Incentive models to improve the installation service of solar panels

- a Case Study at E.ON New Solutions -

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Lund, June 2021

Master Thesis in Industrial Engineering and Management

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Acknowledgments

This master thesis was the final project of our Master of Science in Industrial Engineering and Management at Lund University, Faculty of Engineering. This project aimed to fulfill the request of the principal E.ON New Solutions B2C. The process has been under the guidance of the Department of Industrial Management and Logistics at Lund University, Faculty of Engineering.

We would like to thank the employees at E.ON for participating in our interviews and sharing valuable information for our project. In addition, we would especially like to thank our supervisor at E.ON, Peter Abdon, for his dedication and guidance throughout the project.

Also, we would like to thank our supervisor at the Department of Industrial Management and Logistics, Dr. Andreas Norrman. His engagement and continuous feedback have been invaluable for us in managing this project.

Lund, 2021

Beata Gynnerstedt & Anneli Håkansson

Abstract

Title	Incentive models to improve the installation service of solar panels
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Background
The importance of services is increasing, and companies need well-developed service contracts to ensure the service providers perform at a satisfying level. In contracts, performance-dependent rewards (incentives) can be used to stimulate the agent to act desirably. This master thesis focuses on E.ON New Solutions B2C, who offers solar panel installations to residential customers. They have contracts with external installation companies as well as their fully owned subsidiary EMG Energimontagegruppen AB (EMG). E.ON wants to review their contract with EMG, investigating the use of incentives.

Problem definition and purpose
EMG is not performing at the level E.ON wishes they would. Therefore, E.ON wants to explore the possibility of using incentives in the contract with EMG to nudge them to improve their efficiency and, at the same time, make sure not to lose other important factors such as safety, precision, quality, and customer satisfaction. The purpose of this project was to recommend one incentive model for E.ON to use in their service contract with their internal solar panel installer.

Theoretical framework and methodology
The frame of reference introduces three main fields: services, incentives in contracts and performance measurement with the theoretical lens of principal-agent theory. The intersection of the three fields is performance-based contracts, which was also introduced in this chapter. To fulfill the purpose, a constructive approach with an embedded multiple case study was used. The research included a literature review and data collection through interviews, documents, and observations.

Construction
Relevant KPIs and metrics for the installation process were developed. These were connected to incentives, creating four options for possible incentive models. Common for all models was that they would promote efficiency, safety, quality, precision, and customer satisfaction and that they contained mainly positive rewards. A risk and sensitivity analysis were conducted, and the models were ranked on applicability and potential, to finally come to a recommendation of one model. The recommended model was characterized by gateway values for customer satisfaction and safety, a two-dimensional bonus model promoting efficiency and precision. To promote quality, a fee is subtracted from the bonus for every customer errand.

Keywords
Incentive model, buyer-supplier-customer service triad, service contracting, incentives in contracts.

Sammanfattning

Titel: Incitamentsmodeller för en förbättrad installationsservice av solceller
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Bakgrund
Tjänster blir allt viktigare och företag behöver välutvecklade serviceavtal för att tjänsteleverantörerna ska levererar på en tillfredsställande nivå. I kontrakt kan prestationsberoende belöningar (incitament) användas för att stimulera uppdragstagaren att agera önskvärt. Detta examensarbete fokuserar på E.ON New Solutions B2C som erbjuder solpanelinstallationer till privatkunder. De har kontrakt med externa installationsföretag och även med sitt helägda dotterbolag EMG Energimontagegruppen AB (EMG). E.ON vill granska kontraktet med EMG och undersöka användningen av incitament.

Problemdefinition och syfte
EMG presterar inte på den nivå som E.ON önskar att de skulle göra. Därför vill E.ON undersöka möjligheten att använda incitament i avtalet med EMG för att motivera dem att förbättra deras effektivitet och samtidigt se till att inte förlora andra viktiga faktorer som säkerhet, kvalitet, precision och kundnöjdhet. Syftet med detta projekt var att rekommendera en incitamentsmodell för E.ON att använda i sitt servicekontrakt med deras interna solpanelsinstallatör.

Teoretiskt ramverk och metod
Referensramen introducerar tre huvudsakliga områden: tjänster, incitament i kontrakt och prestandamätning, med den teoretiska linsen av teorin om uppdragsgivare och uppdragstagare (*eng: principal-agent theory*). Kombinationen av de tre huvudområdena är prestationsbaserade kontrakt, vilket också introducerades i detta kapitel. För att uppnå syftet användes en konstruktiv strategi med en inbäddad multipel fallstudie. Forskningen omfattade en litteraturöversikt och datainsamling genom intervjuer, dokument och observationer.

Konstruktion av incitamentsmodell
Relevanta nyckeltal togs fram för att mäta prestandan i installationsprocessen. Dessa kopplades till incitament, vilket skapade fyra alternativ för möjliga incitamentsmodeller. Gemensamt för alla modeller var att de skulle främja effektivitet, säkerhet, kvalitet, precision och kundnöjdhet och att de huvudsakligen innehöll positiva belöningar. En risk- och känslighetsanalys genomfördes och varje modell rankades på potential och applicerbarhet för att slutligen kunna rekommendera en modell. Den rekommenderade modellen är uppbyggd av tröskelvärden för kundnöjdhet och säkerhet samt en tvådimensionell bonusmodell som främjar effektivitet och precision. För att även främja kvalitet dras en avgift från bonusen för varje kundärende.

Sökord
Incitamentsmodell, köpare-tjänsteleverantör-kund-triad, serviceavtal, incitament i kontrakt

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Abbreviations and definitions

Abbreviations

B2B	Business to business
B2C	Business to consumer
BI	Business intelligence
BSC	Balanced scorecard
CRM	Customer relationship management
Ei	Energimarknadsinspektionen
EMG	EMG Energimontagegruppen AB
ERP	Enterprise resource planning
GDP	Gross domestic product
IEA	International energy agency
KPI	Key performance indicator
M&A	Mergers and acquisitions
NPS	Net promoter score
OTIF	On time in full
PBC	Performance based contracting
PV	Photovoltaics
RQ	Research question
SCM	Supply chain management
SCOR	Supply chain operations reference
SLA	Service level agreement

Definitions

Effectiveness	The extent to which customer requirements are met.
Efficiency	How economically the company's resources are utilized when providing a certain level of customer satisfaction.
Incentive	Performance-dependent reward.
Incentive alignment	To fairly distribute risks, costs, and rewards of doing business across the supply chain.
Incentive model	Model to quantitatively determine the mutual benefits.
Key performance indicator	One of the most important indicators that shows how well an economy, company, project, etc. is doing.
Performance-based contracting	The contractual approach of tying at least a portion of supplier payment to performance.
Prosumer	Actor that both produces and consumes electricity.
Service Level Agreement	Describes the performance, which needs to be delivered by the supplier.

1. Introduction

This chapter introduces the topic and the background of this thesis. The problem is defined and the purpose, the research questions, and the deliverables are described. Also, the scope of the project and the outline are presented.

1.1 Background

E.ON, the principal company of this thesis, would like to develop their contracts of installation services for solar panels. However, this is not a problem only for E.ON as services are becoming more important in the global economy. The contribution of the value-added to GDP by services is increasing worldwide. As of 2015, services account for the majority of value-added to GDP both in high-income and low-income countries. (Buckley & Majumdar, 2018) Traditionally, the contracting of services has been associated with supporting activities in a company. But with globalized markets and increasing specialization, contracting of services to outsource value adding-activities is becoming more common. The special characteristics of services demand a different procurement process, which has led to more focus being dedicated to professional purchasing of services. (van Weele, 2014)

Contracting a service is in many ways different from contracting goods, which stems from the difference in nature between services and goods. A service can be defined as "a process consisting of a series of more or less tangible activities, that normally takes place in the interaction between customer and supplier employees, or physical resources and systems, that are offered as an integrated solution to customer problems" (Grönroos, 2000, p. 9). Services are distinguished from goods on four characteristics: a service cannot be touched, it cannot be stored, it is unique, and it is produced and consumed at the same time (van Weele, 2014).

When designing a contract for purchasing a service, the first step is to specify the scope of work for the service provider. Services can be specified in four categories, input specifications, throughput specifications, and output or outcome specification, displayed in table 1.1. The difference between outcome and output-based specifications is outcome-based specifications are focused on the economic value generated by the service provider for the buyer, whereas the output-based focuses on the functionality of the service rather than the activity performed. (Axelsson & Wynstra, 2002)

Table 1.1: Methods for specifying business services. (Axelsson & Wynstra, 2002, p. 144)

Input specification →	**Throughput specification** →	**Output specification** →	**Outcome specification** →
Focus on resources and capabilities of the supplier	Focus on supplier processes needed to produce the service	Focus on the functionality or the performance of the service	Focus on the economic value for the customer to be generated by the service

In the case of output or outcome-based specifications, performance-based contracts can be used to describe what performance needs to be delivered by the supplier. This is preferable to use because it allows the supplier to organize the work in the best possible way, which should benefit pricing and quality. However, when the output is difficult to specify, creating a performance-based contract is challenging. (van Weele, 2014)

Performance-based contracting of an output/outcome specification can be illustrated as a Service Level Agreement (SLA). With an SLA, the buyer can express what result is expected by the service provider and the consequences of different results. It can include specific arrangements related to critical performance indicators, price, and consequences in case the service provider fails. In general, van Weele (2014) stresses an SLA should reflect the overall business goals, be objective, measurable, and comparable against pre-established criteria. It should also be a living document, possible to adjust when business conditions change. (van Weele, 2014)

When designing a contract, there are different ways the buyer can stimulate the service provider to act desirably. One way is to use incentives, which are defined by Merchant and van der Stede (2007) as performance-dependent rewards, where rewards can be both positive and negative. In turn, incentive models connect rewards and/or punishments to performance evaluation, in most organizations driven by performance measurement. Hence, measuring performance is also important when working with SLAs and incentive models. A concept often used when measuring performance is key performance indicators (KPIs). A KPI is defined by the Cambridge English Dictionary (2021) as "one of the most important indicators (indicator = something that shows what a situation is like or how it is changing) that shows how well an economy, company, project, etc. is doing, or how well an employee is working".

In addition, when working with service contracting, incentive alignment and risk-sharing are key factors for success (e.g. Simatupang & Sridharan, 2005; Mentzer et al., 2001; Chopra & Sodhi, 2004). Aligning incentives means fairly distributing risks, costs, and rewards of doing business across the supply chain. Only when incentives are aligned and all supply chain members work towards common goals, they can deliver services quickly and cost-efficiently. When incentives are aligned everybody in the supply chain wins. (Narayanan & Raman, 2004)

A company working with contracting services is E.ON, one of the largest players in the energy market. E.ON Sweden's department New Solutions B2C's core product is to enable in-house production of solar power for residential customers (E.ON, 2020a). This enables their customers to become prosumers, which is defined as an actor that both produces and consumes electricity (Parag & Sovacool, 2016). The prosumer concept is explained further in section 1.5.2. The context of the solar panel market will be further described in section 1.5 of this chapter. One important step in E.ON's solar power business is the installation of solar panels. E.ON has historically been purchasing the service of installing solar panels from external installation companies. However, last year they established their own installation company called EMG Energimontagegruppen AB (hereafter referred to as EMG). EMG is owned by E.ON as an autonomous subsidiary. (EMG, 2021)

The idea is that EMG will complement the external installation companies and conduct a share of all installations. The main purpose of creating EMG was to secure sufficient capacity over time. The market for solar panel installations is relatively new and fast-growing, where demand currently exceeds supply in terms of the manpower available in the installation industry (Buchholz, 2019; Installatörsföretagen, 2019). This makes it crucial for the supply chain partners to have well-functioning collaborations and to develop efficient installation processes. For E.ON, it is also important that EMG ensure a high customer service level, high quality, and a safe installation process. The customer service perspective is especially important since the installers are the ones meeting and interacting with the customers. (Head of E.ON New Solutions B2C, 2021)

1.2 Problem definition

The challenge E.ON New Solutions B2C faces today is that they do not find EMG efficient and competitive enough. As EMG is owned as a subsidiary to E.ON and a procurement process is not conducted for each installation, the risk is EMG might consider E.ON as a guaranteed customer who will continue hiring them regardless of the level of performance. Today there is no structured incentive model in place to motivate efficiency improvements. Therefore, the E.ON New Solutions B2C department wants to investigate possible incentive models to ensure efficient installations within EMG, thus ensuring high-level performance and continuous improvements in the installation process. (Head of Operations E.ON New Solutions B2C, 2021)

The system consisting of the three actors E.ON New Solutions B2C, EMG, and prosumers is illustrated in figure 1.1 below. EMG performs an installation service for a residential customer, who has made an order of solar panels to E.ON. In the contract between E.ON and EMG, the service is specified as well as the level of performance required. This is followed up by certain KPIs and motivated with an incentive model driving certain wanted behaviors. Figure 1.1 will serve as the system model for this thesis, illustrating the service triad and contract setup at E.ON

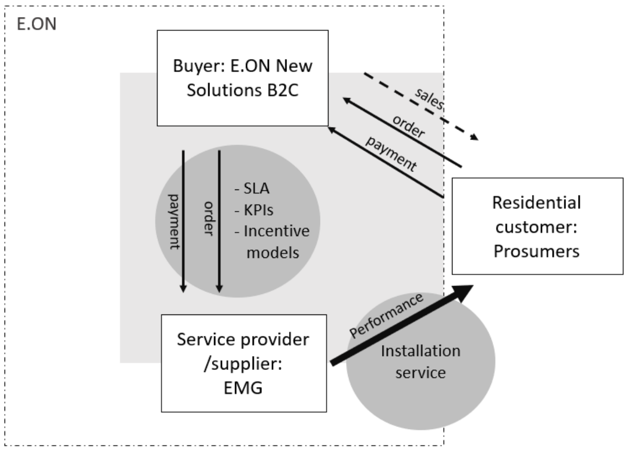

Figure 1.1: The system model, illustrating the relationship between E.ON, EMG, and the prosumers.

1.3 Purpose

The purpose of this project is to recommend one incentive model for E.ON to use in their service contract with their internal solar panel installer.

1.3.1 Research questions

To fulfill the purpose, three research question will be investigated and answered:

RQ1: Which selection criteria for KPIs could E.ON use and which KPIs could E.ON measure in the installation process?
RQ2: How can these KPIs be connected to incentives and how could such incentive models look?
RQ3: Which risks are connected to the proposed incentive models and what sensitivity aspects can be observed?

1.3.2 Deliverables

For E.ON this thesis will provide insights on how they can work with incentive models for the installation process of solar panels for their internal installation company EMG. The goal is to provide a recommendation of an incentive model that is validated and can be applied as a part of E.ON's everyday working methodology.

For academia, this thesis will contribute with a case study where current theory about concepts like service contracts, incentive models, performance-based contracts, and performance measurements is applied to the practical setting of E.ON and their installation company EMG. Hopefully, this will increase the understanding of contracts and incentives in supply chains in the setting of an internal service provider and in the solar power market.

For the authors, this project will improve their knowledge in a subject area they find interesting and highly relevant. They will also gain experience in working in a project setup with a lot of independent work and collaborating with a large, international company.

1.4 Focus and delimitations

The focus of this project is on developing an incentive model for the installation of on-grid solar panels for residential customers executed by EMG. E.ON New Solutions B2C and EMG are the main stakeholders. Therefore, the proposed models will only focus on the formal contract between E.ON and EMG. However, some of the reasonings and ideas could be possible to transfer to other cases like external service providers and other company settings. This will be addressed briefly in the final chapter of the thesis.

The purpose is not to propose solutions to improve the installation process per se, but rather to recommend incentives that will nudge the installation company to improve their processes. Incentive models will be investigated within the boundary of the installation process and will not consider aspects like the production, central procurement, or storage of solar panels. Also, the possible incentives for consumers to buy solar panels is not the focus of this thesis.

The proposed incentive models will mainly be designed for EMG and not the external installation companies that E.ON also works with. Since EMG is run as an independent company, E.ON New Solutions B2C is not involved in how potential rewards in an incentive model are distributed internally within EMG. Therefore, the recommendations in this thesis will not focus on this, but only on the transactions between E.ON and EMG as companies.

1.5 Setting the context: the electricity supply chain

This section provides the context for the project and its research questions. It describes the electricity market as well as the solar power market with a focus on the supply chain and its stakeholders.

1.5.1 Swedish electricity supply chain

The electricity supply chain is different from many other supply chains in the sense that the product (electricity) is not a physical product, and it needs to be consumed immediately. The Swedish electricity network can be divided into three levels: the transmission network, regional networks, and local networks. The transmission network transports electricity long distances at high voltage levels. Local networks connect to regional networks and transport electricity to households and other small end customers. The Swedish transmission network is owned and operated by state enterprise Svenska Kraftnät. They are responsible for the power balance and operational reliability in the Swedish electricity network and the Swedish Energy Markets Inspectorate (Ei) is responsible for monitoring them. Local and regional network companies are responsible for maintaining their networks to ensure the security of supply is maintained. (Gruen et al., 2020) The physical electricity flow and some examples of actors at each level are illustrated in figure 1.2.

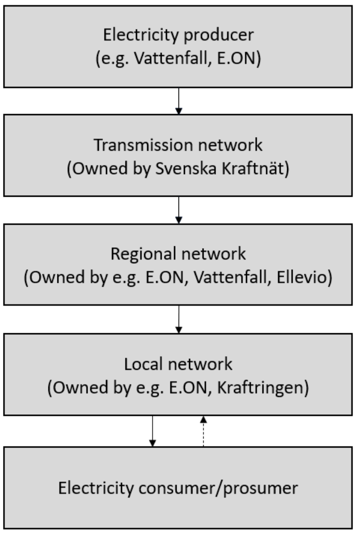

Figure 1.2: Illustration of the physical electricity flow and examples of actors at each level.

1.5.2 Prosumers of electricity

In an energy context, prosumers are defined as agents both producing and consuming energy (Parag & Sovacool, 2016). When private residents install their own energy sources, like solar photovoltaic panels, they go from being consumers of electricity to also become producers of electricity. The idea is prosumers should be able to cut their electricity bill significantly as well as making a positive environmental impact. Also, it is more efficient to use the electricity close to the point of generation to avoid efficiency losses and not burden the network. The electricity surplus can either be stored in a battery or sold. To enable customers to sell their excess electricity a smart meter that can handle both incoming and outgoing electricity is required. This backward flow of electricity from the prosumer back to the local network is illustrated in the dashed line in figure 1.2. (E.ON, 2020b)

1.5.3 Solar power

Solar power is predicted to be one of the fastest-growing sources of energy in coming years. The International Energy Agency (IEA) (2019) predicts annual growth of 15% for solar power between 2019 and 2030. In the European Union, 2019 was a record year with over 100% increase in installed solar power capacity (Thoring, 2019). The leading form of solar energy, photovoltaics (PV), has experienced major deployment growth, much because of great cost reductions during the 2010s and government subsidies (IEA, 2019). Nevertheless, only a small share, roughly 2%, of the world's electricity comes from solar power (Ritchie & Roser, 2020).

In Sweden, both the total number of grid-connected photovoltaic plants and the total installed capacity have increased dramatically in the last couple of years. The number of grid-connected PV plants increased by almost 19 000 in 2019 and thus amounted to a total of 44 000 grid-connected plants throughout Sweden. The installed capacity, which amounted to 698 MW, was an increase of about 70% since the year before. Most of the installed capacity during 2019 comes from plants with an effect under 20 kW, which is smaller PV plants such as residential roofs. This development is illustrated in figure 1.3. (Energimyndigheten, 2020a) However, even with the increase, solar power only accounts for less than 1% of the total installed electricity generation capacity in Sweden (Energimyndigheten, 2020b). Increasing the amount of renewable energy is in line with Sweden's environmental goals to eventually become a fossil free nation (Naturvårdsverket, 2020).

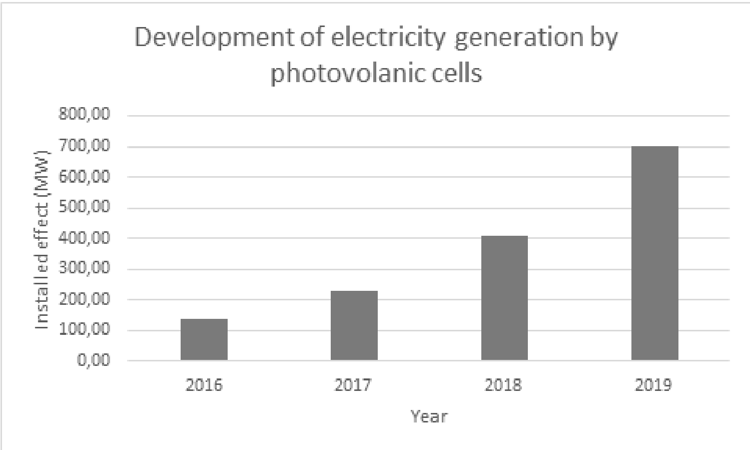

Figure 1.3: Development of electricity generation by PV cells. (Energimyndigheten, 2020a)

The Swedish government has created an economic incentive for investments in the installation of solar panels both for prosumers, businesses, and public organizations (Energimyndigeten, 2020b). However, this incentive is as of July 2020 no longer available to apply for private prosumers. It will be replaced by a tax reduction for installation costs (work hours and material) of 15% starting 2021 (Regeringen, 2020). Sweden changing their subsidies has had E.ON New Solutions B2C experience a temporary decrease in demand during 2020 (Head of Operations E.ON New Solutions B2C, 2021).

The overall increasing demand for solar power leads to the need for more electricians and solar panel installers to be able to install the requested capacity. Currently, there is a lack of supply regarding manpower available in the installation industry (Installatörsföretagen, 2019). This means there is a supply risk regarding the purchasing of the solar panel installation service.

1.6 Thesis outline

Chapter 1: Introduction
In the first chapter, the background, problem, and purpose of the master thesis are described. The major research question and the three sub-questions are presented as well as the deliverables and scope of the project.

Chapter 2: Theoretical framework
This chapter is the result of the literature review, presenting the academic foundation for this thesis. The theoretical framework defines and describes central concepts in subject areas relevant to assess the research questions in the thesis, such as principal-agent theory, contract mechanisms, incentive models, and performance measurement.

Chapter 3: Methodology
This chapter presents the methodology used for this project. It describes the research strategy, the research design, the data collection method, and how the analysis was done. It also illustrates the work process and discusses the academic quality of the project.

Chapter 4: The service triad and contract setup at E.ON
This chapter presents the results of the case study done at E.ON New Solutions B2C. The company's operations and strategy are presented as well as how they currently work with performance measurement and service contracts.

Chapter 5: Case study findings
In this chapter, the data collected in the multiple case study is presented. The case companies' characteristics as well as their use of performance measurement and incentive models are described.

Chapter 6: Cross-case analysis
This chapter consists of a cross-case analysis where the case companies are compared and conclusions regarding performance measurements, incentive models, and risks are drawn. This analysis results in a list of criteria regarding performance measurement and incentive models as well as possible risks connected to incentive models.

Chapter 7: Construction of an incentive model
This chapter combines theory, insights from the multiple case study, and empirical data to develop suggestions regarding performance measurement and incentive models. The risks and sensitivity connected to the models are then analyzed and the potential incentive models are discussed and evaluated in a validation session with E.ON representatives to reach a final recommendation.

Chapter 8: Conclusion
In this chapter, the research questions are answered through a summary and reflection on the results from the analysis. Consequently, a final recommendation regarding which incentive model they could use is made to E.ON. The contribution of this research is discussed as well as areas for further research.

2. Theoretical framework

This chapter is the result of the literature review, presenting the academic foundation for this thesis. The theoretical framework defines and describes central concepts in subject areas relevant to assess the research questions in the thesis, such as principal-agent theory, services, incentives in service contracts, incentive models, performance measurement, and performance-based contracts.

2.1 Structure

The structure for the theoretical framework was developed from the model of the service triad and contract setup at E.ON, presented in figure 1.1. To obtain a comprehensive understanding of the problem, three general topics were identified, illustrated as the circles in figure 2.1: incentives in contracts, performance measurement, and services. These topics will overlap and include sub-topics, which will be visited in the coming sections.

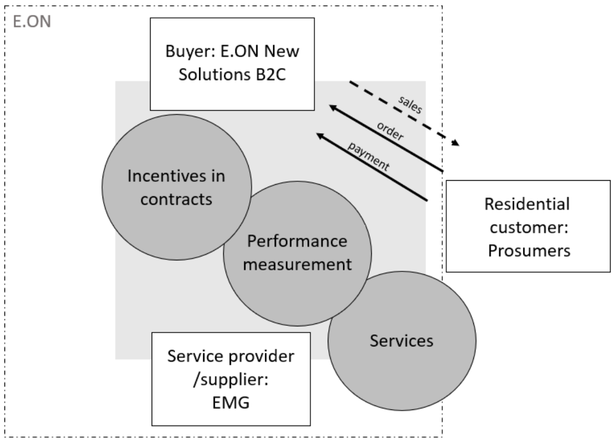

Figure 2.1: Main topics to address in the service triad and contract setup at E.ON.

The theoretical framework will focus on these topics and their interfaces, seen in figure 2.2. The chapter will start by introducing the theoretical lens of principal-agent theory, which addresses all topics. Secondly, the general concept of services will be briefly explained, leading to the contracting of services. Contract mechanisms are explored, and incentives and incentive models are addressed as a tool to be used in contracting. Thereafter, theory on performance measurement is included to understand how to monitor and assess performance in contracting and incentive models. Lastly, performance-based contracting is introduced as the topic tying services, incentives, and performance measurement together.

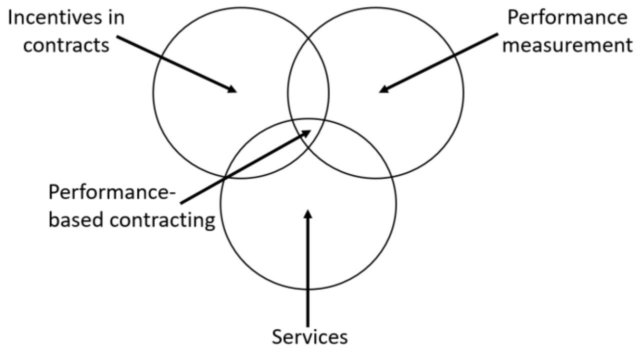

Figure 2.2: Illustration of the structure of the theoretical framework.

2.2 Principal-agent theory

Principal-agent theory studies contracts as a mean to align motives and share risk between parties (Eisenhardt, 1989). The basic component behind the principal-agent theory is the specific relationship between two actors, the principal and the agent. The principal delegates a task to an agent, who accepts to execute the interests of the principal in exchange for a payment. (Braun & Guston, 2003) This setup can be applied to various types of economic relationships with any type of agreement involved (Rapp & Thorstenson, 1994).

The relationship between the principal and the agent is affected by their different objectives and characteristics. One assumption made in principal-agent theory is that of information asymmetry. The agents can choose to not share information with the principal to favor his/her objective, which is called hidden information. Specifically, in the selection phase, the principals do not have sufficient information about the abilities and potential of the agents to contradict the agents' words, called adverse selection. Another assumption is the parties are opportunistic and will act in their own best interest. This creates a moral hazard, where the principals cannot be sure the agents will do their best performing the task, which is called hidden actions. (Braun & Guston, 2003)

Simatupang and Sridharan (2005) discuss information asymmetry, both from the principal's and the agent's perspective, meaning also the principal can take advantage of hidden action and information. To exemplify, it is possible to imagine a retailer and a manufacturer, where the principal can hide how they push the manufacturer's items in the store or hide information about financial measures. Ultimately, both parties have an interest in engaging in the agreement, but if there are no incentives to reach a mutual gain, they are reluctant to share information and will act in their self-interest. These issues can lead to a suboptimal or even unfavorable outcome of the original interest. Deciding on a suitable type of contract between the principal and the agent can avoid such outcomes. (Braun & Guston, 2003) Contracting will be addressed further in the coming sections of this chapter.

To avoid the problem of asymmetric information and the risk of moral hazards and adverse selection in a principal-agent situation, the principal can use a signal that will directly or indirectly provide a certain relevant piece of information about the agent (Spence, 1973). The purpose of using this signal is to obtain certain information about the agent at a lower cost compared to the cost of obtaining complete information. In many situations, it is not even possible to obtain full information about the agent. All signals containing information about the agent's behavior have value for the contract and the compensation plan. However, if the costs connected to the signals exceed the increased value of the contract they should not be used. (Rapp & Thorstenson, 1994)

The principal-agent theory has its origins in risk-sharing theory and broadened this problem to also include the issue of parties having different goals and division of labor. Risk-sharing theory in itself addresses how collaborating parties have different attitudes towards risk. The attitude towards risk is commonly discussed in terms of the level of risk aversion of the actors. Depending on how risk-averse the agent is, it is more or less attractive to pass the risk to the agent in the contract. If both parties are risk-neutral, there is no reason to share the risk, meaning at least one party should be risk averted to motivate risk sharing. (Eisenhardt, 1989)

As the principal is highly dependent on the agent it is crucial to work with risk assessment to get an understanding of just how dependent and vulnerable the company is. The risks connected to the agency problem can be divided into four categories: (van Weele, 2014)

1. **Technical risk -** this risk is related to how well the agent can deliver the needed functionality and performance according to expectations. To minimize this risk, the desired performance must be stated in objective terms in an agreement. It also relates to how well the principal can maintain the crucial knowledge needed to manage the relationship with the agent. The principal needs to be able to ensure that the agent uses and will keep using the latest technology and the best solutions possible as well as having skilled staff.
2. **Commercial risk -** this risk is related to the price the principal will pay and the extra costs connected to the business structure. To maintain this risk, the principal must have in-depth knowledge of the cost structure of the service, which includes an understanding of all the activities conducted by the agent, the key cost drivers in the process, and the underlying cost parameters. Also, the extra cost that might occur for the agent that the principal will cover is included in this risk. These types of risks can be managed by using incentives and/or penalties for above and below-average performance. Another commercial risk is the risk of intellectual property being misused by the agent. To deal with this a confidentiality agreement is an important tool.
3. **Contract risk -** the contract between principal and agent is complex and can contain a lot of risks. To align the agent's interest with the principal's interests, performance-based contracts are the best approach. To assess contractual risks, aspects like sufficient description of desired performance, performance indicators that fully cover the business area, what happens if cost increases, and how penalties should be enforced should be carefully considered. The pricing method within the contract is one way to allocate risk between the parties.
4. **Performance risks -** this risk is related to the possibility that the agent is not capable of performing according to expectations. To assess this risk, it is important to look at aspects like if the agent has the capacity and flexibility to handle fluctuating demand, how well the principal can track the operational performance of the agent and what happens if agreed performance targets are not met.

Since the business environment is subject to change it is hard to deal with all risks in a contract. Therefore, mutual trust and a sense of partnership are also very important to be able to deal with emerging risks. (van Weele, 2014)

2.3 Services and service triads

As presented in the background, services have special characteristics differing from goods. Van Weele (2014) introduces four major attributes distinguishing services:

1. A service is **intangible**, meaning it cannot be touched
2. A service is **perishable**, meaning it cannot be stored
3. A service is **heterogeneous**, meaning it is unique
4. A service is **simultaneous**, meaning it is produced and consumed at the same time

A service can be directly related to a company's core business, meaning it affects the product or service the company is providing, or it can be an indirect service meaning support activities not affecting the core business. This classification depends on the nature of the company, but common supporting services for a manufacturing company are IT services and facility maintenance.

The special attributes of a service affect the purchasing process, where the more intangible the service is, the more time is spent on pre-qualifying and pre-selecting the future service provider. Depending on the characteristics of the service purchased, different purchasing strategies should be pursued. This can be illustrated using Kraljic's purchasing portfolio matrix, seen in figure 2.3. The extent of the supply risk and the financial impact of a specific product (or in this case, service) calls for different strategies. The financial impact is evaluated by looking at e.g. total costs, percentage of purchase cost, quality impact, or business growth. The supply risk reflects short- and long-term availability, supply market structure, geographic distance, and number of potential suppliers. (van Weele, 2014)

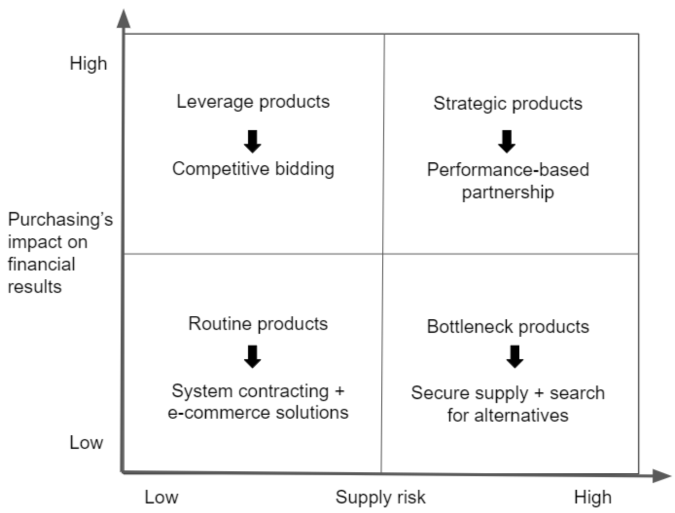

Figure 2.3: Kraljic's matrix, adapted from van Weele (2014, p. 164).

The categorization in Kraljic's matrix implicates suitable supplier strategies for each situation. Securing the supply of bottleneck products can mean doing this at an additional cost and at the same time looking for options to reduce dependence (which often costs more than it is worth). Planning for how to proceed if an emergent risk occurs is necessary. Competitive bidding mainly refers to short-term contracts and having multiple sourcing strategies. Systems contracting is aimed at minimizing the administrational and logistical efforts in the purchasing process, as the products are not decisive for financials or supply risk. (van Weele, 2014)

Strategic products have a significant impact on financials and there are only one or few suppliers to choose from. Depending on the power balance on the market (supplier or buyer dominant) the goal of the purchasing strategy is to develop performance-based partnerships or collaborations. This can be done by mutually agreeing on objectives related to e.g. costs and improvement targets. A key aspect is to be thorough in the supplier selection phase and search for best-in-class suppliers. (van Weele, 2014)

As mentioned in chapter 1, contracting a service has a special nature since it strives to be based on performance (output/outcome). The traditional setting explored has been a supplier performing a service for a buyer. However, as identified by Wynstra et al. (2012) and van der Valk (2012) a formation increasingly seen in practice is a set of three stakeholders. This is called a service triad, consisting of a buyer who contracts a service from a supplier, who in turn performs the service to the buyer's customer, see figure 2.4. A specific characteristic of the triad setting is the service involved becomes a part of the buyer's overall value proposition to the customer. Aligning the interests of these three stakeholders and specifying and monitoring performance poses a challenge when designing contracts between the buyer and the service provider. (Wynstra et al., 2012; van der Valk, 2012)

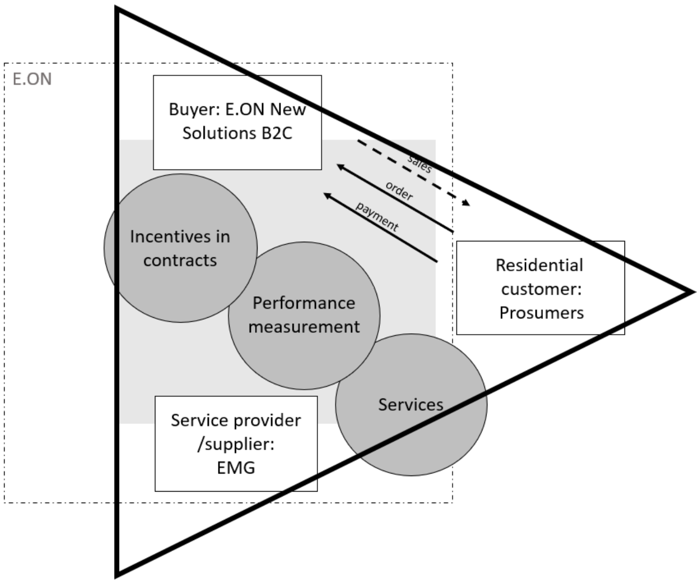

Figure 2.4: The buyer-supplier-customer service triad in this project.

The role of principal-agent theory in service triad relationships is complex since the buyer acts in two roles: the principal contracting the service from the supplier, but also co-producing the service. This complexity is enhanced in a service triad because the three actors have different roles depending on from which actor's perspective the situation is analyzed. The supplier is confronted with two principals, having a contract with the buyer as well as directly dealing with the customer in the providing of the service. These principals have specific objectives that can conflict with each other. (van der Valk, 2012)

The relationship between the three actors changes before, during, and after the service delivery. Before service delivery, in the contracting phase, the buyer is still the bridge to the customer. During the implementation of the service, the dynamics start to shift, and the supplier becomes more involved with the buyer's customer. After service delivery, the supplier is the bridge to the customer. This causes major performance implications for the buyer. As the supplier is providing the service directly to the buyer's customer, there is no way for the buyer to alter or control the service delivery. This creates a moral hazard between the supplier as an agent and the buyer as a principal. (Liker & Choi, 2009)

Therefore, the buyer must take certain measures to retain control over the service delivery and ensure the right quality of the services provided and that the behavior of their suppliers is adequate. Examples of such measures are contracts and Service Level Agreements (SLAs) and monitoring activities. The SLAs are usually created before the contract has been signed and the monitoring activities come after the contract has been signed. (van der Valk & van Iwaarden, 2011) Contracts, SLAs, and performance measurement are discussed further in the coming sections.

2.4 Incentives in contracts

In general, contracts can be explained as the link between parties in a value chain, defining the obligations necessary to achieve the operational objectives and the strategic business goals of the customer. The goal of any contract is to solve the main conflict of interest between a buyer and a supplier: where the buyer wants to pay as little as possible for a job done and the supplier wants to gain as much as possible from minimal effort. This conflict is reflected in the principal-agent problem. Contracts are complex and varied as different types of contracts are used for different situations and objectives. For example, the contract design differs if it involves goods or services. (van Weele, 2014)

According to Rapp and Thorstenson (1994) choosing a suitable contract is dependent on the circumstances for the tasks performed by the agent and if it should incentivize a specific wanted behavior. A suitable contract is also shaped by the sharing of risk and information between the actors. In a model presented by Rapp and Thorstenson (1994), different contracting scenarios are divided into four areas, based on two conditions: if there is one or a few limited ways to perform the activity or process and if there are relevant results variables available to measure the output. Three different contract types can be used for the different scenarios: behavior-based, outcome-based, and group incentives/social control (table 2.1).

Table 2.1: Choice of contract form depending on condition. (Rapp & Thorstenson, 1994, p. 17)

Circumstances		**Is there one or a few limited ways to perform the activity?**	
		Yes	No
Are there relevant result variables to measure?	Yes	A. Behavior-based or outcome-based contracts	B. Outcome-based contracts
	No	C. Behavior-based contracts	D. Social control/Group incentives

The behavior-based contract is about rewarding someone for their time or actions, i.e. not what they produce in the end. This is suitable for when there is only one way to perform a task or if the results cannot be measured or are difficult to measure. One example for scenario C could be a cashier at a convenience store, paid for the time he/she is working. (Rapp & Thorstenson, 1994)

The outcome-based contract is suitable for scenarios where there are several ways to perform the task and there are result variables to measure. An example of scenario B could be fruit pickers. A result variable would be the amount of fruit picked every day, and they could vary the picking method to do it faster. In scenario A, both behavior-based and outcome-based contracts can be used. (Rapp & Thorstenson, 1994) An outcome-based contract generally places more risk on the agent. This can be suitable in the case of a less risk-averse agent (e.g. a wealthy agent) or a more risk-averse principal. Reversibly, behavior-based contracts are preferable for cases where the agent is the more risk-averse part. (Eisenhardt, 1989) An example of scenario A could be a performance-based contract. This will be described further in the coming sections.

Social control or group incentives are suitable for scenarios where there is neither one distinct way to perform the task, nor any relevant result variable available to measure the performance. To use social control, the involved parties should have some social factors in common, like norms or values, meaning they strive towards mutual objectives. Under such circumstances, neither behavior nor outcome-based contracts need to be used. (Rapp & Thorstenson, 1994) Group incentives mean incentivizing a group of agents by letting the reward or punishment for the individual agents be based on group performance. The agents get to choose what other agents they trust to become a member of the group and they monitor each other on following the agreed terms of the contract. (Ouchi, 1979)

2.4.1 Compensation strategies

When designing a contract there are several different compensation types available which include incentives to different extents. The type of compensation and the level of incentives included depend on if the contract is behavior- or outcome-based. What type of compensation is given also relates to how risk is shared between the principal and the agent. Below, some common compensation types are described (Rapp & Thorstenson, 1994).

1. The principal pays a fixed amount (K) to the agent. This type of compensation does not stimulate the agent to make an effort to improve. Equation: $s_1 = K_1$

2. The principal demands a fixed amount (K) of the agent and the agent gets to keep all the remaining result (x) of the job. This means the agent takes all the risk. Equation: $s_2 = x - K_2$

3. A behavior-based compensation can consist of a fixed amount (K) and a variable part (c) that is proportional to, in this case, the time (a) the agent spends on the job. Here, the principal takes all the risk and the compensation is not based on which result is achieved. Equation: $s_3 = c_3 a + K_3$

4. A corresponding outcome-based compensation plan can be that the agent gets or pays a fixed amount (K) and a certain part (c) of the revenue (x). This means the principal and the agent share the risk. Equation: $s_4 = c_4 x + K_4$

5. Another alternative for an outcome-based compensation plan is if the principal only gives compensation (K) to the agent if the result (x) is in a certain interval (between x_1 and x_2). This type of compensation plan can also be used if a certain behavior is desired. Equation: $s_5 = \begin{cases} K_5 \; if \; x_1 \leq x \leq x_2 \\ 0 \quad else \end{cases}$

6. A combined behavior and outcome-based compensation plan could be to give a bonus if good results are achieved. Then the agent receives a fixed amount (K) and a certain amount (c) dependent on behavior (a). In addition, an extra compensation (d) is obtained if the result (x) is better than a certain value (x_0). Equation: $s_6 = K_6 + c_6 a + \begin{cases} d_6(x - x_0) & if\ x \geq x_0 \\ 0 & else \end{cases}$

These different types of compensations have different risk-sharing capabilities and provide different amounts of motivation for the agent's actions. In figure 2.5 the risk allocation in the different compensation models is summarized. When the agent absorbs more risk, it gives him/her incentives to perform better. The level of the agent's incentive to perform with the different compensation types is summarized in figure 2.6.

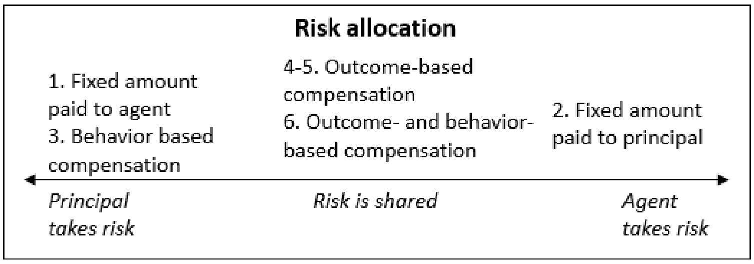

Figure 2.5: Allocation of risk with different compensation types.

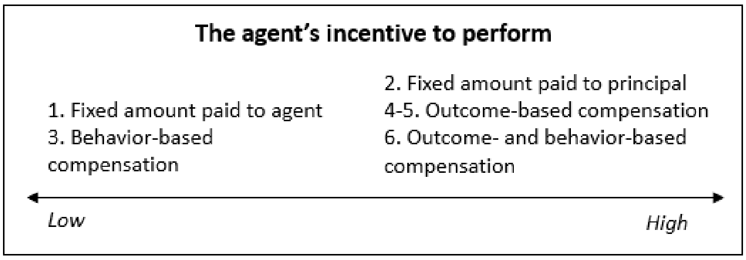

Figure 2.6: The agent's incentive to perform with different compensation types.

Furthermore, when designing a contract there are several principles regarding the compensation plan that should be considered and fulfilled. Grinold and Rudd (1987) summarize these principles in the concepts coincidence of goals, fairness, informativeness, and self-selection:

1. The **coincidence of goals** means the contract should be designed so that it rewards the choice of action that satisfies the principal's goals and needs.
2. To fulfill the **fairness** criteria, the contract should be designed so that the effects of events outside the agent's control do not affect the compensation the agent receives. The agent should be rewarded for the application of his/her skills. Also, the possibility for the agent to use the compensation plan to the agent's advantage should be minimal.
3. The **informativeness** criteria means the contract should be designed so that the principal can evaluate the agent's skills and performance by it.
4. To fulfill the **self-selection** criteria the contract should be designed so that it only attracts the agents that the principal would want to work with.

2.4.2 Incentive models

An incentive is defined by Merchant and van der Stede (2007) as performance-dependent rewards, where rewards can be both positive and negative. In turn, incentive models connect rewards and/or punishments to performance evaluation, in most organizations driven by performance measurement. As a definition, Chen et al. (2020) propose in short: "Incentive models are models to quantitatively determine the mutual benefits". Incentive models are important to keep employees, business partners, or suppliers motivated and aware of result targets. Merchant and van der Stede (2007) presents three management control purposes to introduce incentive models to employees:

1. **The effort-directing purpose** - With incentives, employees become more aware of which performance areas they should direct their efforts to. To just inform about important areas might have some effect, but to include an incentive will more likely make them put more emphasis on these areas.
2. **The effort-inducing purpose** - Incentives will motivate employees to make the extra effort to perform a task well or take on an extra difficult task that is tedious to perform but is in the company's interest.
3. **The personnel-related purpose** - Incentives can be used as a strategy to retain and attract high-quality staff. This can be done using compensations such as higher salary than competitors, a variable pay with the chance to earn more when performing well, or an increase in salary after a certain time at the company.

According to Rapp and Thorstenson (1994) incentives can come in the form of punishments/compulsion, reward, or persuasion. Commonly, incentives are monetary e.g. a bonus or salary increase, but they can also appear in non-monetary forms e.g. increased autonomy or praise/recognition (Merchant & van der Stede, 2007).

When a principal wants to affect an agent's behavior or results, different instruments should be used depending on what type of contract is chosen. Connected to the different types of contracts presented in earlier sections (table 2.1), Rapp and Thorstenson (1994) present what incentives could mean in practice in an organization, illustrated in table 2.2. Contracts can be seen as a tool to implement the incentives (Bower et al., 2002). Laws and regulations appeal to behavior whereas economic incentives connect to the result. Economic incentives can be expressed through payment terms, like the contract mechanisms presented in section 2.4.1. Information can be seen as an instrument to illuminate a certain behavior encouraging the contractor to work towards a certain result. (Rapp & Thorstenson, 1994)

Table 2.2: Compatibility between incentives and contracts. (Rapp & Thorstenson, 1994, p. 19)

Type of contract	**Type of instrument**		
	Law, regulation	Economic incentives	Information
Behavior-based	x		x
Outcome-based		x	x

An economic incentive model can be a combination of a reward and a punishment. For example, a target type contract with an agreed-upon target cost. If the actual cost is higher or lower, the loss/profit is shared according to an agreed formula. Limitations like a maximum price or minimum fee can be added to the agreement. Punishments/rewards can also come in the form of a scheduled incentive based on a target date, where a bonus is paid to the service provider if they deliver before the target date which turns into a penalty when delivery exceeds the target date. Incentives can also be tied to performance measures on other factors than time or cost. They can cover any measure the principal wants to enhance, commonly safety or quality. The design is often similar to the basic cost incentives, with a monetary reward for the service provider when achieving specified levels of performance. (Bower et al., 2002)

Another form of incentive model more complicated to implement but proven successful is the multiple incentive contract. This should motivate the service provider to exceed in several incentive areas but also be designed to balance these areas following the priorities of the customer. Meaning, if the service provider cannot deliver on all parameters and must prioritize, the contract should encourage the trade of decision which is in the best interest of the customer. (Bower et al., 2002)

One important feature of an incentive model is the extent to which the rewards are determined formulaically or subjectively. The form and size of the reward can be decided based on a formula and described in great detail. The other alternative is to leave incentive contracts implicit and assign rewards subjectively. Examples of incentives often given out subjectively are promotions and job assignments. The advantages and disadvantages of the two options are summarized in table 2.3. (Merchant & van der Stede, 2007)

Table 2.3: Comparison of formula-based and subjective rewards. (Merchant & van der Stede, 2007)

	Formula based rewards	**Subjective rewards**
Advantages	- Easy for the employees to understand what is expected of them - Allows for easier administration - Objective and fair in the sense that all employees are treated equally	- Advantageous when superiors do not know how to describe bases for rewards or the weighting of importance before the performance period - More flexible contract to avoid motivating employees in a direction that is no longer desired - Encourages employees to “do their best” and not give up when facing impossible performance targets - Reduces employees’ tendencies to try to manipulate performance measures - Can decrease employee risk of getting affected by events that are out of their control
Disadvantages	- Requires a comprehensive understanding of the bases for rewards in advance - Less flexibility - Can lead to the employees trying to manipulate performance measures - Employees may get affected by events that are out of their control	- Can increase employee risk by the existence of biased evaluators - Can increase employee risk by the employees focusing on other aspects than the evaluators → can cause employee frustration and demotivation - Employees may attempt to inappropriately influence their evaluators - Requires mutual trust between employees and evaluator

2.4.3 Criteria for evaluating incentive models

There are several criteria an incentive model should fulfill to work well. According to Merchant and van der Stede (2007), the most important criteria are:

1. The rewards should be **valued** - rewards without value do not promote performance. It is important to understand what is valued in a certain context. Overall, there are other aspects than the compensation that makes an employee stay and thrive in an organization. These may include satisfaction from the work itself, opportunities for development and advancement, and the feeling of belonging to an organization they admire and share values with.
2. The rewards should be large enough to have an **impact** - if the rewards are too small employees may be insulted rather than motivated. The visibility of the reward can also affect the motivational impact by the sense that employees might feel proud and recognized.
3. The rewards should be **understandable** - the employees must understand the value of and the reason for the reward.
4. The rewards should be **timely** - rewards provided soon after the desired performance is reached have a stronger motivational effect. This also increases the learning effect and therefore it is more likely the performance target is reached again.
5. The rewards should be **durable** - rewards have greater value if the employees' good feelings generated by the reward last for a long time.
6. The rewards should be **reversible** - some rewards, like promotions, are difficult to reverse and since performance evaluators often make mistakes this is considered a weakness.
7. The rewards should be **cost-efficient -** it is in the company's interest to achieve the desired motivation at a minimal cost. This is hard to achieve since all employees value different things depending on personal taste.

2.4.4 Characteristics of different incentives

As mentioned before, an incentive model can be positive or negative. A contract can include incentives as a gain frame or a promotion that awards the agent a bonus if performance targets are met or exceeded. Another alternative for contractual incentives is to use a loss frame or prevention which imposes a penalty if the performance targets are not met. A combination of the two types of incentives can also exist, called a hybrid frame. (Weber & Mayer, 2011)

Selviaridis and van der Valk (2019) have researched how differently framed performance incentives affect buyer-supplier relations and suppliers' responses by conducting three in-depth case studies of the different contractual frames in practice. The result of their study showed promotion-framed incentives lead to positive responses from the suppliers and the relationships improved. Also, the study showed prevention-framed incentives result in negative supplier responses and deteriorating relationships. For the hybrid-framed incentives, it was shown they can lead to productive supplier responses when initial positive expectations are met. The creation of such positive expectations depends on the proportionality of bonus and penalty elements. The study also showed that for promotion- and hybrid-framed incentives to have positive effects, the contracts need to be clear and fair. (Selviaridis & van der Valk, 2019)

Rewards or punishments can seem relatively straightforward and effective at first sight. However, Rapp and Thorstenson (1994) stress the fact that the human instinct is to learn how to avoid punishment or get the reward without needing to change, therefore incentives of a persuasive nature are the only ones leading to a long-term change in behavior. If the incentive does not convince the targeted group the wanted behavior is the right one, it is inevitable they will go back or try to stay with the former, unwanted behavior as soon as the opportunity is given (i.e. when removing the incentive or when finding a way to manipulate the system). This highlights the importance of understanding the preferences and the drive of the agents when designing the incentive model. (Rapp & Thorstenson, 1994)

Furthermore, when the rewards are formulaic, the link between the rewards and the bases on which they are awarded is often determined by an incentives-performance function. According to Merchant and van der Stede (2007), it is common that companies set a lower cutoff or a threshold as well as an upper cutoff or a cap in their incentive contracts. The purpose of the lower cutoff is the company should not have to reward performance they consider mediocre or poor. The upper cutoff or cap means no extra rewards are provided for performance above this level. The reasons for setting an upper cutoff include mitigating the risks of unforeseen luck that increases incentive rewards, short-term increased performance at the expense of the long-term performance level, or a faulty plan design. The last risk is greatest when the plan is new. (Merchant & van der Stede, 2007)

Most of all employees value money as a reward. The larger the proportion of compensation that is based on performance the more incentives for the employees to achieve performance goals are created. However, if the salary is purely based on performance the employees must bear a lot of risks. Assuming employees are risk-averse they must be compensated for bearing risk. This compensation must be large if the stable portion of the compensation does not allow for the employees to maintain a reasonable lifestyle. Because of this, companies rarely compensate their employees solely based on performance. The same reasoning is true for any principal-agent situation. (Merchant & van der Stede, 2007)

2.4.5 Benefits and risks

Benefits to be drawn from adding incentives to a contract depends on what and how incentives are made, but in general, Bower et al. (2002) list possible positive outcomes as lower cost, faster or more timely delivery of service with no compromise of quality, increased service level, better utilization of services, and improved management, control, and monitoring of contract deliverables.

A general risk with incentive models is that there are some clear issues related to incentives and behavior. A badly designed incentive can lead to suboptimization, unwanted behaviors and in the end, the intended result will not be achieved. To be able to deliver on the incentive, the principal must measure the performance of the agent in some way and choose the right variables to measure, to not suboptimize. It is also stressed that an improvement of one result variable does not have to mean an improvement in the actual overall performance. (Rapp and Thorstenson 1994)

2.4.6 Incentive alignment

Many researchers argue incentive alignment or risk-sharing is a key factor for successfully managing a supply chain (e.g. Simatupang & Sridharan, 2005; Mentzer et al., 2001; Chopra & Sodhi, 2004). According to Narayanan and Raman (2004), “a supply chain works well if its companies’ incentives are aligned - that is if risks, costs and rewards of doing business are distributed fairly across the network”. They suggest a three-step approach to align incentives, illustrated in figure 2.7. The first step is to accept the premise and acknowledge incentive misalignment exist. Secondly, it is important to understand why those problems exist. Most of the time the cause for misaligned incentives is hidden action, hidden information, or badly designed incentives. Lastly, to bring incentives back into line, there are three types of solutions: contract-based, information-based, or trust-based solutions. (Narayanan & Raman, 2004)

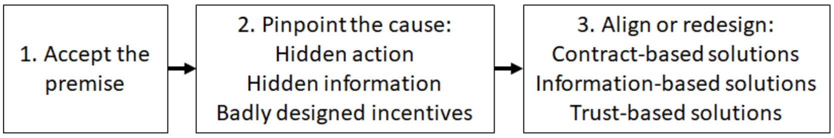

Figure 2.7: Narayanan & Raman's (2004) approach to achieve incentive alignment.

Changing contracts so that they reward or penalize partners based on outcomes can be efficient to achieve incentive alignment. Information-based solutions are connected to revealing hidden information and actions. The most effective way to do this, according to Narayanan and Raman (2004), is to measure more variables and most importantly, the right ones. As mentioned earlier, measuring performance on suitable parameters is crucial to not end up with misdirected incentives. How to structure performance measurement will be addressed in the coming sections. Trust-based solutions can include using an intermediate that both parties trust more than each other or working actively on relationships that are mutually beneficial for both parties. Narayanan and Raman (2004) argue contract-based solutions should be explored before other approaches, since contracts are relatively quick and easy to implement.

Even though aligning incentives is perceived as being important by both researchers and practitioners, a study by Norrman and Näslund (2019) shows there is a gap between perceived importance and actual practice of supply chain incentive alignment both externally (inter-organizational) and internally (cross-functional). To close this gap, Norrman and Näslund (2019) propose logisticians should work to reduce internal silo-thinking by creating congruent internal goals within logistics departments and enable cross-functional cooperation. Also, the understanding of the behavior and effects due to misaligned incentives must be better understood and knowledge of how to both define and implement sophisticated incentives driving the wanted behavior must be developed. Lastly, process performance must be better measured, and congruent performance goals must be connected to incentives. (Norrman & Näslund, 2019)

2.5 Performance measurement

Measuring performance has been considered important by both academics and practitioners for many years. However, researchers have not agreed on one consistent definition of a performance measurement system (Franco-Santos et al., 2007). Leading researchers in the area Neely, Gregory, and Platts (1995) define the performance measurement concept as "a process of quantifying the efficiency and effectiveness of actions" (Neely et al., 1995, p. 80) and a performance measure as "a metric used to quantify the efficiency and/or effectiveness of an action" (Neely et al., 1995, p. 80). There are several different measurements, methods, systems, and perspectives for measuring the performance of a business and these have evolved over time (Zeglat et al., 2012).

Even though the definition of performance measurements differs, Franco-Santos et al. (2007) have found two common features of a performance measurement system among the definitions in literature. These features are performance measures and supporting infrastructure. Performance measures are a necessary for a performance measurement system to exist and supporting infrastructure refers to the systems or processes allowing the performance measurement system to be used. (Franco-Santos et al., 2007)

In a principal-agent scenario, measuring and monitoring performance can help principals to detect and deal with agents' opportunistic behaviors (Alchian & Demsetz, 1972). On the other hand, there are risks associated with monitoring performance. Monitoring can represent an obtrusive form of control, which can offend the agent's sense of autonomy. (Perrow, 1986) However, when monitoring outcomes rather than behaviors this risk is less present since a focus on output lets the agent decide for himself/herself how to achieve the desired outcomes. Then the agent's sense of self-control is less affected and reactance effects are unlikely. (van der Valk & van Iwaarden, 2011)

2.5.1 The Balanced Scorecard

One of the most influential measurement systems is the Balanced Scorecard (BSC) by Kaplan and Norton (1992), see figure 2.8. This measurement system is by far the most cited system and hence the one which has had the greatest influence on the development of the area (Berg et al., 2015). The BSC should provide answers to the following questions:

1. How do the customers see us? (Customer perspective)
2. What do we have to excel at? (Internal perspective)
3. Can we continue to improve and create value? (Learning and growth perspective)
4. How do we view shareholders? (Financial perspective)

The customer perspective can be related to objectives regarding market share and the value proposition offered to the customer. The internal perspective is connected to objectives within the internal business processes and how a company will create its value proposition and at the same time be productive and cost-efficient. The learning and growth perspective refers to objectives connected to employees, information systems, and organizational alignment. The financial perspective includes traditional measures based on financial statement information like Return On Investment. (Kaplan, 2009) The BSC is a clear indication that companies need to measure other aspects than financial figures. Aspects like the customer perspective are also crucial to keep track of. However, there must be a balance between the different perspectives (hence the name *Balanced* Scorecard). It also emphasizes the importance of base measurements on the vision and strategy of the organization and the system takes a clear process perspective. (Kaplan & Norton, 1992)

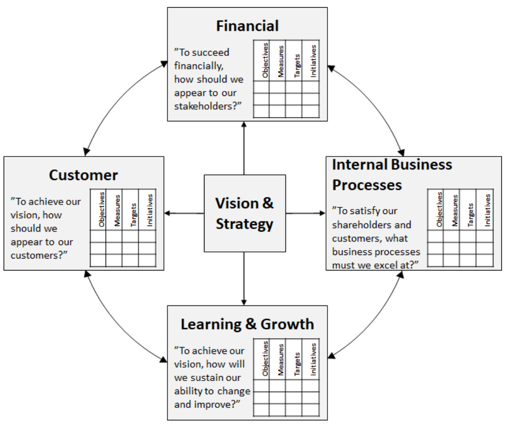

Figure 2.8: The Balanced Scorecard. (Kaplan & Norton, 1992, p. 72)

2.5.2 The Performance Prism

Another important performance measurement framework is the Performance Prism, see figure 2.9. It was developed by Neely, Adams, and Crowe (2001) with the purpose to assist performance measurement selection, which is the crucial process of picking the right measures. It also has the aim of being the second-generation, innovative approach to performance management. One difference between the Performance Prism and the BSC is that in the Performance Prism, the customer focus is developed into a stakeholder focus. The stakeholder concept can contain customers, shareholders, employees, suppliers, alliance partners, intermediaries, regulators, the local community, or pressure groups since all these parts can influence the performance of an organization. (Neely et al., 2001).

The Performance Prism consists of five interrelated facets and specific questions to answer at each facet: (Neely et al., 2001)

1. Stakeholder satisfaction: Who are the key stakeholders in your organization and what do they want and need?
2. Strategies: What strategies are we pursuing to satisfy these wants and needs?
3. Processes: What are the processes that we need to put in place to allow our strategies to be delivered?
4. Capabilities: What capabilities are necessary to operate and enhance these processes?
5. Stakeholder contribution: What do we want and need from the stakeholders to maintain and develop the capabilities needed?

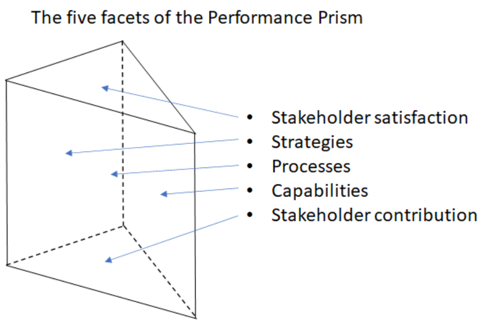

Figure 2.9: The Performance Prism. (Neely et al., 2001, p. 17)

2.5.3 SCOR

For any performance measurement framework or system to be of practical value, the process of identifying, introducing, and using appropriate measures according to the framework must be understood (Neely et al., 2000). There are few models or frameworks that suggest specific dimensions and key figures to measure. One reason for this is that key figures and measures are context-specific, and some authors believe they should therefore not be included in models (Berg et al., 2015).

One well-known performance measurement system is the Supply Chain Operations Reference (SCOR) model created by the Supply Chain Council (nowadays APICS since the Supply Chain Council and APICS merged in 2014) (APICS, 2017). Some of the most important contributions of the SCOR model include it provides a standardized way of viewing the supply chain (cross-industry standard), it emphasizes process orientation and deemphasizes functional orientation as well as enables cross-industry benchmarks. (Akyuz & Erkan, 2010; Lockamy & McCormack, 2004; Holmberg, 2000)

The SCOR model is organized into four sections: performance, processes, practices, and people. The performance dimension of SCOR focuses on the measurement and assessment of the outcomes of supply chain process execution. It consists of measuring attributes grouped under five performance attributes: reliability, responsiveness, agility, cost, and asset management efficiency. Hundreds of proposals for measurements, both performance measures and diagnostic measures to identify the root causes of problems, are defined for the different process steps and strategic levels. The process dimension provides a set of pre-defined descriptions for activities most companies perform to effectively execute their supply chains. The most important management processes on a macro-level are plan, source, deliver, return and enable. The practices dimension provides a collection of industry-neutral practices companies have recognized for their value. They are organized into three categories: emerging practices, standard practices, and best practices. The last dimension, the people dimension, provides standards for managing talent in the supply chain. (APICS, 2017)

A commonly used notion in performance measurement is key performance indicator (KPI). KPIs are strategic (level 1) metrics in the SCOR model. KPIs are diagnostics for the overall health of the supply chain. SCOR recognizes ten strategic metrics and corresponding level-2 diagnostic metrics, see table 2.4. (APICS, 2017)

Table 2.4: Level 1 and 2 metrics in the SCOR model. (APICS, 2017)

Performance attribute	**Definition**	**Level-1 (strategic) metrics**	**Level-2 Metrics**
Reliability	The ability to perform tasks as expected. Reliability focuses on the predictability of the outcome of a process.	• Perfect Order Fulfillment	• % of Orders Delivered In Full • Delivery Performance to Customer Commit Date • Documentation Accuracy • Perfect Condition
Responsiveness	The speed at which tasks are performed. The speed at which a supply chain provides products to the customer.	• Order Fulfillment Cycle Time	• Source Cycle Time • Make Cycle Time • Deliver Cycle Time • Delivery Retail Cycle Time
Agility	The ability to respond to external influences, the ability to respond to marketplace changes to gain or maintain competitive advantage.	• Upside Supply Chain Adaptability • Downside Supply Chain Adaptability • Overall Value at Risk	• Upside Adaptability (Source) • Upside Adaptability (Make) • Upside Adaptability (Deliver) • Upside Return Adaptability (Source) • Upside Return Adaptability (Deliver)
Costs	The cost of operating the supply chain processes. This includes labor costs, material costs, and management and transportation costs.	• Total Supply Chain Management Costs • Cost of Goods Sold	• Cost to Plan • Cost to Source • Cost to Make • Cost to Deliver • Cost to Return • Mitigation Cost (Cost to mitigate supply chain)
Asset management efficiency (Assets)	The ability to efficiently utilize assets. Asset management strategies in a supply chain include inventory reduction and insourcing vs. outsourcing.	• Cash-to-Cash Cycle Time • Return on Supply Chain Fixed Assets • Return on Working Capital	• Days Sales Outstanding • Inventory Days of Supply • Days Payable Outstanding

The level-1 metric for reliability, *perfect order fulfillment*, is defined by APICS (2017, p. 30) as "an order in which the "seven Rs" are satisfied: the right product, the right quantity, the right condition, the right place, the right time, the right customer, and the right cost". The judgment is based on the level-2 metrics and an order is only perfect if all the individual components are fulfilled. The order fulfillment cycle time is defined as "The average actual cycle time consistently achieved to fulfill customer orders. For each order, this cycle time starts from the order receipt and ends with customer acceptance of the order." (APICS, 2017, p. 51) and is made up of data from the Source, Make and Deliver components.

2.5.4 Choosing and evaluating performance measures

The term KPI has developed into a well-known and common term in businesses of today and it is widely used as a tool to follow up on performance. The term KPI is often used colloquially, referring to performance measures. However, a company can have multiple performance measures or metrics without them all being key performance indicators. As mentioned in the previous section, KPIs should be strategic (APICS, 2017) and reflect the performance of an organization in achieving its goals and objectives (Bauer, 2004). The performance measures that are key is unique to each company and its strategy. With available data through information systems like business intelligence (BI), enterprise resource planning (ERP), supply chain management (SCM), and customer relationship management (CRM) a lot of metrics become accessible. Therefore, it is crucial for a company to reflect on the possible metrics and differentiate KPIs from "ordinary" metrics. All KPIs are metrics but not all metrics are KPIs. (Bauer, 2004) It is impossible to know exactly how many performance indicators that should be key, but according to PWC (2007), it is usually between four and ten measures that are likely to be key for most types of companies.

Many authors agree on some main characteristics of what a general good performance measure is. Good performance measures should be quantitative and have objective values rather than subjective values. They are straightforward and it is easy to understand what is being measured and how it is being measured. A good measure is visible to everyone involved in the process and encourages adequate behavior. (Neely et al., 1996; Neely et al., 1997; Coyle et al., 2002) Neely (1996) highlights two key aspects to be addressed when measuring the performance of a process: effectiveness and efficiency. According to Neely (1996, p. 424) "effectiveness refers to the extent to which customer requirements are met while efficiency is a measure of how economically the firm's resources are utilized when providing a given level of customer satisfaction". Notably, Kaplan and Norton (1992) refer to effectiveness and efficiency implicitly in the balanced scorecard, in the customer and internal perspectives. SCOR also implicitly takes effectiveness and efficiency into account through the performance attributes: reliability, responsiveness, agility, cost, and asset management efficiency.

Doran (1981) presents how to set smart targets for performance improvements according to performance measures. A SMART target is a mnemonic acronym for the criteria *specific*, *measurable*, *achievable*, *relevant*, and *time-specific*, which characterizes a well-motivated performance measure. (Doran, 1981) To be able to decide on realistic targets, it is important to understand which performance levels are considered "good enough". One way to do this is to compare the performance of competing actors in the same business, i.e. benchmarking. This can be used in supplier selection and supplier evaluation processes. The buyer/customer can use this argument to e.g. point out it should be possible to perform better or set a lower price at the level of the competitors.

2.6 Performance-Based Contracts and Service Level Agreements

According to van Weele (2014), buying services is by many perceived as more challenging than buying goods. Providing services requires human interactions and it takes time to develop a constructive relationship between the parties. Since a service cannot be stored, available capacity is crucial when dealing with suppliers, but challenging in situations where the future demand is difficult to predict. It is important to acknowledge these challenges and establish professional standards for contracting services.

One type of contract common for services is performance-based contracts (PBC). The interest in this type of contract has been increasing, both in academic literature and in practice (Selviaridis & Wynstra, 2015; Heinrich & Choi, 2007; Hypko et al., 2010). Selviaridis and Wynstra (2015, p. 3505) define PBC as "the contractual approach of tying at least a portion of supplier payment to performance". Key characteristics of PBC include an emphasis on specification and evaluation of output or outcomes instead of inputs, activities, or processes (Martin, 2007). Output refers to the direct result of the service activity itself and outcome refers to the value derived by the customer from a given service. Selviaridis and Wynstra (2015) argue that it is possible to conceptualize the design and management of PBC along three key dimensions: performance, incentives, and risk (figure 2.10)

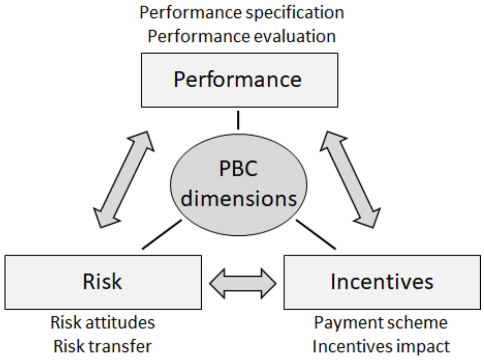

Figure 2.10: A stylized model of PBC. (Selviaridis & Wynstra, 2015, p. 3509)

The concept of performance refers to the processes and practices of specifying, measuring, evaluating, and reporting performance. It is important to specify desired outputs and outcomes and measure these by relevant performance measures. A standard to use when setting up a performance-based contract is to create a Service Level Agreement (SLA) as a part of the contract. Except for the contract header, an SLA should contain the following clauses: (Beaumont, 2006)

1. Definition of the service provided
2. Client obligations to provide data
3. The payment per service
4. Performance targets and methods of measuring performance
5. Computation of penalties and/or bonuses

Since measuring the performance and quality of a service can be challenging, KPIs and other metrics are used to monitor performance objectively and are agreed upon by both parties. The payment is in the form of a fixed price/rate and a bonus or penalty, which depends on how the actual performance relates to the target performance. An example of what can be included in the SLA is the availability of the supplier. For a service supplier resources and expertise should be available at the right time to meet the service needs of the customer. Then the buyer can state in an SLA that, for example, the supplier should be on-site within three hours of having received the information that their services are needed. In this situation, the buyer does not pay only for the hours spent on executing the service, but also for the capacity that the supplier needs to have available to be able to react quickly when the buyer needs their services. (van Weele, 2014) Since SLAs can be complex, negotiating, implementing, monitoring, and renegotiating them is a complex task that requires a considerable amount of managerial time (Beaumont, 2006).

Incentives in figure 2.10 refer to the structure of financial and non-financial incentives and their impact on the behavior of suppliers. One key consideration when developing this kind of contract is if and how to integrate the incentives. Van Weele (2014) argues incentives generally are critical success factors for PBCs. They motivate the agent (service provider) to perform beyond targets. For the incentives to work, both the principal and the agent must agree on the terms of the arrangement i.e. the goals of the contract, the expected quality of service, and what performance measurements to use (van Weele, 2014). Incentives in a PBC primarily relate to the payment structure, their orientation, and intensity. Incentives have been described further in section 2.4.

The risk concept refers to the allocation of financial and operational risks. This depends on the risk attitudes of contracting parties. It generally depends on which party is more or less risk-averse in a situation. Fundamental for PBC is that the risk is transferred to the agent since its reward is tied to performance achievement. (Selviaridis & Wynstra, 2015) Passing risk to the agent through contracting can be done by adjusting the ratio of fixed and variable payment or, passing all risk to the agent by only paying a fixed amount. (Rapp & Thorstenson, 1994) Different contract mechanisms between the principal and agent have been explored further in section 2.4.

Additionally, PBCs is assumed to drive innovation (Sumo et al., 2016; Kim et al., 2007; Martin, 2002). Innovation in services and products is critical for companies' sustained competitive advantage as well as long-term survival. Increasingly, companies complement their internal innovation with ideas and solutions from external partners like suppliers. (Chesbrough et al., 2008) Sumo et al. (2016, p. 1484) defines supplier innovation as "all supplier-initiated, proactive undertakings that result in new (i.e., radical) or improved (i.e. incremental) ways of delivering services". This innovation aims to more efficiently and/or effectively achieve performance targets. This is mostly done through incremental innovation process innovations, but more radical changes can be possible due to, for example, new technology. (Sumo et al., 2016)

Sumo et al. (2016) have researched the two PBC dimensions term-specificity (i.e. the extent to which clauses in the PBC related to behaviors and obligations are specified) and pay-for-performance (i.e., that the supplier's reward is based on the extent to which contracted performance is achieved) and their effects on innovation. They have found that term-specificity has an inverse-U-shaped effect on incremental innovation and no significant effect on radical innovation. This means if term specificity is too low or too high, the highest possible level of innovation will not be reached. For pay-for-performance, they conclude if the supplier's rewards are linked to its performance to a higher extent, it positively affects both radical and incremental innovation. (Sumo et al., 2016)

2.7 Conceptual framework

After studying research on incentive models and other related subjects, the service triad and contract setup at E.ON presented in the beginning of the chapter (figure 2.1) has been developed into a conceptual framework, seen in full in figure 2.11 on the next page. The conceptual framework was used in bridging the empirical data with the theoretical insights. It consists of contextual factors relevant for the case, the main concepts related to PBCs as well as a summary of the most important insights connected to these concepts.

To develop the conceptual framework, firstly, some insights were summarized from the context of the solar power market (described in chapter 1, section 1.5), concerning contextual factors for the solar power market. The most important takeaway from the context is how there is a discrepancy between the demand for the installation of solar panels and the manpower available in the installation industry, meaning there is a lack of capacity. This is highlighted because supply risk affects what is the appropriate sourcing strategy to adapt for the principal company, meaning it also affects what is a suitable contract between the principal and the agent.

Secondly, the principal agency theory and service specifics have been added as a contextual frame to the system investigated. It is crucial to understand what drives and characterizes the principal and the agent, especially under the circumstances of a service triad, which was introduced in section 2.3. Hidden information and hidden actions are key elements in service triads since the ability to monitor is limited. This is also reflected in signaling and the cost of monitoring, meaning extensive monitoring leads to additional costs and the value gained from monitoring should be greater than its cost. For service triads, aligning the interests of the stakeholders and specifying and monitoring performance poses a challenge when designing contracts between the buyer and the service provider.

Performance-based contracts are central in this thesis. But to understand this concept, also the concepts of performance measurement and incentives in contracts must be understood and investigated. The insights highlighted from these concepts in the conceptual framework (figure 2.11) have been applied in the cross-case analysis and construction phase of the project to help answer the research questions connected to KPIs and incentives.

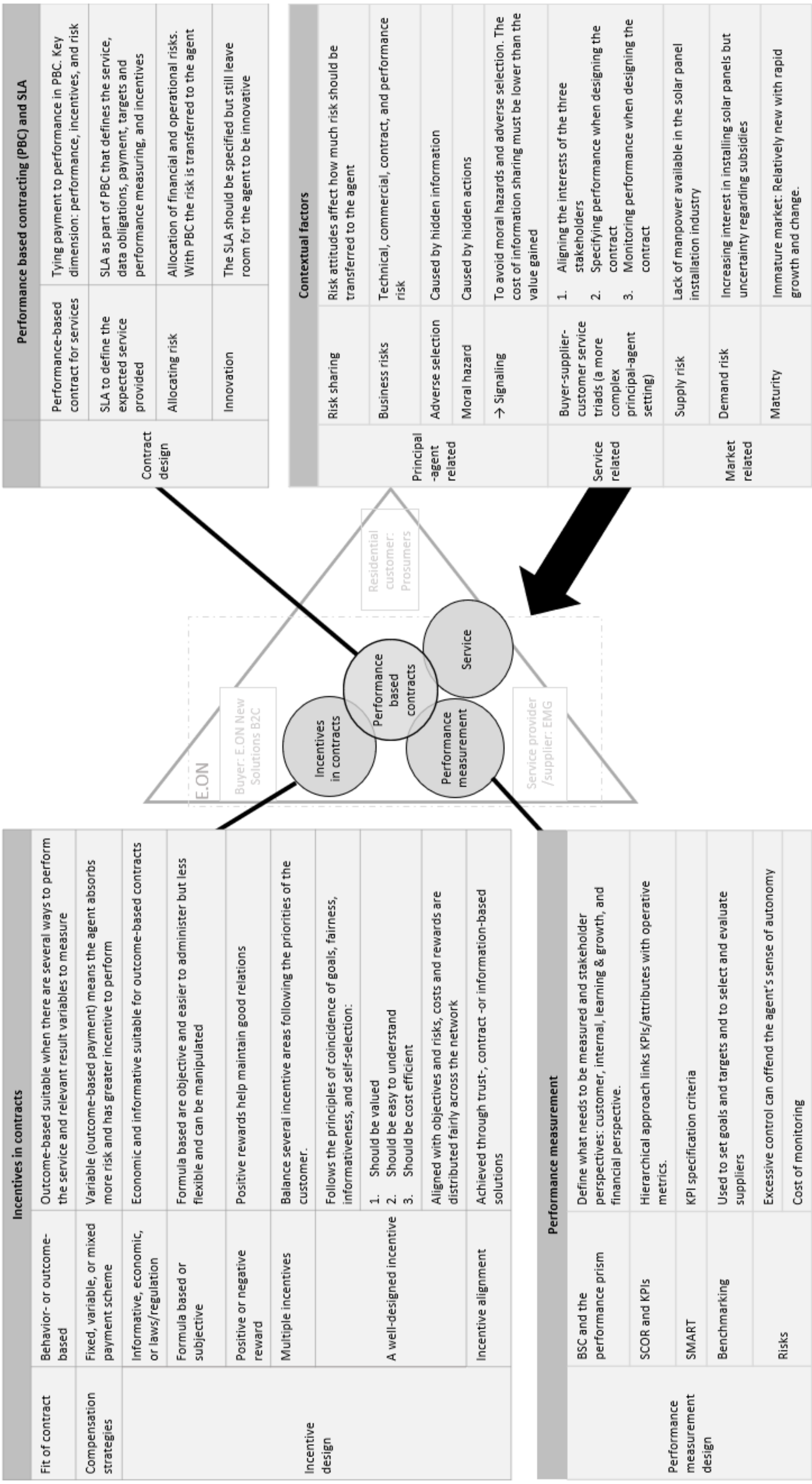

Figure 2.11: The conceptual framework forming the base for empirical research.

3. Methodology

In this chapter, the methodology used in this thesis is presented. It describes the research strategy, the research design, and the data collection method. It also illustrates the work process and discusses the academic quality of the work.

3.1 Research strategy

3.1.1 Systems approach

There are three different philosophical approaches in research: analytical approach, systems approach, and actors approach (Arbnor & Bjerke, 1997; Gammelgaard, 2004), summarized in table 3.1. The approaches are based on different assumptions about reality and the role of a researcher. Therefore, the chosen methodological approach should not be based on the research questions per se but rather the researchers' view of reality (Arbnor & Bjerke, 1997).

According to Arbnor and Bjerke (1997), with the analytical approach, the purpose is to explain reality objectively by showing the relationship between cause and effect (causality). It is believed the whole can be explained by the sum of its parts. From an actors approach, reality is not objective. Instead, it is believed reality is a result of social constructions. This approach is contextual and based on how individuals experience and interpret reality. (Arbnor & Bjerke, 1997)

The systems approach is also based on an objective view of reality. The difference from the analytical approach is that with the systems approach it is believed the components of reality relate to links, goals, and feedback mechanisms, and cannot be divided into independent parts. (Arbnor & Bjerke, 1997) These connections differ between systems, therefore it is important to study, analyze, and compare cases rather than trying to establish universal cause-effect-relations. Since the researcher's main task is to give recommendations for the improvement of a system, they must work closely with the research objects. (Gammelgard, 2004) According to Gammelgard (2004), the most suitable method when having a systems approach is a case study.

Table 3.1: Gammelgard's (2004, p. 482) summary of the three different approaches to methodology.

	Analytical approach	**Systems approach**	**Actors approach**
Theory type	Determining cause-effect relations. Explanations, predictions. Universal time and value-free laws	Models. Recommendations, normative aspects. Knowledge about concrete systems	Interpretations, understanding. Contextual knowledge
Preferred methods	Quantitative (qualitative only for validation)	Case studies (quantitative and qualitative)	Qualitative
Unit of analysis	Concepts and their relations	Systems, links, feedback mechanisms, and boundaries	People and their interaction
Data analysis	Description, hypothesis testing	Mapping, modeling	Interpretation
Position of the researcher	Outside	Preferably outside	Inside as part of the process

Based on the examination of the different approaches, the authors believe the systems approach best corresponds to their view of reality and the problem investigated in this thesis. The relationship between E.ON New Solutions B2C and their installation company is complex and cannot be explained by simple cause and effect connections. It was considered crucial to understand how synergy effects can arise depending on how the different actors in the supply chain interact with each other and how incentives would affect each stakeholder. Also, the goal was not to find an absolute truth about incentive models but rather to find a solution that works in practice. However, the authors believe there might be clear causality in some cases, which is why the actors approach was not favored. The system this project will focus on was presented in previous chapters and is illustrated again in figure 3.1 below.

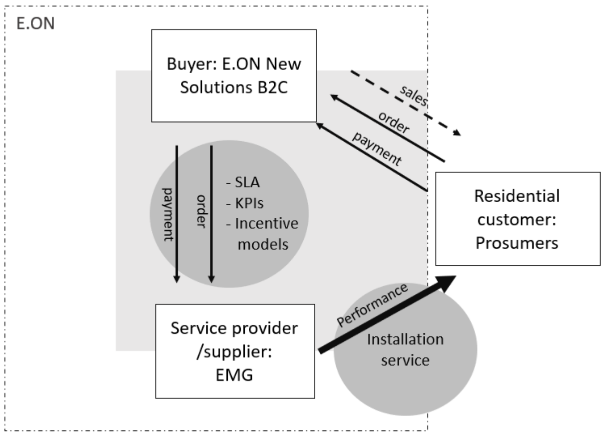

Figure 3.1: A systematic figure of the system studied, referred to as "the service triad and contract setup at E.ON".

3.1.2 Balanced approach

When doing research, it should also be decided how to relate to the qualitative and quantitative approaches. These two approaches are not substituting each other. Instead, they can be viewed as observing different aspects of the same phenomenon. (Kotzab et al., 2005)

In a qualitative approach, the goal is to study a phenomenon on its own terms. Therefore, the first step is to collect data. The literature study is not a separate step in the qualitative process but rather embedded in various steps. The second step is to describe the phenomenon from the point of view of the informant. This is done by conducting interviews with open-ended questions and working with several data sources like documents, interviews, observations, and other material. The last step is to build a theory of the phenomenon based on the analysis of the collected data. (Kotzab et al., 2005)

When using a quantitative approach, the goal is to increase the general knowledge of a phenomenon by building a formal theory that explains, predicts, and controls the particular phenomenon. In the research fields of logistics and supply chain, the quantitative approach dominates. The first step is then to study relevant literature to build a basic understanding and a conceptual framework of the phenomenon that is going to be studied. The next step is to build a formal theory based on previous research. These hypotheses are built before collecting data. The last step is then to collect data to confirm the previously developed formal theory. (Kotzab et al., 2005)

An inductive approach is usually qualitative, and a deductive approach is usually quantitative. When combining these two a balanced (or abductive) approach is created. This is illustrated in figure 3.2, adapted from Golicic et al. (2005). The two loops complement each other, and it is beneficial to use both approaches to truly understand a phenomenon. (Kotzab et al., 2005; Kovács & Spens, 2005)

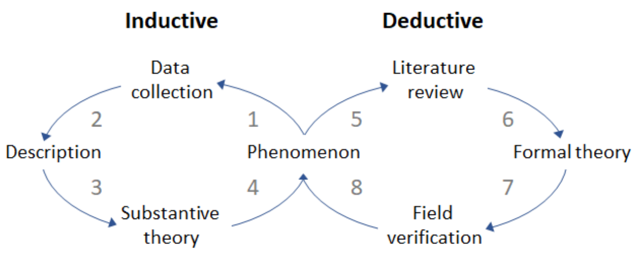

Figure 3.2: The balanced approach model. Adapted from Golicic et al. (2005, p. 20).

Supply chain research is often complex since several stakeholders are usually involved, and there is a need for a holistic view and systemic thinking. Therefore, a combination of the quantitative and qualitative methods is needed to gain a deep understanding of a phenomenon. (Näslund, 2002) This description is in line with the problems presented in this project. Both qualitative data from interviews and observations as well as quantitative data like existing contracts and installation-related data was used. Hence, the balanced approach was deemed most suitable.

At the start of the project, the authors used an inductive approach and to get a basic understanding of the studied phenomenon. When a substantive theory was built, a deductive approach was used to develop and then test a formal theory. Then, during the project, balance was achieved by tacking back and forth between the two approaches, as seen in figure 3.2. Sometimes the same circular path was repeated and sometimes crossing over to the other approach was necessary. An overview of the balanced approach used in this project is illustrated in figure 3.3 below.

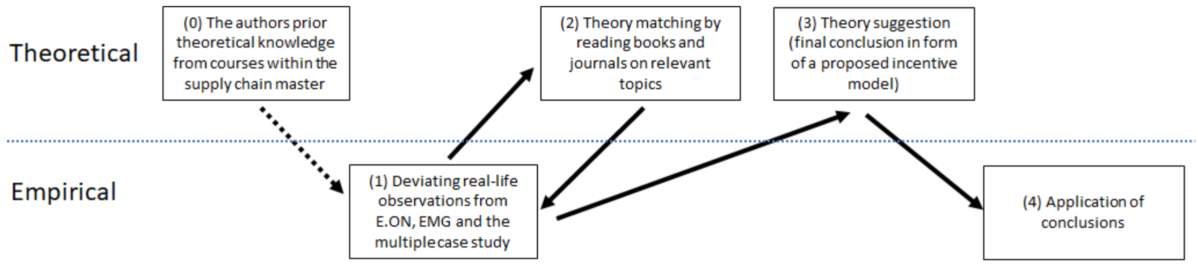

Figure 3.3: An illustration of the balanced approach used in this project.

3.2 Research approach

According to Lukka (2003), inspired by Kasanen et al. (1993), there are five different methodological approaches to research: the conceptual approach, the nomothetical approach, the decision-oriented approach, the constructive approach, and the action-oriented approach (figure 3.4).

	Theoretical	*Empirical*
Descriptive	Conceptual approach	Nomothetical Approach Action-oriented approach
Normative	Decision-oriented approach	Constructive approach

Figure 3.4: Research approaches. (Lukka, 2003, p. 94)

The conceptual approach produces new knowledge mainly through the “method of reasoning”. The nomothetical approach is linked to the modernist (positivist) research tradition, meaning the underlying explanatory model is causal and attempts to create general laws. In the action-oriented approach, the human being is brought into the focus of analysis, and this provides a kind of alternative to the nomothetical approach. The decision-oriented approach is usually based on assumptions that are similar to the ones of the nomothetical approach. The difference is that the research is normative, and the results have the purpose of helping management in running a firm. (Kasanen et al., 1993)

This project followed a constructive approach. The constructive research approach is favorable when the objective is to solve practical problems while at the same time producing academically valuable theoretical findings (Lukka, 2003). Also, Kasanen et al. (1993, p. 244) describe this approach as “problem solving through the construction of organizational procedures or models”. This is suitable for this project as the objective is to develop an incentive model for managerial use at the principal company, E.ON New Solutions B2C, that will ensure efficiency in EMG’s solar panel installation process. Using the constructive approach, the research is divided into phases (figure 3.5). (Kasanen et al., 1993) The innovation phase is the most crucial for this approach since the actual solution to the problem is generated here. The constructive approach gives the authors a hands-on method of how to structure the project and create solutions to the problem.

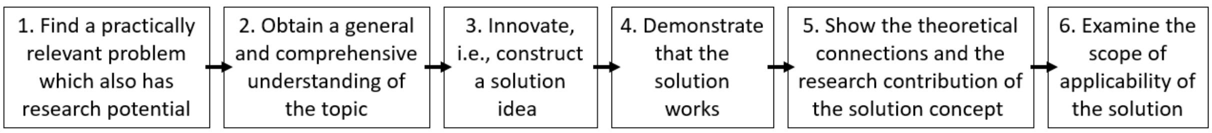

Figure 3.5: Steps of the constructive approach. (Kasanen et al., 1993)

The first phase corresponds to chapter 1 where the problem and the purpose are defined. The problem and purpose definitions were developed together with E.ON. In the second phase, a deep theoretical and practical understanding of the topic was obtained by conducting a thorough literature review as well as a case study of the service triad and contract setup at E.ON. This corresponds to chapters 1, 2, and 4. The third phase is conducted through a multiple case study where several cases have been analyzed to examine what incentive models work well in practice as well as comparing theoretical findings with the case studies. This corresponds to chapters 5 and 6. The construction of possible incentive models are presented in chapter 7.

The fourth phase, where the solution should be tested to ensure it works, was not fully conducted due to the limited time frame of the project. It would have been desirable to implement the solution and evaluate its effect over time. However, to obtain some validation, feedback and validation sessions were held with E.ON stakeholders. The fifth and sixth steps are addressed in chapter 8 of the report. The steps and the work process of this project are summarized in figure 3.6 below.

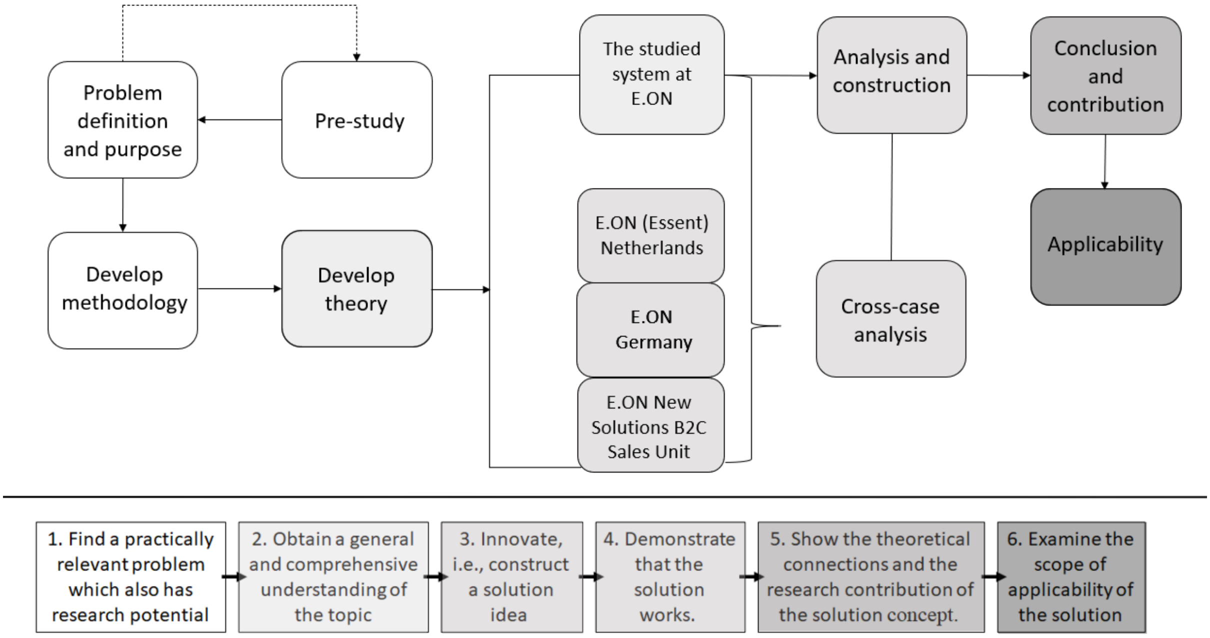

Figure 3.6: Visualization of the process: a constructive approach with an embedded multiple case study.

3.3 Pre-study, problem definition, and purpose

The project started because the authors were interested in E.ON as a company and especially in the solar energy market. E.ON had identified a need to investigate incentive models for their installation company working with the installation process of solar panels to residential customers. The authors found this interesting and thought it was a good topic for their master thesis. Since they had studied a master in logistics and supply chain management, they also had prior knowledge within this field. The problem definition and the research questions were developed in discussions between Peter Abdon (supervisor at E.ON) and the authors and verified by Andreas Norrman (supervisor at LTH) and Dag Näslund (examiner at LTH).

3.4 Literature review

As an initial part of the project, a literature review was conducted to create a theoretical framework as well as a better understanding of the area studied. One important purpose of a literature review is to summarize the state of the art in a particular subject field. Various kinds of sources, like professional and academic journal articles, books, and web-based resources, should be used (Rowley & Slack, 2004). According to Höst et al. (2006), a literature review should be an iterative process as an increasingly focused search becomes possible as the orientation of the research becomes clearer over time. Synder (2019) proposes a four-step process of conducting a literature review that was followed in this project:

1. **Design the review -** In this step, it is important to establish which specific purpose the literature review has and which research questions the review will be addressing. Also, the approach of the review, where to find the literature, and which keywords to search for should be decided. The purpose of the literature review in this project was to gain knowledge of concepts relevant to the research questions. The literature review was conducted by collecting credible information from mainly peer-reviewed academic journals and books. The literature was found using databases such as LUBsearch, Google Scholar, JSTOR, Web of Science, Elsevier, and Emerald. Focus was on the main topic areas services, incentive models in contracts, performance measurement and performance-based contracting. Some of the keywords used for searching literature was "principal-agent theory", "buyer-supplier-customer service triad", "service contracts", "incentive model", "incentive alignment", "performance-based contracts", "service level agreement", "SLA", "performance measurement", "KPI", "KPI selection", "incentive models for solar panels", "solar panel installation" and similar search terms.
2. **Conduct the review -** In this step, the literature review is conducted. If needed, the design of the review can be altered here. The selection of literature to use can be done in different ways. One option is to read the whole article, but this was considered too time-consuming. Other approaches are to conduct the review in stages and first read abstracts or to focus on the research method or findings. To determine if a source was useful for this project, only the abstracts were read at first. All articles deemed useful were logged in an Excel sheet to keep track of them. The articles were chosen based if they included information on the main topic areas and could be useful to apply in the context of a buyer-supplier-customer service triad.
3. **Analysis -** In this step, the analysis of how the literature should be used is conducted. Relevant information is abstracted from each article in a structured way. In this project, relevant information was abstracted to fit the conceptual framework based on the system model and the main topic areas identified. The takeaways from the conceptual framework were used to analyze the cases, motivate construction of the incentive models and answering the research questions and purpose.
4. **Write up the review -** When writing the review, it is important to communicate the need for it and how the literature has been analyzed. The literature review followed the main topic areas services, incentives in contracts, performance measurement and performance-based contracts. The main topic areas were motivated in the system model displayed first in section 1.2, the problem definition of this thesis. The contribution of the literature review can take various forms, and, in this case, it resulted in the conceptual framework (figure 2.11).

3.5 Research method

There are several different research methods suitable for different kinds of research. Yin (2014) presents five common methods: experiment, survey, archival analysis, history, and case study. Experiments are often used when the investigator can control and manipulate the events, and the question is explanatory. Surveys and archival analysis are methods associated with who, where, or how many/much?-questions, when the goal is to describe a phenomenon or predict outcomes. A history is preferred when investigating the past where no contribution can be made in the present, meaning there is nothing to observe or no one to interview. Yin (2014) argues a case study is suitable for exploratory research questions, characterized by being "How?" or "Why?" questions. Further, the case study is preferable when examining contemporary events in-depth in a real-world context outside the researchers' direct influence.

A summary of the conditions for the different methods presented by Yin (2014) is shown in table 3.2. Ellram (1996) believes the choice of method should be based on what data is used and in what way this data is analyzed. The case study method is advantageous for coping with a distinctive situation with multiple sources of data. It is often chosen when the researcher wants to investigate how the context of a phenomenon affects the outcome. (Ellram, 1996)

Table 3.2: Relevant situations for different research methods. (Yin, 2014, p. 9).

Method	**Form of RQ**	**Requires control of behavioral events?**	**Focuses on contemporary events?**
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/no
History	How, why?	No	No
Case study	How, why?	No	Yes

The single and multiple case study is considered two different approaches to case study research. According to Yin (2014), there are five rationales for choosing a single case study: having a critical, unusual, common, revelatory, or longitudinal case. The first would refer to a case being critical to some theory or theoretical proposition. The second is about an extreme case, diverging from theoretical norms. On the contrary, the common case displays the conditions of an everyday situation. The revelatory case is about the opportunity to observe a before unobservable phenomenon. The fifth rationale, the longitudinal case, studies the same case at several points in time.

The rationale for choosing a multiple case study is often because it is considered more robust. A single case study can be considered vulnerable and therefore a multiple case study is preferable if the researchers have enough time and resources available. A multiple case study should be used to either predict similar or contrasting results through various cases. To apply a multiple case study, the replication logic is used, meaning each case study consists of a study in itself and should be executed in the same way. (Yin, 2014) The procedure for a multiple case study is illustrated in figure 3.7.

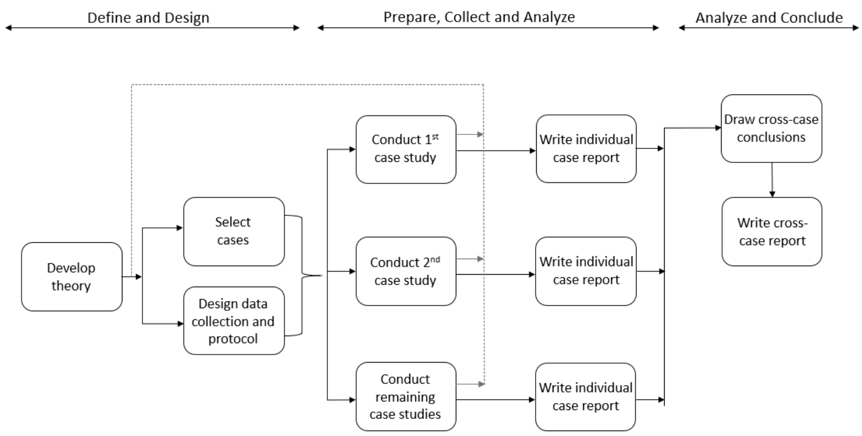

Figure 3.7: Procedure for multiple case studies. (Yin, 2014, p. 60)

A case study needs to have a unit of analysis to illustrate what the case is designed to investigate. It is used to define and set the boundaries for the case study. (Yin, 2014) Besides deciding on a single or multiple case study, one must also decide on having a holistic or embedded unit of analysis. This means a case study can include units of analysis on more than one level, exploring sub-units within the case. This creates four design options within the case study method, illustrated in figure 3.8.

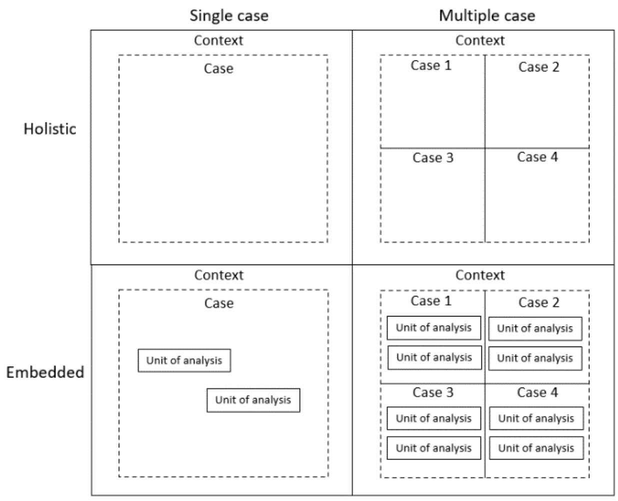

Figure 3.8: Four design options of case study research, adapted from Yin (2014, p. 50).

When conducting a case study Yin (2014) presents a linear but iterative process with six steps: plan, design, prepare, collect, analyze, and share. This process is illustrated in figure 3.9. The steps presented in the constructive approach overlap the ones presented by Yin (2014) and were combined to create the work process for this project.

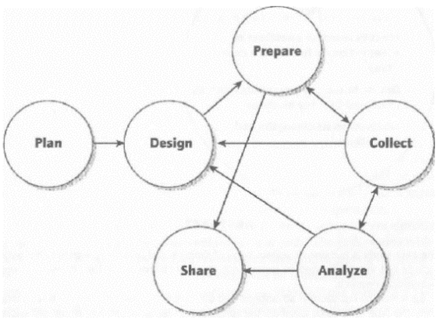

Figure 3.9: Case study research process. Adapted from Yin (2014, p. 2).

According to Voss et al. (2002), it is common for research questions in case studies to develop over time, which leads to them being modified, developed, or abandoned. Voss et al. (2002) mean this is a strength as it allows more knowledge to be gained than if the research was completely focused on one individual research question. This is what Yin (2014) calls an adaptive design and this approach was applied to this project, enabling the possibility to modify the research design if needed. A common reason for a modification is important discoveries during the data collection. Notably, modifications should be carried out with caution to not compromise the rigor of the case study procedures.

3.5.1 Choosing the case study method

This project follows a systems approach, deals with multiple sources of data, and aims to solve a problem in a real-world context. The focus was on a current event where incentive models in the installation process as it looks today were studied. The study took place in its natural environment outside the authors' direct influence. Considering this, a case study method was chosen. Höst et al. (2006) state case studies can be used as a method in the constructive approach to observe a situation or phenomena, to identify and clarify the problem to be solved. This has convinced the authors to choose the case study method to conduct the second phase in the constructive approach where the aim was to get a thorough understanding of the service triad and contract setup at E.ON.

The unit of analysis of this thesis is incentive models in service contracts. To be able to solve the problem of the primary case with incentive models in the contract between E.ON New Solutions B2C and EMG, it was deemed beneficial to explore other similar situations to draw conclusions by conducting a cross-case analysis. The limitation of generalizability when only using a single case (Voss et al., 2002) was a motivation in the choice to study multiple cases to be able to answer the research questions. Therefore, as a part of the third step in the constructive approach, a multiple case study was conducted. Hence, the project followed a constructive approach with an embedded multiple case study with a holistic unit of analysis, illustrated in figure 3.10 where the gray are symbolizes the choice made in this project.

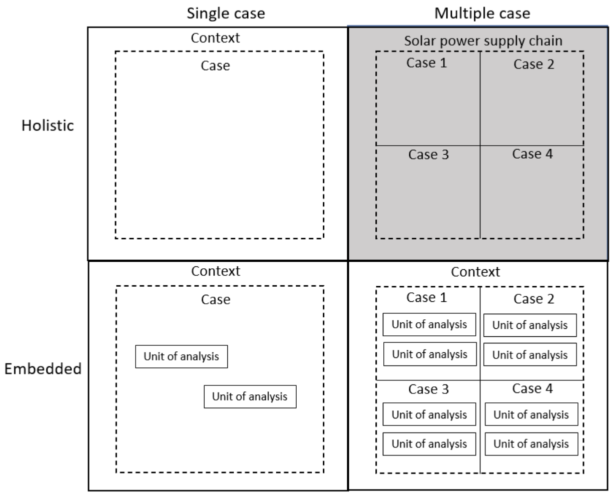

Figure 3.10: Chosen case study design.

Moreover, the workload implicated by the replication logic for a multiple case study was considered problematic due to the circumstances and limited time frame for this research project. The extensiveness of this multiple case study was limited since it was merely done as a step on the way in the constructive approach. To still ensure a rigorous case study research, the authors made sure to fulfill quality criteria such as transferability, truth-value, and traceability (da Mota Pedrosa et al., 2012), which is addressed further in section 3.11. Also, choosing a suitable unit of analysis helps enable the evaluation of transferability in a case study research (da Mota Pedrosa et al., 2012).

Due to this, the denomination 'multiple case study' in this research was questioned since the data involved with each case is mainly based on interviews with one or two stakeholders. This means a triangulation by using several data sources has not been possible in all cases. However, since the focus was to get input from several cases instead of one to gain insights on how the problem identified has been approached and solved in other cases, there has been a trade-off between the depth of data and the number of cases. Nevertheless, the overall multiple case study method according to Yin (2014), described in figure 3.7, has been used. Hence, the cases have been analyzed according to case study principles. Therefore, it could also be possible to call the method used in this project an interview study analyzed with case study methodology.

3.5.2 Selecting cases

Choosing a multiple case study was an adaptation of the research design, which was considered some time into the project. This put some limitations on the planning and accessibility of cases. The sample of cases was selected with the unit of analysis in mind. From this several criteria were developed, summarized in the list below. Firstly, the cases needed to contain a service contract. It was considered advantageous if the service was a kind of installation service, preferably within the solar panel industry. It was also considered advantageous, however not a criterion, if the cases demonstrated a customer-buyer-service triad where the service provider was a subsidiary to the buyer. Then the issues arising due to the relationship with the subsidiary could be studied and better understood. Furthermore, the cases must have been accessible, meaning that key employees were willing to allocate time to be interviewed and share necessary information. Due to the limited time frame, accessibility was the key criteria.

Criteria for selection:

1. The cases should demonstrate some use of service contracts
2. It is preferable if the cases involve some kind of subsidiary service provider
3. It is preferable if the service contracts involve an incentive model
4. The cases must be accessible

Finding cases is time-consuming and especially looking for cases with the circumstances of a company contracting services, preferably from a subsidiary. Without much prior insights into service businesses or contacts, this was difficult to master considering the limited time span. Also, contracts are considered confidential, and for companies to share these was difficult to motivate. Therefore, for this project, only E.ON branches in different countries and departments within E.ON Sweden was investigated. Table 3.3 below summarizes the potential case candidates that were contacted.

Table 3.3: Potential candidates contacted to participate in the multiple case study.

Company	**Type of service contract**	**Purchasing service from a subsidiary?**	**Service contracts include incentive models?**	**Accessible?**	**Case included in the study?**
E.ON Solar in Germany	Solar panel installation service	Yes	Yes	Yes	Yes
E.ON Solar in the Netherlands	Solar panel installation service	Yes	No	Yes	Yes
E.ON Solar in the United Kingdom	*Solar panel installation service*			*No*	*No*
E.ON Solar in Polen	*Solar panel installation service*			*No*	*No*
E.ON Solar in Italy	*Solar panel installation service*			*No*	*No*
E.ON Solar Sales Unit	Solar panel telemarketing service	No	Yes	Yes	Yes

E.ON branches in Germany, the Netherlands, and the sales unit at E.ON New Solutions B2C were investigated as they best resemble the circumstances E.ON New Solutions B2C Sweden faces and fulfill the criteria for selection and were accessible. The supervisor at E.ON confirmed E.ON branches in Germany and the Netherlands best resembled the circumstances of E.ON in Sweden. In addition the supervisor at E.ON had the contacts to employees in Germany and the Netherlands, making it easier to reach them. The Sales Unit stands out from the other cases not being an installation service. However, because it was accessible and had a well-developed incentive model in place with relevant learnings for the project, this was also considered a relevant case to study.

The E.ON branches in the United Kingdom, Polen, and Italy were contacted but not accessible. Therefore, they were not part of the multiple case study and marked as italic in table 3.3. Since they were not accessible, the authors did not know if they are working with subsidiaries for their solar panel installations or if they have or have had any incentive models in their service contracts, which is why those boxes are empty in table 3.3.

3.6 Data collection

The data collection is the other part of the second phase in a constructive research approach. According to Denscombe (2010), there are four different types of sources to be used when collecting empirical data: questionnaires, interviews, observations, and written sources (documents). Yin (2014) proposes six types of sources: documentation, archival records, interviews, direct observations, participant observations, and physical artifacts. The categories are alike but divided into sub-groups. Denscombe (2010) believes interviews and observations are best suited for a case study but emphasizes this does not rule out the use of other types, or a combination, of data. Yin (2014) states documentation is relevant for every case study. In this project mainly observations, interviews, and documentation were used to conduct the multiple case study as well as getting information about and creating an understanding of the E.ON New Solutions B2C and EMG case. Since much of the data collected contained sensitive information, all numbers and financial figures are fabricated or hidden (exchanged with a letter). However, they still have the right dimensions and the conclusions drawn from them are applicable for the real numbers as well.

3.6.1 Interviews

Interviews are key sources of information in a case study and can be structured in different ways. Höst et al. (2006) divide interviews into three categories: structured, semi-structured, and unstructured interviews. In structured interviews, a set protocol of questions is strictly followed. Semi-structured interviews will also include a prepared questionnaire, but the phrasing and order of the questions are flexible. Unstructured interviews have predetermined topics to guide the discussion, but the order and the content of the discussion can change depending on the interviewee. (Höst et al., 2006)

In this project, semi-structured interviews were the chosen method to gain an understanding of the cases. Semi-structured interviews were chosen over structured interviews because they are more flexible and provide the opportunity to reach more in-depth answers. The focus of the interview can be adapted to catch important insights arising during the interview. However, to have a completely unstructured approach was excluded to ensure a clear focus on the right areas and questions. (Blomkvist et al., 2018) All interview guides can be seen in appendix 1.

For the data collection of the E.ON New Solutions B2C and EMG case, the goal was to interview people with different knowledge bases to gain a broad understanding of the case. The interviewees were chosen based on the areas presented in the service triad and contract setup at E.ON: incentives in contracts, performance measurement, and service. In table 3.4 the interviews that were conducted are presented. Due to the ongoing COVID19 pandemic, all interviews were conducted via video link. With permission, all interviews were recorded. After each interview, the recordings were transcribed and sent to the interviewee for confirmation.

Table 3.4: Conducted interviews for the E.ON New Solutions B2C case.

Interview object's position	Knowledge base relevant for the project	Type of interview	Date	Duration
CEO EMG Energimontagegruppen AB	Knows the EMG perspective, the service they provide and the challenges EMG faces.	Semi-structured	Week 9	1 h
Business Developer E.ON New Solutions B2C	Knowledge of the service contracts with the installation partners.	Semi-structured	Week 9	1,5 h
Head of E.ON New Solutions	Knowledge of goals connected to the installation of solar panels. Member of the board of EMG, hence good insights in their work.	Semi-structured	Week 5	1 h
			Week 10	1,5 h
Operations Manager E.ON New Solutions B2C	Knowledge of the E.ON New Solutions B2C business model.	Semi-structured	Regular contact throughout the project	> 20 h
Supply Planner E.ON New Solutions B2C	Knowledge of performance measurement and follow-up on different KPIs.	Semi-structured	Week 9	1 h

For the multiple case study, one or two key employees were interviewed to get a good overview of their business setup as well as how they worked with service contracts, performance measurements, and incentive models. The people interviewed for each case are presented in table 3.5. These interviews were also conducted via video link and recorded. Additional questions and confirmations of the information received were done via email.

The reason for having two interviewees in case 1 – E.ON (Essent) the Netherlands was that two representatives with different skills were needed and were available to give a better overall picture of the case. In the data collections for the other cases, one representative was deemed sufficient and available with good knowledge of the overall picture of the area of interest.

Table 3.5: Conducted interviews for the multiple case study.

Interview object's position	**Case**	**Knowledge base relevant for the project**	**Type of interview**	**Date**	**Duration**
International Category Leader - Installation Services at E.ON	Case 1 - E.ON (Essent) the Netherlands	Knowledge of the installation partners and the solar panel business in the Netherlands.	Semi-structured	Week 12	45 min
Category Manager Procurement at Essent Nederland B.V	Case 1 - E.ON (Essent) the Netherlands	Knowledge of the installation partners and the solar panel business in the Netherlands.	Semi-structured	Week 12	45 min
Head of Operations Solar bei E.ON Energie Deutschland GmbH	Case 2 - E.ON Germany	Knowledge of the installation partners and the solar panel business in Germany.	Semi-structured	Week 12	45 min
Head of Sales E.ON New Solutions B2C	Case 3 - E.ON New Solutions B2C Sales Unit	Knowledge of the sales process and the service contract with sales partners.	Semi-structured	Week 12	45 min

3.6.2 Observations

A good complement to interviews is observations. With observations, the researchers do not have to rely on "second-hand information" from an interview or documentation but can get firsthand insights and draw conclusions from an observed event. Observations can yield great insights but are also time-consuming. There are mainly two types of approaches to observations: systematic observations and participatory observations (Denscombe, 2010). These definitions are equal to Yin's (2014) definitions of direct observations and participant observations.

For this project, direct/systematic observations were preferred. In direct/systematic observations, the researcher observes the activity from the outside. This way, there is less risk of influencing the system. However, the data collected from such an observation can differ depending on, among other things, the researcher's previous experience, when the observations are made, and for how long. It is therefore important to have a clear structure for how the observations should be performed. In participatory observations, the researcher participates in the activity. This can help get a better idea of how the system being observed works. However, it risks affecting the system and the outcome of the observations. For this project, observations have been made during two different installations of solar panels for residential customers. The observations conducted are summarized in table 3.6 and the observation protocol can be seen in appendix 2.

When doing observations, interviews can arise spontaneously, for example when accompanying the respondents to or from a meeting, when eating lunch, drinking coffee, etc. This is called ethnographic interviews (Blomkvist et al., 2018) and was conducted during the observations listed in table 3.6. For the multiple case study, no observations were made.

Table 3.6: Conducted observations.

Place of observation	Date	Duration	Information of what was observed
Installation, Trelleborg	week 10	4 hours	Observation of residential solar panel installation and ethnographic interviews with installers.
Installation, Vellinge	week 17	5 hours	Observation of residential solar panel installation and ethnographic interviews with installers.

3.6.3 Documentation

Yin (2014) states documents can be important for case studies in producing evidence. However, one should have in mind that internal documents can be biased. Documentation can include letters, e-mails, administrative documents, formal studies, or mass media articles.

To strengthen and triangulate statements from interviews and observations, internal documents from E.ON and EMG were reviewed. Collecting documentation was deemed necessary to find information that did not emerge from interviews and observations as well as to create a basic understanding of the operations of both E.ON and EMG. The documents used have been primarily internal documents from the companies' intranet. This has included internal documents on organization, goals, strategies, processes, cost structures, and flows. The documents used are summarized in table 3.7.

Table 3.7: Relevant documents collected.

Document	Description of document	Information obtained from the document
E.ON service contract with installers	The service contract with attachments like installation standards, safety regulations, compensation plan, etc.	- KPIs measured in the installation process - Incentive model introduced 2021-04-01
Planning file including price lists for all installers	All installation companies have filled in their prices depending on different installation characteristics. Used as an aid when assigning projects to installers.	- Increased understanding of the installation process - Understanding of the pricing method for an installation - Benchmarking
Example of a monthly follow-up meeting between E.ON and an installer	PowerPoint of what is discussed during the monthly meetings between E.ON and EMG (same for all installers)	- Understanding of follow-up process between E.ON and the installation companies. - KPIs discussed and shared with the installers
Agenda for monthly follow up meeting at EMG	The agenda of the topics discussed at EMG's monthly meetings with the staff	- Understanding of follow-up process at EMG
Planning file including historical data on installations from the ERP system	The planning file that the supply planners use to plan and administer coming installations as well as obtaining historical data regarding old installations	- Information regarding all of E.ON's installations since January 2020 - Historical data regarding on-time delivery, number of installations executed, NPS, etc.
E-mails	E-mails with E.ON representatives with answers to our questions, times for meetings and feedback sessions, etc.	- Answers to additional questions that arose after the interviews - Confirmations to information obtained from interviews and other documents

For the multiple case study, access to documents was not deemed necessary and therefore not prioritized. However, some documents were obtained and used for triangulation as well as a deeper understanding of the cases. The documentation used in the multiple case study is presented in table 3.8.

Table 3.8: Relevant documents used in the multiple case study.

Case	Name of document	Type of document	Information obtained from the document
Case 2 - E.ON Germany	Price list	A document being part of the SLA listing the prices for the different part of an installation	- Understanding of the solar installation process in Germany - Understanding of what drives costs for the installers
Case 2 - E.ON Germany	Incentive model	The incentive model developed and tried some time ago	- Understanding of possible incentive models
Case 3 - E.ON New Solutions B2C Sales Unit	Incentive models - conversion rate and discounts	The incentive models used in the contract with telemarketing partners	- Understanding of possible incentive models
All cases	E-mails	E-mails with case representatives with answers to our questions, confirmations, and times for interviews, etc.	- Answers to additional questions that arose after the interviews - Confirmations to information obtained from interviews and other documents

3.7 Data analysis and construction

The data analysis is part of the third phase in a constructive research approach. According to Yin (2014), a good starting point for developing an analytical strategy is to write notes during the data collection on promising concepts and insights discovered along the way. This was done during the project. In continuous feedback sessions with the supervisor at E.ON as well as discussions between the authors, new hypotheses were constantly analyzed and evaluated during the project.

Furthermore, one purpose of the data analysis was to understand the service triad and contract setup at E.ON as well as the companies in the multiple case study. This was done through a cross-case analysis where cross-case conclusions were drawn. The cross-case analysis together with the conceptual framework developed from the literature review (figure 2.11), served as a foundation when designing this analysis, addressing similarities and differences between the cases regarding service characteristics, performance measurement and incentives in contracts. This was done to explore possible solutions for incentive models and their adaptability at E.ON.

Miles and Huberman (1984) present some general strategies for data analysis, with emphasis on qualitative data, which was important for this project. The components for data analysis are presented as three parallel streams: data reduction, data display, and conclusion drawing/verification. These streams are to some extent done in parallel with data collection, as an interactive, cyclical process. This creates a more flexible data collection and analysis which allows new ideas to be investigated and insights to be added along the way. (Miles & Huberman, 1984) Data reduction is about simplifying and transforming raw data. Data reduction could mean, but is not limited to, quantification of data. Other ways are to simply select or summarize data. Data display means assembling selected information and presenting it in a way that facilitates an understanding of the phenomena. In turn, this enables the third stream: drawing conclusions and verifying them on plausibility, validity, and robustness. (Miles & Huberman, 1984)

Techniques used in the data analysis were also adapted from Yin (2014), who presents the use of logic models. Yin (2014, p. 155) states "the use of logic models consists of matching empirically observed events to theoretically predicted events". It specifies and operationalizes a complex chain of events over time, staged in cause-effect patterns. In concept, it is a form of pattern matching. It has been discovered beneficial for logic models to be developed collaboratively between the researchers and the stakeholders for the project. This helps define the goals and visions for the outcome of the project more clearly. The stakeholder perspective was guaranteed throughout the project through weekly meetings with the supervisor at E.ON.

The strategies presented above formed how the analysis was performed. A thorough literature review concluded in a conceptual framework which guided further analysis of the cases as well as provided general design options for the construction of incentive models. The literature review and the cross-case analysis helped formulate some initial propositions/hypotheses based on theory and pattern matching on how incentive models could look. A broader understanding of the service triad and contract setup at E.ON was obtained by using data from E.ON interviews and documents to map the stakeholders, the service contract, and the installation process in itself, looking at the efficiency of the current system as well as the key success factors and need for improvements.

Following this, the cross-case analysis was used to extract insights on relevant performance measures and design options for incentive models in contracts from a real-world context. With this, the research questions could be approached in chapter 7 in the construction phase of the project. First, appropriate selection criteria for performance measures were identified by combining the insights from the conceptual framework with those from the cross-case analysis. Then, it was discussed, from a cause-and-effect perspective, how these selection criteria could result in a set of KPIs, thereby addressing the first research question. Thereafter, how these different KPIs could be connected to incentive models was investigated. If the KPIs were suitable or not to incentivize was motivated using theory on principal-agent theory and cost of monitoring as well as insights from the cross-case analysis. Four different incentive models were proposed with different KPIs. The design options for the incentives used were motivated using insights from the conceptual framework and the cross-case analysis. Also, feedback sessions with E.ON representatives were used to develop the proposed models to be in line with E.ON's objectives.

3.8 Demonstrating the solution works

One part in demonstrating the solution works was to conduct a risk and sensitivity analysis on the proposed incentive models, which was the third research question:

RQ3: Which risks are connected to the proposed incentive models and what sensitivity aspects can be observed?

In this section, the work process for the risk and sensitivity analyses are described. In addition to these analyses, the proposed models' applicability was discussed with E.ON stakeholders at continuous feedback sessions and a validation session.

3.8.1 Risk analysis

It is essential to continuously evaluate risks and to apply risk management throughout a project. According to Manuj and Mentzer (2008), the definition of risk differs, but three components are present in all conceptualizations of risk: the potential losses if the risk is realized, the probability of the realization of the risk, and the significance of the consequences of the losses. Deloach (2000) defines business risk as "the level of exposure to uncertainties that the enterprise must understand and effectively manage as it executes its strategies to achieve its business objectives and create value". A more quantitative definition of risk is suggested by Mitchell (1995), who means that risks contain different types of losses and the risk of any type of loss is a combination of the probability (P ($Loss_n$)) of that loss and the significance (I ($Loss_n$)) of that loss. Then the formula for determining the risk of an event n is $Risk_n$ = P ($Loss_n$) * I ($Loss_n$) (Mitchell, 1995). This definition of risk is often illustrated in a risk matrix, see figure 3.11 (Norrman & Jansson, 2004).

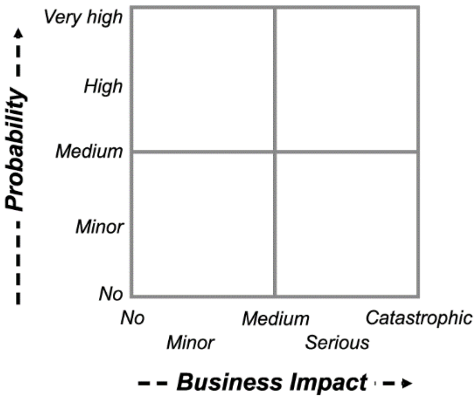

Figure 3.11: Risk assessment matrix. (Norrman & Jansson, 2004, p. 437)

Norrman and Lindroth's (2002, p. 7) definition of supply chain risk management is that "supply chain risk management is to collaboratively with partners in a supply chain apply risk management process tools to deal with risk caused by, or impacting on, logistics related activities or resources". The stages of the risk management process followed in the risk analysis in this project are: (Norrman & Jansson, 2004)

1. **Risk identification -** identifying potential risks. In this project potential risks with the recommended models were identified from the multiple case study, the interviews with E.ON representatives, and the feedback sessions.
2. **Risk evaluation** - evaluating the identified risks by assessing their probabilities and business impact and distributing them in a risk matrix. This evaluation was done primarily by the authors, with some input from feedback sessions.
3. **Risk management** - decision regarding the acceptance of assessed risk and/or the implementation of actions that will reduce the probability and/or consequences if the risk occurs. Appropriate risk management strategies were suggested for the most important risks identified in the previous step (those placed in the top right corner of the risk matrix).

The risk analysis (risk identification and risk assessment) part of the research was done by the authors with some input from feedback sessions with E.ON stakeholders. The developed risk matrix (table 7.14) is therefore mainly the authors' view of the risks associated with the developed incentive models.

3.8.2 Sensitivity analysis

Sensitivity analysis is another important tool connected to risk and uncertainty. Saltelli (2002, p. 579) defines sensitivity analysis as "the study of how the uncertainty in the output of a model (numerical or otherwise) can be apportioned to different sources of uncertainty in the model input". According to Saltelli (2002), sensitivity analysis is considered by some as a prerequisite for any type of model building. It can be used to identify the most significant exposure or risk factors and help develop priorities for risk mitigation. (Saltelli, 2002) Sensitivity analysis can also play an important role in verifying and validating a model throughout the model development phase to refine the model (Kleijnen, 1995). Sensitivity analysis can also be used to assess and provide insights regarding the robustness of a model's results when making decisions. (Saltelli et al., 2000)

Sensitivity analysis methods can be classified as mathematical, statistical, or graphical. Mathematical methods assess the sensitivity of a model output typically by calculating the output for a few different inputs that represent the possible range of the inputs. Statistical methods involve running simulations. Then the inputs are assigned a different probability distribution and the effect of variance in inputs on the output distribution is assessed. Lastly, graphical methods illustrate sensitivity in the form of graphs or charts. These methods are used to give visual indications of how the variation in inputs affects the output. (Frey & Patil, 2002)

For this project, the sensitivity of the proposed models was investigated through mainly mathematical and graphical methods. Historical installation data was used as an input to test and see which result (output) the proposed incentive models would have had historically. The models were also illustrated graphically to give an increased understanding of the output given different inputs and different, possible scenarios were developed to test the output of the models given different inputs.

3.9 Conclusion, contribution, and applicability

After the proposed models were evaluated and verified concerning function, risk, and sensitivity, a final suggestion for a model was determined. The potential and applicability of the models were discussed in collaboration with E.ON stakeholders through continuous feedback sessions throughout the project and a concluding validation session to reach a final suggestion. In the validation session the models were evaluated by letting the E.ON stakeholders rank the models on the following parameters:

- **Potential -** Potential to improve performance considering efficiency as well as maintaining a satisfactory overall performance including customer satisfaction, on time delivery, quality and safety.
- **Applicability -** To what extent is it possible to implement today? Is extensive administration necessary? Will this model be difficult to implement and use?

This input, together with the authors' assessment, was summarized in a table and a graph to illustrate the overall ranking for each model. The method for prioritizing among the choices was inspired by Björnland and Persson (2003). They introduce a similar model with the two dimensions financial potential and difficulties and resources needed. They claim that the option with high potential and low difficulties should be prioritized. This is in line with, in this case, choosing the model with highest potential and highest applicability.

In the event of the ranking being indecisive, it was determined the parameter applicability would be favored as it was deemed important by E.ON stakeholders to find an applicable incentive model. Also, the risks connected to each model was considered and the models with the least serious risks were favored. Lastly, it was possible to make a concluding recommendation for an incentive model, thus fulfilling the purpose to recommend one incentive model for E.ON to use in their service contract with their internal solar panel installer.

The concluding recommendation was complemented by the authors addressing the scope of applicability of the solution. Suggestions for further research as well as potential contributions to theory and practice were also presented based on the authors' learnings from the project. The last step in this project was to share the findings by giving two presentations, one at LTH and one at E.ON. Also, the finished report was published on LUP Student Papers.

3.10 Trustworthiness

A high-quality research design is required for all types of studies to be credible (Ellram, 1996; Yin, 2014). Ellram (1996) and Yin (2014) present four main areas commonly used to establish the quality of empirical research: construct validity (or objectivity), internal validity, external validity, and reliability. However, according to Halldorson and Aastrup (2002), the concepts of validity and reliability are more adapted to quantitative research, which has been the dominant orientation in logistics research. When qualitative studies are added, as is the case in this project, a broader span of quality criteria is necessary. Concepts like credibility, transferability, dependability, and confirmability need to be considered as well. The necessary components of quality in different contexts are illustrated in figure 3.12. In the figure, the top layer represents the philosophical view of the researcher. The intermediate layer represents the components of quality and by which criteria the quality should be evaluated. The bottom layer represents techniques and methods applied by researchers to obtain quality. (Halldorson & Aastrup, 2002)

In line with Halldorson and Aastrup's (2002) ideas on quality for qualitative studies, da Mota Pedrosa et al. (2012) also stress the importance of the criteria transferability, truth-value, and traceability in case study-based research as an addition to validity and reliability. Since case studies are both quantitative and qualitative, all these criteria are necessary to fulfill high-quality research. (da Mota Pedrosa et al., 2012)

Since a combination of a qualitative and quantitative approach is used in this thesis, criteria for the quality of both types of research were considered. In table 3.9 the most important components of quality are described and how they have been approached in this project is explained.

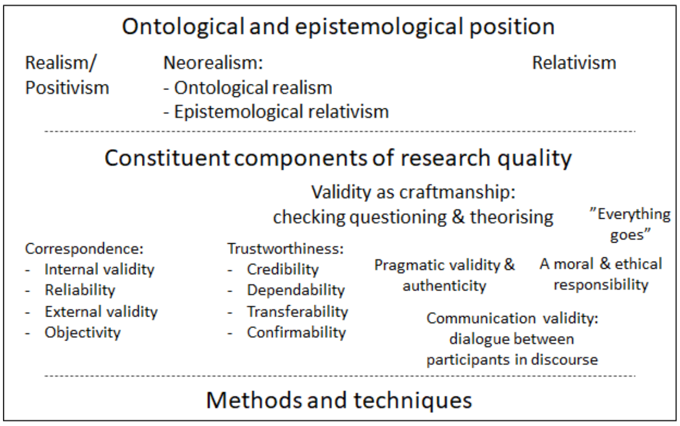

Figure 3.12: Components of quality in context. (Halldorson & Aastrup, 2002, p. 323)

Table 3.9: Definitions of quality aspects and lists of actions taken to ensure quality.

Component of quality	**Definition**	**Actions taken**
Construct validity (objectivity)	Construct validity or objectivity is about defining the proper concepts to be measured in the study, related to the original objectives, and thereafter selecting the specific operational measures in line with the concepts. Preferably, these should be measures used in other studies. Shortcomings of the measures and how to avoid bias should be addressed. Tactics to construct validity include using triangulation, meaning data was collected from multiple sources like interviews, observations, and documents, using both qualitative and quantitative methods, and cross-checking results. Triangulation can also mean working with different articles on a subject written by several different researchers. (Yin, 2014)	- Multiple sources of evidence: interviews, websites, documents, and observations - Working with triangulation - Testing/validation of the construct
External validity	External validity concerns to what extent the findings of a study are generalizable beyond a particular case study. The form of research questions will have a great effect on the possibilities of generalization, why the research design phase is where one has the chance to influence the external validity. A tactic is to use theory to increase external validity in a single case study, and to use replication logic in a multiple case study. (Yin, 2014)	- Appropriate and clearly defined research questions - Use theory in single-case studies - Use replication logic in multiple-case studies - Combining case data with a comprehensive literature review, striving to connect theory to the case findings. - Describing the contextual factors affecting the cases
Transferability	Transferability is similar to external validity, but the transferability concept also takes into account that contexts, as well as people, can change over time. (Halldorson & Aastrup, 2002) This limits the transferability possibilities and leaves it, to some extent, up to other researchers to evaluate the transferability. (da Mota Pedrosa et al., 2012)	
Reliability	Reliability is about ensuring a case study can be repeated, using the same procedures, and arriving at the same findings and conclusions. The objective is to reduce bias and errors in the study. The data collection phase is key when approaching the reliability of a case study. One should make each step of the process as operational as possible and develop case study protocols and develop a case study database to deal with documentation issues. (Yin, 2014)	- Describing and documenting the work process - Using well-developed interview protocols and data collection routines - Interview guides from the case studies are enclosed in appendix 1 - Observation protocol is enclosed in appendix 2 - Clearly stating the processes for data analysis and documenting all relevant findings - Testing of the incentive model - Comparing results to literature within the field
Traceability	Traceability is connected to the documentation of the data sources and the research process and includes the dimensions of dependability and confirmability. (Halldorson & Aastrup, 2002) Dependability is similar to reliability, with the difference being that dependability allows changes in research design as long as they are being documented. Confirmability is connected to the integrity of the findings based on the data. The notion parallels objectivity based on method, meaning the level of neutrality of the method and findings. The difference is that confirmability also acknowledges the interdependence between the researcher and methodology. To obtain high traceability it is important to prove the consistency of the project's findings and the processes should be reproducible and then lead to the same findings (Stuart et al., 2002).	
Internal validity	Internal validity concerns avoiding to incorrectly conclude there is a causal relationship between some factors, risking missing the fact that another factor could be the cause. This is mainly an issue for explanatory studies. However, in a broader sense, internal validity extends to the issue of interference. Yin (2014) argues a case study involves interference every time observations cannot be done directly, meaning interviews and documentation can compromise internal validity. One must ensure the evidence is reliable and all rival explanations have been considered.	- Pattern matching - Two writers of the master thesis project - Interviews across the main company with several stakeholders - Recording the interviews - Confirming information from interviews
Confirmability/ truth-value	Truth-value complements internal validity and refers to the match between the reality conception of the informants and how the researcher views reality. The difference between internal validity and truth-value is that internal validity only refers to the match between a project's findings and one, objective reality. The notion of truth-value considers there could be several, context-dependent realities. To obtain a high truth-value it is therefore important the informant confirms or corrects the researcher's interpretation of the information they present. (da Mota Pedrosa et al., 2012)	

3.11 Summary of the method

Choosing a method is an important component of research. Having a well-defined method is a necessary condition for being able to carry out serious research, since it is a tool for solving problems and gaining new knowledge. In figure 3.13 below, the method choices for this project are summarized. The options colored grey are the ones chosen or considered for this project.

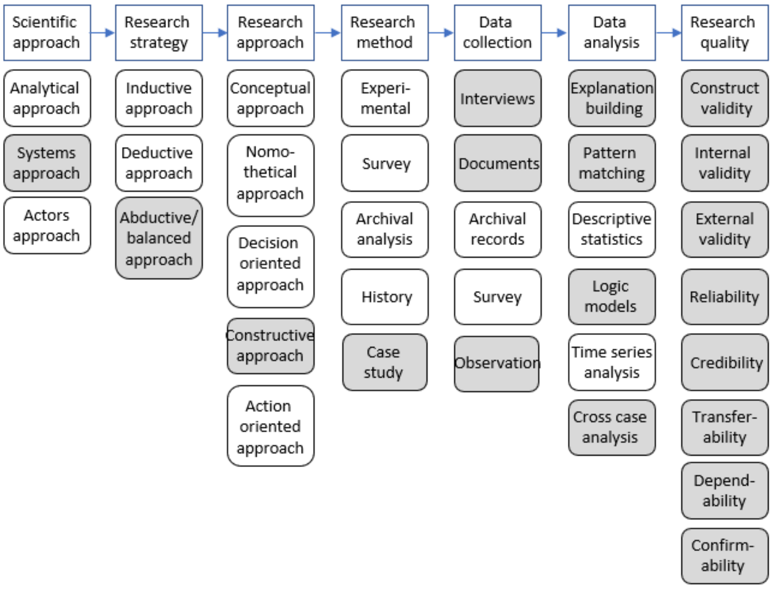

Figure 3.13: Summary of the method used in this project.

4. The service triad and contract setup at E.ON

To be able to answer the research questions, the current situation at E.ON and EMG must first be understood. Therefore, this chapter will present the studied system, which is the service triad relationship and the service contract between E.ON New Solutions B2C and EMG. This chapter includes a description of the companies, the service characteristics, performance measurements, and incentives in the service contract.

4.1 Company description[1]

E.ON Energilösningar AB (E.ON Infrastructure Solutions) is part of E.ON Sverige AB (E.ON Sweden), which in turn is part of the German energy group E.ON. E.ON is a German energy company with 50 million private customers in Europe (E.ON, 2021a). E.ON Sweden delivers electricity, heating, and smart energy solutions to approximately one million private and corporate customers in Sweden (E.ON, 2020a). E.ON also owns the electricity network in some parts of Sweden, shown in dark grey in the boxes in figure 4.1 (E.ON Energidistribution, 2020).

Figure 4.1: E.ON's electricity network. (E.ON Energidistribution, 2020)

E.ON Sweden has set a goal to convert to 100% renewable and recycled energy by the year 2025. One important department contributing to this goal is their New Solutions B2C department. They create value propositions facilitating for people to live sustainably, where their core product is to enable in-house production of solar power for prosumers. E.ON offers a complete deal including solar panels, installation, and service. The organizational structure is shown in figure 4.2. Notably, this is not a complete mapping but includes the main stakeholders addressed in this thesis.

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[1] In all sections of chapter 5 all information is obtained from the interviews with and the documents received from the CEO EMG at Energimontagegruppen AB, the Head of E.ON New Solutions B2C, a Business Developer at E.ON New Solutions B2C, the Operations Manager at E.ON New Solutions B2C and a Supply Planner at E.ON New Solutions B2C if nothing else is stated.

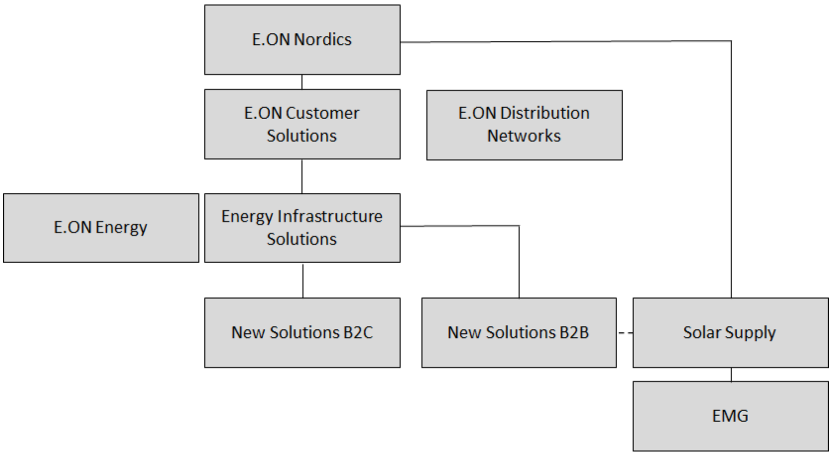


Figure 4.2: Map of E.ON New Solutions' organizational structure.

E.ON New Solutions B2C collaborates with the E.ON-owned subsidiary Solar Supply, the supplier of the material to solar panel installations. For the installation process, they also own an installation company: EMG Energimontagegruppen AB (EMG). EMG was founded in January 2020 and is a fully owned subsidiary of E.ON Energy. They currently do not execute all of E.ON's installations of solar panels, which is why E.ON also works with outsourcing the installation process to external installation companies. Currently, they work with around 20 installation partners in total. EMG is estimated to conduct a significant share of the installations for E.ON. The idea behind EMG, according to the Head of E.ON New Solutions B2C, is for it to work as a cost center, meaning there is no requirement for EMG to make a large profit. However, it is expected they show positive results. EMG follows the same contract as the external installers. The installation of solar panels accounts for around 30% of the total costs that E.ON has for their solar panel business, meaning it has a large financial impact on the business.

Currently, EMG has 28 employees. They are mainly roof panel installers and electricians, but four employees work with administrative tasks. The administrative tasks include the capacity planning for the projects, the daily contact with E.ON, invoicing as well as solving issues that arise on the sites where an installation is being conducted. Today, they have three offices, located in Kalmar, Karlshamn, and Höör. However, the installers and the electricians start their working day from home and drive straight to the customer. The roof panel installers work in teams of two or three. Working in teams of three is favorable since it is possible to find three parallel workstreams, and this enables a faster installation process. Also, since the roof panel installers cannot work on their own, with teams of three there is less sensitivity when someone is sick, home with a sick child, or on vacation. Because of this, EMG has a goal of only having teams of three. Since the roof panel installers start from home the teams are formed on a geographical basis. The electricians work independently. They are responsible for the site visits before a project starts and installing the smart meter that connects the solar panels to the electricity grid. EMG's goal for 2021 is to grow aggressively both regarding increasing their number of employees and their turnover.

4.2 Service characteristics

4.2.1 Product description

As mentioned before, E.ON New Solution B2C's main product is solar panels for residential customers. Today, they offer three different packages, see figure 4.3 below. Notably, the basic package differs from the other two by having silver frames instead of black frames, but the standard and premium packages only differ in effect not in appearance. The packages are priced differently, with the basic package being the cheapest and the premium package the most expensive one. However, the installation process does not differ for the different packages.

Figure 4.3: E.ON New Solutions B2C's product offering. (E.ON, 2021b)

To install solar panels, several components are required. They include the solar panels, a solar inverter, an electric box, an optional battery, a net meter, and the utility grid. These components are illustrated in figure 4.4. An inverter is necessary since the solar panels produce direct current while households use alternating current. (SolarReviews, 2021)

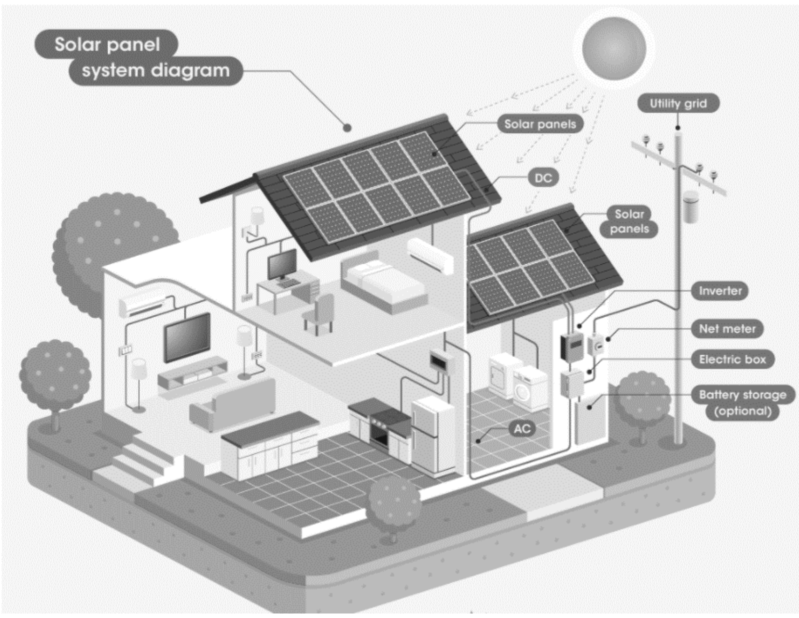


Figure 4.4: Schematic diagram to clarify the parts of a solar panel installation.(SolarReviews, 2021)

4.2.2 E.ON New Solutions sales process

In this section, the sales process for E.ON New Solutions B2C is described. All the steps are summarized in figure 4.5 below.

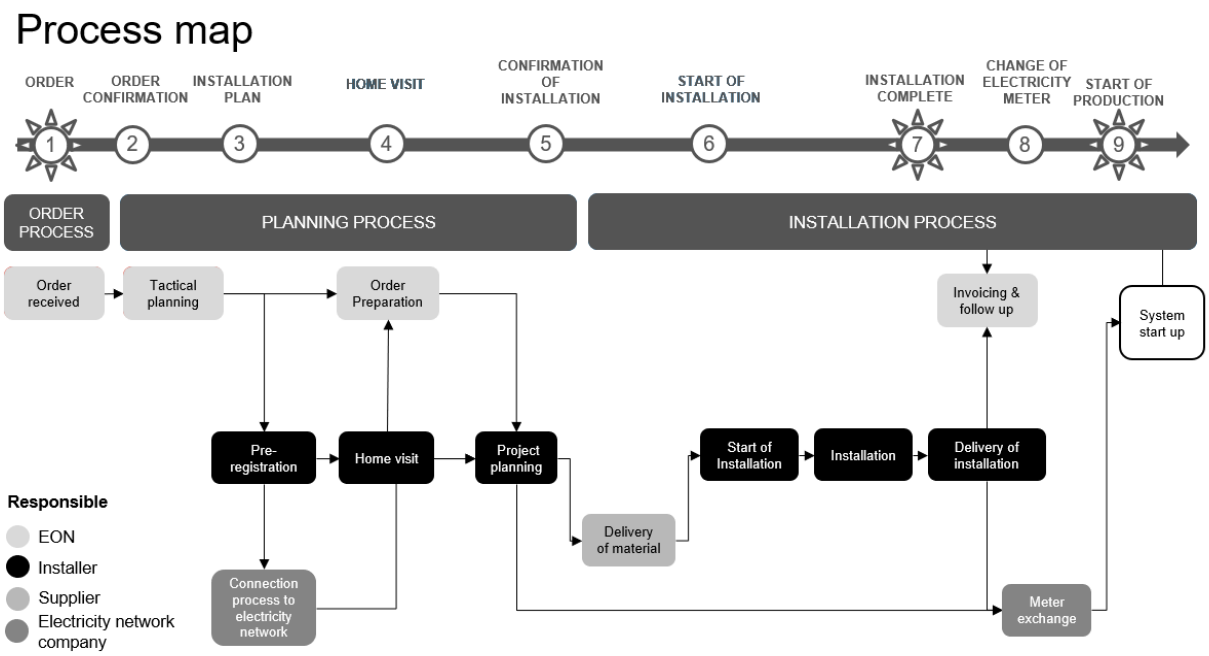


Figure 4.5: Process map at E.ON New Solutions B2C.

The sales process for E.ON's solar panel offer starts with a salesman getting a lead from a customer. The sales unit working with converting the leads to sales orders is outsourced to two different telemarketing companies. Leads can either mean a potential customer has visited E.ON's website and asked for a quotation on a solar panel facility for their residence or the leads can be purchased from an external company. The salesman makes an introductory call to the customer and makes an approximated quotation. This is done using online map services to estimate the conditions for installing solar panels on this specific case, i.e. measure the roof, its position, etc. If the customer decides to proceed, the administrational staff registers the order in the system (step 1 in figure 4.5).

When the order is registered, the planning of the installation starts. First, an E.ON employee controls the customer's credit information and makes a quality check of the facility. It is preferable to cancel the deal as early as possible if there is any reason the installation cannot be done (step 2). When the order has been confirmed, the date for the installation is planned (step 3). This is done considering the capacity available at E.ON and the installers, also taking into account the customer's wishes. The installation companies working for E.ON report their weekly capacity in advance. Aspects like bad weather, delays and absent employees cause uncertainty and risks of interference in the process, making the planning rough. Therefore, E.ON only schedules installations for a specific week at this stage. The planning horizon is the installation should be completed within 8 weeks. Choosing a suitable installer is based primarily on the geographic location and available capacity.

E.ON assigns the project to an installer who takes over the contact with the customer. They schedule and make a site visit (step 4). This should be executed and reported back to E.ON within 14 days from the acceptance of a project. The reason for the site visit is to inspect all conditions for the installation. The activities conducted during the site visit are described further in the next section.

Following the site visit, when everything is controlled and all information is confirmed (step 5), supply planners at E.ON make an order for the material to Solar Supply. They notify the installers and the material is, in most cases, delivered directly to the site a few days before the installation. Then, it is time for the installers to execute the installation (step 6) which consists of two parts: the installation of the panels on the roof and the installation of electricity and the solar inverter, which must be done by a certified electrician. The installation process is described more in detail in the next section.

After the installation is complete, the installer reports back to E.ON and the process is considered finished on their part (step 7). The final report that the installers send to E.ON includes work environment plans, self-made inspections, and pictures of the installation. However, one step remains from the customer's point of view: the electricity network company needs to change the net meter at the customer's residence and complete the connection to the electricity network before the facility can be used (step 8). The meter change is necessary since the meter needs to be able to handle both incoming and outgoing electricity. This process is out of E.ON's and the installers' control but affects the customer satisfaction of the process as a whole. After this, the facility is ready to start up (step 9).

4.2.3 EMG's installation process

EMG's work process starts when they get order data from E.ON. This data includes satellite pictures of the customer's roof and a designed solution with a certain number of panels that the customer has agreed on. The second step is the site visit, conducted by an electrician. EMG books the date and time for this together with the customer. The purpose of conducting a site visit before a solar panel installation is to be able to collect sufficient information for the planning of the installation work and to be able to offer the customer a final proposition. The site visit is therefore important to check the initial order data, complete it, and ultimately give a recommendation on whether the installation should be performed or not. Some of the complementary information needed for the order data include the type of roof, surroundings to build up scaffolding, where to place the inverter, which equipment will be needed, potential obstacles, cable length, etc.

The installers should also make a pre-registration to the electricity network owner, to prepare for a connection process to the electricity network when the installation is made. The electrician also informs the customer that the solar inverter requires an internet connection, preferably with a cable but if this is not possible the Wi-Fi signal should be checked to make sure it is strong enough. At the site visit, the customer can also ask all the questions they might have. After the site visit the order data together with a lot of pictures of the site is sent to E.ON. Having to make changes to these plans drawn up at the site visit is time-consuming, because it involves discussing new agreements with the customer.

After the site visit the installation is scheduled in EMG's work order by the administrative staff. For this, they use a system called Mowin. All the roof panel installers and the electricians have access to this system in their cellphones, where they can see their schedule for the coming weeks. Capacity planning is quite complex since there are a lot of factors that can disrupt the planned schedule. This includes customers changing their minds, weather issues like heavy wind or snow, or previous projects being delayed.

Therefore, EMG makes sure to contact the customer the day before the installation starts to confirm it. Also, when changes must be made EMG contacts the customer, so they always know the status of the installation.

The driving time for the installers from their starting points to the sites is rarely more than an hour. When the roof panel installers arrive at the site the first activity, they perform is briefing the customer about the project as well as answer potential questions. This initial customer contact is perceived as important to ensure high customer satisfaction. Before the construction phase starts, a safety and health plan is prepared, including a risk analysis. After this, the scaffolding is built. To be able to transport the scaffolding a special driver's license for heavy vehicles is needed (BE-license). Most of the roof panel installers at EMG do not have this license. Then the scaffolding must be delivered and picked up by an external transport provider. The management team at EMG has encouraged the installers to get BE licenses and offered to pay for them, but with poor results. After the scaffolding is built, it is controlled using a checklist via Mowin. This is done to ensure a safe working environment for the installers.

The next step is to install the solar panels on the roof. The work process for the installation differs slightly between different types of roofs. For example, a tin roof allows for a faster installation than a concrete or tile roof, since it is easier to mount the panels. When finished with mounting the panels, the roof panel installers take down the scaffolding and clean up at the installation site. When the roof panel installation is on its last day, the electrician should arrive at the site to finish the electricity on the installation. After finishing their parts, both the installers and the electricians conduct a control to ensure everything looks according to the construction plan and works well. The electrician also explains how the solar panel facility works and helps the customer create an account to be able to monitor and control the solar panels electronically. A summary of the installation process can be seen in figure 4.6 below.

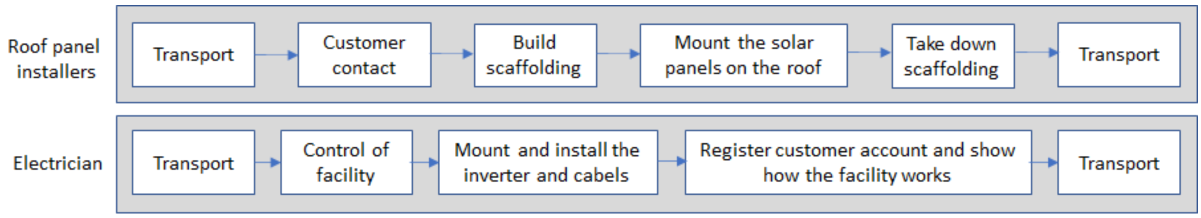


Figure 4.6: Summary of the installation process at EMG.

4.3 Performance measurements

4.3.1 Performance measurement at EMG

As mentioned earlier, EMG uses the system Mowin, including a cellphone application, to document all steps of the installation. This does not include any performance measurement routines per se, but it becomes visible in the documentation which teams are lagging and if any team outperforms others. EMG does not report how many hours are spent on individual installations, but they have benchmarking measures for installation speed. One installer should be able to assemble 5 panels/day, which has been calculated based on the average price list for installations provided by E.ON. A two-person team should be able to complete around 2,5 installations/week, which is a goal provided by E.ON stakeholders. EMG addresses performance and feedback on monthly follow-up meetings.

In the monthly meetings with all EMG employees, they discuss installation projects which were unusually well performed or if any were below normal standards. It is discussed why and if any improvements can be made. If any team has been outperforming the other, it usually means they are faster than other teams. Then, the manager investigates whether they found a more efficient way to work, in that case, this is brought up for the other teams to learn from. However, it could also be they are being careless with safety measures or not managing customer service properly. At times, the manager visits the installers on site to control their work.

4.3.2 Performance measurement at E.ON

Today, E.ON measures the performance of all its installers in the same way. EMG has the same contract as the external installers, and they are compared on the same metrics. E.ON uses monthly follow-up meetings with the installers as a platform to discuss their performance. In these meetings, E.ON follows up on customer satisfaction, the number of completed installations made on time and if not on time: how many weeks from the target installation week it differs. They also follow up on the number of reported site visits and how many weeks from the planned installation date the site visits are made. These measures are benchmarked among all the installers. Table 4.1 is an example of how this can look. It is a direct replica of the table used by E.ON. The numbers have been fabricated but they are representative numbers for a specific month. The reason the left column only contains zeroes are because this specific month no installer has deliver any installation two or more weeks earlier than what was planned. Another month this column could possibly contain installations. Since E.ON only knows the planned installation week, if an installation is planned for a specific week E.ON expects to receive reporting that it is fully completed the week after. An installation is considered overdue if it is reported to E.ON more than a week after the planned installation week.

Table 4.1: Benchmark display among installers of completed installations made on time.

	Completed Install (weeks from Planned Install)*						
Installer	<=2	>=-1 <=1	>=2 <=3	>=4	No Date Entered	Total	Total %
Installer 1	0	4	3	1	0	8	9%
Installer 2	0	0	2	0	0	2	2%
Installer 3	0	0	0	0	0	0	0%
EMG	0	10	5	3	0	18	21%
Installer 4	0	12	5	2	0	19	22%
Installer 5	0	6	1	3	0	10	11%
Installer 6	0	0	0	0	0	0	0%
Installer 7	0	9	4	3	0	16	18%
Installer 8	0	0	0	0	0	0	0%
Installer 9	0	0	0	0	0	0	0%
Installer 10	0	0	0	0	0	0	0%
Installer 11	0	0	0	0	0	0	0%
Installer 12	0	0	3	0	0	3	3%
Installer 13	0	8	2	1	0	11	13%
Installer 14	0	0	0	0	0	0	0%
Installer 15	0	0	0	0	0	0	0%
Installer 16	0	0	0	0	0	0	0%
Total YTD	0	49	25	13	0	87	100%
Total YTD %	0%	56%	29%	15%	0%	100%	
EMG	0%	56%	28%	17%	0%	100%	

**The intervals span from more than two weeks before planned installation to more than four weeks after planned installation.*

The goal for installation lead times is to complete the installations within 1-2 days. Today, E.ON does not measure the lead time for an installation, much because currently they do not have any system able to follow it up. The lead time for an installation refers to the lead time for the installers to complete the installation (steps 6 to 7 in figure 4.5). E.ON’s perception from conversations with their installation partners is that the average lead time for an installation spans between 1-3 days. Another goal is that the installation should be a coherent process. By coherent, it is meant the roof panel installers and the electrician should be on-site together or without any interruptions. However, this is also not followed up systematically.

Also, E.ON has a big focus on safety and has the goal of having zero workplace accidents and this is communicated to all their partners in the contracts. Therefore, measuring and keeping track of safety is extremely important for E.ON. A safe workplace environment protects the employees from injuries, which is the most important reason for any company to ensure safety as much as possible. However, several of the E.ON interviewees state a safe workplace environment is also good for business as it can lower injury costs, reduce absenteeism and employee turnover, increase quality and productivity, and raise employee morale. It is important the employees feel they are taken care of by their employer, especially in a competitive market as the solar panel installation market.

It is difficult to monitor how well the safety regulations are followed by the installers on the installation site. One way to do it is to measure how many safety observations the installers report to E.ON. A safety observation is when the installer observes and reports risks and deficiencies discovered on the installation site. The rationale behind measuring safety observations is to increase safety awareness and therefore prevent accidents.

Customer satisfaction is measured using a Net Promoter Score (NPS) which is derived from a survey that is sent out to the customer from E.ON after each installation. Statistics from 2020 show a 60 % customer response rate. The survey in full can be seen in appendix 3. The grading from 0-10 on the first question *if the customer would recommend E.ON based on their experience of the installation*, is the basis in calculating the NPS. According to NPS standards, having a score of 0-6 is considered as a "detractor", 7-8 is considered "passive" and 9-10 a "promoter". The NPS is calculated by taking the proportion of promoter answers (9 or 10) minus the proportion of detractor answers (0-6), giving a score ranging between -100 and +100. The NPS helps to compare specific installers, looking at what performance stands out, if they need to work with something specific, and what challenges they face. On the monthly meetings, E.ON displays the installer's score as a 3-months rolling average. An accepted performance according to E.ON has previously been a score of at least 30, which has been increased to 40 this year.

The survey also includes a free-writing section where the customer can add comments on why they were satisfied or dissatisfied with the installation service. As many customers do not add any written comments, it remains difficult to give specific feedback to the installers. In general, the handover and information have been given lower scores by the customer. Complaints often concern too little information, problems connecting the inverter to the internet, or delays in the net meter exchange. It is often difficult to connect these comments to the specific installer. Much because the customers might not take notice of who is responsible for what in the process. From their perspective, it is an all-inclusive deal with E.ON.

Nevertheless, the installers cannot always affect the service quality because there are steps in the installation process they do not control. Notably, it is unfair to the installers when they are given a bad score because of actions they cannot control, for example, if the electricity network owners have not done the meter exchange in time. The customer survey does not consider this, and it might affect the installer's score.

This spring (2021) E.ON has started following up on two additional KPIs: customer errands and safety risk observations. Customer errands are complaints received by E.ON from customers. They can be connected to the installation process and need to be handled afterwards when the installation was supposed to be finished. Customer errands were not followed up and connected to specific installers in the same way before. Safety risk observations were followed up before, but this was done separately by a person working with health and safety issues. Now it is included in the monthly follow-up meeting.

In conclusion, the important installation related KPIs measured by EMG and E.ON are summarized in table 4.2 below. In appendix 4 a monthly KPI follow-up among all installers (EMG included) of the

KPIs *complete installations on time*, *site visits reported on time*, and *NPS* can be seen. Since the KPIs *number of customer errands (%)* and *number of safety observations* have not been followed up before, there is no similar historical data available for these KPIs.

Table 4.2: KPIs followed up in the contract by E.ON and at EMG internally.

KPIs measured	Measured by	Explanation
Panels/person/day	EMG	Target 5 per day
Installations/week	EMG	Target 2,5 per week and team
Complete installations on time	E.ON	Measured in the number of weeks from planned installation week. Installations should be planned and completed within 8 weeks from customer order
Site visits reported on time	E.ON	In time = within 14 days of being assigned.
Net Promoter Score (NPS)	E.ON	Performance goal set to ≥ 40
Number of customer errands (%)	E.ON	Complaints are received from customers that need to be handled after the delivery. Added in the new contract as a part of the incentive model.
Number of safety observations	E.ON	The share of installations becoming customer errands that need to be handled after the delivery. Added in the new contract as a part of the incentive model.

4.3.3 Installation service success factors

After conducting all interviews (see table 3.4) some performance measures stood out as the most important ones for an installation to be considered successful. Some are measured today, and some are not. In table 4.3 below, the most important factors that the interviewees highlighted are summarized.

Table 4.3: Summary of success factors for an installation.

Criteria	Explanation
Efficiency	The installation lead times should be as short as possible. Depending on the size and other specifics of the installation, it should generally take between 1-2 days in total.
On-time in full (OTIF)	The site visit and the installation as well as the reporting from them should be executed and sent to E.ON in time. The site visit and the installation should be done at the date and time that has been agreed upon with the customer. Also, the deliveries should be complete or in full, meaning the installers should not have to go back to the site to fix any last details.
Coherent installation	The roof installers and the electrician are on-site together or without interruptions. The installation site is never at a standstill after it has been initiated.
Quality	High quality of an installation means there are no customer errands afterward and that the facility is running without any errors. Also, the facility should comply with all quality regulations stated in the contract.
Safety	The installers should follow all safety specifications stated in the contract during the installation and report risk observations.
Customer satisfaction	The customer service should be high during the installation. This is measured by a survey (NPS) sent to the customer after the installation is done. The NPS score should be above 40.

4.4 Incentive models in contracts

The first contract between E.ON and the installation partners have been used from 2019 until April 2021. As of the first of April 2021, a new contract was adopted. Designing this contract has been followed by collecting tenders from installers, evaluating tenders, and negotiating with installers, and during the first quarter of 2021, the contract was finalized. There has been much work done to reform the old contract with the ambitions to improve the pricing model as well as KPIs and adding incentives.

In the old contract, the payment model was a fixed price per installation which was decided based on three levels of complexity for installations. The complexity was dependent on the factors:

1. Roof height
2. Type of roof
3. Tilt of roof
4. Distance to the electric box
5. Number of roof surfaces to install panels on

From this, a fixed price for the installation was paid to the installers. Apart from this, the installers would also get paid in case of change orders or unplanned extra work. The contract also included specifications about safety, both general regulations as well as E.ON standards. No incentive model was in place in this contract.

The new contract includes a more detailed process description, an updated pricing model as well as the introduction of an incentive model. All steps in the installation process are explained with associated input, output, and KPIs for each step. The installer undertakes to execute installations for compensation that is regulated through a price list that covers installations up to 100 panels. The prices include all contract work and necessary installation material as defined in the appendix of the contract describing the installation process. The pricing model determines the payment to the installer based on the number of panels from the fixed price for an installation up to 100 panels. This is based on cost-driving factors like time required, hourly rates for electrician, installer, and administrator, material cost, and driving compensation.

The compensation to the installer is regulated by a hybrid incentive model. This model is illustrated in table 4.4. The compensation is recalculated in three levels with the price in the price list as a basis. There is one level below the list price (penalty), one in line with the list price, and one above the list price (bonus). The installer's performance is assessed based on the following five areas where each installation is assigned 1, 2, or 3 points for each area depending on the result achieved for each installation. The points are then added up as an average during the last three months. The final compensation level is applied to the previous month's installations and adjusted the following month.

The KPIs represented in the incentive model are:

- **NPS** - Measures customer satisfaction according to E.ON standard and is sent to all end customers after completed installation. Awards a score between -100 to 100 is assigned.
- **Observations** - Number of safety risk observations on average per installation reported to E.ON. Safety risk observations include situations perceived as a health and safety risk on site.

- **Site visits report completed in time** (%) **-** The share of site visits reported in time and complete, meaning all parameters E.ON asks for must be filled in correctly and no additions to the documentation are needed after the site visit.
- **Delivery of installation within 7 days from planned** (%) **-** The share of installations completed and reported within 7 days from the planned installation date.
- **The proportion of customer errands on completed installations** (%) **-** The share of installations becoming customer errands that need to be handled after the delivery.

Table 4.4: Incentive model in the new contract.

Compensation

Compensation levels	95%	100%	105%
Points	0-7	8-12	13-15

Goal completion

Goals	**Points**		
	1	2	3
NPS	< 20	20 - 50	> 50
Observations	< 2	2-4	> 5
Site visit (%)	< 80 %	80 - 90 %	> 90 %
Delivery within 7 days (%)	< 80 %	80 - 90 %	> 90 %
Customer errands (%)	>20 %	10 - 20 %	< 10 %

5. Case study findings

In this chapter, the data collected from the multiple case study is presented. In total three case studies have been conducted. Each case study was elaborated on individually within the areas case description, service characteristics, performance measurement, and incentives in contracts.

5.1 Case 1 - E.ON (Essent) the Netherlands[2]

Essent N.V. is a Dutch energy company based in 's-Hertogenbosch in the Netherlands. It is a fully owned subsidiary to E.ON and has been part of E.ON Group since June 2020 (Essent, 2021a). Essent is the largest energy company in the Netherlands and Belgium is their second home market. Essent provides customers with gas, electricity, heat, and energy services. One of Essent's business areas is providing solar panels to private customers. Essent offers a complete deal including the solar panels, the construction materials, the inverter, and a professional installation by one of their service partners. (Essent, 2021b)

Their service partners are located all over the Netherlands to always be close to the customer. Today, Essent is the full owner of several of their service partners in the solar business, including the companies Energiewacht, Energiewacht Groep, Geas Energiewacht, Volta Limburg, Volta Solar, Energiewacht Solar, EnergieWonen and ZON7. (Essent, 2021c) One of the reasons for Essent to invest in their service partners has been to ensure capacity. This has been important since the Dutch B2C solar market has been characterized by higher demand for installation of solar panels than there have been available service providers. The growth of the Dutch solar market can be seen in figure 5.1. The Essent owned service partners are accountable regarding their revenues and have to explain profit and losses to Essent.

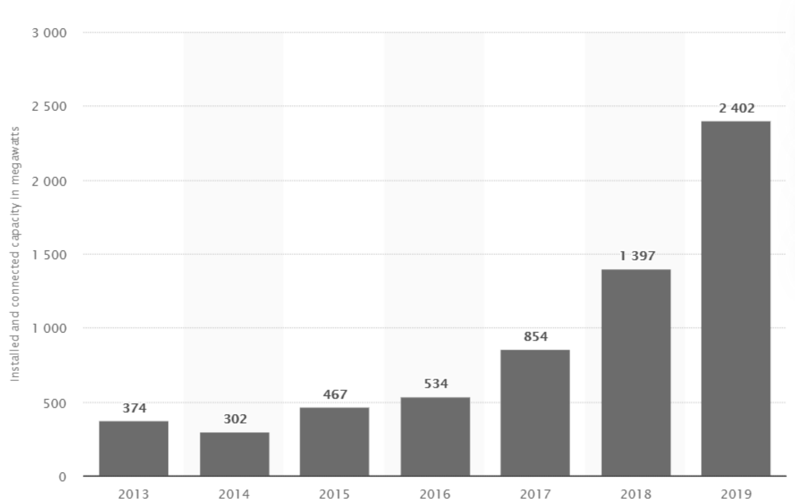


Figure 5.1: Installed net capacity of solar generated electricity in the Netherlands. (Statista, 2021)

5.1.1 Service characteristics

In general, the projects in the Netherlands are relatively small and have short lead times. The average installation size in the B2C market in the Netherlands is 12 solar panel modules per project. Since the

[2] *In section 6.1 all information is obtained from the interview with the International Category Leader - Installation Services at E.ON and the Category Manager Procurement at Essent Nederland B.V if nothing else is stated.*

Netherlands is quite a small country, the driving to site is maximum one hour, and usually they drive less than that. The smaller projects in combination with less time spent on driving enable Essent's service providers to finish the installations in the same day. Sometimes they can even finish two different installations in one day.

The B2C installation service consists of two parts, the roof work and installing the inverter. Installing the solar panels on the roof is carried out by the roofers and an electrician will lay the cabling and connect the solar panels to the inverter and then to the meter cupboard. For the installation, Essent's service providers work both with their own permanently employed installation teams and external subcontractors when it is necessary.

As mentioned before, the key issue for the solar panel business in the Netherlands is installation capacity. This means, they often do not have the possibility to choose which installer to work with on each installation. It is more about who is available and who is most suitable geographically (closest to the installation site). Normally, Essent uses a fixed price model of what they are willing to pay the installers, and if they agree, they take the deal. The general pricing model used is based on the number of panels in the installation, where the price per panel is decreasing as the number of panels is increasing.

5.1.2 Performance measurement

As the solar power business is immature, it was not that long ago Essent did not work with formal contracts with their partners and they had no specific KPI follow-up. Lately, they have started to measure lead time for installations, where the general benchmark is doing one installation per day or sometimes even two in one day. Also, the installers are responsible for checking that all material/the right material is available on site. Regarding safety, there are general national regulations for solar panel businesses to follow. These factors are considered a check-off meaning either they are fulfilled or not. Customer satisfaction is only measured on a company level and not on specific installations. The internal and external companies are treated equally and benchmarking between installers and against market standards is used to evaluate their adequacy. As mentioned before, the internal companies are responsible for profit/loss explanation towards Essent.

5.1.3 Incentive models in contracts

Since Essent has not worked with structured contracts for very long, they have not formulated any extensive incentive models at this time. However, they have considered one incentive that would be connected to the KPI installation lead time, where installers would get a penalty if they are not finished on time (i.e. generally in one day). It is believed to be a risk using penalties since it can harm the relationship and, therefore, they have been cautious to implement this. It is also possible to argue there is a natural business incentive for the service partners to stay efficient and fit in as many projects as possible in a certain period to increase the revenue for the company. Another natural incentive mentioned is that if the installation partners do not deliver satisfactory performance over time, the partnership can be terminated. An incentive model for the installers may be considered in the future, but it is not prioritized at this time.

5.1.4 Summary

In table 5.1 below a summary of the service characteristics, the KPIs measured and the incentives in contracts at Essent can be seen.

Table 5.1: Summary of service characteristics, KPIs, and incentives in the Essent case.

Focus area	**Essent**
Service characteristics	• The average number of modules/installation: 12 • Average driving to site: < 1 h • Average installation lead time: 1 day • Pricing model: Price list. Price is decreasing with an increasing number of modules
KPIs measured	• Installation lead time: 1 day • Material check: OK/not OK • Safety regulations: OK/not OK
Incentives	• *Not implemented, but considered: Penalty: lead time > 1 day* • Risk of termination of partnership

5.2 Case 2 - E.ON Germany (E.ON Energie)[3]

E.ON Energie Deutschland GmbH (E.ON Energie) is a German energy company based in Munich in Germany. It is a fully owned subsidiary of E.ON. It is one of the four largest electricity supply companies in Germany. E.ON Energie provides customers with gas, electricity, heat, and energy services. One of E.ON Energie's business areas is providing solar panels to private customers. E.ON Energie offers a complete deal including the solar panels, the construction material, the inverter, and the professional installation by one of their installation partners. (E.ON, 2021c)

E.ON Energie works with roughly 40-45 regional installation partners on the B2C side. They have acquired three installation companies during the last two years that are 100% owned by E.ON. Currently, their overall strategy is to increase the number of partners as well as to realize more mergers and acquisitions (M&As), since this has been proven successful. The reason for this strategy has been to secure capacity. In Germany, this has been deemed necessary as the demand exceeds supply in the installation market. The trend in Germany is a steadily increasing use of solar panels, see figure 5.2.

[3] *In section 6.2 all information is obtained from the interview with and the documents received from the Head of Operations Solar bei E.ON Energie Deutschland GmbH if nothing else is stated.*

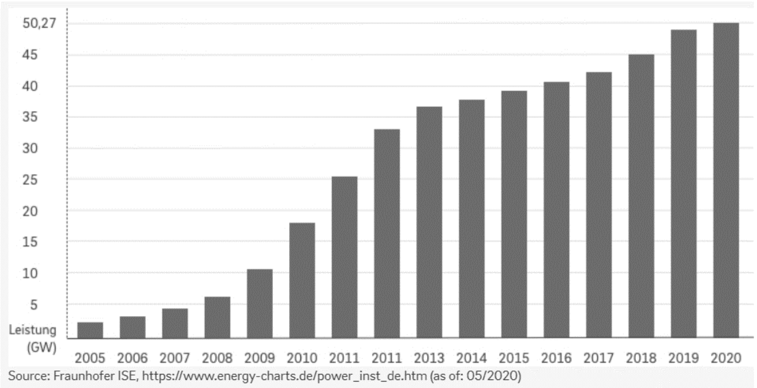


Figure 5.2: Installed net capacity of solar generated electricity in Germany. (E.ONc, 2019)

The three recently acquired installation companies are functioning independently and use their own brand name. A certain share of their capacity is agreed to go to E.ON projects, how much depends, but it is estimated to be at least 50%. To decide this, E.ON has a yearly meeting with them to decide how much capacity they will get from them during the coming year. The E.ON-owned installation partners are accountable regarding their revenues and have to explain profit and losses to E.ON. At the same time, if it does not make sense financially or otherwise for the E.ON-owned installation companies to work with E.ON projects, they will not prioritize them. But the goal is to find a mutual win-win agreement between E.ON and their own installation companies. For example, the E.ON-owned installation companies are allowed to use E.ON panels for their projects which are higher quality and cheaper than other options.

From E.ON’s perspective, they are not treated much differently than the external partners. However, one difference is that E.ON can have more influence as well as better and more extensive communication with their own installation companies. For example, the Head of Solar at E.ON Energie sits on the boards of these three companies. Also, one of E.ON’s two back-office teams shares their office with one of the administrative teams at one of the internal installation partners. This makes the communication more efficient and direct between them. These things improve the quality of the installations performed by E.ON’s own installation companies. In terms of quality, they are all three on the top ten list of all installation partners.

5.2.1 Service characteristics

E.ON Energie offers the customer a solar panel system, meaning a package deal including the creation of an individual offer, an on-site appointment with a local E.ON solar expert, and the installation and commissioning of the system. E.ON outsources the roof assembly of the E.ON photovoltaic system to their local partners who install the complete E.ON solution and explain the operation of the PV system to the customer. They only work with certified specialist installation companies. The average number of panels per installation is around 20-28 and an average installation takes two days to complete. 70% of the B2C installations also include a storage unit (a battery). The traveling time for the installers varies, but it is normally less than one hour one way. E.ON pays the installers according to a predetermined price list, depending on many factors connected to installation complexity and features. Examples of factors increasing the prices are the number of modules, the required cable length, and if a battery is included. The price list is the same for both internal and external partners.

5.2.2 Performance measurement

In contracts with installers, a service level agreement is used to define performance and the output E.ON desires. In the SLA, KPIs are used to address what performance E.ON values and measures. First and foremost, health and safety standards, as well as technical installation specifics, should always be in place according to the legislation in Germany. For this, E.ON has a quality book for the installation with detailed descriptions of these areas. The quality book is accepted by all partners.

Apart from this, E.ON Energie follows up on several time-related aspects. Some examples include lead time for the installer to accept the project, lead time until they contact the customer, and lead time until they report data from the on-site visit. After the on-site visit, they have two weeks until they should have finished the installation. The installation process is divided into 13 steps where each step is well visualized in the CRM system. For all these steps, E.ON has a target lead time. If a partner does not reach these targets, they get contacted by E.ON. Follow-up on performance is coordinated through the back-office team and there is constant communication between them and the installation partners.

Another important aspect E.ON Energie measures is customer satisfaction. After each installation E.ON sends out an NPS questionnaire to the customer. The NPS questionnaire contains questions about the two parts sales and installation as well as a summary for the whole project again. In the installation part, specific questions about the installation are asked and the customers answer with a score. Examples of topics for the questions are quality, on-time delivery, and communication. The final question is if the customer would recommend E.ON to others or if he/she would choose E.ON for a project. The final scores are communicated to the service partners and especially followed up if anything stands out.

5.2.3 Incentive models in contract

At E.ON Energie they have identified one of the biggest challenges within five years in the solar industry is to ensure enough capacity of high quality and good price installations. Currently, they are focusing on optimizing their operations and realizing their business strategy of securing capacity. Therefore, as of now, a punishment/reward system (especially punishments), is not an approach they would use. Instead, they focus on good relationships with the partners since securing capacity is important and for the installers to want to work with E.ON to begin with, is crucial. However, if a partner is not performing well, E.ON will arrange 1-2 meetings with the CEO of the company where the situation is discussed. If this does not help, the partner will not get assigned any new projects. Being considered for projects is considered a main, natural incentive for the installation partners.

However, they have tried to implement a type of bonus/malus model in the past. The incentive model they tried to implement was based on if the service partner delivered below the set targets regarding the lead time on a project. If they were late on any step of the installation process, they would get a penalty fee. If they delivered above the required target, they would get a bonus. The model in full can be seen in table 5.2.

Table 5.2: The incentive model previously used at E.ON Energie.

Key performance indicators (KPI)	Result	Bonus/malus
The project must be confirmed or rejected within two working days	< 1 working day	X € per project
	> 2 working days	-2.5X € per project
Appointments for on-site visit/contact with the customer within 2 working days	< 1 working day	X € per appointment
	> 2 working days	-2.5X € per appointment
Execution of the on-site visit within 10 working days of commissioning	< 5 working days	X € per on-site visit
	> 10 working days	-2.5X € per on-site visit
Feedback to E.ON after on-site visit within 2 working days	< 1 working day	X € per on-site visit
	> 2 working days	-2.5X € per on-site visit
Realization of the installation within 10 working days after the on-site visit	< 5 working days	X € per installation
	> 10 working days	-2.5X € per installation
The final acceptance report sent within 10 working days after the installation	< 5 working days	X € per case
	> 10 working days	-2.5X € per case
Maintenance of the CRM system according to the above step within 2 working days	< 5 working days	X € per case
	> 10 working days	-2.5X € per case

This incentive model was tried together with one of the service partners but was shortly abandoned due to an unreasonable amount of administration connected to it as well as the general resistance to using punishment as motivation. It was also difficult to motivate a punishment scheme towards partners when E.ON themselves sometimes was lacking in their performance, regarding for example paying the installers in time. Therefore, it was predicted to be difficult to maintain a fair and good relationship with the partners if this model was going to be used with all partners. Lastly, coordinating an incentive system with the installation partners was tough since their administrative routines was not as advanced as E.ON needed it to be.

A general issue E.ON Energie has experienced with incentive models and performance measures is that there are always two sides in a contract or business relationship. To provide fair rewards/punishments both sides need to be understood and evaluated. Today, E.ON's current CRM system is not suitable for this approach. E.ON has experienced arguments and discussions with the installers concerning if the assessment is fair or not is time-consuming and the costs associated with this is not worth the effort.

5.2.4 Summary

In table 5.3 below a summary of the service characteristics, the KPIs measured, and the incentives in contracts at E.ON Energie can be seen.

Table 5.3: Summary of service characteristics, KPIs, and incentives in the E.ON Energie case.

Focus area	**E.ON Energie**
Service characteristics	• The average number of modules/installation: 20-28 • Average driving to site: < 1 h • Average installation lead time: 2 days • Pricing model: according to a price list

KPIs measured	• Health, safety, and technical regulations: quality book
	• KPIs regarding lead times:
	• Accepting the project
	  ○ First contact with the customer
	  ○ First visit to the site and sending in the data
	  ○ After the site visit they have 2 weeks to finalize the installation
	  ○ Data sent to E.ON’s front office
	• Customer satisfaction: NPS

Incentives	• Tried but abandoned: bonus/malus system based on KPIs connected to on-time delivery • Risk of termination of partnership

5.3 Case 3 - E.ON New Solutions B2C Sales Unit[4]

The sales organization at E.ON New Solutions B2C is almost entirely outsourced to two external telemarketing partners. To ensure a close cooperation between E.ON and their partners, the Head of Sales at E.ON New Solutions B2C works closely with the partners. He has continuous meetings with them to coach, listen, and help to improve their work processes. This ensures a thorough understanding of their processes. The sales process of the solar panels accounts for around 10% of the total costs that E.ON has for their solar panel business, meaning it has a rather large financial impact.

5.3.1 Service characteristics

The sales partners’ main task is working with leads and converting them into sales orders. There are two different types of leads: internal or external. The internal leads come from E.ON’s own platforms, like their website or social media accounts, and are generated when potential customers ask to be contacted regarding solar panels. The external leads consist of all leads that are generated from platforms that are not connected directly to E.ON. These are bought by E.ON from external companies. All leads go through E.ON’s CRM system before they are received by the telemarketing partners, which means E.ON regulates how many leads they receive.

When leads are registered at the telemarketing partners they are contacted shortly. In this stage, the leads can be disqualified in two ways: either if they are not interested or if they are not suitable candidates for solar panels from E.ON. The reason for this can be because they live in the north of Sweden where E.ON does not operate or they have the wrong kind of roof. If a lead is interested and meets the requirements E.ON has, he/she is considered an opportunity and an offer is drawn up and sent.

[4] *In section 6.3 all information is obtained from the interview with and the documents received from the Head of Sales E.ON New Solutions B2C if nothing else is stated.*

If the offer is signed the sales organization passes the order on to E.ON. This marks the end of the sales organization's responsibility in the process. However, it happens that the clients change their minds even at this stage, and do not want to go through with the order. Then, it is passed back to sales and they resume contact with the client, identifying his/her reason for regretting the original decision and investigating if they can change the potential customer's mind. At the end of each month, the telemarketing partners send an invoice based on the number of sales they have registered. E.ON checks this number and if they had any orders from last month that, for any reason, did not go through, the cost for them is subtracted from the invoice.

5.3.2 Performance measurement

A couple of years ago the most important KPI measured was the number of completed sales. Today, this is still an important KPI, but other measurements have been implemented as well. One of them is the conversion rate for leads, meaning how many of the leads received by the telemarketing partners are converted into completed sales. The reason for this KPI is that leads are expensive for E.ON to obtain, which is why they must be treated with care to get the most out of them.

Another KPI that is followed up is the discount provided. The telemarketing partners are allowed to provide up to X% discount in total. Also, the lead time between the receipt of a lead until the lead is contacted is measured (called speed to lead). This is important since it affects the conversion rate negatively if a lead is not contacted within two days. Overall, for a KPI to work well in the sales organization, it needs to be clear, measurable, easy to communicate and to understand, have support in the CRM system and be possible to work with administratively.

5.3.3 Incentive models in contract

The sales unit at E.ON has been working with incentive models for several years. A couple of years ago the incentive model was only based on the number of sales. The telemarketing partners then received a fixed bonus for every sale, as a commission added to the fixed payment. The current incentive model is primarily based on the conversion rate. Depending on the conversion rate, the sales partners get a certain bonus for each sale. The conversion rate required for a certain level of bonus is higher for the internal leads since they have proven to be easier to convert into orders than external leads. The possible bonus is calculated based on a target cost for each sale and considering the fixed costs and the cost per lead. The incentive model for the external leads can be seen in table 5.4. The one for the internal leads looks similar but with a higher conversion rate to reach the same level of bonus.

Table 5.4: Commission model for telemarketing partners.

		Average External leads delivered per week in the assessment period				
		< V leads	**V - W leads**	**W+1 - Y leads**	**Y+1 - Z leads**	**> Z leads**
Lead-to-sale conversion in assessment period	**< A%**	SEK X	SEK 1.45X	SEK 0.7X	SEK 1.5X	SEK 1.45X
	0,01+A% - B%	SEK 2.8X	SEK 3.65X	SEK 3.5X	SEK 3.9X	SEK 4X
	0,01+B% - C%	SEK 5.7X	SEK 6.3X	SEK 5.55X	SEK 5.9X	SEK 6X
	0,01+C% - D%	SEK 7.2X	SEK 7.5X	SEK 8.65X	SEK 8.85X	SEK 8.8X
	0,01+D% -E%	SEK 7.6X	SEK 7.75X	SEK 9X	SEK 9.15X	SEK 9.2X
	> 0,01+E%	SEK 7.95X	SEK 8.2X	SEK 9.35X	SEK 9.5X	SEK 9.5X

This incentive model ensures each salesperson pays a lot of attention to each lead, doing their best to convert them into sales. The conversion rates are calculated as an average during the last three months. This ensures one specific event will not affect the results as much. When first developing and implementing this model it was a complex task to translate the ideas into legal text in the contract. But overall, this incentive model has worked well for E.ON, enabling them to keep much better control of the cost of the sales organization but still delivering good results. Also, this model makes sure some of the risk is transferred from E.ON to the partners. Regarding payment, E.ON pays relatively little in fixed cost to the telemarketing partners and the salespersons rely on the bonuses from the conversion to get a satisfying compensation. This structure ensures the partners profit from good performance.

There is also an incentive in place regarding discounts. The telemarketing partners are allowed to provide up to a certain percentage discount. However, if they provide less, they get to keep some of the percentages they did not give out. For example, if they are allowed to give X% discount but only give out (X-Y)% in a certain month they get to keep a percentage (Z%) of the discount they did not give out, which amounts to (total sales)*Y%*Z%. This gives them incentives to give out as little discount as possible while still having successful sales. Also, if the telemarketing partners give out too much discount, they will be required to pay E.ON back the exceeding sum.

As a possible development of this model, E.ON is currently investigating to also include the KPI speed to lead. As mentioned before, it has been proven advantageous to contact the lead as fast as possible. Therefore, there are thoughts on implementing an incentive connected to this KPI. A suggestion is the partner would get a penalty on the invoice for each lead that is not contacted within two days.

Overall, the sales unit at E.ON tries to keep their incentive models in the contract with their telemarketing partners simple. If the models are too complex, it will be hard for all involved parties to understand them. According to the Head of Sales at E.ON New Solutions B2C, it can be good to measure many different KPIs, but only around two or three of them should be connected to financial incentives. The KPIs connected to incentives should be the most important ones and the incentives need to drive the desired performance. Also, it has been important for the sales unit to make sure the model creates a win-win situation and that the partner feels they gain from being in a business relationship with E.ON.

5.3.4 Summary

In table 5.5 below a summary of the service characteristics, the KPIs measured, and the incentives in contracts at E.ON New Solutions B2C Sales Unit can be seen.

Table 5.5: Summary of service characteristics, KPIs, and incentives in the Sales Unit case.

Focus area	**E.ON New Solutions B2C Sales Unit**
Service characteristics	• Telemarketing partners converting internal and external leads into sales • Pricing: fixed fee + bonus based on conversion rate and discount provided
KPIs measured	• Number of leads • Number of sales • Conversion rate • Discount provided • Speed to lead
Incentives	• Bonus based on the conversion rate for internal and external leads • Bonus/malus based on the discount • *Not implemented yet, but considered: penalty if speed to lead > 2 days*

6. Cross-case analysis

In this chapter similarities and differences between the cases in the multiple case study and the service triad and contract setup at E.ON are highlighted. The cases are compared and analyzed based on pattern matching from the conceptual framework. Criteria for performance measurements and incentive models as well as risks connected to incentive models are developed.

6.1 Comparing service characteristics

The service characteristics at Essent, E.ON Energie, E.ON New Solutions B2C Sales Unit, and E.ON New Solutions B2C and EMG in Sweden are summarized in table 6.1 below.

Table 6.1: Cross-case comparison of service characteristics.

Focus area	**Essent**	**E.ON Energie**	**E.ON New Solutions B2C Sales Unit**	**E.ON New Solutions B2C and EMG**
Service characteristics	Average number of modules/installation: 12	Average number of modules/installation: 20-28	Telemarketing partners converting internal and external leads into sales	Average number of modules/installation: 25-30
	Average driving to site: < 1 h	Average driving to site: < 1 h		Average driving to site: < 1 h
	Average installation lead time: 1 day	Average installation lead time: 2 days		Average installation lead time: 2-3 days
	Pricing model: Price list. Price is decreasing with an increasing number of modules	Pricing model: According to their own price list	Pricing: Fixed fee + bonus based on conversion rate and discount provided	Pricing model: According to price lists provided by the suppliers

The four cases have several similarities. Firstly, they are all involved in the solar panel market and the product provided to the end customer is therefore similar. The four cases all work with service providers in some way. Both Essent, E.ON Energie, and E.ON New Solutions work with installation partners owned by E.ON as well as external partners. However, neither Essent nor E.ON Energie have experienced much difference in the relationship and the performance between the internally owned partners and the external partners. Some positive traits noted for the internal installation companies were more flexibility, higher quality, and better communication. At E.ON New Solutions they are experiencing closer cooperation with their own installation company, but, in contrast to the others, they are also experiencing that their internally owned installation company is performing poorly regarding efficiency in particular. Since E.ON New Solutions B2C's Sales Unit only works with an external partner this comparison is not applicable in this case.

In addition, there is clearly one large difference between the Essent, E.ON Energie, and E.ON New Solutions cases and the E.ON Sales Unit case. The first three cases are all providers of solar panels, offering their private customers the whole value chain from consultation to, material, installation, and after service. The last case is a sales organization in a solar panel company. Since the services "solar panel installation" and "telemarketing" are quite different it complicates the comparison. The contextual factors in the different markets are described further in the next section.

It is important to have in mind the different service characteristics from the cases when drawing cross-case conclusions. Comparing the service (solar panel installation) executed by the partners to Essent, E.ON Energie, and E.ON New Solutions there are some differences. Firstly, Essent's installations are generally smaller than the others' installations (12 vs. 24-30 panels), which decreases the average installation time. All three companies usually have less than an hour of driving time to the installation sites. However, since the Netherlands is smaller than Germany and Sweden, the driving time to the sites is generally slightly shorter than for the other case companies.

6.2 Contextual factors

The different cases operate in different contexts. It is important to understand the context of the different services since it can affect which contract is most suitable (Rapp & Thorstenson, 1994). In the conceptual framework (figure 2.11) several important insights regarding the context of the service triad and contract setup at E.ON are summarized. Table 6.2 below is an excerpt from the conceptual framework.

Table 6.2: Summary of important insights regarding contextual factors.

Contextual factors		
Principal-agent related	Risk sharing	Risk attitudes affect how much risk should be transferred to the agent
	Business risks	Technical, commercial, contract, and performance risk
	Adverse selection	Caused by hidden information
	Moral hazard	Caused by hidden actions
	→ Signaling	To avoid moral hazards and adverse selection. The cost of information sharing must be lower than the value gained
Service-related	Buyer-supplier-customer service triads (a more complex principal-agent setting)	1.Aligning the interests of the three stakeholders 2.Specifying performance when designing the contract 3.Monitoring performance when designing the contract
Market-related	Supply risk	Lack of manpower available in the solar panel installation industry
	Demand risk	Increasing interest in installing solar panels but uncertainty regarding subsidies
	Maturity	Immature market: Relatively new with rapid growth and change

Based on these takeaways, the most important contextual factors identified in the multiple case study as well as for the service triad and contract setup at E.ON New Solutions B2C are summarized in table 6.3.

Table 6.3 Cross-case comparison of contextual factors.

Contextual factors		**Essent**	**E.ON Energie**	**E.ON New Solutions B2C Sales Unit**	**E.ON New Solutions B2C**	
					Old contract	**New contract**
Principal-agent related	Hidden information/actions	High	High	Moderate	High	
	Risk-sharing (any risk transferred to the agent?)	No	No	Yes	No	Yes
	Signaling (complexity of information system)	Low	Moderate	High	Moderate	
Demand risk	Growth and uncertainty	Moderate	Moderate	Moderate*	Moderate	
Supply risk	Lack of capacity	High	High	Low	High	
Market-related	Need of responsiveness/growth vs. cost-efficiency	Need of responsiveness /growth	Need of responsiveness /growth	Need of cost-efficiency	Need of both	
Service-related	Aligning stakeholders: Internal or external service provider	Both	Both	External	Both	

**This refers to the telemarketing market focused on selling solar panels. The telemarketing market as a whole has not been the focus of investigation in this project.*

All cases work with their installation or telemarketing partners in a principal-agent setting. This creates the issues of hidden information and hidden action (Braun & Guston, 2003). To overcome this, signaling from the service partner to E.ON is necessary (Spence, 1973). However, it is important to remember signaling can be expensive and therefore it should only be used if the value derived from it is greater than the costs.

The solar panel market is characterized by fast growth, leading to capacity deficiency in areas like the installations. The growth of the market in different countries (Sweden, the Netherlands, and Germany) can be seen in figures 1.3, 5.1, and 5.2. In addition to this, there is a demand risk caused by the uncertainty in subsidies on the solar panel market. Governmental subsidies have been used to some extent in all countries, but as the condition changes, the demand is affected. For example, as mentioned in chapter 1.5.3, Sweden changed their subsidies recently, which E.ON New Solutions B2C noticed led to a decreased demand.

When there is a lack of possible partners able to execute the solar panel installations (supply risk), it becomes harder for the employer to push their service providers and make them compete on price (see Kraljic's matrix in figure 2.3). The service providers can decide to take their business elsewhere if they feel they are pushed too far. Instead, the buyer must ensure fair cooperation where all parties benefit from working together. This was highlighted in both the Essent and the E.ON Energie cases. The E.ON New Solutions B2C Sales Unit does not experience the same capacity issue in the telemarketing market.

However, since the salespersons require training before they can be productive, it was still noted as important to have good relationships with the partners, making the cooperation worthwhile for all parties.

Based on the contextual factors and the information obtained from the case studies, the authors have placed the case companies' purchasing situation in Kralijc's matrix (van Weele, 2014) (explained further in section 2.3), illustrated in figure 6.1 below. All services purchased by the case companies have a high impact on the financial results of their businesses. Both Essent and E.ON Energie expressed there are capacity constraints and thereby supply risk on the installation service market. This makes it natural to place their installation service in the strategic section. It has been clear from the case studies both Essent and E.ON Energie focus on strategic partnerships with their installation partners and focus on securing capacity, in line with what is recommended in Kraljic's matrix.

The contextual situation for E.ON New Solutions B2C in Sweden is similar to the other two solar installation companies and the installation service should be a strategic product. However, in practice, they have focused on leveraging their suppliers, which has been somewhat of a mismatch. Kraljic's purchasing portfolio matrix shows that the contract with the supplier when the supply risk and financial impact is high should be a performance-based partnership. Therefore, E.ON New Solutions B2C's new contract, including an incentive model, is a strategy better in line with their position in Kraljics' matrix since it puts more focus on performance and long-term partnership.

As for the E.ON Sales Unit, their service has a rather high financial impact but the supply risk in the telemarketing market is lower than for the solar panel installation market. Therefore, it is suitable for them to have the strategy to leverage products and work with competitive bidding, which they also do.

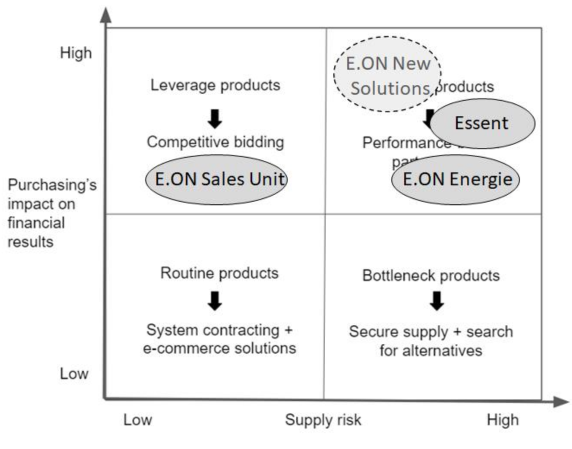


Figure 6.1: The case companies placed in Kraljic's matrix.

6.3 Performance measurement

In the conceptual framework, important insights regarding performance measurement were summarized. Table 6.4 is an excerpt from the conceptual framework and used in this section to analyze the performance measurement of the case companies.

Table 6.4: Summary of important insights regarding performance measurement.

Performance measurement		
Performance measurement design	BSC and the performance prism	Define what needs to be measured and stakeholder perspectives: customer, internal, learning & growth, and financial perspective
	SCOR and KPIs	The hierarchical approach links KPIs/attributes with operative metrics
	SMART	KPI specification criteria
	Benchmarking	Used to set goals and targets and to select and evaluate suppliers
	Risks	Excessive control can offend the agent's sense of autonomy
		Cost of monitoring

The different cases all measure and follow up on KPIs. However, they have chosen different ones that they believe are suitable for their business cases. The different KPIs measured in the different cases are summarized in table 6.5 below and they have been categorized in line with the SCOR performance attributes (APICS, 2017), as introduced in section 2.5.3.

Table 6.5: Cross-case comparison of KPIs measured.

Focus area	**SCOR performance attribute**	**Essent**	**E.ON Energie**	**E.ON New Solutions B2C Sales Unit**	**E.ON Sweden New Solutions B2C**
Lead times	Responsive-ness	Installation lead time: 1 day	Time to accept the project	Speed to lead	On-time site visit (within 2 weeks after initiated project)
			Time to first customer contact		On-time installation delivery (within 8 weeks after initiated project)
			Time to first site visit and data hand in		
			Finished installation 2 weeks after site visit		
			All data sent to E.ON.		
Quality	Reliability	Material check according to list: OK/not OK	Health, safety, and technical regulations: Quality book OK/not OK	Conversion rate	Number of customer errands
Safety	Reliability	Safety regulations: OK/not OK		*Not applicable*	Number of safety observations
Customer satisfaction	Reliability		NPS		NPS
Other				Number of leads	
				Number of sales	
				Discount provided	

The organizations behind the different cases are unevenly developed in their routines for performance measurement. Solar panel installations are still a immature market and therefore focus has been on structuring operations. This is highlighted in the Essent case as well as for E.ON Energie, even though E.ON Energie has implemented a more extensive KPI follow-up. Also, for E.ON New Solutions B2C in Sweden their performance measurement system is not as well developed as it could be. The sales unit operates in a more mature business and routines for measurements are well-developed. However, it is clear they also have had to reconsider which are the most relevant measures for them.

E.ON Energie and E.ON New Solutions B2C, use surveys with NPS to measure customer satisfaction. Both have expressed concerns about the level of accuracy of the NPS. Four of the interviewees in the E.ON New Solutions B2C case study expressed that for the NPS to be valuable in measuring the customer satisfaction of the installation, the questions in the survey must be clearly delimited to the installation. Regardless of this, both case companies expressed the concern that, even though there are efforts made to clarify the questions, a customer survey can still be subjective and there are risks the rating is unfair.

One important aspect highlighted by the interviewees in the Essent, the E.ON Energie, and the E.ON New Solutions B2C cases was the difficulties connected to measuring and comparing the different installation projects. All projects have their individual traits driving the complexity of the installation. Examples of those traits mentioned in the case studies are the number of panels, the roof height, the roof inclination, the roof type, the address (driving time for installers), the distance to the electric box, the number of roof surfaces to install panels on, and the weather conditions. Since the lead time for an installation depends on all these factors, the interviewees have expressed difficulties in setting objectives regarding lead times and comparing different projects with each other.

Furthermore, to analyze and understand if the case companies have captured all relevant perspectives in their KPIs, the Balanced Scorecard (Kaplan & Norton, 1992), described in section 2.5.1, has been used. This analysis is summarized in table 6.6. Overall, a balanced scorecard should include a balanced set of financial and non-financial measures (Kaplan & Norton, 1992). As can be seen in table 6.6, all cases measure figures beyond the financials but the financial perspective is also considered important.

Table 6.6: Analysis of the measured KPIs according to the BSC.

BSC perspective	**Essent**	**E.ON Energie**	**E.ON New Solutions B2C Sales Unit**	**E.ON Sweden New Solutions B2C**
Customer and partner perspective	Essent does not measure customer satisfaction on a detailed level	The customer perspective is considered using customer surveys (NPS)	The speed to lead and conversion rate relates to customer satisfaction	The customer perspective is considered using customer surveys (NPS)
Internal perspective	Focus on delivery speed, reliability, safety and quality	Focus on delivery speed, reliability, safety and quality	Number of leads, number of sales and discount provided	Focus on delivery speed, reliability, safety and quality
Learning and growth perspective	No specific measures between Essent and the service providers	No specific measures between E.ON Energie and the service providers	No specific measures between E.ON New Solutions Sales Unit and the service providers	No specific measures between E.ON New Solutions and the service providers
Financial perspective	Covered - accountable for profits and losses	Covered - accountable for profits and losses	Covered - accountable for profits and losses	Covered - accountable for profits and losses

Regarding the learning and growth perspective, the authors have not discovered any particular KPIs measuring and following up on this regarding the installation of solar panels and in the relationship between E.ON and their service providers. It is deemed probable that the service providers in the cases have goals regarding their own improvement and growth. An example of this is that EMG has a stated goal to grow with a certain number of employees and increase their turnover by a certain percentage. In each case organization investigated there seems to be a lack of KPIs ensuring learning and growth in their partnerships. However, it is possible to argue the KPIs for installation/project lead times and on-time delivery used by Essent, E.ON Energie, and E.ON New Solutions B2C as well as all the KPIs for the Sales Unit can promote the learning and growth perspective since there is always possibilities to improve and develop on these measures.

Regarding the financial measures that should be included according to the BSC (Kaplan & Norton, 1992), these have not been the focus during the case studies. Monitoring the budget and the financial results of the installations are considered necessary and all case companies have financial measures covered and followed up on. The case companies are all accountable for their profit and losses. Naturally, the external installation companies measure their own financial performance as well, but this is not considered in the service contract with E.ON. As mentioned, the subsidiaries are measured on their financial performance and must report their results. The Sales Unit has been aware of their financial perspective, for example by considering they pay for leads to give to their partner, and the performance measures how well they make use of these leads.

Choosing suitable performance measures is important. As seen in table 6.5 and 6.7, SCOR and the SMART criteria can be an aid to do so. SCOR provides a performance measurement system with hundreds of proposals for measurements (APICS, 2017). SCOR is further described in section 2.5.3. However, since the goal with the multiple case study is not to suggest improvements for KPIs, SCOR has not been used further in this chapter. The SMART criteria, on the other hand, is suitable to evaluate the existing KPIs. The SMART criteria are further described in section 2.5.4.

The evaluation of the KPIs measured by the case companies is analyzed by the authors according to the SMART criteria (Doran, 1981) in table 6.7 on a scale from 0 - 3. 0 means the criteria is not relevant for this KPI, 1 means the KPI poorly fulfills the SMART criteria, 2 means the KPI fulfills the SMART criteria, and 3 means the KPI fulfills the SMART criteria well.

Table 6.7: The measured KPIs in the cases and how well they comply with the SMART criteria.

KPI	Measured by	Specific	Measurable	Achievable	Relevant	Time-specific
Installation lead time	Essent, E.ON Energie, E.ON New Solutions	3	2	2	3	3
On-time delivery	E.ON Energie, E.ON New Solutions	3	3	3	3	3
Material check	Essent, E.ON Energie	3	1	3	3	0
Number of customer errands	E.ON New Solutions	2	3	2	3	2
Safety check	Essent, E.ON Energie	3	1	3	3	0
Number of safety observations	E.ON New Solutions	3	3	3	2	0
Project lead times/deadlines	Essent, E.ON Energie, E.ON New Solutions	3	3	2	3	3
NPS (customer survey)	E.ON Energie, E.ON New Solutions	3	3	1	3	2
Number of leads and sales	E.ON Sales Unit	3	3	2	3	3
Conversion rate	E.ON Sales Unit	3	3	2	3	3
Discounts	E.ON Sales Unit	3	3	3	3	3
Speed to lead	E.ON Sales Unit	3	2	2	3	3

It is clear the KPIs measured by the case companies are generally in line with the SMART criteria. In all cases, the KPIs are specific. The only criteria that were, according to the authors, less specific were the number of customer errands (a KPI measured by E.ON New Solutions). The reason for this is customer errands can be related to other aspects than the actual installation, like faulty hardware in the solar panels. Therefore, a subjective assessment is needed to connect the customer errands specifically to the installation process.

The authors have understood there is sufficient administration in place to follow up on the current KPIs at the case companies. However, the measurability for measuring safety and material check (quality) accurately can be difficult due to hidden actions and hidden information. Even though there are clear rules and regulations in place, E.ON cannot monitor the procedure since they are not present on the installation site. Instead, they must trust their installation companies to report truthfully.

Achievability has been evaluated partly on the installer's possibility to affect the outcome of the KPI but it also depends on what target performance level is set by E.ON. For example, installation lead time could be unachievable if an unrealistic target is set. Almost all KPIs have been deemed to fulfill the achievable criteria by the authors. The reason the NPS only received a score of 1 was customer satisfaction can be affected by events beyond what the installation companies can control or some customers may be more critical than justified.

All KPIs are, according to the authors, relevant in the sense that they match the efforts needed to achieve a good performance and the KPIs are related to the right stakeholders. Not all KPIs are time-specific, but for the ones that are not, this has not been considered as a main criterion for their relevance. However, a time aspect can be useful to create averages over a certain period.

6.4 Incentives in contracts

In the conceptual framework important insights regarding incentives in contracts were summarized. Table 6.8 below is an excerpt from the conceptual framework and used in this section to analyze the incentives in the contracts of the case companies.

Table 6.8: Summary of important insights regarding incentives in contracts.

Incentives in contracts		
Fit of contract	Behavior- or outcome-based	Outcome-based suitable when there are several ways to perform the service and relevant result variables to measure
Compensation strategies	Fixed, variable, or mixed payment scheme	Variable (outcome-based payment) means the agent absorbs more risk and has a greater incentive to perform
Incentive design	Informative, economic, or laws/regulation	Economic and informative suitable for outcome-based contracts
	Formula based or subjective	Formula based are objective and easier to administer but less flexible and can be manipulated
	Positive or negative reward	Positive rewards help maintain good relations
	Multiple incentives	Balance several incentive areas following the priorities of the customer
	A well-designed incentive	Follows the principles of coincidence of goals, fairness, informativeness, and self-selection
		1.Should be valued 2.Should be easy to understand 3.Should be cost-efficient
		Aligned with objectives and risks, costs, and rewards are distributed fairly across the network
	Incentive alignment	Achieved through trust, contract, or information-based solutions

The different cases work with payment strategies, incentives, and incentive models in different ways. The contracts and incentive models used in the different cases are summarized in table 6.9.

Table 6.9: Cross-case comparison of incentive models in the contracts.

Focus area	**Essent**	**E.ON Energie**	**E.ON New Solutions B2C Sales Unit**	**E.ON New Solutions B2C**	
				Old contract	**New contract**
Type of contract	Outcome-based	Outcome-based	Outcome-based	Outcome-based	
Compensation strategy	Increasing based on the number of modules, according to their own price list	According to their own price list.	Fixed fee + bonus based on conversion rate and discount provided	Payment per installation according to the complexity levels	Payment per installation according to a detailed price list provided by the installers
Incentive design	*Not implemented, but considered: Penalty: lead time > 1 day*	*Tried but abandoned:* bonus/malus system based on KPIs connected to on-time delivery	Bonus based on the conversion rate for internal and external leads	Long-term risk of termination of partnership	Bonus/malus based on NPS, observations, on-time site visits, on-time delivery, and customer errands
	Long-term risk of termination of partnership	Long-term risk of termination of partnership	Bonus/malus based on the discount		Long-term risk of termination of partnership
			Not implemented, but considered: Penalty if speed to lead > 2 days		

All case companies have contracts with an output/outcome specification. This is a suitable fit according to Rapp and Thorstenson's (1996) matrix (table 2.1) introduced in section 2.4. There are relevant result variables to measure regarding the finished installation and the installers can perform the task in several ways.

Today, neither Essent nor E.ON Energie use any specific incentive models in the contracts with their (internal or external) partners. The main reasons identified for this are the immaturity of the market, the lack of installation capacity, and the complexity of administering incentive bonus/penalty systems. Since the market is immature and in constant change, the contracts, as well as the processes developed, are not sophisticated yet. Both Essent and E.ON Energie mentioned they might consider developing and implementing an incentive model in the future, but that the current focus is to develop processes and secure capacity by increasing their number of partners. Both Essent and E.ON Energie have stated they value their relationship with their partners greatly. They believe imposing penalties or too much risk on their partners can impair the relationships and ultimately this might lead to their partners taking their business elsewhere.

In contrast, both E.ON New Solutions B2C and E.ON New Solutions Sales Unit are using incentive models in the contracts with their partners. Since E.ON New Solutions B2C's incentive model has not been implemented for long (only since April 1st, 2021) there was no available data regarding its results when this thesis project was conducted.

However, what is eminent is there is no incentive in the new contract to cover efficiency, which has been perceived to be important when interviewing key stakeholders at E.ON. The idea has been that there is a natural incentive for the installation companies to remain efficient since they get paid per installation. Nevertheless, it has been clear to E.ON the efficiency at EMG is not at the same level as their competitors. It is also the author's view, from the interviews with E.ON employees and two visits at installations, that there are opportunities for improvements regarding efficiency. But today, there does not seem to be enough incentives for EMG to improve their efficiency.

The incentive model used by the E.ON New Solutions Sales Unit is well-developed and they are content with it. The telemarketing market is a more mature market and incentive or commission models are common. The incentive model used at the sales unit is based on what they can affect (number of leads) and drive desirable behaviors (converting as many leads as possible into sales). Also, the addition of an incentive for the telemarketing partner to provide as little discount as possible is important. This is a good example of incentive alignment since both parties share the "reward" when less than the allowed discount level is provided.

Notably, E.ON Energie in Germany has made efforts to implement an incentive model but abandoned this because of the extensive administration. The model, displayed earlier in table 5.2, shows they followed up on many KPIs and had a bonus/malus connected to each individual KPI. This is in contrast with the Sales Unit highlighting a simple model with few KPIs incentivized. Naturally, incentivizing more KPIs puts more pressure on the follow-up to ensure the installers feel it is handled fairly and correctly. Also, putting as much focus on the time aspect as in the German model might risk suboptimization. As described by Rapp and Thorstenson (1994), incentivizing one parameter does not guarantee an overall process improvement, and could even lead to worsening or negligence of other parameters.

The analysis of the design of incentive models seen in the case studies is summarized and the type of incentive, impact on performance as well as risks are described in table 6.10.

Table 6.10: Impacts and risks connected to the incentives discovered in the multiple case-study.

Incentive	Used by	Type of incentive	Desired impact on performance	Risks
Penalty for lead time > 1 day	Essent	- Economic - Formula based - Negative monetary reward	Fast and efficient installations	Deteriorating relationships with partners Administrative challenges (suboptimization) Deteriorated quality, customer service, and/or safety (suboptimization)
Bonus/malus system for time-based KPIs	E.ON Energie	- Economic - Formula based - Positive and negative monetary reward	Fast and efficient installations	Deteriorating relationships with partners Administrative challenges Deteriorated quality, customer service, and/or safety
Bonus/malus based on NPS, observations, on-time site visits, on-time delivery, and customer errands	E.ON New Solutions	- Economic - Formula based - Positive and negative monetary reward	Installations delivered on time and with the right quality, safety, and customer satisfaction	Deteriorating relationships with partners Administrative challenges
Risk of termination of partnership	Essent, E.ON Energie, and E.ON New Solutions	- Informative - Subjective based - Negative reward	Satisfactory performance in all important areas	Infected relationships
Bonus based on conversion rate	E.ON Sales Unit	- Economic - Formula based - Positive monetary reward	Increased number of sales and effort invested in each lead	
Bonus/malus based on the discount	E.ON Sales Unit	- Economic - Formula based - Positive and negative monetary reward	Providing as little discount as possible while still securing the sale	If pushed too hard it might put off the customer
Penalty if speed to lead > 2 days	E.ON Sales Unit	- Economic - Formula based - Negative monetary reward	Increased number of sales	Impaired quality and lost sales due to a rushed sales process

A comment to table 6.10 is that the risk of terminating the business relationship is not a formulated incentive model per se, but a key incentive for both parties to perform. For E.ON's external partners, this is believed to be the main motivation for the partners to uphold a satisfactory performance to get assigned more projects and thereby increase their revenues. If E.ON is not satisfied with the installers, they will not give them more projects and eventually end the partnership. The risk is, if this is used as a threat by E.ON it could lead to an infected relationship. Also, in the particular market of solar panel installations, the installer has an advantage since supply is scarce and if they do not feel well treated in the relationship with E.ON, they could terminate the relationship from their end.

6.5 Conclusions from the cross-case analysis

In conclusion, the cross-case analysis has been used as a learning experience and an inspiration in the design of the suggested model for the service triad and contract setup at E.ON, as seen in the next chapter. The key takeaways have been summarized by connecting them to the research questions. This, together with the insights from the theoretical framework, has been crucial to understanding important aspects of a well-functioning incentive model.

To answer RQ1: *Which selection criteria for KPIs could E.ON use and which KPIs could E.ON measure in the installation process?* Conclusions regarding this topic were drawn from the cross-case analysis. When studying the KPIs measured by the case companies, with the conceptual framework in mind, criteria were identified as crucial when selecting KPIs, seen in table 6.11. Also, the SMART criteria provide guidelines to evaluate KPIs (Doran, 1981).

Table 6.11: Criteria for KPIs.

Criteria	Explanation
Measurable	For a KPI to be valuable it needs to be measurable (part of the SMART criteria). Since E.ON is not present when the service is executed by the service partners, some aspects will always be hard to measure accurately. The measurable criteria were deemed to be the most challenging SMART criteria to fulfill for the case companies.
Aligned with objectives	When selecting KPIs it is important they represent all important objectives.
Communicative & understandable	For a KPI to be effective it needs to be possible to communicate it to and follow it up with the service providers. They need to understand how the KPI is measured and why.

To answer RQ2: *How can these KPIs be connected to incentives and how could such incentive models look?* Some important conclusions regarding this topic were drawn from the cross-case analysis. After analyzing the incentives in the case companies under the lens of the conceptual framework, some criteria were identified as the most relevant and meaningful when designing an incentive model, summarized in table 6.12. To answer RQ3: *Which risks are connected to the proposed incentive models and what sensitivity aspects can be observed?* some important conclusions regarding this topic as well were drawn from the cross-case analysis. When studying the risks highlighted by the case companies and connecting these to the conceptual framework, some risks were identified as the most dominant when evaluating incentive models. The risks connected to the incentive model criteria are summarized in table 6.12.

Table 6.12: Criteria and risks for incentive models.

Incentive criteria	**Explanation of incentive criteria**	**Risks connected to the incentive criteria**	**Explanation of risk**
Simplicity	An incentive model should be kept simple, meaning only a few selected KPIs should be incentivized. Otherwise, the model will be hard to understand and possibly not function as expected.	Extensive administration	Using incentive models can create a need for additional administration and performance measures when performance needs to be followed up and a potential bonus/penalty needs to be calculated and invoiced. This might also lead to extensive communication with the service providers when they want to explain their performance
Promote partnership	An incentive model should ensure good relations are kept with the partners, especially if the market is characterized by a high supply risk. This means penalties should be used with caution or avoided and events outside the agent's control should not affect the compensation received.	Impaired relations	When using incentive models, especially if there are penalties involved, this can create discontent among service providers. This can impair the relationship with the service providers. This includes the sense of unfairness if events outside the agent's control affect the compensation received.
Promote performance	When designing an incentive model the foundation should be what performance it should promote. Then it is crucial the model actually rewards this performance and nothing else.	Suboptimization	Incentive models can create narrow focus and suboptimization if excessive focus is put on the incentivized KPIs. Then other important aspects might get less attention, which will damage the total performance level.
Valuable	An incentive model should have value for all the involved parties. This means the rewards/penalties included in the model should have a meaningful impact on the service providers.	Lack of impact	If the incentive model does not have value for the incentivized actor, it will not lead to any noticeable improvements.

7. Construction of an incentive model

In this chapter, the findings from the theoretical framework and the cross-case analysis were used to define the problem at E.ON. Suitable KPIs were identified and possible ways to incentivize these were explored. The alternatives for incentive models were formalized and evaluated on risks and sensitivity as well as in a validation session, to determine which model was the most suitable.

7.1 The problem situation at E.ON

In the situation at E.ON it is clear incentive misalignment exists. The cause for this is a combination of the factors hidden actions, hidden information, and badly designed incentives, illustrated in figure 7.1 (Narayanan & Raman, 2004) presented in section 2.4.6.

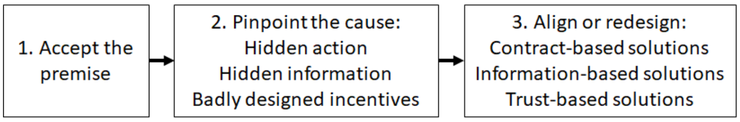


Figure 7.1: Narayanan & Raman's (2004) approach to achieve incentive alignment.

E.ON and EMG operate in a buyer-supplier-customer service triad, where E.ON has little to no control of EMGs performance towards the end customer. This could create a moral hazard in line with principal-agent theory and E.ON is worried the efficiency is not as good as it could be. In addition, EMG takes no risk in the agreement, since all their costs are covered and they are guaranteed customers by E.ON, which is unlike the situation for the other cases in the multiple case study. Risk sharing is an important contextual factor affecting the contract between a principal and an agent. This and other valuable concepts to understand the problem situation has been identified in the conceptual framework (first seen in chapter 2, section 2.7, figure 2.11, but for the readers' convenience it is included again in figure 7.2).

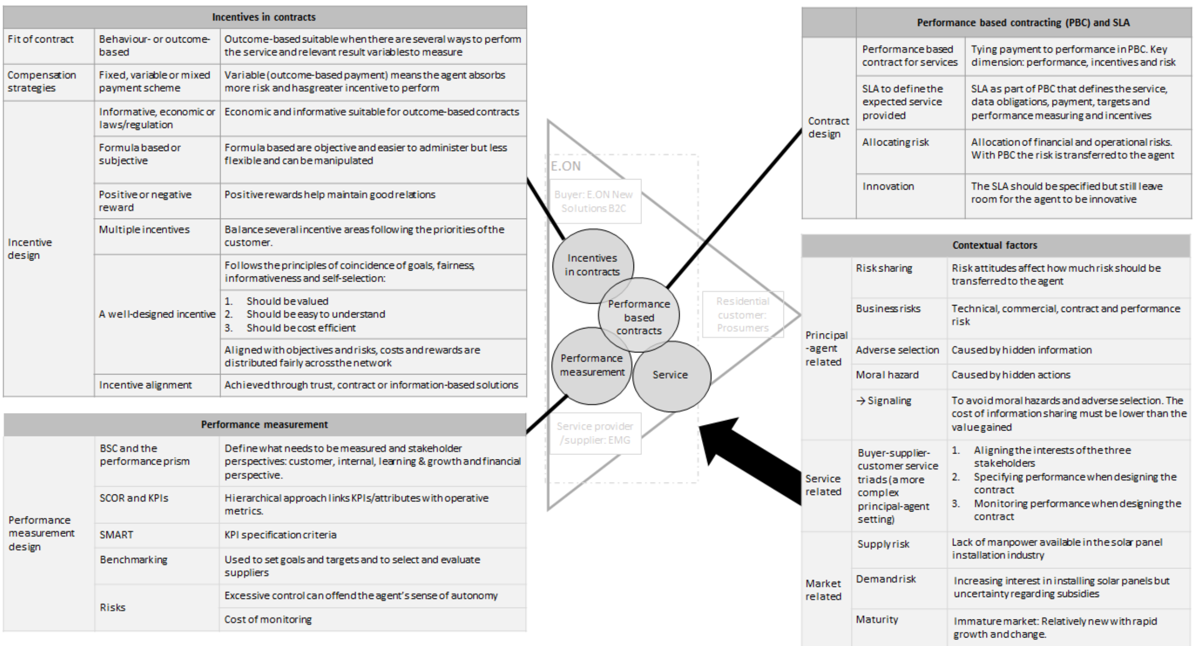


Figure 7.2: The conceptual framework used to analyze the service triad and contract setup at E.ON.

To address this incentive misalignment, Narayanan and Raman (2004) proposes redesign and alignment through contract-based, information-based, or trust-based solutions. All approaches could be relevant for E.ON to investigate to achieve incentive alignment in the installation process, however, the research questions formulated for this project limit the scope to primarily looking at contract-based solutions. Notably, the other solution alternatives might also be important to completely eliminate the misalignment. Information-based solutions are touched upon as performance measurement is a step in designing incentives.

In all principal-agent situations, there are business risks that can be divided into technical risks, commercial risks, contract risks, and performance risks (see section 2.2 and figure 7.2) (van Weele, 2014). Currently, E.ON is experiencing all these risks to some extent. To minimize them, E.ON should maintain crucial knowledge about the installation process needed to manage the relationship with the installers, use performance-based contracts to align the interests, use incentives and/or penalties for above and below-average performance, and have performance indicators that fully cover the business area. (van Weele, 2014) The technical risk is deemed the least important for E.ON since the authors believe they have good technical knowledge about the installation process. The other risks will be approached in this chapter.

7.2 Selecting appropriate KPIs

RQ1: Which selection criteria for KPIs could E.ON use and which KPIs could E.ON measure in the installation process?

As concluded from the cross-case analysis (table 6.11), the KPIs E.ON chooses should be measurable, aligned with objectives as well as communicative and understandable. To be aligned with objectives, they should reflect the identified success factors (table 4.3) efficiency, on-time delivery, coherent installation, quality, safety, and customer satisfaction. With the newly implemented incentive model (table 4.4), some of these factors are considered. But they still lack some important measures to meet their objectives. In addition to the selection criteria derived from the cross-case analysis, it is also important to select KPIs that fulfill the SMART criteria (Doran, 1981) and that are balanced among the customer, internal, learning and growth as well as financial perspective (Kaplan & Norton, 1992). In table 7.1 below the identified selection criteria are summarized.

Table 7.1: Selection criteria for KPIs.

Criteria	**Explanation**
Aligned with objectives	Represent all important objectives and enable follow-up on them
Communicative and understandable	Possible to communicate the KPI and follow it up with the service providers, that should understand how the KPI is measured and why
SMART	Specific, Measurable, Achievable, Relevant, and Time-specific
Balanced among important perspectives	Balanced between the customer, internal, learning, and growth as well as financial perspective
Strategic	KPIs should be strategic and reflect the performance of an organization in achieving its goals and objectives

Based on takeaways from the case studies and the criteria presented in table 7.1, the metrics E.ON could measure are summarized in table 7.2 and described further in this section. The authors have adapted the metrics based on the principles summarized in the conceptual framework, looking specifically at the SCOR performance attributes and metrics suggested (see section 2.5.3 table 2.4) as well as relevant measures brought up by the case companies, summarized in the cross-case analysis. Notably, these are not all possible metrics available to measure, but what has been brought up specifically in this project and highlighted as important by relevant stakeholders in the service triad and contract setup at E.ON.

Table 7.2: Summary of possible metrics E.ON could measure.

Focus area	**Metric**	**Adapted from**
Efficiency	Installation lead time	Essent and SCOR - responsiveness
	Pre- & after-roof work lead time	SCOR - responsiveness
	Roof work lead time	SCOR - responsiveness
	Electrician lead time	SCOR - responsiveness
	Number of panels/installer during a time period	SCOR - responsiveness
	Number of installations during a time period	SCOR - responsiveness
	On-time project deadlines while getting assigned a good amount of projects	E.ON Energie and SCOR - responsiveness
	Complete documentation after site visit - rate of installations that completely follows the detailed installations plan established at the site visit and where no additional material has to be added	SCOR - reliability
On time in full delivery (OTIF)	On time: on planned week. In full: No errands after installation	E.ON New Solutions B2C and SCOR - reliability
	On time: on planned day(s). In full: No errands after installation	SCOR - reliability
Coherent installation	An installation completed without interruptions	SCOR - reliability
Quality	Number of customer errands	E.ON New Solutions B2C and SCOR - reliability
	Quality check on site by installers	Essent, E.ON Energie, E.ON New Solutions B2C, and SCOR - reliability
Safety	Number of safety observations	E.ON New Solutions B2C and SCOR - reliability
	Safety check on site by installers	Essent, E.ON Energie, E.ON New Solutions B2C, and SCOR - reliability
Customer satisfaction	NPS	E.ON New Solutions B2C, E.ON Energie and SCOR - reliability

7.2.1 Efficiency

One installation success factor not measured in a detailed way by E.ON New Solutions B2C today is efficiency. As stated in section 2.5.4, efficiency refers to “how economically the firm’s resources are utilized when providing a given level of customer satisfaction.” (Neely, 1996, p. 424). The costs covered for EMG are mainly made up of personnel costs, and EMG has aggressive growth targets for the coming year. Increasing efficiency is the main solution to cut costs per installation. Working with incentives to cut costs would be possible, but at this point, the number of installations during a certain time period is considered important to improve by E.ON. The more installations EMG can fit into a working week, the less is the cost per installation, shown in figure 7.3.

$$cost\ per\ installation = \frac{\sum cost}{\#\ of\ installations}$$

Figure 7.3: Equation showing the cost per installation for EMG.

However, efficiency must not come at the price of quality, on time delivery, safety, or customer satisfaction. In other words, the “given level of customer satisfaction” (Neely, 1996, p. 424) must remain. It is therefore not a question of choosing one or the other but to include and implement all success factors in the incentive model in a logical way, to not suboptimize, so that the reward is connected to overall high-level performance.

To fit more installations in the same working hours, the lead time per installation must be reduced. Currently, the lead time for each installation is not measured, but E.ON has the goal that an installation should not take longer than 1-2 days. This makes it difficult to measure improvements in the installation process and if a possible incentive model would result in improved lead times. Therefore, the authors suggest that E.ON introduces a more thorough measure of efficiency. From interviews and feedback sessions with E.ON stakeholders together with the selection criteria identified in table 7.1, options for metrics regarding efficiency were developed and presented in table 7.3. It can also be seen which metrics the authors believe should be KPIs and which should be regular metrics (Bauer, 2004).

Table 7.3: The authors' suggestions for efficiency-related metrics.

Metric		**Unit**	**Description**	**Metric or KPI?**	**Need of additional administration**
Total installation lead- time		Hours	The installers indicate the time they start the installation and the time they complete the installation. Enables a more thorough measure than exists today where lead times could be measured on even half days	KPI	Could be reported via an app, for example, the app Mowin that the installers at EMG already use. Data need to be transferred from Mowin to E.ON via mail or other
Specified installation lead time	Pre- & after-roof work lead time	Hours	The lead time of the initial customer contact and building the scaffolding as well as removing the scaffolding and cleaning up the site after the installation	Metric	Need to start measure and report this KPI via mail or other
	Roof work lead time	Hours	The lead time of the roof panel installation	Metric	Need to start measure and report this KPI via mail or other
	Electrician lead time	Hours	The lead time for the electrician's work on the site	Metric	Need to start measure and report this KPI via mail or other
Panels/day/installer		Number of panels/day	Measuring the number of panels installed per time period. This KPI is already used by EMG as a rough estimate of how long each installation should take so they can plan their work schedule	KPI	Keep a record of number of employees at EMG and working days each month and connect to the installed number of panels
Accepted projects/month		Number of accepted projects	Measuring the total number of accepted projects per time period.	KPI	No additional administration
Complete documentation after site visit		Share of complete site visits	Rate of installations that completely follows the detailed installations plan established at the site visit and where no additional material has to be added	Metric	Need to start measure and report this KPI via mail or other

The authors recommended that E.ON starts measuring the solar panel installation lead time as a KPI. However, the authors believe it would be interesting to measure the lead time for each part of the installation, but this should not be considered KPIs. Having more detailed information regarding installation lead times and the different stages of an installation combined with the parameters regarding roof height, roof inclination, roof type, the address, etc. can give indications of which of the various parameters affects the installation lead time most. This could also give E.ON opportunities to more accurately plan their installations as they have data showing how long an installation with some parameters should take. However, since there are many factors affecting the lead times that are out of the installers' control like project specifics, the weather, etc. setting sharp goals for lead times can be perceived as unfair.

The last metric from table 7.3, *complete documentation after site visit*, is not directly related to efficiency, but indirectly, it can affect the lead times of a project. If the installer has missed details during the site visit, such as the exact number of panels that can be installed or the number of mounts needed, it can take a lot of time for the installers to get the additional material needed when they are in the middle of an installation. Therefore, the authors recommend E.ON New Solutions to monitor this metric to follow up on the accuracy of the documentation from the site visit. However, it was not considered strategic enough to reflect the performance of an organization in achieving its goals and objectives and therefore it does not qualify as a KPI.

7.2.2 On-time in-full delivery

Currently, E.ON follows up if some part of the installation is not executed in time. They measure the KPI *completed installations on time* measured in weeks. Meaning it takes a week before E.ON acts and a seven-day delay is thus an acceptable delay. This is not an optimal KPI to fulfill the criteria measurability and alignment. Since an installation is measured in days and usually takes from 1-3 days, the measuring unit being weeks is misleading. Also, it does not reflect the objective to have high customer satisfaction. From the customer's point of view, having the installation done Monday or Friday the same week could make a difference in their overall satisfaction.

However, there is some logic behind using week as a time unit because it makes the planning easier. Supply planners at E.ON can schedule a suitable week, make plans for material delivery, and notify the customer and there is still some flexibility for the installation companies if there is interference such as weather conditions or if the customer has to reschedule. On the other hand, the authors do not see why it should not be possible to set a fixed date for the delivery, and then change this day if there is any interference. Therefore, the recommendation is to start measuring on time delivery in days, but, keeping the measure in weeks is better than having no on-time measure at all

Measuring on-time and in-full (OTIF) deliveries mean the percentage of how often the customer gets what they asked for at the time they expect it. This metric relates to the SCOR-measure reliability and has the advantage of measuring the performance of the whole logistic organization in meeting customer service expectations. The authors believe OTIF is strategic and therefore qualifies as a KPI.

OTIF is a good measure to capture the accuracy of delivery. However, what is on time and in full must be clearly defined to enable measurement. The on-time aspect could be either a set date, a set week, or it could be in the form of a lead time. It is communicated from E.ON that an installation should be completed within 8 weeks from the accepted order. This could be used as a measure for on time, giving flexibility to the installer to plan the process within this time. The authors' suggestion for an on-time in-full related metric can be seen in table 7.4.

Table 7.4: The authors' suggestion for an on-time in-full related metric.

Metric	Unit	Description	Metric or KPI?	Need of additional administration
OTIF	Days	Measure OTIF with on time as installation on a certain day and in full as that the solar panel facility works, and the installers have no intention of returning to the site	KPI	Must report installation completion in days instead of weeks.

7.2.3 Coherent installation

Since a coherent installation was identified as one of E.ON’s goals, the authors recommend this should be measured and followed up as a KPI. Currently, this is not being done. However, the installers know if the installation has been coherent and could report it to E.ON. A weakness with this KPI is that it would be difficult for E.ON to verify the information provided by the installers. They could do site visits to check, but when an E.ON representative has been on site it is, according to the authors, unlikely the installers will not tell the truth in the report. Therefore, for this KPI, E.ON needs to trust what the installers report to them. The authors’ suggestions for a coherent installation related KPI can be seen in table 7.5.

Table 7.5: The authors’ suggestion for a coherent installation-related metric.

Metric	**Unit**	**Description**	**Metric or KPI?**	**Need of additional administration**
Coherent installation	Yes/No	The roof panel installers and the electrician have been on site with no interruptions in between.	KPI	Include in the form of a box to tick in the report the installers send to E.ON after finishing a project.

7.2.4 Quality

The measurement currently used to follow up on quality is the number of customer errands (included in the new contract). This metric reflects the objective to have a top-level quality and if an installer is sloppy, this will be observable using this measurement. Therefore, this should be measured as a KPI. It is both in the installers’ and E.ON’s interest to minimize customer errands since it is an extra cost to return to the customer for the installer and E.ON wants the customer to be satisfied to maintain a good reputation as a provider.

The number of customer errands is a measurable KPI in the sense that it is easy to monitor the number of errands coming in and connecting these to the installer who did the specific installation. However, all incoming customer errands might not be due to a faulty installation. There could, for example, be issues connected to the hardware. Therefore, to use this KPI to measure the quality of the installations, a subjective assessment of each customer errand will be necessary.

Preferably, quality should be measured before it leads to a dysfunctional facility and a customer errand. This is done when the installers and the electrician control the facility before they finish and leave the site. However, this has proven to be insufficient since E.ON still receives customer errands. E.ON could also do site visit checks to ensure the facility meets its quality standards, but this requires available staff and is time-consuming. Therefore, the authors believe customer errands is the best KPI to measure quality, as described in table 7.6. However, the quality check should still be done and followed up as a metric.

Table 7.6: The authors' suggestions for quality-related metrics.

Metric	Unit	Description	Metric or KPI?	Need of additional administration
Customer errands	Number of customer errands	Zero customer errands on an installation as a quality measurement	KPI	A subjective assessment of each customer errand will be necessary
Quality check on site by installers	Yes/no	The installers have a quality checklist that they go through after each installation and include in the documentation they send to E.ON	Metric	No additional administration

7.2.5 Safety

Measuring safety is important to E.ON since they have a goal of zero workplace accidents. In the solar panel installation process, it is quite easy to define how a safe installation should be conducted and to define the safety regulations. This is also done in the current contract with the suppliers. There are, for example, checklists that should be filled out for every installation listing possible danger as well as thorough descriptions of which safety equipment the installer must use, how, and when. However, since the solar panel installations are executed at the customer's site by the installation teams, it is difficult for E.ON to monitor to what extent the safety regulations are followed.

Therefore, the KPI presented in the new contract, where the number of safety observations reported is measured for each project, is a suitable KPI for safety according to the authors, as seen in table 7.7. If the installers must report safety observations, this creates a culture where safety is prioritized and reflected upon.

Table 7.7: The authors' suggestions for safety-related metrics.

Metric	Unit	Description	Metric or KPI?	Need of additional administration
Safety observations	Number of safety observations	The installers list and report all important safety observations for each project	KPI	No additional administration
Safety check on site by installers	Yes/no	The installer does a safety check on every installation and hands in a report	Metric	No additional administration

7.2.6 Customer satisfaction

Using the NPS as a measure for customer satisfaction is considered a well-defined and strategic metric and the authors suggest E.ON continues to measure it as a KPI, with some recommendations for adjustments (see table 7.8). Even though the definition of efficiency as presented by Neely (1996, p. 424) also takes customer satisfaction in consideration, it was deemed necessary to keep this as a separate measure as well to follow the philosophy of the balanced scorecard, considering all stakeholder perspectives. Also, it was clear from interviews with E.ON representatives customer satisfaction should be prioritized and not deteriorated. Presenting it as an average over 3 months rolling decreases the effect of single events. Something to be considered regarding using the survey as the base for the NPS is how the questions are designed. As the survey looks today (displayed in appendix 3) some questions do not relate to the performance of the installer per se and for some questions, it is ambiguous what part of the process should be considered. The interviewees at E.ON have expressed concerns of unfairness in the survey, where customers give low scores because of aspects the installers cannot control. It should not affect the rating of the installer if it is not related to their performance. The effect of this could be the installers feel unfairly treated leading to an impaired relationship with E.ON.

Even though there are efforts made to clarify the questions, a customer survey is still subjective and there are risks the rating is unfair. This could be handled to some extent by removing extreme values from the ratings. Alternatively, this can be motivated to be evened out over time.

Table 7.8: The authors' suggestion for a customer satisfaction-related metric.

Metric	**Unit**	**Description**	**Metric or KPI?**	**Need of additional administration**
NPS	Score according to NPS standards	Measure NPS on a 3 month period, based on the rating from the customer survey	KPI	Already covered. Recommended to adjust questions to clarify the rating should apply to the performance of the installers in particular. Also, consider a method to remove the influence of extreme values

7.3 Constructing possible incentive models

RQ2: How can these KPIs be connected to incentives and how could such incentive models look?

When designing an incentive model there are several parameters to decide on, explained in section 2.4 in the theoretical framework and summarized in table 7.9. To construct suggestions for incentive models, the authors have followed the conceptual framework as well as the conclusions from the cross-case analysis. To evaluate the suggestions and select one final model, benefits and risks were discussed in a validation session with E.ON stakeholders.

Firstly, the model can have different purposes: the effort directing purpose, the effort inducing purpose, and the personnel-related purpose (Merchant & van der Stede, 2007). According to the authors, in this case, the effort directing purpose will be important. The incentive model should help EMG as a company as well as each installer to understand what the most important factors for a successful installation are. Also, the effort inducing purpose is important especially for areas like efficiency. In this focus area, it is important EMG is motivated to make an extra effort to increase efficiency.

Table 7.9: Excerpt from the conceptual framework.

Incentives in contracts		
Fit of contract	Behavior- or outcome-based	Outcome-based suitable when there are several ways to perform the service and relevant result variables to measure
Compensation strategies	Fixed, variable, or mixed payment scheme	Variable (outcome-based payment) means the agent absorbs more risk and has a greater incentive to perform
Incentive design	Informative, economic, or laws/regulation	Economic and informative suitable for outcome-based contracts
	Formula based or subjective	Formula based are objective and easier to administer but less flexible and can be manipulated
	Positive or negative reward	Positive rewards help maintain good relations
	Multiple incentives	Balance several incentive areas following the priorities of the customer
	A well-designed incentive	Follows the principles of coincidence of goals, fairness, informativeness, and self-selection
		1.Should be valued 2.Should be easy to understand 3.Should be cost-efficient
		Aligned with objectives and risks, costs and rewards are distributed fairly across the network
	Incentive alignment	Achieved through trust-, contract-, or information-based solutions

The authors conclude E.ON New Solutions B2C should use a performance-based contract, where a part of the compensation is variable and connected to the level of performance, which will be made up by the suggested incentive model. Given the SLA is not too specified, linking the supplier's rewards to its performance positively affects innovation (Sumo et al., 2016), which will enable an improved solar panel installation. Depending on the nature of this variable part, more or less risk will be put on the agent (as illustrated in figure 2.6) (Rapp & Thorstenson, 1994). In this case, a positive reward will not transfer more risk to the agent if the fixed part of the payment remains constant and the variable part is added to it. A negative reward will, on the other hand, transfer risk to the agent. However, it is the authors' view that since both E.ON New Solutions B2C and EMG are ultimately part of the same company, risk sharing is not as central as in collaborations with external companies.

Another parameter to consider is if the incentive model should be formula-based or subjective (Merchant & van der Stede, 2007). As described in section 2.4.2, table 2.3, formula-based incentives create better understandability and allow for easier administration. The fact that formula-based incentive models are more objective and fair is also important for E.ON to cherish the relationship with EMG. These factors have also been identified as important in the conclusions from the cross-case analysis regarding criteria for incentive models and avoiding the risks connected to them (see table 6.12).

In addition, it is important to decide if the reward should be positive, negative, or a hybrid between the two. As presented in section 2.4.4, positively framed incentives lead to positive responses from the suppliers and improved relationships, and hybrid framed incentives can also have positive results. (Selviaridis & van der Valk, 2019) Therefore, these types of rewards have been considered primarily by the authors when constructing incentive models. Regarding what form the positive rewards should take, the options are quite limited. Since E.ON New Solutions B2C cannot affect how rewards are distributed within EMG, only rewards to the company as a whole can be considered. Incentives like promotions or other individual rewards cannot be implemented by E.ON New Solutions B2C.

The only other option the authors have identified where non-monetary positive rewards can be used is the monthly follow-up meeting. There, E.ON New Solutions B2C can offer praise and recognition to EMG representatives. However, the authors believe this is not valued enough to have the desired impact. The meetings will still be a valuable and important platform to address the follow-up on KPIs in general, including the ones not connected to incentives.

To construct a suitable incentive model, the first part of RQ2: *How can these KPIs be connected to incentives* was discussed based on the previously suggested KPIs (table 7.3-7.8) as possible parameters to incentivize (table 7.10). As it has been identified in the cross-case analysis, an incentive model should be simple meaning it should not require extensive administration. This means it should not contain all relevant KPIs. Instead, the most important KPIs should be incentivized, but others should still be measured and followed up. Simply keeping track of performance even without incentives will help E.ON to make sure efforts are prioritized in line with their objectives.

Table 7.10: Summary of possible KPIs E.ON could measure and incentivize.

Focus area	**KPI**	**Could it be incentivized?**	**How/Why?**
Efficiency	Installation lead time	Yes	Positive or hybrid reward
	Number of panels/person during a time period	Yes	Positive reward
	Accepted projects/month	Yes	Positive reward
On time in full delivery (OTIF)	On time: On planned day(s) or week. In full: No errands after installation	Yes	Positive or hybrid reward
Coherent installation	The roof panel installers and the electrician have been on site with no interruptions in between	No	Hidden information
Quality	Number of customer errands	Yes	Negative or hybrid reward
	Quality check on site by installers (metric)	No	Hidden action
Safety	Number of safety observations	Yes	Positive or hybrid reward. Risk of hidden information but promotes safety culture
	Safety check on site by installers (metric)	No	Hidden action
Customer satisfaction	NPS	Yes	Positive or hybrid reward

The reason the KPIs coherent installation, quality check, and safety check are not suitable to incentivize is that it is not possible to make sure the installers report these KPIs truthfully. In other words, the cost of monitoring these KPIs would exceed the value of the monitoring. In section 2.4.4 it is highlighted that the human instinct is to learn how to avoid punishment or get the reward without needing to change

(Rapp & Torstensson, 1994). Therefore, all KPIs that are incentivized must be possible for E.ON to check easily. All other KPIs in table 7.10 should, according to the authors, be incentivized. Together they represent and measure all important areas identified for a successful solar panel installation (table 4.2).

In addition, the contract should be designed so that the effects of events outside the agent's control do not affect the compensation the agent receives (Grinold & Rudd, 1987). It is important that all KPIs incentivized can be affected by EMG. As mentioned in sections 4.3.2, 7.2.1, and 7.2.6, there are risks connected to incentivizing the KPIs NPS and efficiency. Since EMG's control of these KPIs can be questioned it can create a sense of unfairness to incentivize them. This risk is further addressed in section 7.4.1.

To answer the second part of RQ2: *How could such incentive models look,* four alternatives of possible incentive models were developed by the authors. The foundation for all proposed incentive models was the suggested KPIs as well as the criteria identified in the conceptual framework and the conclusions from the cross-case analysis (table 6.12). The possible incentive models are presented in the coming sections 7.3.1-7.3.4.

All proposed incentive models have an outcome-based compensation plan seen in figure 7.4, adapted from compensation plan number 6 in section 2.4.1 (Rapp & Thorstenson, 1994). Then EMG receives a fixed amount (K) based on the price list and an extra compensation (d) if the result (x) is better than a certain value (x_0). This type of outcome-based compensation plan creates incentives for EMG to improve.

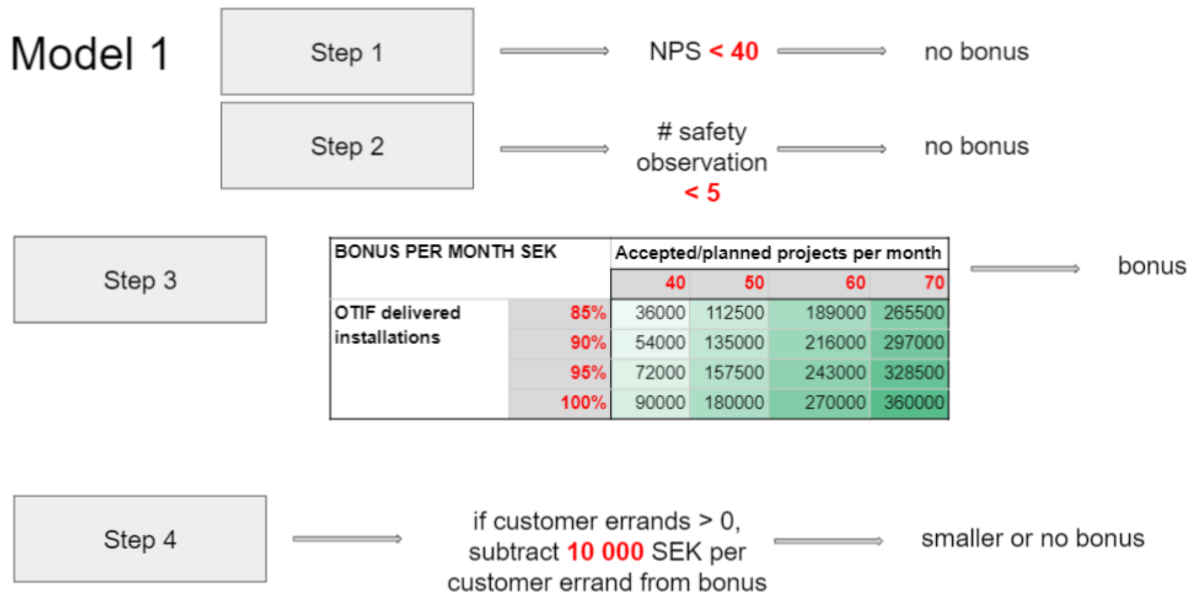
$$s = K + \begin{cases} d(x - x_0) if\ x \geq x_0 \\ 0 \qquad\qquad else \end{cases}$$

Figure 7.4: The general compensation plan followed in the constructed incentive models.

In addition, all proposed incentive models will have a lower cutoff as well as a cap. The purpose of the lower cutoff (x_0 in figure 7.4) is the company should not have to reward performance they consider mediocre or poor. The upper cutoff or cap means no extra rewards are provided for performance above this level. (Merchant & van der Stede, 2007) Also, similarly to both the current incentive model in the contract between E.ON and EMG and the incentive model used by the E.ON New Solutions B2C sales unit, the KPIs are added as an average for the last 3 months in the proposed new incentive models. This makes them less sensitive to extreme events.

7.3.1 Model 1 - Two dimensions to ensure efficiency and OTIF

Model 1, seen in figure 7.5, has been inspired by the commission model used by the E.ON New Solutions B2C sales department. This model has two dimensions where a bonus is awarded to the installer based on performance. To incentivize both efficiency and precision, the two dimensions chosen were the number of accepted installations and finished projects reported on time and in full. This will ensure the installer benefits from being efficient and having time to do more installations and at the same time not decrease their reliability. To ensure the customer satisfaction and safety focus is not lost, these parameters will be gateways to the bonus model.



BONUS PER MONTH SEK		Accepted/planned projects per month			
		40	50	60	70
OTIF delivered installations	85%	36000	112500	189000	265500
	90%	54000	135000	216000	297000
	95%	72000	157500	243000	328500
	100%	90000	180000	270000	360000

Figure 7.5: Incentive model 1 - two dimensions to ensure efficiency and OTIF.

The threshold values, presented in bold and red in steps 1 - 2 in figure 7.5, have been defined with the levels of the current incentive model at E.ON New Solutions in mind as well as from the feedback sessions held with E.ON representatives. The bonus levels are based on the profit made from the additional installations executed beyond the accepted level. The authors propose an acceptable level of installations could be either based on how many installations EMG has to do each month to “break-even” or a certain percentage of all of E.ON New Solutions’ installations. In the proposed model the accepted level is put at 30 installations. If EMG performs on a level above the accepted level, they will get part of the excess profit derived from the overperformance. The calculations made to reach the different bonus levels as well as the financial figures needed can be seen in appendix 5. However, due to the sensitive nature of these financial figures, all financial figures used in this model are completely fabricated. But they still represent and explain the logic behind the model.

Lastly, in step 4, the bonus can be decreased if E.ON has registered any customer errands regarding installations done by EMG. This is done to ensure quality is not deprioritized in favor of efficiency. The subtracted sum of 10 000 SEK per customer errand is derived from the profit that is lost for E.ON when EMG has to spend a day on revisiting and repairing an old project due to malfunction instead of spending that time on new installations. The penalty is only subtracted from the bonus. If the penalty fee is larger than the bonus a certain month, EMG will not receive any bonus nor penalty.

It is important to notice that all numbers presented in bold and red in figure 7.5 are subject to change. E.ON New Solutions B2C can change these numbers as they see fit according to their financial strategy without the purpose of the model being impaired. In table 7.11 the KPIs incentivized, benefits, risks, and comments connected to model 1 can be seen.

Table 7.11: KPIs incentivized, benefits, risks, and comments regarding model 1.

KPIs incentivized	Customer satisfaction: NPS from customer survey
	Safety: Number of safety observations
	Efficiency: Number of installations accepted per month
	On time in full: On planned week and no additional errands after the installation
	Quality: Number of customer errands that can be connected to the installation company
Benefits	Promotes performance: Motivates EMG to both accept many installations but also complete them on time
	Promotes partnership: Mainly focuses on positive rewards
	Valuable: Profit-sharing model where both E.ON and EMG benefit from additional installations
Risks	Administration: E.ON must maintain/update certain numbers e.g. target number of installations as EMG grows
	Impaired relations: Having the NPS as a gateway to bonus can be perceived as unfair as the score is somewhat out of the installer's control. Also, the fee for customer errands can risk impaired relations
	Lack of impact: Could be EMG considers it too difficult to reach the first level of the bonus model with the result that they will not even try
Comments	Stakeholders at E.ON can adjust how much of the profit they deem reasonable to share with EMG
	Cannot be used on the external installers without modifications since they do jobs not only for E.ON
	Penalties could easily be added to this model if it is desirable

7.3.2 Model 2 - Installed panels/person/day as an efficiency measure

Model 2 is based on the current incentive model recently implemented by E.ON New Solutions B2C. However, some minor changes were made to the limits in the current incentive models to make it clearer and not open for misinterpretations. This model covers the majority of the measures the authors have deemed necessary and reasonable to incentivize. However, a crucial parameter missing is efficiency, hence, this is added as an additional step for EMG to get the bonus.

In model 2, the efficiency measure is introduced as a separate model in addition to the current one. The benefit of introducing a separate model is that it does not have to be measured using the stepwise score system. With this, the installers would not be rewarded for improving until they reach the next level, and if this is too difficult to reach, they might settle. Hence, a suggestion for a continuous bonus model in addition to the current one will be presented, to motivate the installers to make every step of improved efficiency valuable.

Model 2, displayed in figure 7.6, uses the efficiency measure panels/person/day. This measure is considering EMG's growth in the number of employees and will ensure they have to increase efficiency for example when a team goes from two to three installers. The installed panels/person/day is derived from the target set by EMG (see chapter 4, section 4.3.1) of 5 panels/person/day. However, if this is considered too low or too high this figure is subject to change without the model losing its purpose. The bonus will be a percentage of the sum that EMG has been paid during the month in question.

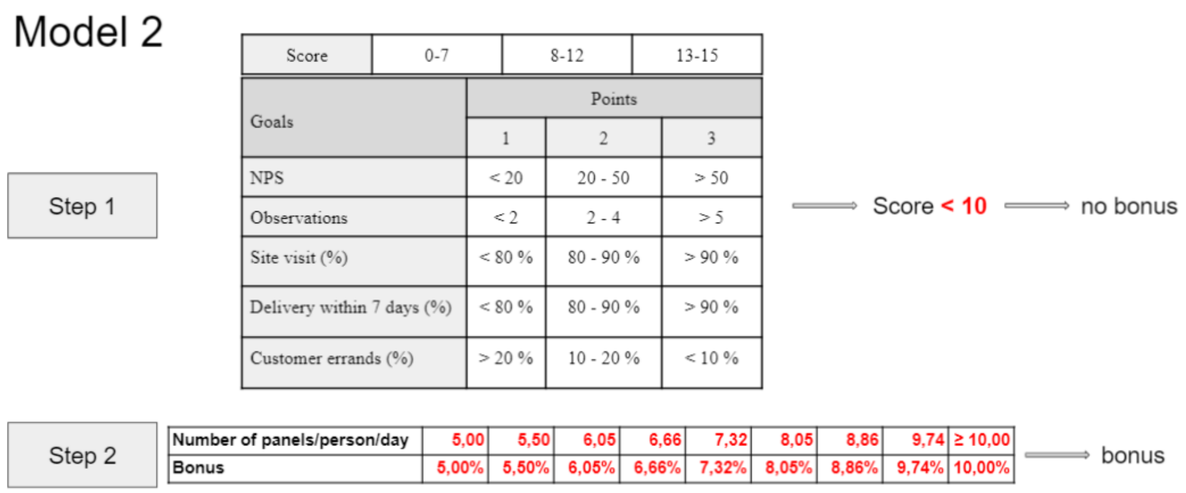


Figure 7.6: Incentive model 2 - Installed panels/person/day as an efficiency measure.

As a gateway to be eligible for a bonus, EMG must reach at least 10 points in the existing incentive model. This way, an acceptable level of other parameters beyond efficiency is ensured. The input data needed to extract the efficiency level is specified in appendix 5. One of the input data will be the number of employees at EMG to calculate their panels/person/day. This can be done either with the total number of employees or only the installers or the installers and the electricians and adjusting the baseline target thereafter. The authors suggest that the number of employees for this model should be both the roof panel installers and the electricians, but not the administrative staff. Then everyone working at the installation site will be included and have an incentive to be efficient. With this, it will be necessary for E.ON to follow EMG's growth per month and how many of their employees were at work each month. In table 7.12 the KPIs incentivized, benefits, risks, and comments with model 2 are presented.

Table 7.12: KPIs incentivized, benefits, risks, and comments regarding model 2.

KPIs incentivized	Customer satisfaction: NPS from customer survey
	Safety: Number of safety observations
	Quality: Number of customer errands that can be connected to the installation
	On time: Installation on planned week
	OTIF (site visit); Report handed in on time in full
	Efficiency: Number of panels/person during a time period
Benefits	Simple: All of the KPIs exist and are measured in some way today, which indicates implementing this model will not call for much extra administration
	Promotes performance: Covers KPIs regarding many of the identified success factors for an installation, making sure none can be disregarded completely
	Promotes partnership: promotion framed model leads to improved relationships
	Valuable: Model with an economic bonus leading to positive financial impact for EMG
Risks	Impaired relations: Sense of unfairness because factors out of the installer's control affect the efficiency
	Suboptimization: A higher rejection rate on installations because the installers try to avoid complex installations where the rate of panels would be lower
	Lack of impact: The bonus/penalty targets are not on a suitable level and leads to installers not feeling they can reach the next level or settle on a comfortable level
Comments	The added efficiency measure cannot be used on the external installers. Since they do jobs not only for E.ON and lead time is not measured, their panels/person/day cannot be measured in the same way.

7.3.3 Model 3 - Adding lead time as an efficiency measure in the current model

Like model 2, the third proposed model is based on the current model (with some minor changes to the limits to reduce possible misinterpretations). In model 3, the efficiency measure is added as an integrated part of the current incentive model. The benefits of an integrated model are the administration will be more straightforward and it will not lead to double-penalty or double-reward.

The efficiency measure used in model 3 is installation lead time. This would ensure efforts are directed to the speed of an installation. Also, following up on lead time can help in monitoring what EMG spends their time on. If they see EMG has increased their speed, they can assign them more installations. Model 3 is illustrated in figure 7.7. The bonus/penalty will be a percentage of the sum that EMG has been paid during the month in question.

Model 3

Step 1

Goals	Points		
	1	2	3
NPS	< 20	20 - 50	> 50
Observations	< 2	2 - 4	> 5
Site visit (%)	< 80 %	80 - 90 %	> 90 %
Delivery within 7 days (%)	< 80 %	80 - 90 %	> 90 %
Customer errands (%)	> 20 %	10 - 20 %	< 10 %
Average lead time (h)	**> 16**	**12 - 16**	**< 12**

Step 2

Compensation levels	95%	100%	105%
Points	**0-9**	**10-14**	**15-18**

Figure 7.7: Incentive model 3 - Lead time as an efficiency measure.

As the goal is an installation should take 1-2 days, the threshold value has been set to 16 hours to get 2 points in the model. An option for measuring lead time is to split it up into three separate measures, adapted from the different parts making up an installation, as identified in table 7.3. Having the lead time split up creates awareness of how much each part of the installation affects the whole. One aspect brought up in a feedback session was a wish to highlight the time for scaffolding, which tends to take more time than necessary. However, this will also create a need for more administration, both for EMG and E.ON. Also, measuring the lead time as a whole should be effort directing and EMG can themselves analyze what drives their lead times internally. Hence, the authors believe E.ON should start by incentivizing lead time as a whole but if this is not enough to show performance improvement, the lower level metrics on lead time can be used. In table 7.13 the KPIs incentivized, benefits, risks, and comments with model 3 are presented.

Table 7.13: KPIs incentivized, benefits, risks, and comments regarding model 3.

KPIs incentivized	Customer satisfaction: NPS
	Safety: Number of safety observations
	Quality: Number of customer errands
	On time: Installation on planned week
	OTIF (site visit); Report handed in on time in full
	Efficiency: Number of panels/person during a time period
Benefits	Promotes performance: Covers KPIs regarding many of the identified success factors for an installation, making sure none can be disregarded completely
	Promotes partnership: Hybrid model with both bonus and penalty, but with a higher chance of getting full payment or bonus than penalty
	Valuable: Hybrid model with an economic penalty/bonus leading to eminent financial impact
Risks	Administration: Lead time is not measured at this time, and it will be necessary to include this in the follow-up and adjust the system/create a new function to do this
	Suboptimization: A higher rejection rate on installations because the installers try to avoid complex installations where the rate of panels would be lower
	Lack of impact: The bonus/penalty targets are not on a suitable level and leads to installers not feeling they can reach the next level or settle on a comfortable level
Comments	Can measure lead time as a whole or in parts

7.3.4 Model 4 - Using benchmarking as a basis for bonus

In model 4 the idea is to use benchmarking to ensure high-level performance. EMG would receive a bonus if they qualify as one of the top three out of all installation companies that E.ON New Solutions B2C works with on the five KPIs: efficiency, customer satisfaction, OTIF site visit, OTIF installation, and customer errands. To make sure EMG will not receive a bonus for substandard performance, regardless of if they are “best in class”, the parameters OTIF and customer errands will be gateways to the bonus model. Also, the number of safety observations needs to reach a certain level for EMG to qualify for the bonus model. The fourth suggestion of an incentive model is presented in figure 7.8.

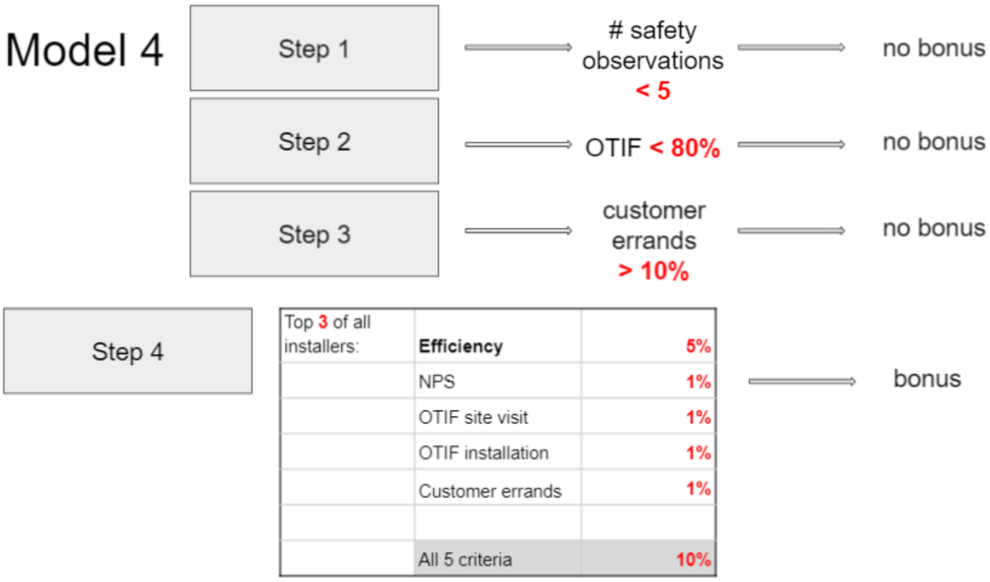


Figure 7.8: Incentive model 4 - using benchmarking as a basis for a bonus.

The gateway values (presented in bold and red in step 1-3 in figure 7.8) are derived from the middle level in the current incentive model that E.ON New Solutions B2C uses as well as what the authors have understood are in line with E.ON's performance targets. In step 4, the idea is that EMG should deliver as the top 3 out of the roughly 20 installation companies E.ON New Solutions works with. This level was deemed appropriate by the authors since the goal is to ensure a top-level performance by EMG. However, this number can easily be modified without it affecting the main purpose of this model. The same is true for all numbers presented in bold and red in figure 7.8, they can be altered to fit the current business goals at E.ON New Solutions B2C.

The bonus will be a percentage of the sum that EMG has been paid during the month in question. Furthermore, this model is a multiple incentive model that motivates the EMG to exceed in several incentive areas but also balances these areas following the priorities of the E.ON. In the proposed model efficiency generates the largest bonus, which will lead to EMG putting the most focus on this KPI.

E.ON New Solutions are in a good position to use benchmarking since they work with several installation companies and this type of model would be regulated automatically by the players on the market. Also, it is E.ON's responsibility to choose good installation partners that will ensure EMG needs to deliver high performance to be on top. The benefits, risks, and additional comments connected to model 4 are summarized in table 7.14.

Table 7.14: KPIs incentivized, benefits, risks, and comments regarding model 4.

KPIs incentivized	Safety: Number of safety observations
	On time in full: Both site visit and installation on planned week and no additional errands after site visit/installation
	Quality: Number of customer errands that can be connected to the installation
	Customer satisfaction: NPS from customer survey
	Efficiency: ∑(panels)/∑(lead time of installations) = panels/h
Benefit	Ensures that EMG performs at market level and is self-regulating
	Step 1-3 ensures minimum requirements regarding safety, OTIF, and quality so that bonuses cannot be paid for substandard performance
	In step 4 efficiency is rewarded most because an acceptable level of the other parameters have already been ensured
	The model is automatically adjusted for possible seasonality in efficiency
Risk	Administration: The lead times for the installations are currently not measured, so this needs to be in place and function well before this model will be applicable
	Suboptimization: This measurement of efficiency does not drive an efficient use of half days (meaning another installation is started if the previous one is finished before the workday is over). However, with a start and end time for each project, it will be easier for E.ON to follow up and question what the teams did during their half days and thus drive them to start new installations instead of taking time off
Comments	Step 1-3 could be excluded if it is believed being one of the top 3 on the different KPIs is good enough and worthy of a bonus
	Other KPIs could be added to the benchmarking table as well. Also, other ways to measure efficiency are possible

7.4 Risks and sensitivity

RQ3: Which risks are connected to the proposed incentive models and what sensitivity aspects can be observed?

For each proposed incentive model there are risks that must be considered and, if possible, mitigated. A risk analysis is therefore necessary. It is also important to understand how sensitive the proposed models are. The risk analysis is presented in section 8.4.1 and the sensitivity analysis is presented in section 7.4.2.

7.4.1 Risk analysis

The first step of the risk analysis is risk identification (Norrman & Jansson, 2004). The risks identified for each proposed model were presented in table 7.11, 7.12, 7.13, and 7.14. In table 7.15 below all risks are summarized.

Table 7.15: Summary of all risks connected to the proposed models.

<table>
<tr><th rowspan="2">Model</th><th colspan="5">Risks</th></tr>
<tr><th>Extensive Administration</th><th>Impaired Relations</th><th>Suboptimization</th><th>Lack of impact</th><th>Other</th></tr>
<tr><td rowspan="2">All models</td><td rowspan="2">Follow up on incentive model and make bonus payments</td><td>Complexity of installation not considered when measuring efficiency</td><td rowspan="2">Increased rejection rate after site visit when efficiency is incentivized</td><td rowspan="2">Threshold targets in the model are not on a suitable level</td><td>Efficiency affected by seasonalities or unexpected events (i.e. bad weather, accidents, customers not home etc.)</td></tr>
<tr><td>EMG believes they can only affect the NPS and efficiency result to some extent</td><td>Bonus levels too generous</td></tr>
<tr><td>Model 1</td><td>Too complex to maintain target numbers as EMG grows or if business goals changes</td><td>Fee for customer errands decreases or eliminates bonus</td><td></td><td></td><td></td></tr>
<tr><td>Model 2</td><td>Too complex task for E.ON to administer the number of active employees at EMG during a certain time period</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Model 3</td><td>No routine for measuring lead time present today</td><td>Penalty aspect is considered unfair</td><td>Does not drive an efficient use of half days</td><td></td><td></td></tr>
<tr><td rowspan="2">Model 4</td><td rowspan="2">No routine for measuring lead time present today</td><td rowspan="2">EMG believes it is unfair to compare all installation partners since they all have different prerequisites</td><td rowspan="2">Does not drive an efficient use of half days</td><td rowspan="2"></td><td>Some installation companies are doing much fewer installations for E.ON than EMG, making them unsuited for comparison</td></tr>
<tr><td>If all installation companies perform poorly EMG could get a bonus for poor performance on the KPIs that are not included in step 1-3</td></tr>
</table>

The second step of the risk analysis is to evaluate the identified risks by distributing them in a risk matrix with the dimensions of business impact and probability of risk (Norrman & Jansson, 2004). The result of how the authors evaluated the identified risks can be seen in table 7.16.

*Table 7.16: Risk matrix of identified risks.**

Probability	Very high	Impaired relations because EMG believes they can only affect the NPS and efficiency result to some extent	Other: Efficiency affected by seasonalities or unexpected events (i.e. bad weather, accidents, customers not home etc.)		Suboptimization because the model can lead to increased rejection rate after site visit when efficiency is incentivized
	High	- Extensive administration due to follow up on incentive model and make bonus payments - Impaired relations because penalty aspect is considered unfair (M3) - Extensive administration because it is a too complex task to maintain target numbers as EMG grows or if business goals changes (M1)	- Impaired relations because EMG believes it is unfair to compare all installation partners since they all have different prerequisites (M4)	- Lack of impact because threshold targets in the model are not on a suitable level - Extensive administration because no routine for measuring lead time present today (M3, M4) - Other: Some installation companies are doing much fewer installations for E.ON than EMG, making them unsuited for comparison (M4)	Suboptimization because the model does not drive efficient use of half days (M3, M4)
	Medium	- Impaired relations because fee for customer errands decreases or eliminates bonus (M1) - Other: If all installation companies perform poorly EMG could get a bonus for poor performance (M4)	Impaired relations because the complexity of installation not considered when measuring efficiency		
	Minor	Extensive administration because it is a too complex task for E.ON to administer the number of active employees at EMG during a certain time period (M2)	Other: Bonus levels too generous		
		Minor	Medium	High	Very high
	Business impact				

**(M1 indicates the risk is associated with only model 1, M2 indicates the risk is associated with only model 2, etc.)*

From table 7.16 it is concluded not all risks have the same importance when evaluated on business impact and probability. The risks ranked as minor and medium risks are not as important as the risks on a high and very high level. The final step of the risk analysis process is to decide how to manage the risks. This can mean accepting the risk or implementing actions that will reduce the probability and/or the business impact if the risk would occur. (Norrman & Jansson, 2004) The authors have decided to only address the most important risks, i.e. the risks with the highest probability of occurring as well as the highest business impact (marked in red, in the top right corner, in table 7.16). The proposed risk strategies can be seen in table 7.17 below.

Table 7.17: Risk management strategies for the most important risks.

Risk	**How to manage the risk**
Other: Efficiency affected by seasonalities or unexpected events (i.e. bad weather, accidents, customers not home, etc.)	This risk can be reduced by calculating the values in the incentive model based on data from an average during 3 months.
Suboptimization because the model can lead to increased rejection rate after site visit when efficiency is incentivized	This risk can be mitigated by starting to measure the rejection rate after site visits (%) as a metric to make sure this rate is not increased when the incentive model is implemented. Two suggestions on how to use this are: • Follow up and include in monthly meetings • Include as a gateway measure in the incentive model
Lack of impact because threshold targets in the model are not on a suitable level	This risk should be accepted at this point in time. Even though the targets in the model are too high, the models still provide the effort directing purpose and give EMG clear indications on which performance levels are expected of them regarding different KPIs. Also, the threshold targets can be subject to change if deemed necessary.
Extensive administration because no routine for measuring lead time present today (M3, M4)	This is a risk that should be accepted. Since efficiency is considered important it should be prioritized to start measuring lead times accurately for each project.
Other: Some installation companies are doing much fewer installations for E.ON than EMG, making them unsuited for comparison (M4)	This risk can be mitigated if only the installation companies doing many installations for E.ON are part of the comparison. For example, only half of the installers working with E.ON could be included and then the ones doing the most installations should be chosen.
Suboptimization because the model does not drive efficient use of half days (M3, M4)	This risk should be accepted since the proposed incentive models do not worsen the situation with inefficient half days compared to the current situation. However, the authors recommend E.ON follow up on half days since they, with improved KPIs regarding lead times, can monitor if a project ends in the middle of the working day another project should be started in the afternoon that same day. This can be followed up on the monthly meetings.

7.4.2 Sensitivity analysis

As a first step in the sensitivity analysis, the authors analyzed how the proposed models would have played out during the last year by using historical data on EMG installations. Previously, data regarding customer errands and safety observations have not been collected in a structured way or connected to specific installations, which is why this data has not been included. Important to notice when looking at the number of finished installations each month is that EMG has grown a lot since they were established at the beginning of 2020. Therefore, part of the increase in the number of installations can be derived from this. The available historical data relevant to the proposed incentive models are summarized in table 7.18.

Table 7.18: Historical data on EMG's installations a year back.

Month	NPS	NPS rolling 3 months	# Installations	# Installations rolling 3 months	OTIF installation	OTIF installation rolling 3 months	OTIF Site visit	OTIF Site visit rolling 3 months
2021-03	46	55	31	27	71%	44%	-	-
2021-02	100	53	21	26	52%	40%	34%	48%
2021-01	28	29	28	30	54%	34%	40%	66%
2020-12	39	28	28	33	14%	28%	71%	71%
2020-11	34	25	33	35	33%	35%	88%	59%
2020-10	25	32	39	32	36%	38%	54%	38%
2020-09	30	25	32	23	34%	45%	37%	30%
2020-08	55	33	26	16	42%	46%	24%	44%
2020-07	0	39	12	12	58%	44%	28%	50%
2020-06	55	72	11	14	36%	47%	80%	60%
2020-05	72	-	13	-	38%	-	42%	63%
2020-04	100	-	18	-	67%	-	58%	-
2020-03	-	-	-	-	-	-	90%	-
Average	45	39	24	24	45%	40%	54%	53%

The historical data covers the planning process until February 2021 and installations executed until March 2021. The data has been extracted from E.ON's planning file, which is a continuously updated document, but it is not a guarantee all data on all installations done are included or that the data is completely accurate.

From the data presented in table 7.18, it is concluded EMG has not reached the gateway target for OTIF installation any month last year. Regarding the NPS it is concluded EMG would have reached the gateway target of 40 only a few months. This means, reaching a bonus will be difficult if implementing one of the suggested incentive models at this time. It should be noted the gateway targets set are what E.ON expects their installers to perform and lowering them would mean going against their business goals. However, with the risk of lack of impact in mind (as addressed in section 7.4.1, table 7.15 and 7.16) the authors recommend E.ON to review this and adjust these levels if deemed appropriate.

Robustness of the models is increased by all models having a lower and an upper cap, making them less sensitive to, for example, unforeseen luck, short-term increased performance at the expense of the long-term performance level, or a faulty model design (Merchant & van der Stede, 2007). Especially the upper caps increase the robustness of the models since they make it impossible for E.ON to pay a larger bonus than the highest bonus level regardless of performance (Saltelli et al., 2000).

Model 1 - Two dimensions to ensure efficiency and OTIF

Graphical methods illustrate sensitivity in the form of graphs by giving visual indications of how the variation in inputs affects the output (Frey & Patil, 2002). This was done for model 1 in figure 7.9 below. There it is visible how different efficiency levels (the colored lines) and the OTIF levels (on the x-axis) give different bonus amounts (the y-axis). Notably, the graph would look similar if the levels of accepted installations were illustrated on the x-axis and the OTIF levels as the colored lines. This could be illustrated in a three-dimensional graph as well, but this was excluded in favor of the simplicity of a two-dimensional graph.

It is concluded that using stepwise bonus levels in model 1 (the filled-in lines) makes it less sensitive to an increased number of projects. The dotted lines in figure 7.9 illustrate how the bonus would be affected if the OTIF bonus levels were continuous rather than steps and it is concluded that if the bonus was continuous, E.ON would have to pay a larger amount of bonus to EMG than they would do for the proposed stepwise model.

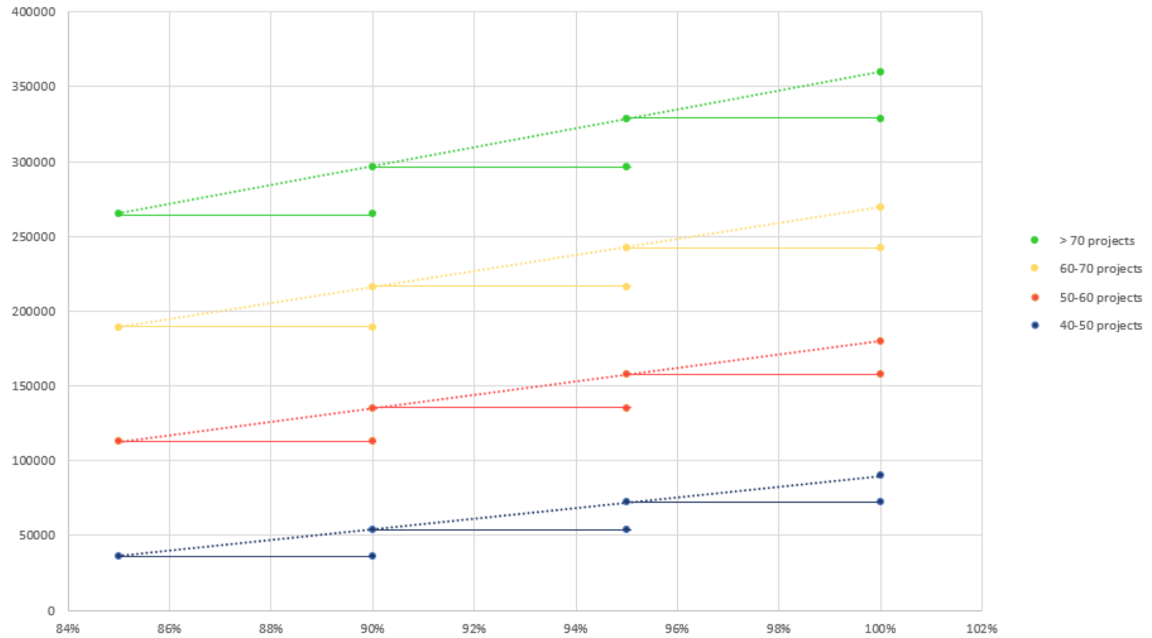


Figure 7.9: Graphical illustration of how different inputs affect the output of model 1.

Furthermore, the baseline for model 1 is the target of the number of installations EMG should execute each month. The bonus is earned if this number is exceeded. For this to be applied correctly, it is crucial this target is maintained at a suitable level. A potential issue for this is EMG's aggressive growth target. The model will be sensitive to if EMG can manage more installations simply by growing as a company (increasing their capacity) and not by increasing their efficiency.

It is concluded this model is sensitive to increased capacity as EMG grows. In this model design, capacity is promoted more than efficiency. For example, assuming an acceptable number of installations for EMG today is 30 installations, the graph in figure 7.10 illustrates if EMG grows by around 30% they will automatically reach the first efficiency level in model 1 simply by having grown in the number of employees and not doing anything to improve their efficiency. This is a risk associated with this model, first presented in table 7.11, and it is crucial to continuously monitor these stepwise limits for the number of accepted installations in this model for the bonus payments only be paid for improved efficiency. A solution to this would be to relate the number of installations to the number of employees instead.

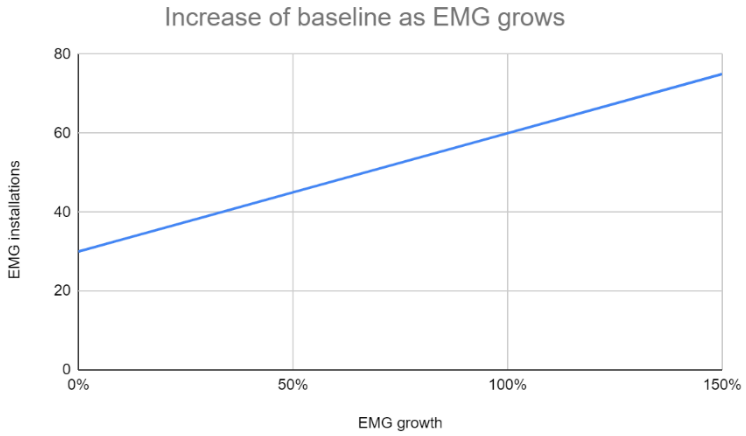


Figure 7.10: Increase in EMG's capacity as they grow.

Lastly, it has also been concluded customer errands will decrease the bonus paid and many customer errands can eliminate the bonus. This analysis has been done by calculating how many customer errands lead to all of the bonus being eliminated. If the penalty fee for each customer errand is 10 000 SEK (as suggested in section 7.3.1), table 7.19 below illustrates how many customer errands EMG can have before all of the possible bonus payment is gone. For high bonus levels. EMG can afford having many customer errands.

Table 7.19: Illustration of how many customer errands EMG can have before the bonus is zero.

Number of customer errands before the bonus is gone		**Accepted installations per month**			
		40	50	60	70
OTIF delivered installations	85%	3,6	11,3	18,9	26,6
	90%	5,4	13,5	21,6	29,7
	95%	7,2	15,8	24,3	32,9
	100%	9,0	18,0	27,0	36,0

Model 2 - Installed panels/person/day as an efficiency measure

In the sensitivity analysis of model 2, it was concluded the baseline target for the number of panels can be adjusted and will affect the bonus outcome, but the upper cap of 10 % bonus increases the robustness. Graphical illustrations of how the variation in inputs affects the output in the second step of the model were used. The authors also believed it was interesting to graphically examine how the outputs would be affected if the baseline (meaning the level where the bonus begins) of the two-dimensional model in step 2 was changed. This is illustrated in figure 7.11. In the graph in figure 7.11, it becomes visible that different efficiency levels (x-axis) affect the bonus paid to EMG (y-axis).

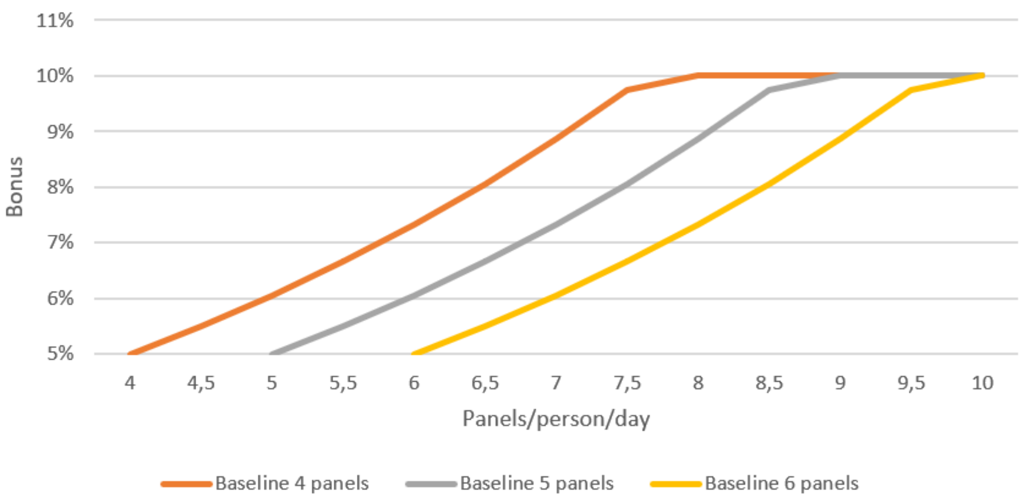


Figure 7.11: Graphical illustration of how different inputs affect the output of model 2.

Furthermore, it was concluded EMG needs on average 2 points on every gateway KPI to be eligible for a bonus. Since the first step in model 2 has five times three dimensions it is complicated to visualize this step graphically. However, it is interesting to look at different scenarios and see, for example, how many one-pointers EMG can have to still move on to the second step of the model and possibly receive a bonus. In table 7.20 it can be seen that EMG can have two one-pointers, one two-pointer, and the rest three-pointers and still be eligible for the second step and a bonus.

Table 7.20: Scenarios where EMG get no bonus or are eligible for the next step in the model.

	Points (input)		
	scenario 1	scenario 2	scenario 3
KPI 1	1	1	2
KPI 2	2	1	2
KPI 3	2	2	2
KPI 4	2	3	2
KPI 5	2	3	2
Total score	**9**	**10**	**10**
Result (output)	**No bonus**	**Eligible for bonus**	**Eligible for bonus**

Model 3 - Adding lead time as an efficiency measure in the current model

It is concluded EMG needs an average above 2 points to get a bonus. As identified earlier in the historical data displayed in table 7.18, this can be challenging. As for model 2, graphically illustrations were deemed too complex by the authors. Instead, it is interesting to look at different scenarios and see, for example, how many one-pointers EMG can have to still receive a bonus. In table 7.21 different scenarios where EMG receives a different amount of one-pointer, two-pointers, and three-pointers are examined to see all possible inputs that lead to a bonus (≥ 15 points) or a penalty (≤ 9 points) as an output.

Table 7.21: Scenarios where EMG get a penalty, neither a penalty nor a bonus or a bonus.

	Points (input)					
	scenario 1	scenario 2	scenario 3	scenario 4	scenario 5	scenario 6
KPI 1	2	2	1	2	1	2
KPI 2	2	2	1	2	2	2
KPI 3	2	2	3	2	3	2
KPI 4	1	2	3	2	3	3
KPI 5	1	1	3	3	3	3
KPI 6	1	1	3	3	3	3
Total score	**9**	**10**	**14**	**14**	**15**	**15**
Result (output)	**Penalty**	**No bonus**	**No bonus**	**No bonus**	**Bonus**	**Bonus**

Model 4 - Using benchmarking as a basis for bonus

The bonus earned by EMG in model 4 can range from 0 to 10 %, depending on which KPIs they exceed at compared to the other installation companies. As a first step of the sensitivity analysis, the authors graphically examined which bonus would be generated in different scenarios, where EMG was one of the top three performers on different KPIs (figure 7.12). The bonus levels range from 1% to 10% if they are among the top performers regarding only one of the KPIs or all KPIs in the model.

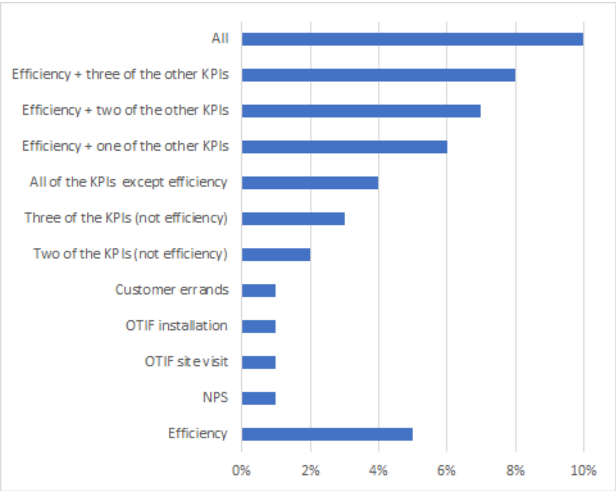


Figure 7.12: Graphical illustration of the bonus earned in different scenarios.

Furthermore, it is also interesting to see the output (bonus to EMG) during the past year if this model would have been in place. Since measuring efficiency by ∑(panels)/∑(lead time of installations) = panels/h has not been done at all before it is not possible to look at historical data for this KPI. The same is true for customer errands. But it is possible to illustrate this for NPS, OTIF site visit, and OTIF installation. Table 7.22 shows an average during a year for EMG and the other installers E.ON works with. In appendix 4, the KPIs are displayed monthly, using a 3-month rolling average value.

It is concluded EMG would have a chance of getting some bonus, but the outcome is sensitive to the performance of the other installers. The small installers doing less than 20 installations a year, can create misleading benchmarking because the sample is too small. For example, an installer only doing one installation a month for E.ON will have greater chance/risk of unrepresentative measurement results. This was also brought up as a risk by E.ON representatives in one of the feedback sessions. To avoid this, the largest suppliers should not be compared to the smallest in the benchmarking. Also, if choosing to only benchmark a few of the installers with EMG, it might be too generous with a top 3 criteria, and it could then be changed to a top 2 or number one criteria.

Table 7.22: The top three installers for different KPIs during the last year.

Supplier	OTIF installation	OTIF site visit	NPS	Number of projects registered
EMG	51%	59%	39	285
Installation company 1	52%	49%	7	238
Installation company 2	47%	44%	32	140
Installation company 3	46%	58%	21	99
Installation company 4	69%	20%	40	90
Installation company 5	18%	31%	−7	45
Installation company 6	43%	13%	5	40
Installation company 7	17%	89%	−44	38
Installation company 8	80%	74%	20	28
Installation company 9	65%	33%	51	25
Installation company 10	16%	71%	15	20
Installation company 11	14%	7%	−13	18
Installation company 12	89%	24%	32	13
Installation company 13	78%	56%	34	10
Installation company 14	0%	100%	−75	1
Installation company 15	0%	0%	0	0
Installation company 16	0%	0%	0	0
Installation company 17	0%	0%	0	0

7.5 Recommendation of one model

Purpose: To recommend one incentive model for E.ON to use in their service contract with their internal solar panel installer.

Following the risk and sensitivity analysis, a final validation session was held with E.ON representatives to evaluate the applicability of the models and to decide which has the most potential. In the validation session with E.ON New Solutions B2C representatives, all models were presented, and the participants shared their thoughts on the potential and applicability of the models. This was done in a systematic way where the participants got to rank each model from 1-5 (with one being the lowest score and five the highest) on the criteria:

- **Potential -** Potential to improve performance considering efficiency as well as maintaining a satisfactory overall performance including customer satisfaction, on time delivery, quality and safety.
- **Applicability -** To what extent is it possible to implement today? Is extensive administration necessary? Will this model be difficult to implement and use?

The result of the ranking is presented in table 7.23 and figure 7.13.

Table 7.23: Ranking 1-5 of each model on the criteria potential and applicability.

Model	Criteria	Head of E.ON New Solutions B2C	Head of Operations	Business Developer	Supply Planner	Average
Model 1	Potential	2	4	3	3	3
	Applicability	3	4	5	5	4,25
Model 2	Potential	4	2	4	3	3,25
	Applicability	3	4	2,5	3	3,125
Model 3	Potential	3	4,5	4	3	3,625
	Applicability	2	2	3	4	2,75
Model 4	Potential	4	3	4	4	3,75
	Applicability	2	3	4	3	3

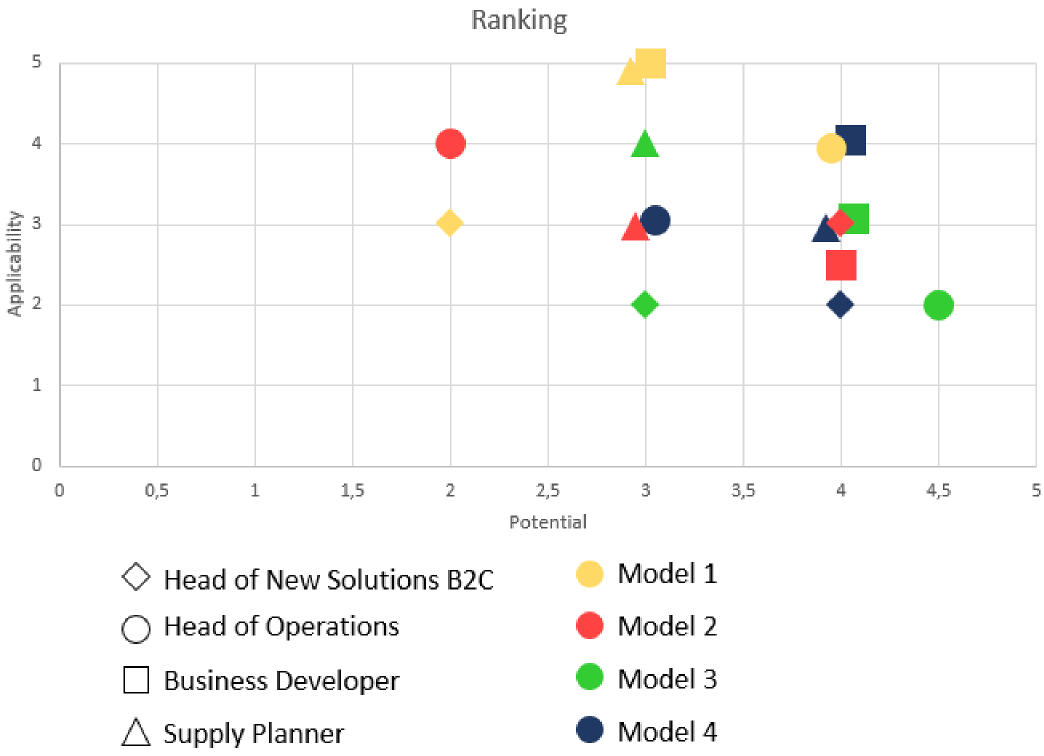


Figure 7.13: Ranking 1-5 of each model on the criteria potential and applicability.

Some comments on the models were that model 1 would be easy to implement because all the data and metrics needed are available today. The participants also thought model 1 was easy to understand and communicate. It was also noted this model would be suitable for EMG in particular because of it is clear focus on efficiency. Model 2 and 3 was in general considered too complex because they include many parameters. Model 4 was generally liked by the participants because of the competitive aspect of the benchmarking setup. They thought this would motivate EMG to constantly improve. However, it was considered to be a complex task to measure efficiency for all installers and decide which installers to benchmark with EMG.

From the ranking, the authors concluded two models stood out as the most preferred by the E.ON representatives, model 1 and model 4. Model 1 has the highest score on applicability and a medium score on potential, whereas model 4 has the highest score on potential and a medium score on applicability. Considering it was important the recommended model was an *applicable* incentive model for E.ON to use on EMG, model 1 has been favored by the authors because of the higher rank on applicability, but still also having good potential. Also, looking at the risk analysis, it is concluded models 1 and 2 have the least high impact/high probability risks connected to them (see appendix 6) and the most important risks all have strategies to handle or mitigate them. This leads to the conclusion that the authors would like to recommend model 1.

8. Conclusion

In this chapter, the research questions are answered through a summary of the results from the analysis and construction chapters (chapters 7 and 8). The final recommendation regarding which incentive model the authors think E.ON should use is presented. Also, the scope of applicability, the contribution of this research, and areas for further research are presented.

8.1 Fulfilment of Purpose and Research Questions

The authors conclude that the purpose to *recommend one incentive model for E.ON to use in their service contract with their internal solar panel installer* has been fulfilled. The recommended model was model 1, presented first in figure 7.5 and in section 8.1.4. Its potential and applicability were confirmed in a validation session with E.ON representatives. In this chapter, the answers to the three sub-questions as well as the overall research question are summarized.

8.1.1 RQ1: Which selection criteria for KPIs could E.ON use and which KPIs could E.ON measure in the installation process?

The KPIs E.ON chooses should be measurable, aligned with objectives as well as communicative and understandable. To be aligned with objectives, they should reflect the identified success factors efficiency, on-time delivery, quality, safety, and customer satisfaction. In addition, the KPIs should follow the SMART criteria and be balanced among important perspectives. The selection criteria are summarized in table 8.1 below.

Table 8.1: Selection criteria for KPIs.

Criteria	**Explanation**
Aligned with objectives	Represent all important objectives and enable follow-up on them
Communicative and understandable	Possible to communicate the KPI and follow it up with the service providers, that should understand how the KPI is measured and why
SMART	Specific, Measurable, Achievable, Relevant, and Time-specific
Balanced among important perspectives	Balanced between the customer, internal, learning, and growth as well as financial perspective
Strategic	KPIs should be strategic and reflect the performance of an organization in achieving its goals and objectives

The authors have developed several performance measures they believe are important for E.ON to measure and follow up on. They are all connected to the identified success factors and fulfill the selection criteria. The proposed KPIs with descriptions are summarized in table 8.2. Some of the KPIs in table 8.2 are already measured by E.ON and some of them are new propositions.

Table 8.2: KPIs E.ON could measure for the installation of solar panels.

Focus area	KPI	Unit	Explanation
Efficiency	Installation lead time	Hours	The installers indicate the time they start the installation and the time they complete the installation. This could be reported via an app, for example, the app Mowin that they already use. Enables a more thorough measure than exists today where lead times could be measured on even half days.
	Number of panels/person during a time period	Panels/ person/time unit	Measuring the number of panels installed per time period (e.g. month or day). This KPI is already used by EMG as a rough estimate of how long each installation should take so they can plan their work schedule. Person = employees including installers and electricians.
	Accepted installations/month	Number of accepted installations	Measuring the total number of accepted installation projects per time period. This is already followed up by E.ON in their systems.
On time in full delivery (OTIF)	On time: On planned day(s) or week. In full: No errands after installation	Days or weeks	Measure OTIF with on time as installation on a certain day and in full as that the solar panel facility works and the installers have no intention of returning to the site.
Coherent installation	The roof panel installers and the electrician have been on site with no interruptions in between	Yes/No	The roof panel installers and the electrician have been on site with no interruptions in between.
Quality	Customer errands	Number of customer errands	Zero customer errands on an installation as a quality measurement.
Safety	Safety observations	Number of safety observations	The installers list and report all important safety observations for each installation.
Customer satisfaction	Net Promoter Score (NPS) from customer survey	Score between -100 and 100	Measure NPS on a 3-month period, based on the rating from the customer survey. (% of scores 9 - 10) – (% of score 0 – 6) = NPS. Important that the questions in the survey are clearly linked to the installation.

8.1.2 RQ2: How can these KPIs be connected to incentives and how could such incentive models look?

The authors concluded the possible incentive models should have both the effort directing purpose and the effort inducing purpose. In addition, the incentive models should be formula-based and consist of positive, or hybrid framed monetary rewards. The authors believe monetary rewards will have more impact than other positive rewards like praise and recognition. It was also deemed important to keep the proposed incentive models simple to allow for as easy administration as possible, but at the same time, ensure they cover all performance dimensions E.ON finds important. Therefore, an incentive model should only contain the most important KPIs, but other metrics should still be measured and followed up. Also, all KPIs that are incentivized must be possible for E.ON to monitor to ensure the installers report them truthfully.

With all this in mind, four alternatives of possible incentive models were developed by the authors. All proposed incentive models have an outcome-based compensation plan and would be part of a performance-based contract. The developed models are presented in figure 8.1. They all have suggestions for limits and bonus levels that the authors found appropriate. However, these limits are subject to change without the proposed models losing their purpose.

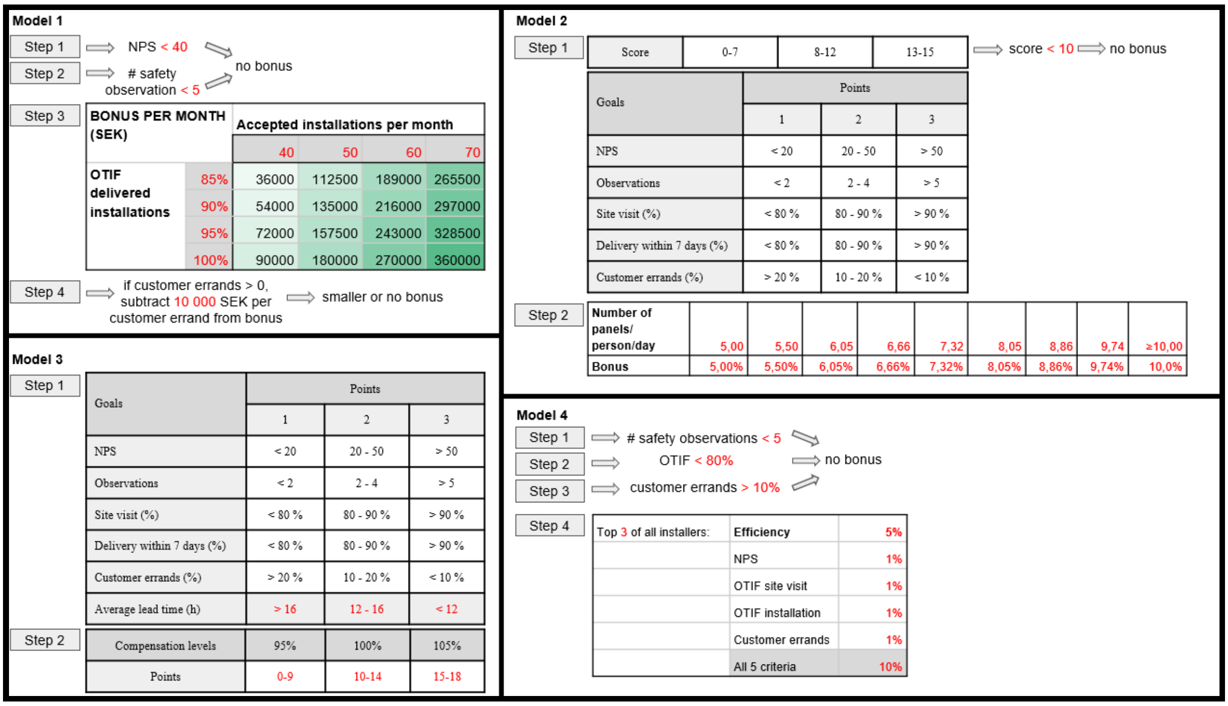


Figure 8.1: Summary of all proposed incentive models

8.1.3 RQ3: Which risks are connected to the proposed incentive models and what sensitivity aspects can be observed?

Each proposed incentive model is connected to risks. A risk analysis was made to identify and evaluate possible risks for each model. The risks were divided into the categories of extensive administration, impaired relations, suboptimization, lack of impact, and others. All risks connected to the proposed models are summarized in table 7.15 and evaluated in table 7.16. For the risks that the authors deemed the most severe, a risk management strategy was presented seen in table 8.3.

Table 8.3: Most important risks and proposed risk management strategies.

Risk	How to manage the risk
Other: Efficiency affected by seasonalities or unexpected events (i.e. bad weather, accidents, customers not home, etc.)	This risk can be reduced by calculating the values in the incentive model based on data from an average during 3 months.
Suboptimization because the model can lead to increased rejection rate after site visit when efficiency is incentivized	This risk can be mitigated by starting to measure the rejection rate after site visits (%) as a metric to make sure this rate is not increased when the incentive model is implemented. Two suggestions on how to use this are: • Follow up and include in monthly meetings • Include as a gateway measure in the incentive model
Lack of impact because threshold targets in the model are not on a suitable level	This risk should be accepted at this point in time. Even though the targets in the model are too high, the models still provide the effort directing purpose and give EMG clear indications on which performance levels are expected of them regarding different KPIs. Also, the threshold targets can be subject to change if deemed necessary.
Extensive administration because no routine for measuring lead time present today (M3, M4)	This is a risk that should be accepted. Since efficiency is considered extremely important it should be possible to accurately measure lead time for each project.
Other: Some installation companies are doing much fewer installations for E.ON than EMG, making them unsuited for comparison (M4)	This risk can be mitigated if only the installation companies doing many installations for E.ON are part of the comparison. For example, only half of the installers working with E.ON could be included and then the ones doing the most installations should be chosen.
Suboptimization because the model does not drive efficient use of half days (M3, M4)	This risk should be accepted since the proposed incentive models do not worsen the situation with inefficient half days compared to the current situation. However, the authors recommend E.ON follows up on half days since they, with improved KPIs regarding lead times, can monitor if a project ends in the middle of the working day another project should be started in the afternoon that same day. This can be followed up on the monthly meetings.

All proposed incentive models have a lower and an upper cap, making them less sensitive and more robust. To further investigate how sensitive each model is, different sensitivity analyses were made for each proposed model. Firstly, looking at installation data from the past year shows EMG would have difficulties reaching the gateway targets and getting a bonus will be difficult if implementing an incentive model at this time. Table 8.4 summarizes the sensitivity aspects investigated for each model.

Table 8.4: Summary of the sensitivity analysis.

Model 1	**Model 2**	**Model 3**	**Model 4**
Increased robustness by including lower and upper caps on bonus levels.	Increased robustness by including lower and upper caps on bonus levels.	Increased robustness by including lower and upper caps on bonus levels.	Increased robustness by including lower and upper caps on bonus levels.
EMG growing as a company implies an increased number of installations should be expected (figure 7.10)	An average of 2 points per KPI is needed for EMG to be eligible for a bonus (table 7.18)	An average of 2,5 points per KPI is needed for EMG to be eligible for a bonus (table 7.19)	Historical data shows EMG is not the top performer on the majority of the KPIs incentivized (table 7.20)
Many customer errands could eliminate the bonus (table 7.17)	The baseline target for the number of panels can be adjusted and will affect the bonus outcome (figure 7.11)		Benchmarking is sensitive to installers doing uneven or small amounts of installations for E.ON (appendix 4)

8.1.4 Purpose: To recommend one incentive model for E.ON to use in their service contract with their internal solar panel installer

All the proposed incentive models in figure 8.1 are possible options for an incentive model in E.ON's service contract with their internal installation company. In the validation session, the models were ranked on applicability and potential to improve performance. There, model 1 and 4 stood out as favorable among E.ON representatives. Model 1, seen in figure 8.2, had the highest applicability score of the two and least severe risks connected to it. Therefore, the authors have concluded they want to recommend model 1. Model 1 is characterized by gateway values for customer satisfaction and safety, a two-dimensional bonus model promoting efficiency and on-time delivery. To promote quality, a fee is subtracted from the bonus for every customer errand.

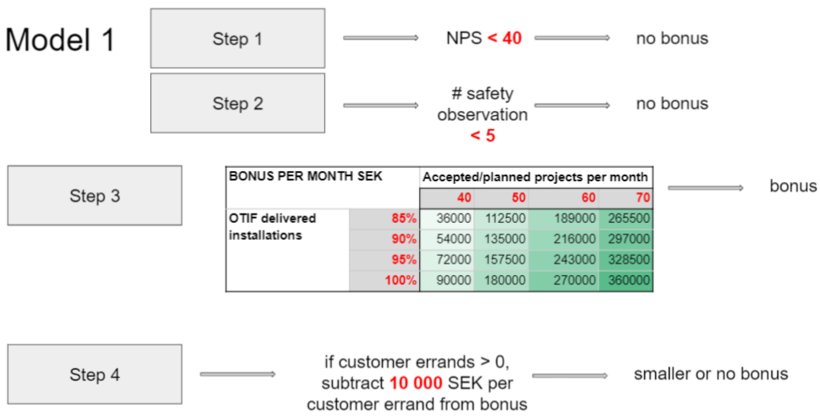


Figure 8.2: The final recommended model to E.ON.

8.2 Scope of applicability

The models developed in this project were focused on the contract between E.ON and EMG. Implementing an incentive model for only EMG provides a good opportunity to test and validate the model on a smaller scale before possibly implementing it for all installation partners. Since E.ON owns EMG and therefore has closer cooperation with them it is ideal to introduce an incentive model to them first.

Even though the external installation companies were not the focus of this project it is reasonable to assume the recommended model will, with some adjustments, be suitable for them as well. For model 1, the adjustments necessary would be the target levels for accepted installations. The amount of installations the external companies do for E.ON varies a lot and it is not reasonable for them to have the same levels as EMG who only work for E.ON. Therefore, another measure for efficiency would be more suitable if this model were to be expanded to the other installers as well.

In addition, the theoretical framework presented in chapter 3 applies to most companies contracting services, especially if the setting is a buyer-supplier-customer service triad. The ideas presented in the analysis could be useful for other companies contracting services to some extent, especially for companies on the solar panel market. However, the constructions are especially adapted for E.ON and their special needs and requirements. Therefore, for them to apply to other contexts, the authors conclude they would need to be modified.

8.3 Contributions to theory and practice

This research has constituted an attempt to provide an increased understanding of the use of incentives in contracts in a buyer-supplier-customer service triad setting. The area of service triads has not received much specific coverage in prior research (Wynstra et al., 2015), which is why this is a valuable contribution. Also, the report provides a summation of relevant literature on the topic of performance-based contracting. During the project, the authors have found little written material containing concrete examples of the design of incentive models for services. Most research found has been general and broad. Therefore, this research will contribute to theory by providing an example from a real-world context of how incentive models can be used in a buyer-supplier-customer service triad setting. Also, specifically an understanding of incentives under the lens of the electricity supply chain and solar power/solar panel expansion.

For E.ON, this research provides theoretical insights in areas relevant to their business. The multiple case study also provides insights into how other branches of E.ON in other countries work with contracting of installation services. It also provides a recommendation of an incentive model that E.ON can use in the service contract with their internally owned installation company EMG. Furthermore, the research presented in this thesis is a base for discussion of concepts like performance measurement, performance-based contracts, SLAs, and incentive models for E.ON.

8.4 Suggestions for future research

To further increase the understanding of incentive models in service contracts, future research must be made. In this section, the authors present future research opportunities for both E.ON and for researchers that the authors believe would be interesting to investigate.

8.4.1 For E.ON New Solutions B2C

One area that the authors believe would be interesting for E.ON to investigate is possible personal incentive models for the individual installers within EMG. Since this thesis was limited to exclusively looking into the service contract between E.ON and EMG, the internal contracts within EMG were not investigated in this project. However, the authors believe it would be motivating for the installers to have an incentive model with positive rewards in their contracts. Incentives within EMG could also have the personnel-related purpose, meaning incentives can be used as a strategy to retain and attract high-quality staff (Merchant & van der Stede, 2007). In a market where there is a lack of skilled solar panel installers, this could be beneficial.

Another area the authors would like to suggest E.ON looks into are information and trust-based solutions to achieve incentive alignment (Narayanan & Raman, 2004). This project has focused on contract-based solutions, but the authors believe there could be great potential to solve the issues experienced in the relationship between E.ON New Solutions B2C and EMG by improving the social contracts. In a social contract, the buyer and seller establish agreements, that are not legally binding, about objectives and behavioral standards as a foundation for their ongoing interactions. These social incentives can be a powerful motivator for improved performance (van der Valk & van Iwaarden, 2011). Also, mutual trust and a sense of partnership are important aspects to deal with emerging principal-agent-related risks. (van Weele, 2014)

In addition, the authors think pricing methods could also be an interesting area for E.ON to investigate further. All models proposed in section 8.3 are built on the fact that the currently used price list is still going to be in place and the potential bonus is added to this. It could be an option to decrease the fixed payment per installation and increase the variable, performance-dependent part of the payment to put more risk on the agent which provides an even greater incentive to perform.

Also, it could be interesting for E.ON to conduct a more extensive sensitivity analysis of the proposed models in section 7.3. An option would then be to create a database of simulated KPI values over time and see which bonuses/penalties the models would generate. Due to the limited time frame of the project, the authors did not do this sensitivity analysis themselves.

Since the solar power market is a rather new and fast-growing market, the authors believe there is a possibility to improve business processes, routines, and leadership to improve areas like efficiency, quality, and customer satisfaction in the installation process of solar panels. Therefore, this would be an interesting area to further research for E.ON. This work could be done before or in parallel with introducing an incentive model.

8.4.2 For researchers

To make the findings from this thesis more substantiated, further research in the form of empirical testing of incentive models in service contracts are needed, especially in the context of a buyer-supplier-customer service triad setting. Another area that would be interesting to further research is in which contexts incentive models in contracts are suitable to improve the performance of an agent. The authors believe it would be interesting to study if all markets are compatible with incentive models or if some aspects or qualifications need to be in place for incentive models to be suitable.

Also, further investigation of the electricity supply chain under the lens of the solar power expansion is necessary. When doing research for this project, the authors concluded there is little published research in this supply chain area. Possible research areas could be the similarities and differences between electricity supply chain management and classic supply chain management, how the monopolistic nature of the electricity market affects the supply chain management processes, renewable energy supply chain management in the context of solar energy, or similar areas. The authors believe the renewable electricity supply chain in general and solar panel technology in particular will become increasingly important in the coming decades to fight global warming. This is why more research in these areas is absolutely necessary.

References

Akyuz, G. A. and Erkan, T. E. (2010) Supply chain performance measurement; a literature review. *International Journal of Production Research*, 48 (17), pp. 5137-5155.

Alchian, A. and Demsetz, H. (1972) Production, information costs, and economic organization. *American Economic Review*, 62 (5) (1972), pp. 777-795.

APICS (2017) Supply Chain Operations Reference Model: SCOR Version 12.0. APICS internal report.

Arbnor, I. and Bjerke, B. (1997) Methodology for Creating Business Knowledge. Sage Publications, Newbury Park, CA.

Axelsson, B. and Wynstra, J. Y. F. (2002) Buying Business Services. Chichester: John Wiley and Sons.

Bauer, K. (2004) KPIs - The Metrics That Drive Performance Management. *DM Review*, v. 14, n. 9, pp. 63–64.

Beaumont, N. (2006) Service level agreements: An essential aspect of outsourcing. *The Service Industries Journal*, 26:4, pp. 381-395. DOI: 10.1080/02642060600621563.

Berg, E., Norrman, A., and Näslund, D. (2015) Systematiska och processorienterade mätsystem: En teoriöversikt. Lund University.

Björnland, D. and Persson, G. (2003) Logistik för konkurrenskraft – ett ledaransvar. Liber.

Blomkvist, P., Hallin, A., and Lindell, E. (2018) Metod för företagsekonomer. Studentlitteratur AB.

Bower, D., Ashby, G., Gerald, K., and Smyk, W. (2002) Incentive Mechanisms for Project Success. *Journal of Management in Engineering*, J Manage Eng 2002; 18(1): pp. 37–43.

Braun, D. and Guston, D. H. (2003) Principal-agent theory and research policy: An introduction. *Science and Public Policy*, Volume 30, Issue 5, October 2003, pp. 302–308.

Buchholz, K. (2019). Solcellsmarknaden exploderar - men installatörerna saknas. Göteborgs-Posten. 15 june. Available 2020-01-26. https://www.gp.se/nyheter/solcellsmarknaden-exploderar-men-installat%C3%B6rerna-saknas-1.15616855

Buckley, P. and Majumdar, R. (2018) The services powerhouse: Increasingly vital to world economic growth. Issues by the Numbers, July 2018, Deloitte Insights. https://www2.deloitte.com/us/en/insights/economy/issues-by-the-numbers/trade-in-services-economy-growth.html/#endnote-sup-4

Cambridge English Dictionary (2021) Meaning of key performance indicator in English. Available 2021-02-24 https://dictionary.cambridge.org/dictionary/english/key-performance-indicator

Chen, Q., Hall, D. M., Adey, B. T., and Haas, C. T. (2020) Identifying enablers for coordination across construction supply chain processes: a systematic literature review. *Engineering, Construction and Architectural Management,* Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/ECAM-05-2020-0299

Chesbrough, H. W., Vanhaverbeke, W., and West, J. (Eds) (2008) Open Innovation: Researching a New Paradigm. Oxford University Press, Oxford.

Chopra, S. and Sodhi, M. (2004) Managing Risk to Avoid Supply-Chain Breakdown. *MIT Sloan Management Review*.

Coyle, J. J., Bardi, E. J., and Langley, C. J. (2002) The Management of Business Logistics—A Supply Chain Perspective (seventh ed.), Thomson Learning, Canada (2002).

da Mota Pedrosa, A., Näslund, D., and Jasmand, C. (2012) Logistics case study based research: towards higher quality. *International Journal of Physical Distribution & Logistics Management*, Vol. 42 No. 3, pp. 275-295. https://doi.org/10.1108/09600031211225963

Deloach, J. W. (2000) Enterprise-wide Risk Management. Strategies for Linking Risk and Opportunities, Financial Times/Prentice-Hall, London.

Denscombe, M. (2010) The good research guide: for small-scale social research projects. 4:e red. Maidenhead: Open University Press.

Doran, G. T. (1981) There's a S.M.A.R.T. way to write management's goals and objectives. *Management Review*. 70 (11): pp. 35–36.

Eisenhardt, K. M. (1989) Agency theory: An assessment and review. Academy of Management. *The Academy of Management Review*, Vol. 14 No. 1, pp. 57-74.

Ellram, L. M. (1996) The use of the case study method in logistics research. *Journal of Business Logistics,* 17(2), pp. 93-138.

EMG (2021) Om oss. EMG. Available 2021-01-26 https://emgab.se/om-oss/

Energimyndigheten (2020a) Nätanslutna solcellsanläggningar. Statens energimyndighet. Available 2021-01-26 http://www.energimyndigheten.se/statistik/den-officiella statistiken/statistikprodukter/natanslutna-solcellsanlaggningar/

Energimyndigheten (2020b) Energiläget 2020. Statens energimyndighet, maj 2020 ET 2020:1. ISSN 1404-3343.

E.ON (2020a) Om E.ON | Om företaget - E.ON. Available 2020-12-10. https://www.eon.se/om-e-on/om-foeretaget.html

E.ON (2020b) Solceller - Installera solceller för villa och hus. Available 2020-12-10. https://www.eon.se/solceller?utm_expid=.DUoyn_u9THGF0LTS17hvhA.0&utm_referrer=https%3A%2F%2Fwww.eon.se%2Fsolceller%2Fsolcellspaket

E.ON (2021a) Decentralized energy supply for private customers. Available 2021-02-09. https://www.eon.com/en/private-customers.html

E.ON (2021b) Solcellspaket. Available 2021-03-08. https://www.eon.se/solceller/solcellspaket

E.ON (2021c) E.ON Solar. Available 2021-03-23. https://www.eon.de/de/pk/solar.html#faq

E.ON Energidistribution (2020) Koncessionsområde. Available 2020-12-10. https://www.eon.se/content/dam/eon-se/swe-documents/installatorer/swe-natomradeskarta.pdf

Essent (2021a) E.ON Groupons moederbedrijf . Available 2021-03-29. https://www.essent.nl/content/overessent/eon-group/index.html

Essent (2021b) Ontdek ons bedrijf. Available 2021-03-29. https://www.essent.nl/content/overessent/index.html

Essent (2021c) Essent servicepartners in heel Nederland. Available 2021-03-29. https://www.essent.nl/content/particulier/energie-besparen/onze-servicepartners.html#

Franco-Santos, M., Kennerley, M., Micheli, P., Martinez, V., Mason, S., Marr, B., Gray, D., and Neely, A. (2007) Towards a definition of a business performance measurement system. *International Journal of Operations & Production Management.* Vol. 27, No. 8, pp. 784-801.

Frey, H. C. and Patil, S. R. (2002) Identification and Review of Sensitivity Analysis Methods. *Risk Analysis an International Journal*, Volume 22, Issue 3, June 2002, pp. 553-578.

Gammelgaard, B. (2004) Schools in logistics research?: A methodological framework for analysis of the discipline. *International Journal of Physical Distribution & Logistics Management*, 34(6), pp. 479-491.

Golicic, S. L., Davis, D. F., and McCarthy, T. M. (2005) A balanced approach to research in supply chain management. In H. Kotzab, S. Seuring, M. Müller, & G. Reiner (Eds.), Research methodologies in supply chain management, pp. 15–29. Heidelberg: Physica-Verlag HD. DOI: 10.1007/3-7908-1636-1_2.

Grinold, R. and Rudd, A. (1987) Incentive Fees: Who Wins? Who Loses? *Financial Analysts Journal*, 43(1), pp. 27-38.

Gruen, S., Dalheim, M., Karlsson, J., Morén, G., Svanberg, E., and Wahlberg, S. (2020) Sveriges el- och naturgasmarknad 2019. Energimarknadsinspektionen R2020:05.

Grönroos, C. (2000) Service Management and Marketing: A Customer Relationship Management Approach. Second edition. John Wiley & Sons Ltd. ISBN: 0-471-72034-8.

Halldórsson, Á. and Aastrup, J. (2003) Quality criteria for qualitative inquiries in logistics. *European Journal of Operational Research*, 144 (2003) pp. 321–332.

Heinrich, C. and Choi, Y. (2007) Performance-Based Contracting in Social Welfare Programs. *American Review of Public Administration*, 37 (4), pp. 409-435.

Holmberg, S. (2000) A systems perspective on supply chain measurements. *International Journal of Physical Distribution och Logistics Management*, 30(10), pp. 847-868.

Hypko, P., Tilebein, M., and Gleich, R. (2010) Clarifying the concept of performance-based contracting in manufacturing industries. *Journal of Service Management*, 21 (5), pp. 625-655.

Höst, M., Regnell, B., and Runeson, P. (2006) Att genomföra examensarbete. Studentlitteratur, Lund.

IEA (2019) Solar - Fuels & Technologies 2020. Available 2021-01-26 https://www.iea.org/fuels-and-technologies/solar

Installatörsföretagen (2019) Kompetensbristens klimatkonsekvenser - Hur underskottet på installatörer påverkar klimatomställningen. Installatörsföretagen.

Kaplan, R. S. and Norton, D. P. (1992) The balanced scorecard – measures that drive performance. *Harvard Business Review*, 70(1), pp. 71-79.

Kaplan, R. S. (2009) Conceptual Foundations of the Balanced Scorecard. Handbook of Management Accounting Research, Vol 3, pp. 1253-1269.

Kasanen, E., Lukka, K., and Siitonen, A. (1993) The Constructive Approach in Management Accounting Research. *Journal of Management Accounting Research*. Vol. 5, pp. 243-264.

Kim, S. H., Cohen, M. A., and Netessine, S. (2007) Performance contracting in after-sales service supply chains. *Management Science*, Vol. 53 No. 12, pp. 1843-1858.

Kleijnen, J. P. C. (1995) Verification and validation of simulation models. *European Journal of Operational Research*, Volume 82, Issue 1, 1995, pp. 145-162, ISSN 0377-2217, https://doi.org/10.1016/0377-2217(94)00016-6.

Kotzab, H., Suering, S., Müller, M., and Reiner, G. (Eds.) (2005) Research Methodologies in Supply Chain Management. Physica-Verlag, Heidelberg.

Kovács, G. and Spens, K. M. (2005) Abductive reasoning in logistics research. *International Journal of Physical Distribution & Logistics Management*, Vol. 35 No. 2, pp. 132-144. https://doi.org/10.1108/09600030510590318

Li, M. and Choi, T., (2009) Triads in Services Outsourcing: Bridge, Bridge Decay and Bridge Transfer. *Journal of Supply Chain Management*, 45 (3), pp. 27-39.

Lockamy III, A. and McCormack, K. (2004) Linking SCOR planning practices to supply chain performance. *International Journal of Operations and Production Management*, 24 (12), pp. 1192-1218.

Lukka, K. (2003) The constructive research approach. In Ojala, L. & Hilmola, O-P. (eds.) Case study research in logistics. Publications of the Turku School of Economics and Business Administration, Series B 1:2003, pp. 83-101.

Manuj, I. and Mentzer, J. (2008) Global Supply Chain Risk Management. *Journal of Business Logistics*, Vol. 29 Issue 1, pp. 133-155.

Martin, L. L. (2002) Performance-based contracting for human services: lessons for public procurement? *Journal of Public Procurement*, Vol. 2 No. 1, pp. 55-71.

Martin, L. L. (2007) Performance-based Contracting for Human Services: A Proposed Model. P*ublic Administration Quarterly,* 31 (2): pp. 130–151.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., and Zacharia, Z. G. (2001) Defining Supply Chain Management. *Journal of Business Logistics*, Vol.22, No.2, pp. 1-25.

Merchant, K. A. and van der Stede, W. A. (2007) Management Control Systems – Performance Measurement. Evaluation and Incentives, Prentice Hall.

Miles M. B. and Huberman, A. M. (1984) Drawing Valid Meaning from Qualitative Data: Toward a Shared Craft. Educational Researcher. 1984;13(5): pp. 20-30. DOI:10.3102/0013189X013005020

Mitchell, V. W. (1995) Organizational Risk Perception and Reduction: A Literature Review. *British Journal of Management,* Vol. 6, No. 2, pp. 115-133.

Narayanan, V. G. and Raman, A. (2004) Aligning Incentives in Supply chains. *Harvard Business Review*, Nov, Vol. 82 Issue 11, pp. 94-102.

Naturvårdsverket (2020) Sveriges miljömål - Utsläpp av växthusgaser till år 2045. Naturvårdsverket. Available: 2020-12-10 https://sverigesmiljomal.se/etappmalen/utslapp-av-vaxthusgaser-till-ar-2045/

Neely, A., Adams, C., and Crowe, P. (2001) The performance prism in practice. Measuring Business Excellence, Vol. 5 No. 2, pp. 6-13. https://doi.org/10.1108/13683040110385142.

Neely, A., Gregory, M., and Platts, K. (1995) Performance measurement system design: A literature review and research agenda. *International Journal of Operations and Production Management*, 15 (4), pp. 80 – 116.

Neely, A., Mills, J., Platts, K., Gregory, M., and Richards, H. (1996) Performance measurement system design: should process based approaches be adopted? *International Journal of Production Economics*, 46-47 (1996), pp. 423-431.

Neely, A., Mills, J., Platts, K., Richards, H., Gregory, M., Bourne, M., and Kennerley, M. (2000) Performance measurement system design: developing and testing a process-based approach. *International Journal of Operations & Production Management*, Vol. 20 No. 10, pp. 1119-1145. https://doi.org/10.1108/01443570010343708

Neely, A., Richards, H., Mills, J., Platts, K., and Bourne, M. (1997) Designing performance measures: a structured approach. *International Journal of Operations and Production Management*, 17 (11) (1997), pp. 1131-1152.

Norrman, A. and Jansson, U. (2004) Ericsson's proactive supply chain risk management approach after a serious sub-supplier accident. *International Journal of Physical Distribution & Logistics Management*, Vol. 34 No. 5, pp. 434-456. https://doi.org/10.1108/09600030410545463

Norrman, A. and Lindroth, R. (2002) Supply chain risk management: purchasers' vs planners' views on sharing capacity investment risks in the telecom industry. Proceedings of the 11th International Annual IPSERA Conference, Twente University, 25-27 March, pp. 577-95.

Norrman, A. and Näslund, D. (2019) Supply Chain Incentive Alignment: The Gap between Perceived Importance and Actual Practice. *Operations and Supply Chain Management: An International Journal*, 12(3), pp. 129-142. https://doi.org/10.31387/oscm0380237

Näslund, D. (2002) Logistics needs qualitative research – especially action research. *International Journal of Physical Distribution & Logistics Management*, 32(5): pp. 60-77.

Ouchi, W. G. (1979) A conceptual framework for design of organizational control mechanisms. *Management Science*, 25 (9), pp. 833-848.

Parag, Y. and Sovacool, B. (2016) Electricity market design for the prosumer era. Nature Energy. 1. 16032. 10.1038/nenergy.2016.32.

Perrow, C. (1986) Complex Organizations: A Critical Essay Random House. New York (1986)

PWC (Pricewaterhouse Coopers) (2007) Guide to key performance indicators - Communicating the measures that matter. Available: 2021-05-20. https://www.pwc.com/gx/en/audit-services/corporate-reporting/assets/pdfs/uk_kpi_guide.pdf

Rapp, B. and Thorstenson, A. (1994) Vem skall ta risken? Studentlitteratur, Lund.

Regeringen (2020) Nytt skatteavdrag nästa år för privatpersoner som gör gröna investeringar. Regeringen. Available 2020-02-10 https://www.regeringen.se/pressmeddelanden/2020/09/nytt-skatteavdrag-nasta-ar-for-privatpersoner-som-gor-grona-investeringar/

Ritchie, H. and Roser, M. (2020) Renewable Energy. Published online at OurWorldInData.org. Available 2020-01-26. https://ourworldindata.org/renewable-energy

Rowley, J. and Slack, F. (2004) Conducting a literature review. *Management Research News*, Vol. 27 Iss 6 pp. 31-39.

Saltelli, A. (2002) Sensitivity Analysis for Importance Assessment. Risk Analysis, 22: pp. 579-590. https://doi.org/10.1111/0272-4332.00040

Saltelli, A., Chan, K., and Scott, E. M. (Eds.) (2000) Sensitivity Analysis. John Wiley and Sons, Ltd.: West Sussex, England.

Selviaridis, K. and van der Valk, W. (2019) Framing contractual performance incentives: effects on supplier behaviour. *International Journal of Operations & Production Management*, Vol. 39 No. 2, pp. 190-213. https://doi.org/10.1108/IJOPM-10-2017-0586

Selviaridis, K. and Wynstra, F. (2015) Performance-based contracting: a literature review and future research directions. *International Journal of Production Research*, 53:12, pp. 3505-3540, DOI: 10.1080/00207543.2014.978031

Simatupang, T. M. and Sridharan, R. (2002) The collaborative supply chain. *International Journal of Logistics Management*, Vol. 13 No. 1, pp. 15-30.

Simatupang, T. M. and Sridharan, R. (2005) Supply chain discontent. *Business Process Management Journal*, 11 (4), pp. 349–369.

SolarReview (2021) What equipment do you need for a solar power system? Available: 2021-03-08. https://www.solarreviews.com/blog/what-equipment-do-you-need-for-a-solar-power-system

Spence, M. (1973) Job market signaling. *Quarterly Journal of Economics*, 87: pp. 355-374.

Statista (2021) Photovoltaic capacity installed and connected in the Netherlands 2013-2019. Available: 2021-03-29. https://www.statista.com/statistics/497350/installed-photovoltaic-capacity-netherlands/

Stuart, I., McCutcheon, D., Hanfield, R., McLachlin, R., and Samson, D. (2002) Effective case research in operations management – a process perspective. *Journal of Operations Management*, Vol. 20 No. 5, pp. 419-33.

Sumo, R., van der Valk, W., van Weele, A., and Bode, C. (2016) Fostering incremental and radical innovation through performance-based contracting in buyer-supplier relationships. *International Journal of Operations & Production Management*, Vol. 36 No. 11, pp. 1482-1503. https://doi.org/10.1108/IJOPM-05-2015-0305

Thoring, K. (2019) EU solar boom. SolarPower Europe. Available 2020-01-26 https://www.solarpowereurope.org/eu-solar-boom-over-100-solar-market-increase-in-2019/

van der Valk, W. and van Iwaarden, J. (2011) Monitoring in service triads consisting of buyers, subcontractors and end customers. *Journal of Purchasing and Supply Management*, Volume 17, Issue 3, 2011, pp. 198-206. ISSN 1478-4092. https://doi.org/10.1016/j.pursup.2011.05.002

van der Valk, W. (2012) Three's a crowd: the tangle of principal-agent relationships in a supplier-buyer-customer service triad. Conference: 4th Production & Operations Management Conference.

van Weele, A. (2014) Purchasing and Supply Chain Management. 6th edition. ISBN 978-1-4080-8846-3. Cengage Learning.

Voss, C., Tsikriktsis, N., and Frohlich, M. (2002) Case research in operations management. *International Journal of Operations & Production Management*, Vol. 22, No. 2, pp. 195-219.

Weber, L. and Mayer, K. J. (2011) Designing effective contracts: exploring the influence of framing and expectations. *Academy of Management Review*, Vol. 36 No. 1, pp. 53-75.

Wynstra, F., Robbe, T., Rooks, G., Türksever, H., and van der Valk, W. (2012) Three is a crowd, but in which ways? Performance Based Contracting in Buyer-Supplier-Customer Triads. IPSERA 2012 Conference Proceedings, Part C: Competitive Papers, CP41.

Yin, R. (2014) Case Study Research, Design and Methods. Vol. 5, SAGE Publications.

Zeglat, D., Al Rawabdeh, W., Al Madi, F., and Shrafat, F. (2012) Performance Measurement Systems: Stages of Development Leading to Success. *Interdisciplinary Journal of Contemporary Research in Business*, 4(7), pp. 440-448.

Interviews

Business Developer E.ON New Solutions B2C (2021) *Interviewed by Anneli Håkansson and Beata Gynnerstedt 2021-03-02.*

Category Manager Procurement at Essent Nederland B.V. (2021) *Interviewed by Anneli Håkansson and Beata Gynnerstedt 2021-03-22.*

CEO EMG Energimontagegruppen AB (2021) *Interviewed by Anneli Håkansson and Beata Gynnerstedt 2021-03-04.*

International Category Leader - Installation Services at E.ON (2021) *Interviewed by Anneli Håkansson and Beata Gynnerstedt 2021-03-22.*

Head of E.ON New Solutions (2021) *Interviewed by Anneli Håkansson and Beata Gynnerstedt 2021-01-27 and 2021-03-10.*

Head of Operations Solar bei E.ON Energie Deutschland GmbH (2021) *Interviewed by Anneli Håkansson and Beata Gynnerstedt 2021-03-23.*

Head of Sales E.ON New Solutions B2C (2021) *Interviewed by Anneli Håkansson and Beata Gynnerstedt 2021-03-24.*

Operations Manager E.ON New Solutions B2C (2021) *Regular interviews by Anneli Håkansson and Beata Gynnerstedt during the project.*

Supply Planner E.ON New Solutions B2C (2021) *Interviewed by Anneli Håkansson and Beata Gynnerstedt 2021-03-03.*

Appendix 1 - Interview guides

Interview guide - The service triad and contract setup at E.ON

Interview guide

Date:
Interviewer:
Co-interviewer:
Respondent:
Location:
Time:

Context: *The context of the thesis as well as the RQs are briefly explained.*

Questions for all interviewees:

Introductory questions:

- Do you want to tell us a little about yourself, your background, and your role in the company?
- *Describe a normal working day for you.*

Relationships and the contracts:

- Can you briefly describe the relationship between E.ON and EMG?
- What type of contract exists between E.ON and EMG? Is it based on performance at all? Why / why not?
- How do you ensure the goals and incentives for EMG and E.ON in line with each other?
- What do you think would be the biggest challenge in implementing PBC?
- How is the service EMG performs specified in the contract?
- Is there a bonus/penalty based on performance?
- What do you think are the biggest challenges in designing a PBC?

Measurement of performance:

- What does performance measurement mean to you and what function do you think it fulfills?
- What criteria do you think a good KPI meets?
    - *Explain the concept of KPI if necessary.*
- How do you use key figures / KPIs for performance measurement of the installation process?
- What key figures do you measure?
    - *Why these?*
    - *How do you decide which key figures are measured?*
- How is the actual measurement and follow-up done?
- How are the key figures presented?
- Who is responsible for this?
- How often are measurements made?
- How does EMG stand out compared to other suppliers / how are suppliers benchmarked when it comes to customer service, quality, and safety?
    - *How would you define these concepts? How are they measured (e.g. graduation, binary, etc.)?*
    - *How is customer satisfaction measured?*
    - *How is customer satisfaction defined?*

Improvements and changes:

- What does an incentive model mean for you and how is a good one designed in your opinion?
  - *Possible criteria: clear? equitable? leads to the right behavior? easy to use? data available/easy to capture?*
- Are there any incentives/motivations today for EMG and the employees there to work actively with efficiency/improvement?
  - *Bonus system?*
  - *Praise / recognition?*
  - *Career development?*
- Are there specific goals set for the development/improvement of EMG?
  - Time horizon: quarterly? annually? longer time horizon?
  - Consequences if the goals are achieved / not achieved?
- What do you think works well and less well today in the collaboration between E.ON and EMG?

Risks:

- What do you think is the most important thing to keep in mind when developing an incentive model?
- What do you see as general risks with implementing incentive models - linked to some specific key figures (which have come up in previous questions)?

Conclusive questions:

- Do you have anything to add on the subject that you feel we have not addressed?
- Access to relevant documents (contract/SLA, follow-up meetings, etc.)?
- Do you know anyone else you think we should talk to?

We say thank you for the conversation, and ask if it is possible for us to send an email if something needs to be clarified or if we have additional questions.

Role specific questions:

CEO of EMG Energimotagegruppen AB:

- Tell us about EMG.
- Number of employees?
- Structure (teams, admin, etc.)?
- Tell us about the installation process.
  - *Difference between different types of installations?*
  - *What factors drive complexity in an installation?*
- Who are your primary / largest cost drivers? *(fixed and variable)*
- Do you see any difference in performance between different teams within EMG?
- How are they compared?

Business Developer at E.ON New Solutions B2C:

- Are there other similar situations as E.ON / EMG with the relationship between client and supplier within E.ON New Solutions B2C?
  - *What do these contracts look like?*
  - *What has worked well / less well with them?*
- How is the desired performance/delivery defined in the contracts with suppliers?
- What does the contract with EMG look like?
  - *What is specified about the installation process there?*
  - *How is EMG paid?*

Interview guide - Multiple case study

Interview guide

Date:
Interviewer:
Co-interviewer:
Respondent:
Location:
Time:

Context: *The context of the thesis as well as the RQs are briefly explained.*

Introductory questions:

- Can you describe your business briefly?
- What is your role at the company?
- What is your business relationship with the Installation/telemarketing partners?
    - *External installation/telemarketing companies?*
    - *Internal installation/telemarketing company (subsidiary)?*
    - *Many/few installation/telemarketing companies?*
    - *How close are the partnerships?*

Contracts:

- What is specified in the service contract regarding performance levels (KPIs)?
- Is the payment connected to performance in the contract?
- *Which pricing model do you use for your internal installation/telemarketing company?*

Performance measurement:

- How do you measure the performance of the installation/telemarketing partners?
    - *Which KPIs?*
        - *Quality*
        - *Safety (compliance with safety regulations)*
        - *Customer satisfaction*
        - *Efficiency*
    - *How is this communicated?*
- What are your selection criteria when deciding what to measure?
- How do you follow up on performance measurement?
- Do you use benchmarking to compare different installation/telemarketing companies?
    - *Especially if they work with both internal and external installers/telemarketing companies.*
- Is anything being done right now to develop and improve contracts with the partners?
    - *What kind of goals and/or targets has been set up for the performance of the installation/telemarketing process? (i.e, monthly, yearly targets/goals for improvement)?*

Incentive models:

- How do you/Have you worked with incentive/commission models in the contract with the installation/telemarketing partners to guarantee top-level performance?

    If yes:
    - *What kind of incentives? How does the incentive model look?*
    - *What was the reason behind implementing an incentive model?*
    - *What has been the result when implementing an incentive model?*

    - *Pros and cons?*
    - *Are there any unintended consequences of the designed performance incentives?*

    If no:
    - *Is this something you have considered? Why/why not?*
    - *Do you think a well-designed incentive model could make a difference?*
- What do you think are some pros and cons of incentive models?

Risk/sensitivity:
- What would you say are some risks/challenges connected to implementing incentive models?
    - *Have you experienced that something did not turn out as expected when working with this?*
    - *How have you tackled the risk aspect when working with incentive models?*
- How do you think one can avoid risk when implementing incentive models?

Conclusive questions:
- Do you have anything to add on the subject that you feel we have not addressed?
- Access to contract/SLA?
- Do you know anyone else you think we should talk to?

We say thank you for the conversation, and ask if it is possible for us to send an email if something needs to be clarified or if we have additional questions.

Appendix 2 - Observation protocol

Observation protocol for installation / site visit

Date:
Observers:
Location:
Time:

Installation-specific data:
Number in the installation team:
Electrician on-site:
Roof type:
Size (number of panels):
Roof height:
Tilt of roof:
Number of roof surfaces to install panels on:
Duration of installation (in days):

On-site interview guide:

- What is your role?
- How long have you worked as a solar panel installer?
- Number of panels?
- Number of days?
- Exact start and end time?
- If you finish in the middle of the day, do you go straight to another installation?

- What factors drive the complexity of an installation?
  - *Roof type, roof tilt, number of panels, number of roof surfaces, customer contact, etc.*

Appendix 3 - NPS questionnaire

The full NPS questionnaire can be seen in figure A3.1-A3.5. The questions are also translated and presented below:

1. Based on your experience of the installation of the solar panels, how likely is it that you would recommend E.ON to a friend or a colleague? 0 = not likely at all, 10 = very likely.
2. How satisfied are you with the installation of the solar panels? 1 = not satisfied at all, 5 = very satisfied, do not know. The boxes to the right allow for the customer to write about what they were satisfied with as well as not satisfied with connected to the installation process.
3. How satisfied are you with the information provided by E.ON prior to the installation? 1 = not satisfied at all, 5 = very satisfied, do not know.
4. How satisfied are you with treatment from the installer? 1 = not satisfied at all, 5 = very satisfied, do not know.
5. How well do you agree with the following statement: The installer showed me in a good way how the solar panel facility works. 1 = do not agree at all, 5 = fully agree, do not know.
6. Your answer has been registered. Thank you very much for participating. Your feedback helps us create a better customer experience.

Fråga 1

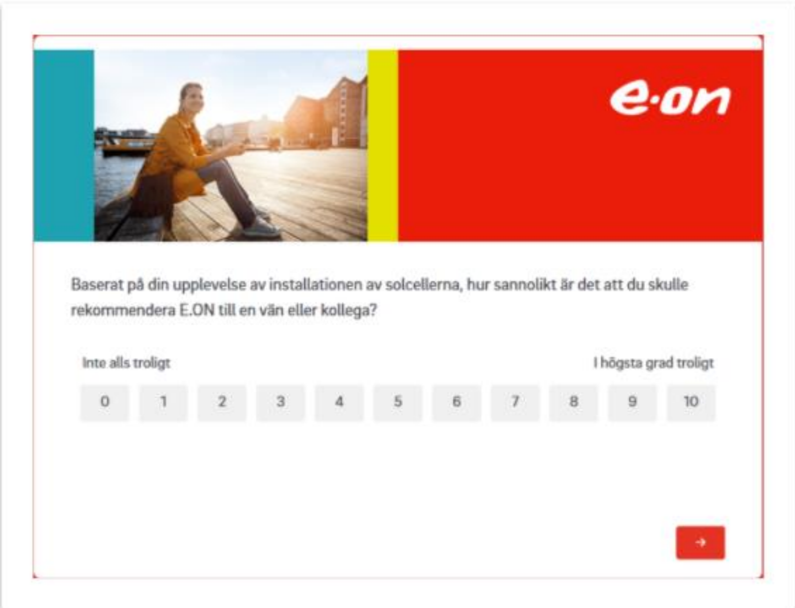


Figure A3.1: Question 1 in the NPS questionnaire.

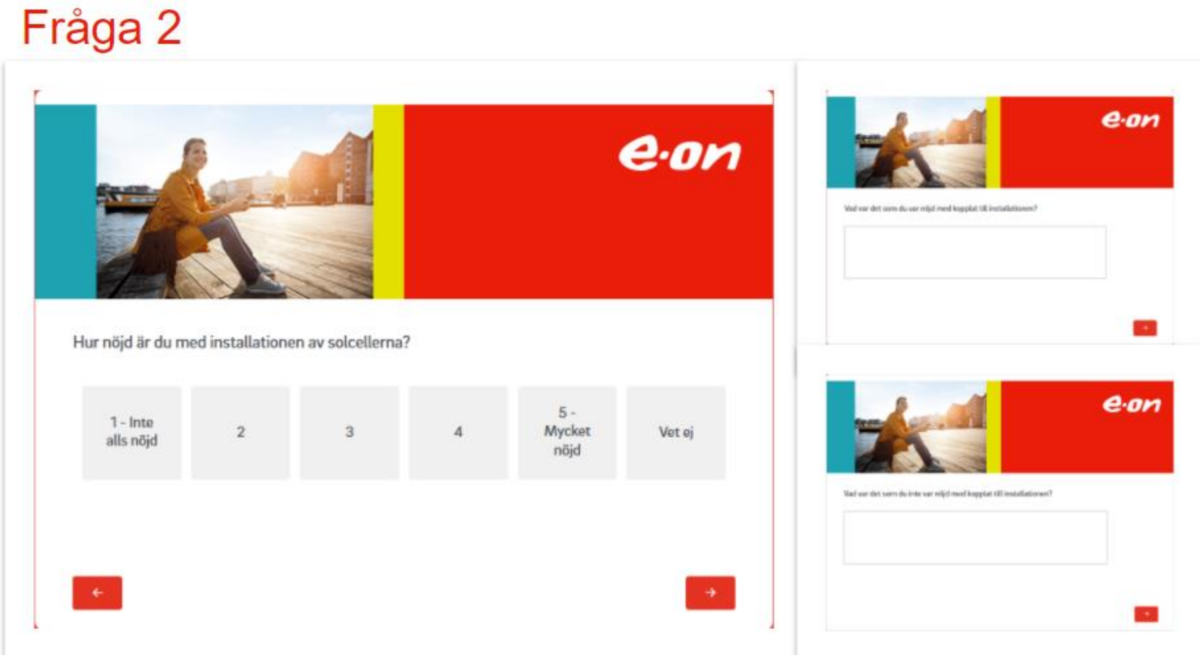


Figure A3.2: Question 2 in the NPS questionnaire.

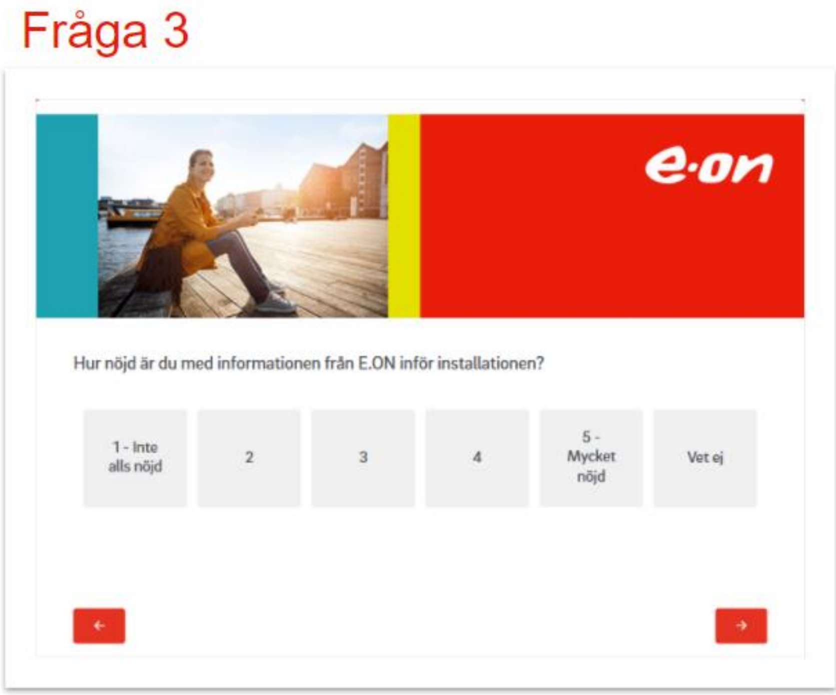


Figure A3.3: Question 3 in the NPS questionnaire.

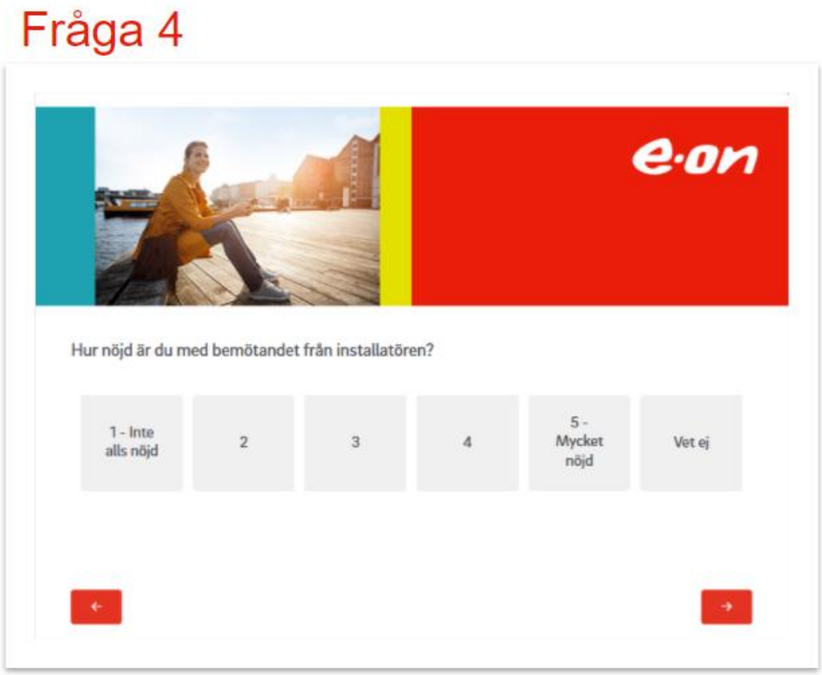


Figure A3.4: Question 4 in the NPS questionnaire.

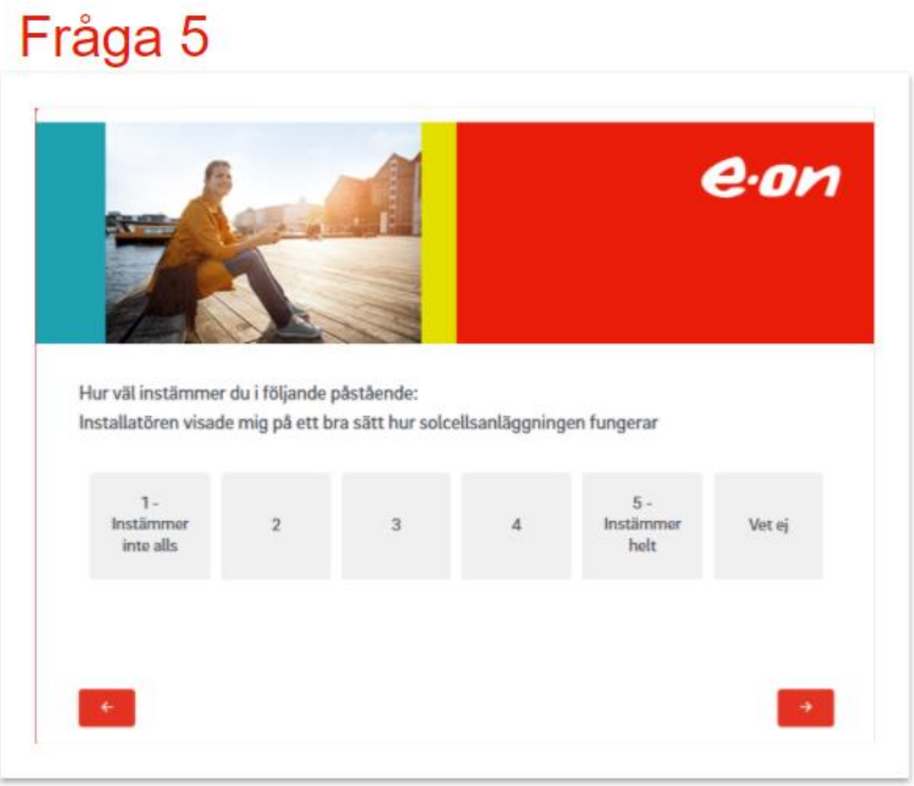


Figure A3.5: Question 5 in the NPS questionnaire.

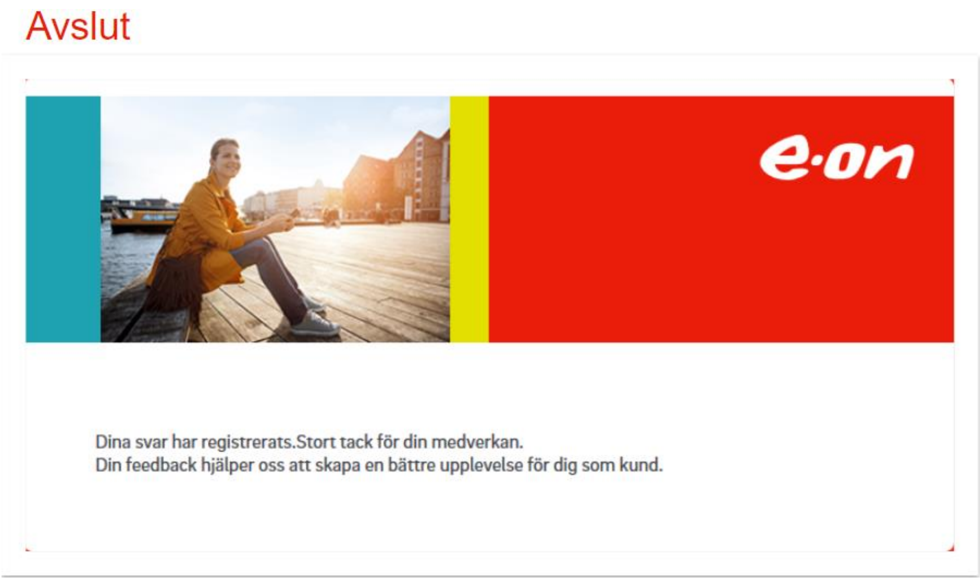


Figure A3.6: Ending of the NPS questionnaire.

Appendix 4 - Monthly KPI follow-up among installers

Table A4.1: The OTIF installation for each installer every month, using 3 months rolling average.

	Supplier														
Month	**EMG**	**Installer 1**	**Installer 2**	**Installer 3**	**Installer 4**	**Installer 5**	**Installer 6**	**Installer 7**	**Installer 8**	**Installer 9**	**Installer 10**	**Installer 11**	**Installer 12**	**Installer 13**	**Installer 14**
Apr															
May															
June	40%	38%	35%	12%	66%	30%	0%	38%	54%	75%	0%	32%	100%	100%	0%
July	54%	43%	43%	8%	67%	0%	0%	24%	63%	88%		21%	100%	100%	0%
Aug	56%	39%	47%	14%	69%	0%	33%	6%	83%	75%		15%	100%		
Sep	55%	50%	55%	28%	67%	0%	67%		83%	50%	21%	0%	100%	100%	
Oct	48%	50%	35%	40%	69%	0%	100%		83%	75%	38%		100%	100%	
Nov	45%	56%	40%	65%	65%	0%	100%		83%	100%	25%		100%	50%	
Dec	47%	52%	34%	63%	80%	43%			83%	100%	25%		100%	50%	
Jan (2021)	53%	65%	65%	85%	68%	45%			100%	50%	0%		100%	50%	
Feb (2021)	60%	70%	59%	79%	80%	45%			100%	0%	0%			100%	
Mar (2021)	54%	55%	54%	66%	58%	16%	0%	0%	67%	33%		0%	0%	50%	0%

Table A4.2: The OTIF site visit for each installer every month, using 3 months rolling average.

Month	Supplier														
	EMG	**Installer 1**	**Installer 2**	**Installer 3**	**Installer 4**	**Installer 5**	**Installer 6**	**Installer 7**	**Installer 8**	**Installer 9**	**Installer 10**	**Installer 11**	**Installer 12**	**Installer 13**	**Installer 14**
Apr															
May															
June	60%	41%	39%	45%	35%	27%	13%	77%	35%	0%	79%	27%		68%	100%
July	70%	28%	35%	37%	10%	27%	27%	100%	69%	0%	85%	0%			100%
Aug	60%	23%	32%	35%	10%	0%	27%		100%	50%		0%		0%	
Sep	54%	34%	23%	40%	0%	0%	0%		85%	50%		0%		0%	
Oct	40%	55%	27%	59%	10%	13%	0%		74%	25%			24%	0%	
Nov	48%	54%	29%	66%	27%	13%			63%	50%				100%	100%
Dec	69%	54%	45%	68%	33%	25%			72%	50%				84%	100%
Jan (2021)	71%	68%	50%	75%	29%	41%			90%	75%	50%			84%	100%
Feb (2021)	69%	65%	75%	83%	24%	76%				25%				68%	
Mar (2021)	50%	67%	83%	76%	18%	89%				0%				100%	

Table A4.3: The NPS score for each installer every month, using 3 months rolling average.

	Supplier														
Month	**EMG**	**Installer 1**	**Installer 2**	**Installer 3**	**Installer 4**	**Installer 5**	**Installer 6**	**Installer 7**	**Installer 8**	**Installer 9**	**Installer 10**	**Installer 11**	**Installer 12**	**Installer 13**	**Installer 14**
Apr															
May															
June	74	18	36	−16	2	−20	−26	−2	55	47	−45	35	50	46	0
July	41	15	29	−17	19	0	−2	−1	0	58	16	35	67	46	−50
Aug	35	21	46	−23	30	0	6	−14	−16	13	20	35	50		−100
Sep	27	8	49	7	32	−10	−1	−30	−4	−8	−11	−35	50		−100
Oct	34	13	28	33	66	−6	10	−33	63	−23	−56	−35	0		−100
Nov	27	13	25	49	50	−27	0	−65	67	77	0	−100	33	0	−100
Dec	30	26	13	65	46	−16	55		35	100	100		17	0	
Jan (2021)	31	10	52	32	65	−16			−15	100	100		17	25	
Feb (2021)	55	−29		44	49	0		−100	−15	100			0	75	
Mar (2021)	57	−18		48	52	30		−100	50					75	

Appendix 5 - Suggested incentive models

Model 1

All number presented in this appendix numbers are fabricated.

	A	B	C	D	E	F	G
1	Model 1 - Two dimensions to ensure efficiency and OTIF						
2							
3	**Gateways:**	NPS	>40	**Penalty per customer errand:**		10000	SEK
4		Safety observations	>5				
5							
6		To fill in:					
7	Revenue per project:	150000					
8	Profit target (GM):	15%					
9	E.ON profit per installation:	22500					
10	Share of (excess) profit to give EMG:	40%					
11	Bonus start level # of installations:	40					
12	OK/target # of installations:	30					
13	Average cost per installation:	40000					
14							
15							

Figure A5.1: Input data needed for the bonus levels of model 1.

	A	B	C	D	E	F	G
15							
16	**FINISHED PROJECTS OTIF**						
17			**Accepted/planned projects per month**				
18			40	50	60	70	
19	**OTIF delivered installations**	85%	34	43	51	60	
20		90%	36	45	54	63	
21		95%	38	48	57	67	
22		100%	40	50	60	70	
23							
24							
25	**TOTAL BUDGET AVAILABLE**						
26			**Accepted/planned projects per month**				
27			40	50	60	70	
28	**OTIF delivered installations**	85%	225000	450000	675000	900000	
29		90%	225000	450000	675000	900000	
30		95%	225000	450000	675000	900000	
31		100%	225000	450000	675000	900000	
32							

Figure A5.2: The number of installations finished on time at each efficiency and precision level.

FINISHED PROJECTS OTIF

		Accepted/planned projects per month			
		40	50	60	70
OTIF delivered installations	85%	34	43	51	60
	90%	36	45	54	63
	95%	38	48	57	67
	100%	40	50	60	70

TOTAL BUDGET AVAILABLE

		Accepted/planned projects per month			
		40	50	60	70
OTIF delivered installations	85%	225000	450000	675000	900000
	90%	225000	450000	675000	900000
	95%	225000	450000	675000	900000
	100%	225000	450000	675000	900000

Figure A5.3: The budget available to give out as a bonus at each efficiency level. Based on the profit per installation multiplied with the extra number of installations above the accepted level.

 # LATE PROJECTS

		Accepted/planned projects per month			
		40	50	60	70
OTIF delivered installations	85%	6,0	7,5	9,0	10,5
	90%	4,0	5,0	6,0	7,0
	95%	2,0	2,5	3,0	3,5
	100%	0,0	0,0	0,0	0,0

COST LATE PROJECTS

		Accepted/planned projects per month			
		40	50	60	70
OTIF delivered installations	85%	135000,0	168750,0	202500,0	236250,0
	90%	90000,0	112500,0	135000,0	157500,0
	95%	45000,0	56250,0	67500,0	78750,0
	100%	0,0	0,0	0,0	0,0

Figure A5.4: The number of late installations at each efficiency and precision level.

 # LATE PROJECTS

		Accepted/planned projects per month			
		40	50	60	70
OTIF delivered installations	85%	6,0	7,5	9,0	10,5
	90%	4,0	5,0	6,0	7,0
	95%	2,0	2,5	3,0	3,5
	100%	0,0	0,0	0,0	0,0

COST LATE PROJECTS

		Accepted/planned projects per month			
		40	50	60	70
OTIF delivered installations	85%	135000,0	168750,0	202500,0	236250,0
	90%	90000,0	112500,0	135000,0	157500,0
	95%	45000,0	56250,0	67500,0	78750,0
	100%	0,0	0,0	0,0	0,0

Figure A5.5: The cost for late installations at each efficiency and precision level. To calculate this cost the number of late installations was multiplied by the profit per installation.

	A	B	C	D	E	F	G
50	BUDGET LEFT FOR BONUS						
51			Accepted/planned projects per month				
52			40	50	60	70	
53	OTIF delivered installations	85%	90000,0	281250,0	472500,0	663750,0	
54		90%	135000,0	337500,0	540000,0	742500,0	
55		95%	180000,0	393750,0	607500,0	821250,0	
56		100%	225000,0	450000,0	675000,0	900000,0	
57							
58							
59							
60	BONUS PER MONTH SEK		Accepted/planned projects per month				
61			40	50	60	70	
62	OTIF delivered installations	85%	36000	112500	189000	265500	
63		90%	54000	135000	216000	297000	
64		95%	72000	157500	243000	328500	
65		100%	90000	180000	270000	360000	
66							
67							

Figure A5.6: The total budget left for a bonus after the cost for late installations was subtracted.

	A	B	C	D	E	F	G
50	BUDGET LEFT FOR BONUS						
51			Accepted/planned projects per month				
52			40	50	60	70	
53	OTIF delivered installations	85%	90000,0	281250,0	472500,0	663750,0	
54		90%	135000,0	337500,0	540000,0	742500,0	
55		95%	180000,0	393750,0	607500,0	821250,0	
56		100%	225000,0	450000,0	675000,0	900000,0	
57							
58							
59							
60	BONUS PER MONTH SEK		Accepted/planned projects per month				
61			40	50	60	70	
62	OTIF delivered installations	85%	36000	112500	189000	265500	
63		90%	54000	135000	216000	297000	
64		95%	72000	157500	243000	328500	
65		100%	90000	180000	270000	360000	
66							
67							

Figure A5.7: 40% of the total budget for a bonus, meaning EMG will get 40% of the profit of the excess number of installations that were done.

	A	B	C	D	E	F	G
68							
69	BONUS PER MONTH %		Accepted/planned projects per month				
70			40	50	60	70	
71	OTIF delivered installations	85%	2,3%	5,6%	6,8%	11,1%	
72		90%	3,4%	6,8%	9,0%	12,4%	
73		95%	4,5%	7,9%	10,1%	13,7%	
74		100%	5,6%	9,0%	11,3%	15,0%	

Figure A5.8: The bonus level presented as a percentage.

Model 2

Current incentive model:	>10
Input data	
Number of roof installers:	18
Working days per month:	20
Number of panels insatalled during the past month:	1000
Number of panels/person/day:	2,78
Target (panels/person/day):	5
Bonus level start	5%
Bonus level increase:	10%

Figure A5.9: The input data is what is needed to fill in each month and number of panels/person/day is calculated from this data. The target and bonus levels can be adjusted to what E.ON sees fit.

Number of panels/person/day	**Bonus**
5,00	5,00%
5,50	5,50%
6,05	6,05%
6,66	6,66%
7,32	7,32%
8,05	8,05%
8,86	8,86%
9,74	9,74%
>10	10,00%

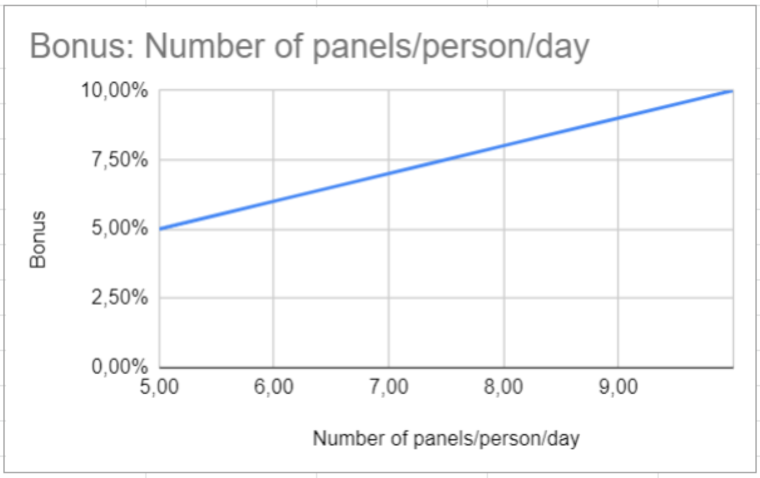


Figure A5.10: The bonus increases with the number of panels.

Appendix 6 - Severity of risks connected to each model

Table A6.1: Risks connected to each model colored according to the severity of the risks.

<table>
<tr><th rowspan="2">Model</th><th colspan="5">Risks</th></tr>
<tr><th>Extensive Administration</th><th>Impaired Relations</th><th>Suboptimization</th><th>Lack of impact</th><th>Other</th></tr>
<tr><td rowspan="2">All models</td><td rowspan="2">Follow up on incentive model and make bonus payments</td><td>The complexity of installations not considered when measuring efficiency</td><td rowspan="2">Increased rejection rate after site visit when efficiency is incentivized</td><td rowspan="2">Threshold targets in the model are not on a suitable level</td><td>Efficiency affected by seasonalities or unexpected events (i.e. bad weather, accidents, customers not home etc.)</td></tr>
<tr><td>EMG believes they can only affect the NPS result to some extent</td><td>Bonus levels too generous</td></tr>
<tr><td>Model 1</td><td>Too complex to maintain target numbers as EMG grows or if business goals changes</td><td>Fee for customer errands decreases or eliminates bonus</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Model 2</td><td>Too complex task for E.ON to administer the number of active employees at EMG during a certain time period</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Model 3</td><td>No routine for measuring lead time present today</td><td>Penalty aspect is considered unfair</td><td>Does not drive efficient use of half days</td><td>-</td><td>-</td></tr>
<tr><td rowspan="2">Model 4</td><td rowspan="2">No routine for measuring lead time present today</td><td rowspan="2">EMG believes it is unfair to compare all installation partners since they all have different prerequisites</td><td rowspan="2">Does not drive efficient use of half days</td><td>-</td><td>Some installation companies are doing much fewer installations for E.ON than EMG, making them unsuited for comparison</td></tr>
<tr><td></td><td>If all installation companies perform poorly EMG could get a bonus for poor performance.</td></tr>
</table>