of piloting is often seen as a form of experiment which leads to nowhere after the pilot project has finished. To have data what lies beneath the numbers and inquiries that are telling us how the project went instead of how the project went from point A to point B.

6.4 Culture of innovation in Finland

Innovation culture is something that cannot be explained easily. To understand innovation culture, it is important to understand the context in which the innovation is about to happen. It is also important to know the company or organization in which the innovation happens to understand the culture of the individual organization or perhaps a city. There are differences also within the countries and their way of innovating, for example, the innovation culture of Sweden can substantially differ from the innovation culture of Finland.

As mentioned in the chapter *3.3,* the collaboration in Finland is working relatively well. Yet there is always room for improvement. For example, while large amount of

innovating is happening in collaboration with universities and private sector organisations, more than half of the remaining innovation is not happening within this collaboration. As innovations are usually concepts of creating something new or improving something already familiar, collaboration in a bigger scale with universities or other public sector parties would be more fertile. One thing that creates new aspects among innovations is the inclusion of students or in other words the generation of future. This can be explained to be an idea worth introducing because the future users of the innovations are the young people from today.

With the knowledge of Finland's culture of innovation and the realization of well the innovation system is handled in the entire country. The biggest issues in the innovation culture are the cultural differences within the companies. Innovation in the national level has been taken under consideration quite heavily and yet missing pieces in the piloting and innovation in smaller scale are noticeable. While biggest institutions and companies do take innovation and innovation process seriously and handle the innovation project with care, this is not probably the case in smaller businesses.

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APPENDIX 1. Categorization of pilots with CSFs and KPIs

Amount of KPIs UNMAPPED:	Demand responsive transport	Digital route guide	CCAM	Combining logistic and mobility	Sustainable mobility	General improvement or experiment on transportation	Shared mobility	Inclusive mobility	Mobility data
Environmental impacts	4	2	2	2	7	5	11	2	1
Positive effects on project delivery	4	4	0	4	6	7	10	2	5
Quality and health factors increased	0	1	0	0	4	0	0	0	0
Iron triangle	1	0	2	3	3	5	3	1	0
Production or delivery costs reduced	1	1	0	4	0	3	5	0	3
Amount of CSFs UNMAPPED:	Demand responsive transport	Digital route guide	CCAM	Combining logistic and mobility	Sustainable mobility	General improvement or experiment on transportation	Shared mobility	Inclusive mobility	Mobility data
Cross-functional team	5	3	3	4	5	10	13	3	6
Customer/stakeholder involvement	7	4	3	4	5	10	13	3	5
Culture of innovation	3	3	3	1	4	7	8	2	5
Availability of technology	5	3	3	4	3	10	11	3	6