A design strategy for KPN

introducing a platform to enable, inspire and educate SME customers resulting in a more sustainable use of telecom services

Master thesis
Strategic Product Design

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Preface

Dear reader,

The report in front of you is the graduation report for the Master Strategic Product Design at the Delft University of Technology. Before introducing the project, I would like to express my gratitude to the people who have helped make this project possible.

First, I would like to thank everyone who participated in the project. The people working at the SMEs in my neighbourhood to who I was coming back again and again with more and more questions to ask. Thank you for being enthusiastic about the topic of sustainable telecom and never failing to provide me with exciting insights. These insights provided during the user research were an essential and valuable part of the project.

Furthermore, I want to thank the people in the customer journey team at KPN for making me feel very welcome in the team. Although I was not "officially" part of the team in Zoetermeer, I always felt welcome to talk with employees about the many things I was wondering about. Especially a thanks to Carah, Kirsten and Paul for their help. Thank you to those that were willing to give me their time and input or to reference me to other people, spreading the word about sustainability at KPN.

I feel grateful that I had the opportunity to graduate at KPN. In particular, I would like to thank Jeroen, who has guided me with his expertise and knowledge about sustainability and innovation at a corporate. Furthermore with providing me with all resources (including his extensive network with many connections) needed to finish the project successfully.

Of course, a thank you to my supervisors, Ruth and Erik-Jan, who have helped me in the process by providing me with critical feedback and asking relevant questions to improve the project and the writing of the report.

Then, I also want to thank Quinten for always being by my side in the process and helping me out when I needed it the most. Last but not least, I want to thank Tosca, Megan and Margriet for their great advice and invaluable support.

After all, I can proudly say that I have completed my graduation project.

Enjoy reading!

Paulien

Executive summary

The sustainability adoption of sustainability practices is currently low for Small Enterprises, Freelancers and Small-Medium Enterprises (SMEs), while they must do their part to become more environmentally sustainable. SMEs are responsible for many greenhouse gas emissions emitted and as almost all companies in the Netherlands are SMEs, this presents an urgent call for change. However, many SMEs are not prioritising sustainability which is not without cause. Many limitations within SMEs withhold them from taking action. The most significant hurdle for SMEs is their size which comes with limited human, financial and technical resources.

Furthermore, the same limitations result in SMEs' lagging use of digital technologies. This lagging use of digital technologies is unfortunate because ICT can positively contribute to environmental goals if an SME uses ICT in their business. A way to improve environmental sustainability with ICT is through telecommunication (telecom).

However, there is still no broadly adopted manner in which SMEs can use current telecom technologies to be less harmful to the environment. The telecom sector is in a position where it can enable its customers to become more sustainable and reduce scope 3 downstream emissions. Nevertheless, as the role of enabler is not yet optimally utilised by telecommunication companies (telcos), customers are not yet decreasing their emissions. Therefore, there is potential for KPN to guide SMEs with their sustainability expertise to transition them towards sustainability through using telecom.

SMEs face challenges when open to adopting sustainable telecom practices. The explorative research in this thesis has shown that six different topics influence whether an SME can or is willing to adopt a sustainable telecom practice. These topics are; the right means for an online way of working, collaborative effort, education of digital sustainability, management decisions for sustainability, office building restrictions and reducing physical presence.

To enable SMEs to use their telecom more sustainably, telcos should keep these topics in mind while working towards solutions. Furthermore, elements that are valuable to SMEs to adopt sustainable telecom practices are knowledge, inspiration, community and guidance.

In this thesis, a platform is designed with which KPN can support SMEs by being the provider that connects telecom to sustainability by facilitating SME customers with inspiration, guidance and education on suited sustainable telecom practices while considering specific context challenges that SMEs face. With the platform, KPN educates its SME customers by communicating sustainability information to provide the customers with sufficient knowledge to start acting. As a result, the SME customers of KPN can be inspired to use telecom more sustainably. Furthermore, the platform includes a community of stakeholders connecting KPN to customers and customers to each other to exchange sustainability knowledge. The development of the platform allows KPN to become a partner in sustainable telecom use for SMEs.

To work towards the proposition of being a sustainability partner, KPN should prioritise sustainability in their organisation and introduce it in the SME market. To do so, KPN should educate and teach its employees about sustainable telecom practices KPN conducts. To incorporate sustainability at KPN, a new design principle is designed that communicates sustainability. The design principle summarises information about SME customer values for sustainability so it can be tested on customer journeys. With the new knowledge, the employees can prioritise sustainability more in their work, resulting in its implementation in customer journeys.

Involved parties

This thesis is conducted in collaboration with Royal KPN N.V. and Delft University of Technology (figure 1). Other stakeholders in this project include SMEs.

Royal KPN N.V. (KPN)

KPN plays an essential role in the telecom network of the Netherlands. In 1881, the first public telephone network in the Netherlands became operational in Amsterdam. This network was provided by Administratie der Posterijen en Telegrafie (P en T). Later, the name was changed into state-owned PTT (Posterijen, Telegrafie en Telefonie) and in 1989, the name became Koninklijke PTT Nederland NV. known as KPN. Since then, KPN's mission has been to be "the network of the Netherlands" and make the Netherlands the world's best-connected country (KPN, n.d.).

KPN is a Dutch organisation with almost 10.000 full-time employees. KPN focuses on both private and business customers in the Netherlands. For the private customers KPN serves, the services on offer include fixed and mobile telephony, mobile data, internet and television. For business customers (small, medium and large), KPN offers a full range of services, including telephony, internet and diverse end-to-end solutions (KPN, n.d).
KPN's 2021 - 2023 strategy is

"accelerate to grow"

with which they aim to provide solutions for the best digital access as fast as possible. One of the pillars of this strategy is to grow & strengthen the customer footprint. For KPN, this is important because they want to connect everyone to a sustainable future (Royal KPN N.V., 2022). Furthermore, KPN is constantly trying to reduce its own climate impact and help reduce the impact of the organisations and resources they're working with to achieve its climate goals (Royal KPN N.V., 2022). As sustainable solutions are desired for the different customer markets KPN is active in, KPN wants to offer its customers sustainable telecom products and services. Moreover, sustainable telecom creates more value for KPN's SME customers. Therefore, KPN is focused on becoming more sustainable.

Delft University of Technology (TU Delft)

This thesis is the result of the graduation project, part of the Master's program of Strategic Product Design at the faculty of Industrial Design Engineering of the Delft University of Technology. As the project focuses on the topic of sustainability, the project was carried out with the Circular Design Lab of the faculty.

Figure 1. Logo Royal KPN N.V. (left) and logo Delft University of Technology (right)

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Glossary

Abbreviations and definitions used throughout this report

Abbreviations

CX:	Customer Experience
ESG:	Environmental, Social, and Governance
FTE:	Full-Time Equivalent
ICT:	Information Communications Technology
IT:	Information Technology
SME:	Small Enterprises, Freelancers and Small-Medium Enterprises
Telco:	Telecommunication company
Telcos:	Telecommunication companies
Telecom:	Telecommunication or Telecommunications

Definitions

Definitions of terms used in this thesis are given to help the reader in the understanding of the thesis.

IT & ICT

Information Technology (IT) and Information and Communications Technology (ICT) are closely related. IT relates to the complete information domain and is the use of computers and other digital or electronic devices to elaborate networks, access, create, store and process electronic data and information. It also includes managing, retrieving, exchanging and communicating digital information. The IT industry comprises companies that produce IT systems such as hardware, computer software, and other peripheral equipment that IT users operate. The IT industry also includes companies that provide internet and or internet-related services.

Information Technology is a subset of the umbrella term Information and Communications Technology. ICT is mainly used for academic purposes to refer to the IT industry. Within the industry, the terms are often used interchangeably. However, ICT is more specifically used to refer to

"The convergence of audio-visual and telephone networks with computer networks through a single cabling or link system" ("Information Technology", 2022),

where the integration of telecom is also included.

SME

The term SME refers to a wide range of companies consisting of freelancers, small enterprises and small-medium enterprises. Those enterprises range from single business owners to businesses with up to 250 employees. Almost all enterprises in the Netherlands are considered SMEs. In the first quarter of 2022, there were 2,1 million active companies, of which 99,9% were SMEs (Centraal Bureau voor de Statistiek, 2022). KPN includes companies with up to 150 employees in their SME business market segment. The Dutch term for SME is "mkb", which is used to describe the same set of enterprises and "mkb" stands for "midden- en kleinbedrijf". In this thesis, we refer to the English term. Figure 2 shows the number of employees of the different enterprise groups.

Sustainability

Sustainability is a broad term that includes many (different) definitions. In this thesis, there's a focus on environmental sustainability. The most frequently quoted definition of sustainability is from the "Our Common Future" report of the UN World Commission on Environment and Development (also UN Brundtland Commission, 1987):

"Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Net-zero

"Net-zero means cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance" (United Nations, n.d.).

A company can achieve net zero when there is a balance between greenhouse gasses emitted and the number of greenhouse gasses removed from the atmosphere (STL partners, 2021).

Telecom

Communicating is essential in society to pass information to someone else. To communicate when people are separated by distance, telecommunication comes into place. The word telecommunication combines the Greek word tele, which means distant or far and the Latin word communicare, which means to share. So literally, telecommunication means to share from a distance (Chai & Lazar, 2021).

Telecom is the operation of electronic communication networks that telecom providers (telcos) offer to their consumer- and business customers. Telecom allows communication at a distance using electrical signals or electromagnetic waves with components supporting the system.

A telecom system is a collection of nodes (devices we use, e.g. telephone, computer) and links (medium between two or more nodes, e.g. hardware link (ethernet cable) or wireless link (wifi network)) that enables telecommunication. The telecom sector is involved in the construction, operation, management and provision of those networks and vital facilities.

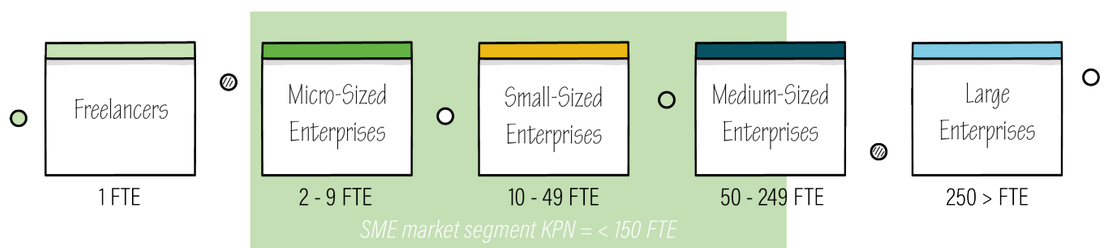


Figure 2. Enterprise size by the number of employees

Telcos offer telecom solutions that include mobile- and fixed telephony, radio broadcasting, computer networks, and the internet, but they also provide internet nodes, data centres, hosting, and certification services.

Sustainable telecom

The definition of sustainable telecom used in this report:

"Telecom solutions that help its users become more environmentally sustainable with telecom and contribute positively to environmental targets."

There are two ways telecom can help its users use their telecom more environmentally sustainable. The first one is through the use of telecom. Examples are; the possibility of meeting online and working at home in the cloud, which allows people to avoid commute and business travel. In addition, digitalisation allows for dematerialisation, making users print less paper and reducing their CO2 emissions.

The other way in which users can use telecom more sustainable is with the use of telecom. Examples are; turning devices off when not in use to save energy and reusing telecom devices for other users, or increasing the lifetime of products to avoid waste.

Introduction

In the introduction a brief overview of the context and objective of this project is given. It sets the relevance of this thesis and introduces the design challenge. Additionally, it provides the design and research approach used, which structure the report.

In this chapter

1.1 Context

The role of ICT in climate change

With the Paris Agreement, dangerous climate change is aimed to be prevented by keeping global warming below 2°C and effort is made to limit global warming to 1.5°C (Paris Agreement, 2015). The world is nowadays already 1.1°C warmer than in the pre-industrial period (1880-1900) (IPCC, 2022). Compared to all greenhouse gas emissions, CO2 emissions in the atmosphere contribute the most to climate change. It is in the world's interest to prevent dangerous climate change because its consequences will be irreversible for the earth. This means that the world urgently needs to reduce emissions.

The ICT sector causes 3 to 4% of global CO2 emissions and telcos are responsible for 1.6% of those emissions (Friedrich et al., 2021). Between 2020 and 2030, the ICT sector has to reduce greenhouse gas emissions by 45% to contribute to the Paris Agreement, according to the International Telecommunication Union (Williams, 2021). If no significant steps are taken to lower environmental impact, telecom technology companies could be responsible for 14% of global CO2 emissions by 2040 (BCG, 2021). They indicate that the telecom sector's potential growth also brings severe societal concerns raising sustainability questions concerning our future.

On the other hand, research in 2015 showed that the ICT sector was also in a powerful position to enable a 20% reduction in global CO2 emissions by 2030 (GeSI & Accenture Strategy, 2015). According to GSMA and Carbon Trust (2019), the amount of avoided emissions enabled by telecom in 2015 was already ten times greater than the global CO2 emissions emitted by the ICT sector that year. ICT-enabled savings can mainly contribute to decreasing global emissions by reducing fuel, gas and energy consumption (GSMA & Carbon Trust, 2019). Thus back in 2015 already, enablement savings in the telecom sector made a tenfold positive environmental impact. As the telecom sector keeps growing, the positive environmental impact is likely to increase even further in the future if the telecom is appropriately upheld.

Telcos in the Netherlands

Currently, telcos in the Netherlands are transitioning towards becoming more environmentally sustainable through all kinds of business practices. KPN is leading in this transition as they are a telco that aims to be "the green connector" (KPN, n.d.-c). To be "the green connector" means that KPN places sustainability high on its list of priorities and tries to do a little better every day by contributing to people and the environment. As KPN is on the right track to reach its own climate goals, the telco can also play an essential role in enabling others to become more sustainable. For example, when KPN lowers company emissions and makes its products and services more sustainable, the telco can allow others to become more energy-efficient and reduce CO2 emissions.

In 2021, KPN enabled its customers to avoid around 518 kilotons of CO2 emissions and save as much energy as 309% of KPN's energy consumption by using their ICT products and services (as shown in figure 3). In 2022 they want their customers to save amost as much energy as 200% of KPN Group's energy consumption (KPN, 2022). KPN serves customers in the consumer- and business markets. The customers in KPN's business market mainly consist of Small Enterprises, Freelancers and Small Medium Enterprises (SMEs) with up to 150 employees.

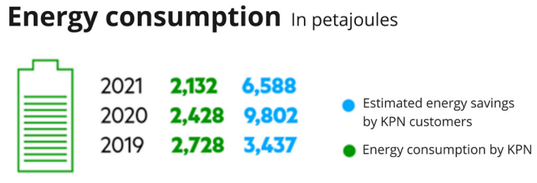


Figure 3. Overview of energy consumption by KPN and estimated savings by KPN customers per year (KPN, 2022)

SMEs' need for sustainability in using telecom

In the Netherlands, SMEs form the most significant business market: In quarter one of 2022, there were 2,1 million active companies, of which 99,9% were SMEs (Centraal Bureau voor de Statistiek, 2022). A significant disadvantage of SMEs is their substantial adverse environmental impact. SMEs worldwide account for almost 60% of CO2 emissions (Ernst et al., 2022). The fact that the emissions are such large shows that SMEs must consider how they can reduce their emissions. Unfortunately, the transition to sustainability has been proven difficult for them (Murphy, 2013).

However, during Covid-19, more and more SMEs have adopted digital technologies to survive the pandemic and improve their performance (Cuevas-Vargas et al., 2022). As stated, if telecom is appropriately upheld, ICT-enabled savings of the ICT sector can enable a transition towards a less negative environmental impact. Therefore, enabling SMEs to become more sustainable with ICT can help towards a more sustainable future.

1.2 Project objective

Sustainable telecom for SMEs

The knowledge that many SMEs are still struggling to implement environmental sustainability practices while accounting for a considerable part of greenhouse gasses emitted presents an urgent call for change. In the present times, it is essential to collaborate to act more sustainably to stop the acceleration of global warming and reduce climate change. This means that SMEs also must do their part to prevent unwanted emissions. As more SMEs are adopting digital technologies, it becomes relevant to consider how these technologies can enable a possible reduction of environmental impact. More, the use of telecom can contribute to strengthening implementation to move toward climate goals (IPCC, 2018). However, many SMEs have not broadly adopted sustainable telecom practices and this is not without cause. If SMEs already incorporate sustainability practices in their business, it is often on subjects other than via telecom.

It is understood that there is a huge opportunity for SMEs to use telecom more sustainably to contribute to reducing CO2 emissions. It is furthermore known that the telecom industry holds a powerful position to enable users' environmental sustainability through telecom. "Enablement" uses telecom to increase environmental sustainability and thereby avoid CO2 emissions (GSMA & Carbon Trust, 2019). An example of telecom enablement is the possibility to meet online, which allows people to avoid commuting and thus reduce CO2 emissions. However, among other things, due to common problems with which SMEs are struggling (e.g. time, resources, knowledge), there is still no broadly adopted way to use telecom more sustainably for SMEs. Moreover, it is still unclear what precisely sustainable telecom is and what can be done in this field. This applies to both SME customers and telcos themselves.

Project aim

How SMEs can use their telecom more sustainably to become more environmentally sustainable ought to be examined. This thesis explores how telcos can enable their SME customers to adopt sustainable telecom practices bridging the gap between sustainability and telecom in current practice.

This thesis aims to create a customer experience for KPN's SME customers that supports them in adopting sustainable telecom practices. Additionally, the SME team at KPN has to start design customer journeys with sustainability touchpoints for the SME customers.

The argument put forth in this thesis is that if KPN's employees are supported to design customer journeys with sustainability touchpoints for SME customers, and KPN's SME customers are thereby enabled to use telecom more sustainably, we are a step closer to reducing KPN's and its customers' CO2 emissions.

A strategic roadmap is designed for KPN to introduce sustainable telecom solutions in the SME market.

Research questions

The main objective of this thesis is to answer the following research question:

How can KPN enable its SME customers to use telecom in a more environmentally sustainable manner?

Respective sub-questions are as follows:

1. In which sustainability and digitalisation context do SMEs operate?

2. What are the current sustainability developments in the telecom industry?

3. What is the role of KPN in the transition toward enabling SME customers to use telecom more sustainably?

4. How can telecom be used sustainably?

5. Which challenges do SMEs face that contribute to the (not) environmentally sustainable use of telecom for SMEs?

6. How can KPN support these SMEs in using telecom environmentally sustainable?

7. What does the customer experience of KPN's SME customers look like when implementing sustainability?

To examine these questions, there's a focus on enabling the reduction of SMEs' environmental impact through the telecom of KPN.

1.3 Design challenge

Design a strategy for KPN to enable its SME customers to use telecom more sustainably.

Strategic design approach

The Human-Centered Design approach is used in this thesis. Human-Centered Design is a creative problem-solving approach (IDEO.org, n.d.). With this approach, different user research methods are used to understand the users and eventually come up with ideas that the user embraces. This way, the solutions designed will be tailored to the users' needs.

The Human-Centered Design approach has three phases: Inspiration, Ideation and Implementation (figure 4). This thesis is structured by following these phases.

Inspiration

The first phase is the inspiration phase which is focused on learning directly from the people designed for, in this project, SMEs.

The inspiration phase started with the intention to "do something in the SME market with the sustainable telecom that KPN can provide" (Appendix A, project brief). As the topic of sustainability in the SME market in combination with telecom is very broad, the first phase focused on understanding SMEs, their needs, KPN and challenges.

The context in which SMEs operate is discovered with initial field research about telecom and sustainability within SMEs.

Secondly, literature research about SMEs, digitalisation and sustainability is conducted to learn from existing knowledge. The literature study highlights the relevance of sustainable telecom by the impact it could make. There is ground for KPN's position in the transition for SMEs to use telecom more sustainable and why KPN is the one to fulfil this position. Furthermore, explorative research is done to gather the factors contributing to SMEs' sustainable use of telecom.

Finally, all insights are combined and interpreted and possible opportunities for KPN and SMEs are framed. The goal here is to come to the problem definition by understanding how the SME needs and KPN's problems align. Then, explorative, interactive research is done to create the design brief. The future vision and design brief lead to the focus of the solution of this thesis.

Sub-research questions answered in the inspiration phase are 1, 2, 3, 4 and 5.

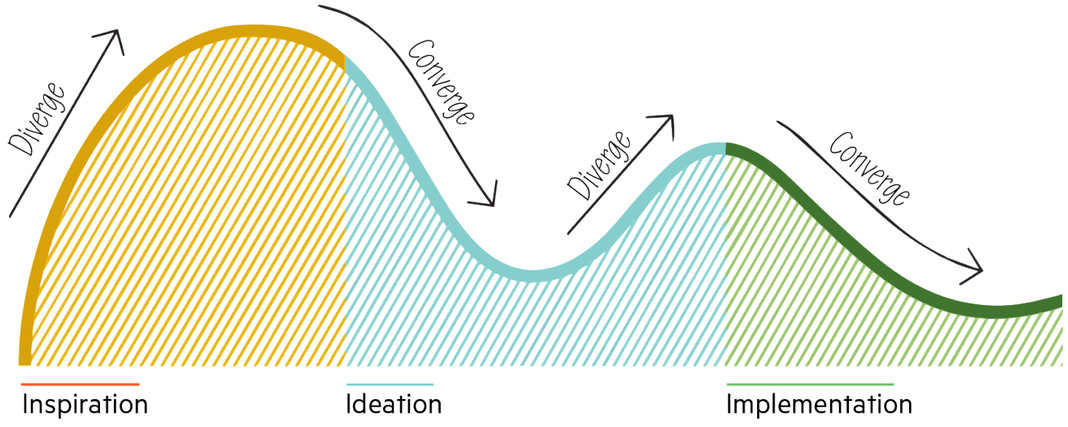


Figure 4. Human-Centered Design approach

Ideation

The second phase is the ideation phase, which serves to brainstorm and identify design opportunities and prototype possible solutions. During this phase, possibilities for enabling the reduction of SMEs' environmental impact when using telecom are ideated.

Ideas and concepts are generated that the different stakeholders directly validate to work towards potential solutions. Multiple creative sessions are facilitated and a concept with a prototype is made. The desirability of the concept is validated by testing the prototype with SMEs. The most suitable solution will be created.

Sub-research questions answered in the ideation phase are 6 and 7.

Implementation

The last phase of the project is the implementation phase. This phase is focused on bringing the designed solution to life.

In the implementation phase, the project zooms out to provide strategic recommendations for KPN to enable SMEs to use telecom more sustainably. A strategy is designed combining the previous phases' findings to support the solution and implementation of the design at KPN. The strategy is visualised in a strategic roadmap that has three horizons and a future vision to work towards. The outcome is tested with stakeholders on desirability, viability and feasibility.

Finally, the project is concluded. Directions for future research are indicated and recommendations are given to KPN. The report ends with a personal evaluation looking back on the project.

1.4 Report structure

This report is divided into the three different phases of the Human-Centered design approach. Each phase represents a part. Each part is divided into sections covering the research questions as explained in 1.3. In figure 5 the report structure is illustrated.

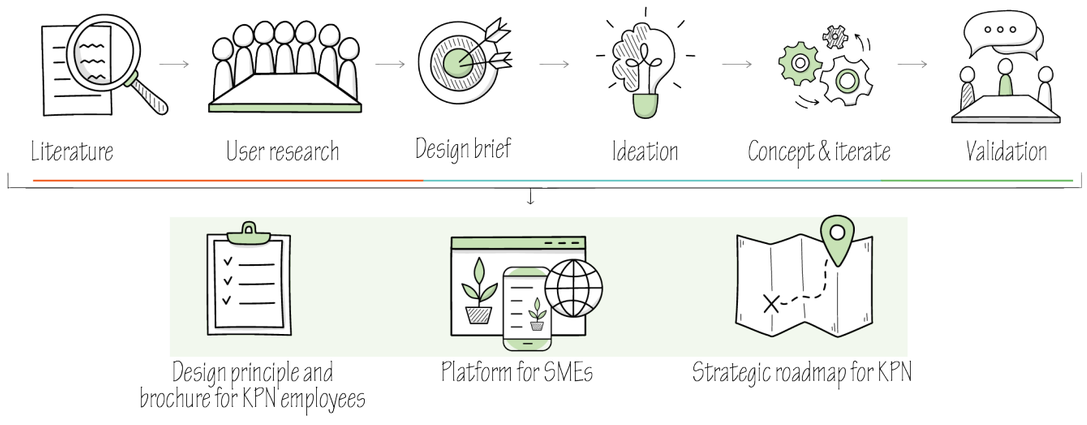


Figure 5. Report structure

1.5 Chapter conclusion

Almost all companies in the Netherlands are SMEs. Unfortunately, many of these SMEs are highly polluting and emit many CO2 emissions. As SMEs are highly polluting, they should reduce their greenhouse gas emissions. A way to do this is through telecom, as the telecom sector is in a position where it could possibly enable a reduction of CO2 emissions.

However, there is little known about using telecom more sustainability within SMEs. Therefore there is potential to help SMEs become more sustainable through their telecom.

In the Netherlands, KPN is a telco that highly values sustainability. An opportunity emerges for KPN to allow its SME customers to avoid emissions and help them become more sustainable.

The design challenge is to create a strategy for KPN to enable its SME customers to use telecom more sustainably. Throughout the report, the Human-Centered Design approach is used. The report is structured with the design approach used, consisting of three phases: Inspiration, Ideation and Implementation.

Inspiration

The project's first phase is the inspiration phase, which focuses on understanding SMEs, their needs, KPN and challenges.

Literature research is conducted to understand the role of SMEs in environmental sustainability and the impact of ICT on SMEs. The context in which SMEs operate is discovered with initial field research about telecom and sustainability within SMEs.

Secondly, research about sustainability in the telco industry is conducted to understand the current state of telcos and how they could help SMEs. The telco landscape in the Netherlands is explored with a company and competitor analysis to dive deeper into the company KPN. Afterwards, insights are combined for potential opportunities for KPN's position in the transition for SMEs to use telecom more sustainable and why KPN is the one to fulfil this position.

A customer journey analysis is done to understand better where is room for KPN to help their SME customers to use their telecom more sustainably. Therefore, a selection of sustainable telecom practices to adopt is put together. Furthermore, explorative research is done to gather the factors contributing to SMEs' adoption of sustainable use of telecom.

With these insights gathered, the problem definition is defined. Then, a focus on which SME market segment to serve is chosen and a design brief is created. The design brief consists of the future vision, design goal and design requirements.

Sub-research questions answered in the inspiration phase are question 1, 2, 3, 4 and 5.

2. Understanding the ecosystem in which SMEs are operating
3. Understanding sustainable telecom
4. Contribution of digital technology to mitigate climate change at SMEs
5. Problem definition
6. Design brief

2. Understanding the ecosystem in which SMEs are operating

This chapter starts with an introduction to the role of SMEs in the transition towards environmental sustainability. Then, it summarises the current state of knowledge about SMEs and their contributions to sustainability practices and climate action. Furthermore, it describes the diverse characteristics of SMEs and the opportunities and challenges they face in digitalisation and sustainability.

Moreover, in this is defined how SMEs can utilise digital opportunities to become more environmentally sustainable. Environmentally friendly use of digital services comes hand in hand with ongoing environmental sustainability trends that have influenced SMEs due to the pandemic. Insight is provided into the current level of technology adoption of SMEs in the Netherlands and how this is related to sustainability.

Besides, this chapter aims to provide insight into the context in which SMEs operate and their limitations regarding adopting (digital) sustainability practices.

Research question:

1. In which sustainability and digitalisation context do SMEs operate?

In this chapter

2.1 The role of SMEs

Enabling SMEs to adapt and thrive by participating more actively in sustainability transformation is important to achieving sustainable environmental goals. Research has outlined that SMEs have an essential role in the transition towards environmental sustainability (Purwandani & Michaud, 2021). However, as many SMEs are not yet acting sustainable, there are opportunities to decrease emitted emissions.

Exploring opportunities in the SME market for SMEs to reduce climate impact will increase the project's relevance as it helps map the context of SMEs. By understanding the factors that impact the behaviour of SMEs to implement sustainability practices, we can respond to the transition towards more sustainable SMEs.

Impact of SMEs

As societal sustainability awareness grows and acceptance of implementing climate action increases, it seems that a big part of the business market is forgotten. The focus for sustainability mainly lies on large corporates and SMEs are still spared from taking drastic sustainability measures. However, compared to SMEs, large corporates are already more engaged in making their companies more sustainable and capable of realising global solutions (Luthra et al., 2022; Denicolai et al., 2021; Nulkar, 2018; Ernst et al., 2022).

The same applies to authorities; they also focus on large companies for sustainability legislation. For companies with 250 or more employees, the European Union has added a directive that makes it mandatory to report on the impact of their activities on people and the environment (MVO Nederland, 2022). By 2024, the Corporate Sustainability Reporting Directive (CSRD) will come into effect and large companies must start reporting on sustainability if they are not already doing so. As part of the European Union's Green Deal, the CSRD plays a major role in sustainability transformation for companies with 250 or more employees. However, the majority (68%) of SMEs comprise companies with 2-5 employees and 2% of SMEs are Medium companies with 50-150 employees (Centraal Bureau voor de Statistiek, 2022). As 99,9% of the 2,1 million businesses in the Netherlands consists of SMEs, their impact can be huge with collective impact.

The collective impact of SMEs altogether can exceed the impacts large companies can make as many SMEs supply their products and services to large companies (OECD, 2017; Nulkar, 2018). The research indicates that the relevance of sustainability in SMEs is increasingly high. Nevertheless, the degree of adoption of sustainability practices for SMEs is currently low (Luthra et al., 2022).

Adoption of sustainability practices

Purwandani & Michaud (2021) have defined green (sustainable) businesses practices as:

"efforts that a company makes to decrease negative impacts on local and global environments, the economy, and society".

In the context of this project, the "effort" relates to the effort that an SME can make to use telecom in a more sustainable manner.

Sustainability awareness

Although most SMEs are aware of the need to become more sustainable, many are not yet at the point where they are willing to and capable of contributing to realising a sustainable world (Purwandani & Michaud, 2021). A possible reason can be taken from the research of Luthra et al. (2022). The study emphasises that at the moment, many users are unaware of the environmental impact generated by their consumption behaviour and therefore do not necessarily take responsibility for it. This can be applied to SMEs, as many are unaware of their enterprises' sustainable footprint and do not necessarily prioritise sustainability practices over their daily operations (Nulkar, 2018).

State of the SME

SMEs do not always have the right people at hand to focus on making future investments as they are relatively small. Most SMEs struggle with the same restrictions and barriers that keep them from taking sustainability action, as most obstacles come with size-related limitations.

Furthermore, SMEs' potential for participating in environmental sustainability is hugely dependent on their awareness, knowledge, (technical) skills, capabilities and resources available (Ernst et al., 2022; Denicolai et al., 2021). Compared to large corporates, SMEs have limited human, financial and technical resources (Juergensen et al., 2020).

Most SMEs strongly focus on short-term goals (Luthra et al., 2022). Generally, SMEs take business actions that lead them to save costs and short-term profits (Nulkar, 2018). However, Nulkar (2018) also explains that sustainability practices with no direct business gains (such as employing clean technologies or life-cycle analysis) often need investment to perform, which is mainly seen as a non-priority expense. Therefore, although sustainability practices contribute to the sustainability of an SME, these barriers do not help SMEs to undertake sustainability actions.

Overcome barriers

In contrast, recognising the long-term benefits of sustainability is essential for a SMEs' future (Ernst et al., 2022). To overcome issues, educating and increasing awareness among SMEs are crucial factors in growing sustainability practices' adoption rate (Purwandani & Michaud, 2021). This applies to all people working at the SME but is more important for management or decision-making employees. Therefore, sustainability implementation must be trained organization-wide to be more easily adopted and becomes a priority.

Drivers for sustainability implementation can include external stakeholder pressure (e.g. only investing in sustainable companies), customer expectations, supplier demands, governmental regulations, etc. (Denicolai et al., 2021; Luthra et al., 2022; Ernst et al., 2022; Purwandani & Michaud, 2021). Stakeholders and the sustainability adoption pressure that might be coming from them are shown in figure 6.

Steering SMEs towards sustainability

As explained, governmental regulations are currently implemented for companies with 250 or more employees, although regulations for smaller SMEs are lacking. On the one hand, Ernst et al. (2022) explain that regulations can help establish rules or industry standards that force SMEs to implement sustainability practices. Which can guide SMEs and help them with the sustainability transition. On the other hand, the same research shows that governmental regulations could lead to reluctance to embrace sustainability practices as legislations are often not practical to implement and could even lead to demotivation for sustainability engagement among SMEs.

If government intervention is not always the proper means for making the SME more sustainable, SME can change on its own. In times of crisis, this can happen quickly. For example, consider Covid-19 and current other circumstances such as high energy prices and gas shortages that can accelerate an SME's transition to reduce energy consumption, resulting in making an SME more sustainable. The transition towards sustainability is not always done voluntarily but can, for example, be done out of necessity due to increasing costs. Therefore, sustainability is not always the motivation to become more sustainable but can be a side effect of a financial causality.

Figure 6. Stakeholders and their pressure to adopt sustainable business practices for SMEs

Sustainability: the business case

According to Kautonen et al. (2020) and Purwandani & Michaud (2021), a transition towards sustainability orientation for SMEs might be possible if it entails minimal conflict with business interests and can improve company performance. Most SMEs must be encouraged to go beyond the sustainable solutions provided and start implementing sustainability practices themselves.

Working on environmental sustainability can simply mean working more efficiently by not wasting money, resources or time. An example to become more sustainable and benefit from it is to focus more on reducing waste and efficiency for financial benefit (Kautonen et al., 2020). Lowering costs is a commonly observed benefit of implementing sustainability practices in SMEs (Nulkar, 2018). Besides, by becoming more sustainable, SMEs can financially benefit from reducing their energy consumption and CO2 emissions to contribute to climate goals (e.g. through governmental subsidies, attracting investors and increased market share, competitive advantage and acquiring new customers). Another benefit can be competitive advantage by becoming more sustainable and showing customers how sustainable they are.

However, the financial risk of environmental practices should not be neglected. Nulkar (2018) aligns that implementing sustainability practices can also result in putting in many (expensive) person-hours in SMEs that do not directly contribute to the SMEs' core business. More ultimately, this could lead to the loss of those person-hours when environmental tasks are not sufficiently implemented. Therefore, preference is given to easily implementable, lower-cost strategies which come with lower risk. Consequently, they are more likely to be adopted by SMEs starting to be more sustainable (Purwandani & Michaud, 2021).

To avoid conflict with business interests, SMEs have to overcome sustainability misconceptions (it is costly, complicated and burdensome), awareness about sustainability practices can be raised and SMEs can be educated to understand better how to implement sustainability in their business (Purwandani & Michaud, 2021).

Conclusion

SMEs' adoption of sustainability practices is currently low. However, due to the large number of SMEs and their pollution, SMEs must do their part in the transition towards environmental sustainability.

SMEs should prioritise sustainability to increase the degree of sustainability adoption. Implementing sustainability practices can financially benefit SMEs by reducing energy consumption, attracting subsidies, lowering waste and resources needed and attracting new customers. To do so, awareness about sustainability should be raised among SMEs.

Size-related limitations such as limited human, financial and technical resources withhold SMEs from implementing sustainability practices. Furthermore, SMEs do not have sufficient knowledge about sustainability which causes risks to their SMEs. Therefore, a preference is given to easily implementable, lower-cost sustainability strategies.

2.2 Impact of ICT on SMEs

One of the potential impacts of digitalisation on SMEs is environmental sustainability (Denicolai et al., 2021). As introduced, ICT can contribute to reducing emissions and environmental impact. Unfortunately, the potential of the ICT sector is visible but not put incredibly to use at SMEs. The complexity of understanding sustainability and digitalisation technologies such as telecom could be a reason.

Furthermore, Moss et al. (2006) mentioned that the relationship between telecom and sustainability is complex because a change in telecom mainly has indirect effects that influence sustainability. For example, ICT can increase energy efficiency and decrease energy consumption (Lee et al., 2022). Hence, these uses of ICT can positively contribute to environmental goals if an SME uses ICT in their business. An overview of the environmental impact of ICT is shown in figure 7.

ICT sector as a provider of solutions for SMEs

The enablement of energy efficiency with ICT in other areas (cross-sector) to become more sustainable is called

"greening by ICT".

As ICT solutions can be deployed to mitigate climate change by enhancing energy efficiency (e.g. smart cities, smart grids, smart mobility etc.), these solutions can reduce environmental impact across sectors. An example by Moss et al. (2006) of sustainable ICT use is making buildings operate smart and more efficient through telecom. Climate control, more efficient information streams and smart lighting are technologies that save energy and are thus more sustainable. Examples of ICT solutions that can be used to improve energy management are using sensors, the Internet of Things, robotics and Artificial Intelligence (IPCC, 2022).

There are already advanced solutions available to help SMEs become more (energy) efficient and sustainable with the use of digital technologies. For example, KPN has set up multiple case studies to demonstrate the advantages of using telecom to improve sustainability performance. An example of a network application to realise sustainable telecom solutions within the farming sector is shown in Appendix B. As 5G can provide precision farming, less crop protection is needed, resulting in more sustainable agriculture. However, it is important to realise that not all SMEs in the Netherlands have adopted digital technologies to run their business.

The current state of digitalisation in SMEs

Understanding how greening by ICT practices can impact SMEs also brings attention to the adoption of ICT by SMEs. Evidence has shown that SMEs are lagging in digitalisation and many of them have not taken full advantage of new technologies and the additional possibilities those technologies can bring (OECD, 2017).

In 2020, 75% of SMEs in the Netherlands had at least basic levels of digital intensity of which only around 30% were highly digitalised (European Commission, 2021). This means that most Dutch SMEs are still low digitalised and a fourth is not digitalised at all. Those enterprises reach a basic level of digitalisation when they use at least four technologies (e.g. electronic information sharing, social media, cloud technologies, Artificial Intelligence, Big Data etc.). Research by KPN shows that most SMEs do have their own website, use social media and are online reachable for contact. KPN's research corresponds with the statements of the European Commission as this indicates that the adoption of more extensive digital technologies is lagging.

Telcom used by SMEs

Despite all digitalisation products and services KPN offers their SME customers, SMEs' most purchased telecom products are still internet and calling.

In every SME group (by size), sim cards are most frequently bought from KPN, which makes sim

cards the number one provided product to SMEs by KPN (P. Von Aesch, Microsoft Teams, March 23, 2022). SMEs' second most purchased product is "KPN EEN kantoor" (figure 7). These are licenses per employee who have their own Voice over Internet Protocol (VoIP: a phone service delivered over the internet) device. Other services companies purchase are "Onbeperkt bellen voor KPN EEN kantoor" and "Combinatie Voordelen: Dubbele data, minuten en SMS". Appendix C provides an overview of products used from KPN by SMEs by size.

Adoption of digitalisation within SMEs

Research has shown that the organisational nature of the SME plays a role in adopting digital technology (Denicolai et al., 2021). For example, organisations digital by nature, such as internet-enabled SMEs operating in digital sectors, have a high mater of digital intensity. Such SMEs also include lean global start-ups. In comparison, more mature SMEs must go through a digital transformation to reach a similar level of digitalisation. For mature firms, the digital transformation is slow (Denicolai et al., 2021).

When we look at most SMEs, they are not that known with the current technologies and do not require breakthrough innovation for their daily operations. This is another reason that most SMEs do not yet embrace the digital solutions offered. If SMEs are already adapting and transforming digitally, it is undoubtedly a challenge for many. But, again, the adoption lag is mainly due to the characteristics of SMEs described in chapter 2.1.

However, an accelerator for technology adoption for many SMEs is the Covid-19 pandemic (OECD, 2021). As a result, some SMEs saw an opportunity to go out of their comfort zone and transform their daily business operation to start offering their products and services online during the lockdown. Worldwide, surveys suggested that at the beginning of the pandemic, 70% of SMEs had already intensified their digital technology use (OECD, 2021). This brings attention to a characteristic of SMEs that is beneficial for change. Compared to large corporates, it can be helpful for SMEs that they are more flexible and adaptable because they are relatively small and often less hierarchically structured (Luthra et al., 2022). This allows them to adapt faster and more efficiently to a changing ecosystem generated by the Covid-19 pandemic. On the other side, it brings practicalities such as training staff, consultation of resources and gaining knowledge to go through this transition.

However, SMEs can not escape the digital transition as the EU has set targets for digital transformation. In 2030, the EU aims to have at least 90% of SMEs reach the basic level of digital intensity.

Conclusion

Knowledge about sustainable telecom solutions is available, but there is still no broadly adopted manner in which current telecom technologies can be used to be less harmful to the environment. Many SMEs are lagging in digitalisation and can not take full advantage of the positive impact digitalisation can bring them.

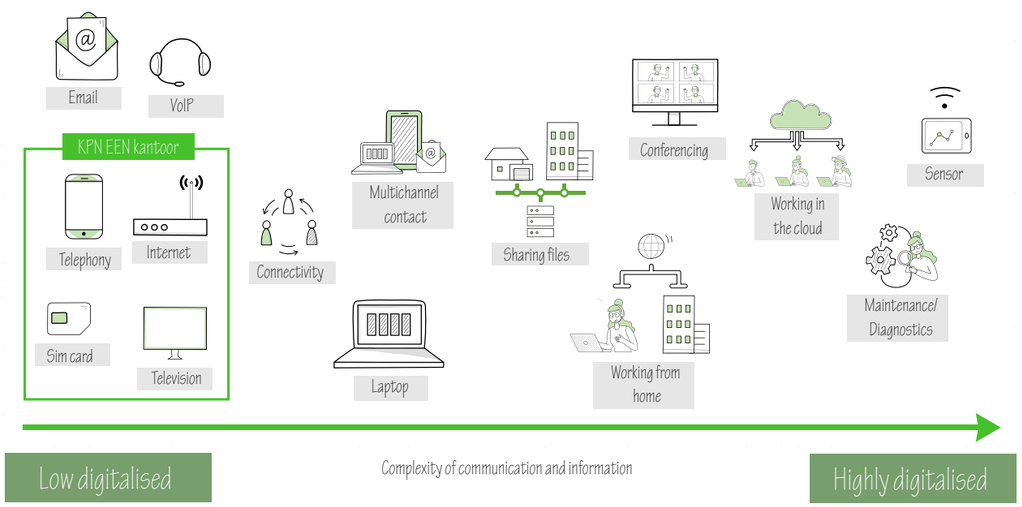


Figure 7. Digitalisation in the SME market

2.3 Understanding SMEs

This part is about understanding the context in which SMEs operate and their current state of knowledge and sustainability implementation. Initial field research is done to gather insights about whether a telco could support SMEs with sustainable telecom.

Initial field research

Every SME is different and they are working in unique ways that fit their enterprise. SMEs vary in size, target industry, age, ownership, customers, business operations, location, and business model. Therefore, initial field research is conducted. SMEs are interviewed to create ground and knowledge from the SME perspective on the project. Asking SMEs about their experiences is an essential step to getting a feeling of the context of the target group. The first goal is to explore in practice why most SMEs are not yet operating more sustainably by gathering insights about current sustainability and digitalisation practices. The aim is to understand if SMEs are open to increasing environmental sustainability by using telecom. The second goal of the initial field research is to find the topics where KPN might be able to contribute with their knowledge, experience and ambitions.

Method

Qualitative interviews are conducted with eight SMEs in Delft. The participants were required to use telecom in their company, so an understanding of how they could become more sustainable through telecom that they already have could be created. However, they did not necessarily need any sustainability experience. The interviews were carried out in the SME's company building and included observations of telecom devices present and sustainability practices conducted to gather insights about both topics. The interviews lasted about 20 minutes.

Regarding the number of participants, eight SMEs were chosen to involve in explorative research. Despite, it was essential to speak to a broad range of SMEs. Eight participants were considered to be enough as soon saturation occurred with the collected data after interviewing the first SMEs. The participants included SMEs operating in different sectors of different sizes and they have different levels of sustainability and digitalisation going on but are all using telecom in their daily operations. Table 1 provides an overview of the companies interviewed with their characteristics. The interviews were conducted with SME owners and employees. The interviews were semi-structured and the selection of participants was based on convenience sampling, but it also took into account the heterogeneity of respondents. The outline of interview questions can be found in Appendix D.

As the interviews are part of initial field research, keywords, quotes and field notes are taken during the interviews and voice memos are captured directly after the interviews.

SME	Size	# FTE	Sector	Description
C1	Small	10	Consumer Goods	Clothes and home concept store
C2	Small	2	Information Technology	Reseller of electronics
C3	Medium	85	Information Technology	Business intelligence consulatancy
C4	Small	15	Logistics	Technology for load carrier management
C5	Small	8	Personal Services	Hairdresser
C6	Medium	186	Retail and Administrative	Student employment agency
C7	Medium	56	Support Services	accelerator and incbator for start-ups
C8	Small	12	Support Services	financial consultancy agency

Table 1. Overview of SMEs interviewed

Analysis

To analyse the insights gathered from the interviews, field notes (including quotes) and voice memos are written out per company interviewed. The written text is coded and the codes are clustered in eight themes. As there was some overlap in the themes, those themes are put together to create categories (figure 8). The coding and clusters can be found in Appendix E.

Figure 8. Themes clustered in four categories

Results

Table 2 shows that sustainability and digitalisation considerations derive from the SMEs' intentional relationship towards four topics. The results are summarised per topic concerning the existing literature in Table 2. These topics are of importance to understanding why most SMEs do not yet operate more sustainably and digital. The results show the considerations for sustainable digitalisation hugely depend on the company and its employees. The topics formed are the use of telecom, daily sustainability practices, personal interest in sustainability and sustainability & telecom. The results show various reasons why sustainability practices are not yet implemented and what is happening in the context of an SME. In addition, the perspective of the SME becomes clear with their attitude towards sustainable telecom.

The four topics together determine the attitude of a specific SME to sustainable telecom practices. For most SMEs, it can be said that the use of telecom is limited and more complex options are not being used to their potential. A participant for example said;

"We did not update the cash register system to send out digital receipts because I do not trust the internet. I'm afraid customers won't receive their receipt as it can be stuck in an email system or somewhere online or it is difficult with email addresses that are not valid. Just to be sure, I print out everything so it is at least not my fault and people can't make up excuses for not receiving a receipt."

There is a lack of knowledge for employees company-wide about what digital technologies can do for the SME. The same applies to sustainability practices. Many sustainability practices result from existing systems or ways of working:

"I think [...] is more sustainable, but it's also just more convenient, so that is the main reason I'm doing it"

SMEs are not necessarily interested in sustainability and are also not acting with priority on sustainably. However, employees understand that it is important to be conscious of sustainability and work.

"Personally, I don't really know anything about sustainability; it's difficult, I wouldn't know where to start and I'm too busy to really delve into it. We're not doing anything with it now, but if there's something we can implement easily, I'd like to try it; why not."

It becomes clear that there is no existing relationship between sustainability and telecom to all SMEs interviewed as the connection has not yet been made between the two topics.

The results indicate that if an employee is personally interested in working more sustainably, this can be quickly done as the employees in SMEs have the freedom to do their work their way. When management is involved, sustainability practices can be directly implemented in the whole SME. The results show a relation between the four topics and the adoption possibility of sustainable telecom practices.

Conclusion

Figure 9 shows the relation between an SME and environmental sustainability with telecom. An SME can become more environmentally sustainable if the barriers (lack of knowledge and busy with daily activities) are taken away. Knowledge and room for sustainability practices in day-to-day operations can guide toward sustainable telecom usage. If there is personal interest, the chances are likely that employees can implement sustainability practices on an individual level with the potential to change the company's way of working. The connection between sustainability and telecom is not yet made, but employees are open to it when it is easy and convenient for them to implement. This corresponds with the literature that suggests that sustainability practices should conflict minimally with business interest (Kautonen et al., 2020).

When sustainability and digitalisation are

Topic	Use of telecom	Daily sustainability practice	Personal interest in sustainability	Sustainability & telecom
Context	Telecom is not something that employees deal with daily, but do hugely rely on. Internet and telephony are services that are essential for daily business activities. Telecom products are often personal and do not have complex functions or the newest technologies.	The companies spoken to are not actively involved with environmental sustainability. The main reason is that customers do not necessarily ask about sustainability performance. Day-to-day sustainability practices often depend on how a system around the practice works. Sustainability is, therefore, usually not the greatest motivation but is a side effect of, for example, cost savings, convenience, habits or management decisions.	SME employees have a lot of freedom to shape their own (sustainable) way of working. Management often determines what needs to be done, and employees define how this is done. If there is an interest in doing something differently, it can be done individually. However, management decisions influence the employees' way of working directly	The relationship between sustainability and telecom is unclear to all SMEs and awareness and knowledge about the topic are lacking. Some SMEs are open to implementing sustainable telecom practices if it does not conflict with their existing way of working. Other SMEs are less interested as they simply do not have the knowledge and insights into why sustainable telecom would be important to their SME.
Proof quotes	"I am using my private phone to WhatsApp with customers when they can come to pick something up or to make an appointment."	"I'm separating waste because the municipality comes to pick it up separated, but now I realise this is in the first place because of more sustainable recycling reasons."	"I've never heard of that" - "No clue what that means" - "When I know how it can be done, I'll be happy to try it"	"I've never heard of that" - "No clue what that means" - "When I know how it can be done, I'll be happy to try it"
Link to the extant literature		Environmental Sustainability Practices for SMEs (Nulkar, 2018)	An analysis of operational behavioural factors and circular economy practices in SMEs (Luthra et al., 2022), What are the drivers and barriers for green business practice adoption for SMEs? (Purwandani & Michaud, 2021)	The dark side of sustainability orientation for SME performance (Kautonen et al., 2020)
Differentiation from the literature	The concept of SMEs' use of telecom is specific per SME and has not been generally discussed in the literature.	As Nulkar describes, many SMEs are unaware of sustainability practices. The interviews show that although SMEs are ignorant, they are already working on sustainability as a (positive) side effect of other daily activities.	It is defined that SMEs are flexible because of their relatively small size and less hierarchically structure. However, although flexibility and individual ways of working are encouraged, in the end, the management determines what should be done.	The concept of sustainability and telecom links to existing research about implementing sustainability practices when it conflicts minimal with business operations. The knowledge about the connection between sustainability and telecom has not been studied in the context of SMEs.

Table 2. Results of the initial field research

incorporated, sustainable telecom can enhance the SME's environmental sustainability.

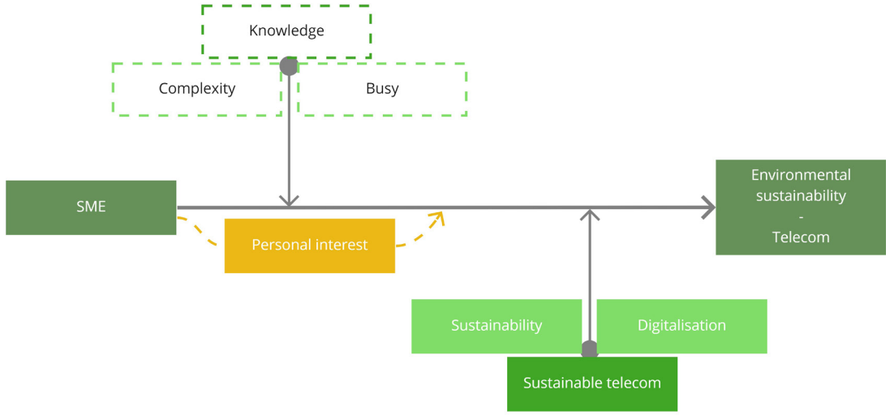


Figure 9. The relation between an SME and environmental sustainability with telecom

2.4 Chapter conclusion

Insights are gathered about SMEs and their current state in the transition towards environmental sustainability. Currently, many SMEs are not prioritising sustainability which is not without cause. Many limitations within SMEs withhold them from taking action. The most significant hurdle for SMEs is their size which comes with limited human, financial and technical resources. Furthermore, the same limitations result in SMEs' lagging use of digital technologies. The lagging use of digital technologies is unfortunate because ICT can positively contribute to environmental goals if an SME uses ICT in their business. With this knowledge, the first research question (In which sustainability and digitalisation context do SMEs operate?) is answered.

However, the findings also present opportunities for SMEs. The initial field research shows that SMEs are open to using their telecom more sustainably to become more environmentally sustainable. Sustainability through telecom seems an easy-to-implement solution to improve SME sustainability. However, SMEs lack knowledge about implementing sustainable telecom practices. The SMEs can be inspired to make the connection between sustainability and telecom as the SMEs have not heard about sustainable telecom yet. SME employees are open to implementing sustainability when it is easy and convenient for them. Therefore, there is potential to guide SMEs with sufficient knowledge to transition towards sustainability through their telecom.

3. Understanding sustainable telecom

To better understand how SMEs can be helped to achieve sustainability goals, the potential of the telecom industry is examined. This chapter seeks to explain how sustainability plays a vital role in the telecom industry and how telcos can enable the reduction of greenhouse gas emissions. Therefore, a telco's generated emissions are explained to figure out where telcos should start reducing emissions emitted. Likewise, the current state of sustainability maternity of the industry is examined. Creative trend research is conducted to detect changes in the telecom industry.

We zoom in deeper on the telecom landscape in the Netherlands to critically examine KPN and its competitors on their sustainability status. Finally, this chapter concludes with a SWOT analysis further highlighting KPN's sustainability position.

With the insights gathered, it will become clear where KPN can jump in and support SMEs to use telecom more sustainably.

Research questions:

2. What are the current sustainability developments in the telecom industry?

3. What is the role of KPN in the transition toward enabling SME customers to use telecom more sustainably?

In this chapter

3.1 Sustainability in the telecom industry

For many industries, it seems complicated to become more environmentally sustainable and is it seen as more of a burden than an opportunity. However, in the telecom industry, it is the other way around. Sustainability is an emerging topic that brings many opportunities for telecom providers to reduce greenhouse gas emissions. In this chapter, the current state of telcos is explored and trends and opportunities for the telecom sector are discovered to identify the future of telcos.

Sustainability is emerging

Worldwide, 88% of telcos report sustainability in their company reports, and in Europe, 93% of telcos report (Lamanauskas, 2021). These percentages indicate that sustainability is a topic of interest for many telcos worldwide. Reports inform on the company's sustainability performance and climate impact (CO_2 emissions), which is necessary to communicate ambitions and progress to stakeholders. Stakeholders expect telcos to have sustainability ambitions for business benefits. This is expected by the general public and financial market (ESG), it adds value to customers and for a telco to attract and retain talent (J. Cox, personal communication, March 15, 2022).

Emissions generated by telcos

To understand the sustainability practices of telcos, we look at the greenhouse gases a telco emits and should therefore start to reduce. There are three scopes of greenhouse gas emissions, where CO_2 emission is the primary gas emitted through human activity (Bernoville, 2022).

- **Scope 1** emissions are direct emissions released by owned or controlled sources of the reporting company: company facilities and company vehicles e.g. used to perform maintenance tasks or install equipment.
- **Scope 2** emissions are indirect emissions from upstream activities, such as purchased electricity (e.g. electricity to power networks), steam, heating & cooling for own use.
- **Scope 3** emissions include all other emissions in a company's value chain (e.g. emissions to manufacture network equipment). Scope 3 emissions are split into indirect emissions through upstream and downstream activities. The downstream activities include emissions generated by customers using the company's products or services, and upstream emissions occur during the production phase of those products. Upstream activities also include employee business travel and commuting.

The scopes described are shown in an overview in Figure 10.

For telcos, there are options to minimise environmental impact in every scope. Most major telcos have defined targets for emissions, waste and share of renewable energy. Scope-specific examples of those targets are the use of electric vehicles (scope 1), 100% operating on electricity from renewable sources (scope 2) and recycling resources and reusing devices (scope 3).

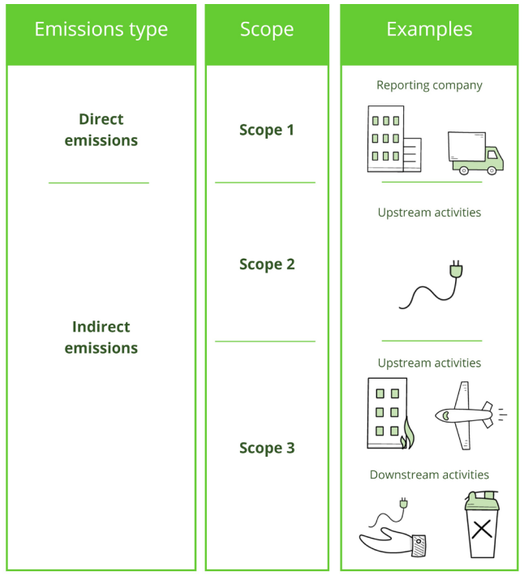


Figure 10. Overview of greenhouse gas scopes

Current sustainability state of telcos

Most telcos have set net-zero goals for scope 1 & 2 emissions (Lambrette, 2021), which shows that they are working towards reducing their CO_2 emissions. Research by Lamanauskas (2021) among 49 telcos worldwide with a high market share supports this. The study shows that 21% of telcos in Europe have reached net-zero within their own operations and 71% have set those net-zero goals for their own operations. This research was conducted to understand the current level of sustainability ambition with telcos. In figure 11, telcos with net-zero goals are shown on a timeline. The figure shows that most telcos have the aspirations to become net-zero in their own operations (scope 1&2) at the latest by 2030. However, the aspiration to become net-zero in the whole supply chain (scope 3) is put further in the future. Telcos in Europe and the Americas are working on reducing their carbon footprint with net-zero goals for scope 1 & 2 emissions in the short term (2025 - 2030), while net-zero in scope 3 is still a long way off (2030 - 2050).

However, scope 3 emissions are important to consider for sustainability. Lambrette (2021) describes that scope 3 emissions account for almost two-thirds of the telecom industry's overall emissions. To specify, most of a telco's environmental impact is caused by scope 3 upstream emissions in the supply chain, scope 3 downstream electricity consumption by customers through the use of the products sold and; scope 2 upstream energy consumption to run telecom services (Lambrette, 2021; Royal KPN N.V., 2021; Friedrich et al., 2021).

A significant aspect of emitted emissions is how humans impact the environment, especially in scope 3 emissions with downstream activities. The downstream use of electricity by customers for telecom services (scope 3) forms roughly 15% of a telco's total carbon footprint (Lambrette, 2021). If a telco wants to reduce its emissions, it is necessary to address those scope 3 emissions.

Two sustainability strategies for telcos

Another way for telcos to reduce environmental impact is by accelerating innovations. For example, 5G could lead to a 70% decrease in energy per gigabyte for mobile networks (Friedrich et al., 2021). Also, the spread out of fiber-optic internet is a sustainable innovation regarding cable versus fiber internet (KPN, 2020). It consists of more sustainable materials, is more durable, uses energy more efficiently and consumes less power in manufacturing.

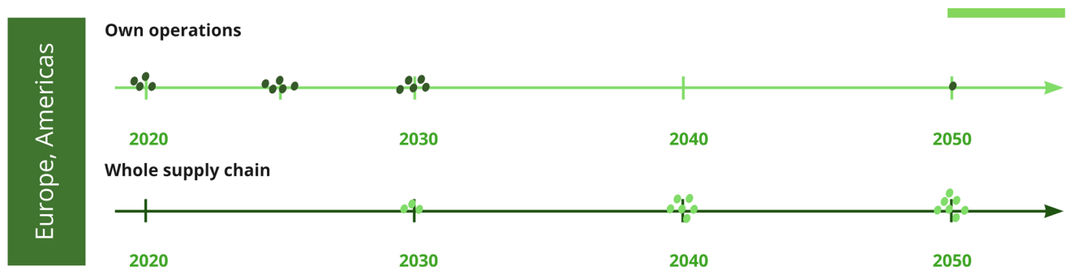


Figure 11. Timeline with telcos' net-zero goals

Through innovations, smart design and lower energy usage, a telco can reduce its negative environmental impact and through its services, a telco can increase its positive impact on the environment (J. Cox, personal communication, March 15, 2022). When we look at telcos, there are two strategies to become more sustainable in scope 3 emissions. In figure 12, the two strategies are shown.

Strategy one

The first strategy is to make the telecom itself more sustainable. Telecom services require devices such as routers, modems, telephones, television receivers and wifi extenders that mostly cause scope 3 emissions by upstream manufacturing activities. To **reduce the environmental impact** of those devices, KPN is working together with their supply chain to manufacture more environmentally friendly.

Strategy two

The second strategy to become more sustainable through telecom is to enable customers to use the telecom more sustainably themselves. An example is to allow customers with their telecom devices to reduce their energy consumption by turning it off when not needed, reducing paper usage by working digital or no travel commute (and thus no fuel emissions) required by online meetings. With this sustainability strategy, telcos can enable their customers to become more sustainable using sustainable telecom solutions. This strategy is about

the application of telecom to achieve sustainable goals and how (business) customers can use these devices more sustainably to improve their postitive environmental impact.

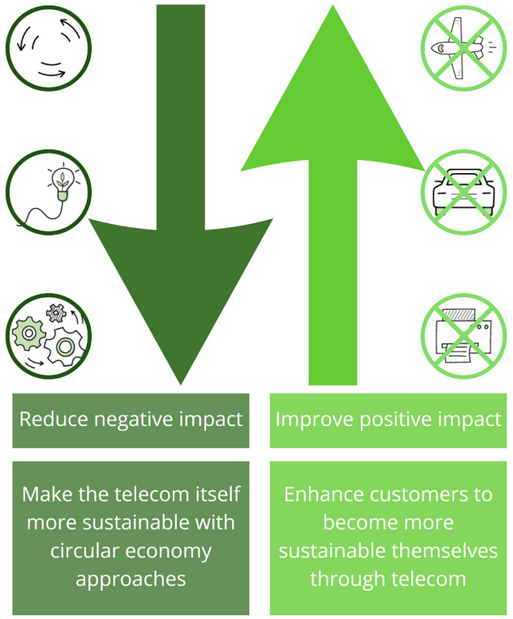


Figure 12. Two sustainability strategies for telcos

Telecom trend research

As the current sustainability state of telcos is explored, creative trend research is conducted to detect changes in the telecom industry (Appendix F). The goal is to determine where promising opportunities for the future lie.

The Covid-19 pandemic has accelerated digitalisation and digital technology implementation ("Enhancing Sustainable Business by SMEs' Digitalization", 2022). Digitalisation means increased use of telecom services and growing demand for data and connecting, resulting in more energy consumption (to power communication networks, data centres and operations) than ever. As a result, the telecom sector was forced to consume more energy to keep its networks running. Meanwhile, this also meant that they expanded their CO2 emissions. At the same time, the telecom sector is already one of the most significant energy consumers in the Netherlands (KPN, 2022).

With the trend research is found that "sustainability as a strategic priority" is a significant and relevant trend for telcos. The trend is supported by other trends distilled from research, which are shown in figure 13. The trends include digitalisation and connectivity with innovations as 5G quickly followed up by 6G. These technological developments will eventually lead to the Internet of Everything, the networked connection of people, processes, data, and things (Bradley, 2021). Telcos will strive for a competitive advantage by becoming net-zero and consuming 100% renewable energy. Environmental, Social, and Governance (ESG) criteria and government regulations will help to disclose a company's climate risks to the public.

As digitalisation and connectivity are important trends, the telecom sector will increase its energy consumption if nothing is done. To illustrate, the data traffic on KPN's network is growing by 40% per year, indicating a need for network expansion (KPN, n.d.). The challenge is to ensure that the increase in energy consumption doesn't lead to a higher negative environmental impact.

Conclusion

Sustainability is an emergent topic as stakeholders expect telcos to report on their sustainability status. A telco can reduce its emissions in all three scopes of greenhouse gas emissions. Most telcos have defined targets to reduce scope 1 and 2 emissions. However, scope 3 emissions are still far off while

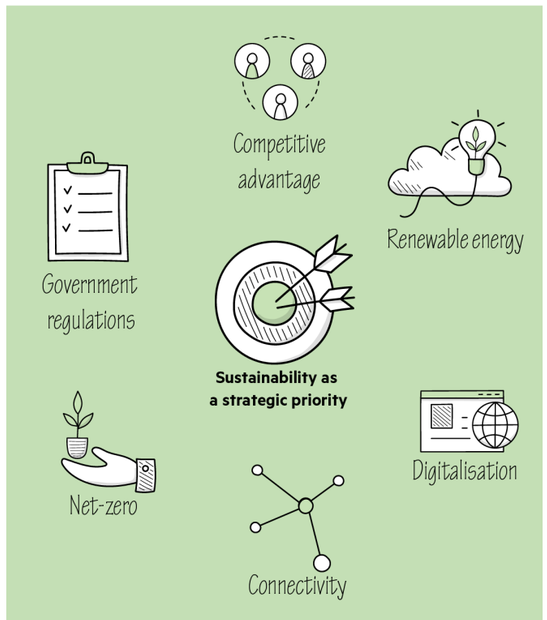


Figure 13. Creative trend research

they account for almost two-thirds of the industry's overall emissions. Telcos should start reducing these emissions to reduce environmental impact further.

There are two strategies for telcos to become more sustainable in scope 3 emissions. Both strategies can be used to achieve climate goals.

Trends show that sustainability as a strategic priority is more relevant than ever. Moreover, digitalisation and connectivity will increase energy consumption if nothing is done. Therefore, there is an opportunity for telcos to reduce scope 3 emissions by enabling customers to use their telecom more sustainably.

3.2 The telco landscape in the Netherlands

The operators in the Netherlands are competing on a technologically very high level (Umlaut, 2022). KPN, T-Mobile and VodafoneZiggo are the telcos in the Netherlands with the biggest market share. In figure 14, the three telcos are shown by business market size share. The percentages shown are from 2018, but as the market share has been quite constant over the years it gives an indication of the status in 2022. As shown, KPN has the largest business market share (48,8%), followed by its competitors VodafoneZiggo (27,5%) and T-Mobile (13,1%)(Meijer, 2019).

Sustainable practices of telcos

All major telcos in the Netherlands report sustainability in their annual reports and on their corporate web pages (figure 15). Even though the telcos are working on sustainability, it is not always immediately apparent what they do and how they do it. The communication on public pages is very general and goals are formulated differently everywhere.

The telcos in the Netherlands are putting sustainability high on their agenda, therefore; the question is **not** whether the telcos are working on sustainability, but **what** exactly they will do and **when**. For example, it appears that the telcos have a different focus on making an impact and limiting polluting business processes. In addition, their focus is often aimed at reducing scope 1 & 2 emissions. Sustainable milestones and future goals are put on a timeline in figure 16 to provide an overview of the current sustainability status and goals of KPN, VodafoneZiggo and T-Mobile.

In 2011, KPN was 10 years ahead of its competitors in consuming 100% renewable electricity. In 2015, KPN became net-zero in scopes 1&2. VodafoneZiggo and T-Mobile followed in 2021 and are now also taking more steps towards sustainability for their company. T-Mobile even has the very ambitious goal of becoming net-zero for scope 1-3 already in 2035, 5 years ahead of its competitors. However, KPN aims to become net-zero in its whole supply chain

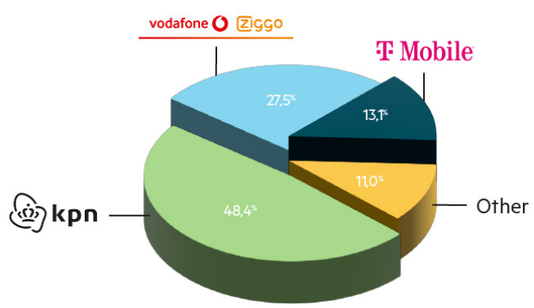


Figure 14. Dutch telcos by business market share in the Netherlands in 2018 (Meijer, 2019)

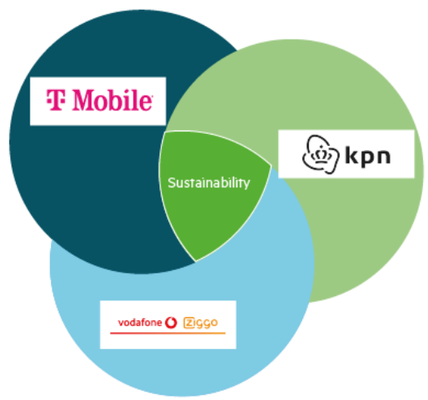


Figure 15. Sustainability as common interest of telcos in the Netherlands

by 2040. T-Mobile and VodafoneZiggo do not have these goals set yet.

From here, there is first a focus on KPN's sustainability status before comparing them with competitors.

Sustainability at KPN

KPN is one of the world's most sustainable companies and has set goals to make a greater contribution to a sustainable world (KPN, n.d). KPN's highly sustainable business strategy is;

"to connect everyone in the Netherlands to a sustainable future".

The ambition corresponding is to enable sustainability through connectivity.

KPN has been working on a circular approach for its products to support sustainable goals. As a result, since 2019, more and more products have a circular design, which means that 84% of the products can now be reused or recycled (Royal KPN N.V., 2022). An overview of everything that KPN does to operate more sustainable is shown in Appendix G.

KPN's sustainable telecom products

KPN currently offers its customers 12 products with reused and recycled materials. Some examples (also shown in figure 17 - 19) of those more sustainable products are:

- E-sim (figure 17)

E-sim is a sim card embedded in mobile phones; no physical sim card is needed anymore, which means less plastic production. However, not all phones are eligible for this digital sim yet, so KPN also came up with an "EcoSIM", a sim card made of 100% recycled/ recyclable plastics.

- KPN TV (figure 18)

KPN TV has an energy-saving mode, "deep sleep", in which it uses less than 1W and the TV receiver itself is made of 64% less plastic than its predecessor and consists of 33% recycled plastics.

- SuperWifi points (figure 19)

SuperWifi points are made from recycled plastic and because of their black colour more environmentally friendly to produce and easier to recycle (they used to be white). In addition, they are 33% smaller than their predecessor and equipped with Wifi6, which is more energy-efficient.

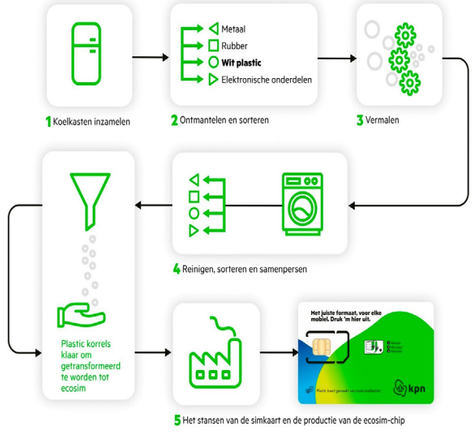


Figure 17 KPN's EcoSIM made from old refrigerators (KPN, 2022)

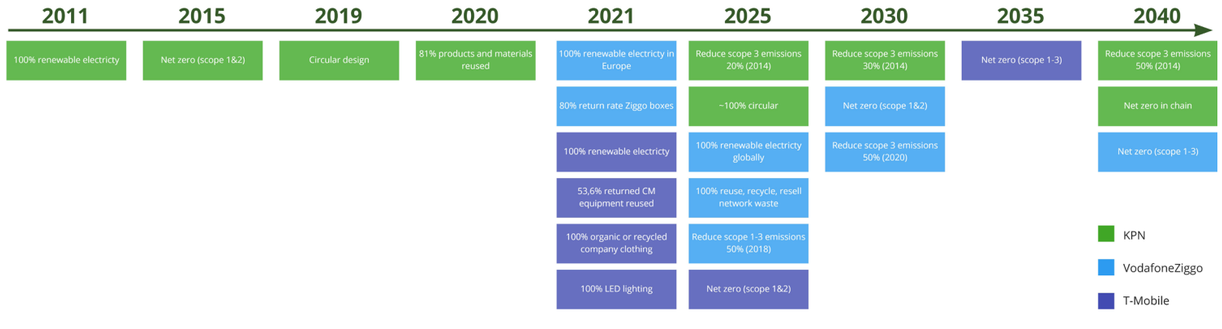


Figure 16. Timeline sustainable milestones and future goals of the three biggest telcos in the Netherlands (KPN, VodafoneZiggo, T-Mobile, 2022)

Figure 18. KPN TV and energy-saving mode

Figure 19. Black SuperWifi point

companies worldwide. In the Sustainable Brand Index, KPN is perceived as a telecom industry winner on perceived brand sustainability perception (including social and environmental responsibility) by Dutch consumers and scores 70th place in the overall ranking (Sustainable Brand Index 2022, 2022).

Scope 3 limitations for KPN

When we critically examine the products KPN provides, a significant limitation is the customer's (sustainable) behaviour with the product (scope 3 downstream emissions). Research by Luthra et al. (2022) stresses that sustainability practices' success depends mainly on how users interact with a product or service. To illustrate, to a certain extent KPN already limits the customer's energy consumption by making the products more energy-efficient. However, for example, customers must manually turn on the energy-saving mode "deep sleep" for KPN TV. As not all customers choose this option by default, there's still potential to reduce environmental impact. Furthermore, customers nonetheless decide for themselves the lifespan of, for example, their mobile phone or laptop and whether and how they recycle their devices. Thus, people's behaviour with the product or service is essential to KPN's sustainability footprint.

KPN's competitors

In Appendix I, an extensive competitor analysis is shown. This part highlights the differences between competitors to give an idea of what the competition is doing. This information can later be used as a point of comparison to identify KPN's strengths and weaknesses relative to the competitors.

Comparing competitors

VodafoneZiggo communicates the most and most transparent about sustainability. Their sustainability communication is not only visible on corporate web pages, but unlike KPN and T-Mobile, also directly targeted at business customers. Since April (2022), VodafoneZiggo has included a reference to sustainability for smartphones on their business customer website. If you scroll to the bottom of this page, you will see the banner shown in figure 20 on the occasion of Earth Day (Vodafone, n.d.).

The banner on the sales webpage directly brings the customer to a sustainability webpage. On this page, VodafoneZiggo compactly describes its climate neutral company activities and their scope 1&2 ambitions. Furthermore, VodafoneZiggo gives advice to make smartphones last longer and they provide information about how they make it easier to recycle and buy refurbished devices (Vodafone, 2022). They explain and offer reduce, re-pair, re-use and re-cycle smartphone services to their customers. These services shown on VodafoneZiggo's webpage, are visible in Appendix J.

Figure 20. Banner green Earth Day campaign VodafoneZiggo (Vodafone, n.d.)

KPN is the furthest with mapping out sustainability goals and is the industry's best in renowned sustainability rankings. KPN is targeted at designing their devices more sustainable and they were the first to launch the Eco-sim, which VodafoneZiggo quickly followed. T-Mobile is more focused on greening of own operations and its supply chain (scope 1 & 2). They outsource sustainability to their supply chain and form strategic partnerships to become more sustainable. Together with VodafoneZiggo, T-Mobile has participated in an eco-rating initiative that evaluates the environmental impact of the entire process of production, transportation, use and disposal of mobile phones (Eco Rating 2022, n.d.). An example of this Eco-Rating is shown in figure 21.

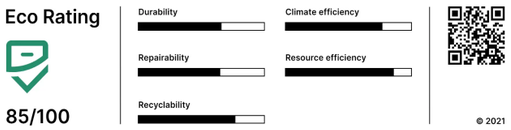


Figure 21. Eco Rating

SWOT KPN

A SWOT analysis helps identify a company's Strengths, Weaknesses, Opportunities and Threats. It guides to build on what the organisation does well, address weaknesses, seize new openings and minimise risks. A SWOT Analysis is conducted to assess KPN's position before devising any new strategy for the future.

The strategies from the SWOT analysis are shown in figure 22; the complete SWOT is shown in Appendix K. The most interesting findings are highlighted and discussed is how they affect the design process.

Overall, the SWOT analysis shows that on the topic of sustainability, KPN should have enough knowledge and experience to be a leader in sustainable telecom. In addition, the opportunities show that there is a lot of value to add beyond KPN's current business practices for (SME) customers and KPN employees. From the analysis, four topics are emerging to dive further into. The topics are further explained in the rest of this part.

Prioritise sustainability and introduce it in the SME market

Sustainability is prominently represented at KPN's board level and company strategy. A strategy to prevent threats through KPN's strengths is prioritising sustainability on the work floor to ensure sustainability is also in lower employee levels in the core company DNA. For example, sustainability threats of competitor VodafoneZiggo in the SME market can be reduced when KPN prioritises sustainability in the SME market and entirely devotes itself to design based on sustainability.

Diving into the SME market with sustainability also means that the company's sustainability impact will be more significant, as KPN has an extensive customer share of the business market in the Netherlands (figure 14).

Communication of KPN's sustainability practices to SME customers

Not all sustainability features of products and services by KPN are communicated to customers. Consumers perceive KPN as a sustainable brand in telecom, but the brand image could still be improved by clear communication about sustainability

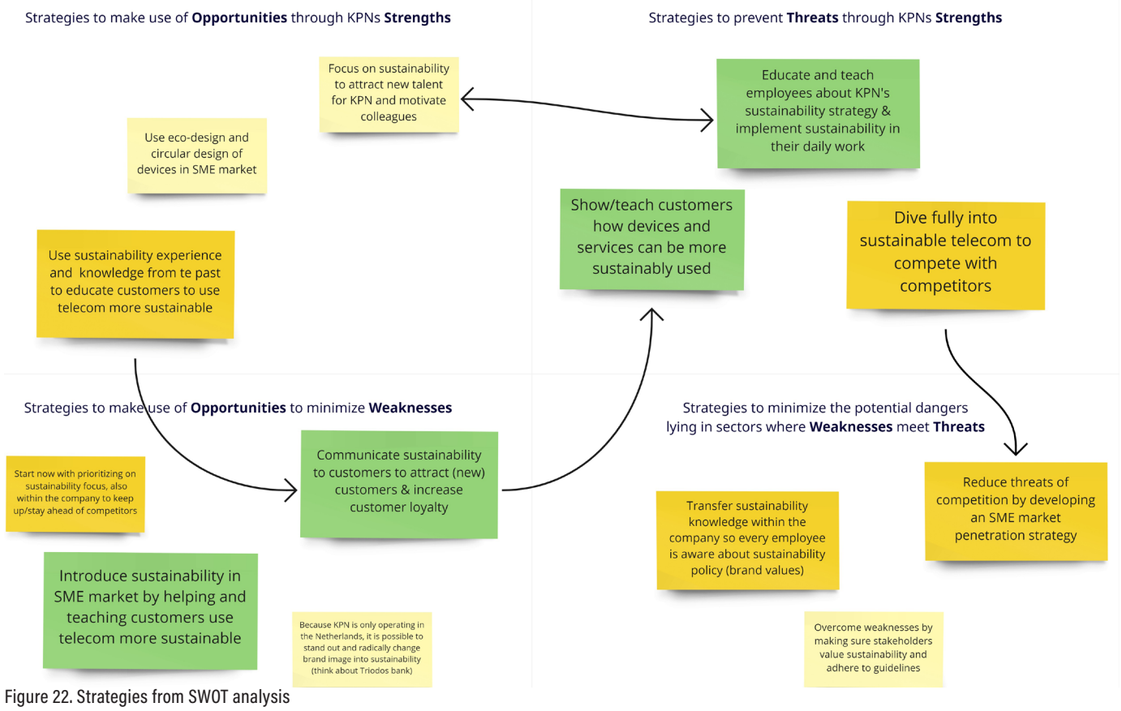


Figure 22. Strategies from SWOT analysis

motivations for products and services. As KPN has the sustainability knowledge and experience, they can start incorporating sustainability in customer channels today.

Educate SME customers about using their telecom more sustainable

Combining the strengths of having a sustainability strategy and a lot of knowledge from experience with the opportunity to help customers use telecom more sustainably results in the ability to guide customers in sustainable telecom use. KPN has all the means to be the provider that can help their customers as sustainability expert and ensure that they know how to use their telecom more sustainably. With this, KPN offers customers the opportunity to take an extra step in implementing sustainability by using telecom more sustainable.

Educate and teach employees about sustainable telecom practices of KPN

One of KPN's weaknesses is that many employees company-wide do not know about its sustainability status. Also, not in all teams there is someone directly responsible for incorporating sustainability, although most employees are enthusiastic about working on sustainability and consider it important. As long as the employees do not have the knowledge, they are not implementing sustainability in their work (yet).

In the consumer market segment, KPN has employees devoted to sustainable design. Here, KPN communicates to and designs for its customers with sustainability. With the experience from the consumer market, KPN can use its knowledge to ensure that sustainability is also rising in importance in the SME market. This means that the two departments should transfer sustainability knowledge. As KPN does have the expertise and resources in-house, they are perfectly able to start using them. To increase the level of sustainability of KPN, there is an opportunity to overcome weaknesses and educate employees company-wide to work with sustainability in mind.

Conclusion

KPN, VodafoneZiggo and T-Mobile are the largest telcos in the Netherlands in the business market. They are all working on making their company more sustainable. Their focus is often aimed at reducing scope 1 & 2 emissions. VodafoneZiggo has taken the first steps to reduce scope 3 emissions. Their Green Earth Day campaign enables customers in the business market by showing them a minimal overview of what they can do more sustainably with Vodafone's services. This is still a very moderate step, but it makes VodafoneZiggo a direct competitor for KPN as they have already introduced the topic of sustainability in their SME market. On the other hand, T-Mobile is less concerned with showing its level of sustainability. T-Mobile has done nothing yet to reduce scope 3 downstream emissions.

KPN seems to be a trusted partner for sustainability as perceived by its customers, which makes sense as KPN used to have a leading position and started implementing sustainable practices years earlier than competitors. To ensure KPN can compete with its competitors, they need to live up to their sustainability reputation.

Opportunities found from the SWOT analysis for KPN are;

- Prioritise sustainability and introduce it in the SME market
- Educate and teach employees about sustainable telecom practices of KPN
- Communication of KPN's sustainability practices to SME customers
- Educate SME customers about using their telecom more sustainable.

Earlier is found that SMEs need inspiration, knowledge and guidance to implement sustainability (chapter 2.4). Combing these insights with the findings presented in this chapter shows that KPN can educate and communicate sustainability to its customers.

3.3 Chapter conclusion

Current sustainability developments in the telecom industry are mainly targeted at reducing scope 1 and 2 emissions. Trends show that sustainability as a strategic priority is more relevant than ever due to increased demand for digitalisation and connectivity. This also shines a light on the responsibility of telcos for the increased emissions emitted in scope 3.

A massive part of telcos' emissions generated consist of scope 3 downstream activities that occur during the phase where customers use the company's products or services. Unfortunately, Dutch telcos do not focus enough on reducing scope 3 emissions. However, the telecom sector is in a position where it can enable its customers to become more sustainable and reduce scope 3 downstream emissions. As the role of enabler is not yet optimally utilised by telcos, customers are not yet decreasing their emissions.

It is concluded in chapter 3.2 that KPN can educate and communicate sustainability to its customers. Therefore, KPN can be the one to seize the opportunity to enable its customers to reduce emissions. Looking back at the insights presented in chapter 2.3 (understanding SMEs), two interesting topics emerge for KPN to jump in.

KPN can inspire SMEs to raise their personal interest in using telecom more sustainably. Furthermore, KPN is in the perfect position to make the connection between sustainability and telecom. Both topics lie in KPN's expertise in how telecom could be more sustainable.

The insights presented in this chapter answer research questions 3 and 4. Furthermore, the findings indicate further exploring the direction for KPN to guide SMEs in using digital technologies to mitigate climate change and become more sustainable.

4. Contribution of digital technology to mitigate climate change at SMEs

The previous chapter has discovered two promising directions for KPN to dive in further. These are to make SME employees personally interested in sustainability with KPN's telecom and to make the connection between sustainability and telecom for the SMEs.

In this chapter, the customer journey SME customers go through while being a customer of KPN is analysed to explore if there is a possibility to implement sustainability.

Digitalisation can significantly contribute to making a company more sustainable. Nonetheless, it is not yet known what sustainable telecom practices are that SMEs can carry out. Therefore, an overview of sustainability practices is created for SMEs.

Different factors influence whether an SME can adopt the sustainable telecom practice to use telecom more sustainably. Therefore, explorative research is done to map out the challenges that arise.

Research questions:

4. How can telecom be used in a sustainable manner?

5. Which challenges do SMEs face that contribute to the (not) environmentally sustainable use of telecom for SMEs?

In this chapter

4.1 Customer journey analysis

To better understand the opportunity KPN has to help its SME customers we zoom in on the customer journey that SMEs go through while being a customer at KPN.

Goal

The aim of the analysis is to show if there is a possibility to implement sustainability in the current SME customer journey. Implementing sustainability in the customer journey can lead to recognition by the SME customer that telecom can be sustainable and to guide them to use KPN's telecom more sustainably with the knowledge to do so. Any shortcomings in the current customer journey are exposed.

In addition, these insights can be used to determine design criteria in the later phases of this project.

Phases in the customer journey

In the customer journey, it is assumed that the customer has already decided to become a KPN customer based on other reasons than sustainability. Since it appears that the SMEs currently are unaware of the connection between telecom and sustainability, it seems unlikely that KPN is chosen for sustainability reasons.

As the whole customer journey can be quite complex, with many different customer needs and interactions, the customer journey is simplified into three main phases. The three phases are: becoming a customer, being a customer and end being a customer. Within these phases, not every customer will go through every step of the phase. However, mapping the different phases gives an overview of which touchpoints customers will encounter while being a KPN customer. The customer journey is shown in figure 23.

Becoming a customer

The first phase starts with an orientation to which products and services KPN has and deciding which solutions are needed for the SME. Then, a final decision is made and the order is placed.

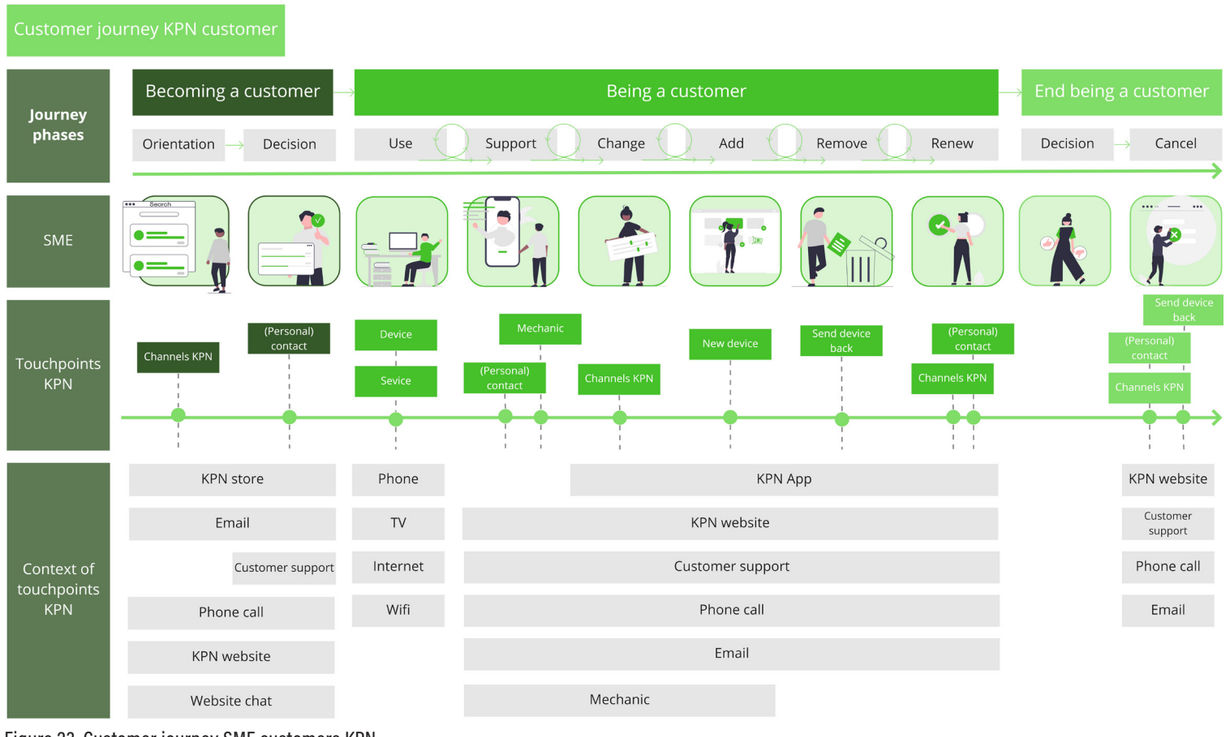


Figure 23. Customer journey SME customers KPN

Sustainability touchpoint analysis

Currently, there is one sustainability touchpoint visible on the "KPN Zakelijk" website (figure 24).

Figure 24. Sustainability touchpoint

KPN being the green connector is one of the reasons promoted for choosing KPN. These reasons are shown somewhat at the bottom of the page (KPN Zakelijk, n.d.). From internal analysis by KPN, it appears that only 19% of customers scroll entirely down to this part of the website (C. in 't Veld, Microsoft Teams, June 16, 2022). Indicating that only a tiny percentage of web page visitors are exposed to this sustainability touchpoint if they have already read what is on the page, as the average engagement is 0,5 seconds.

When choosing a product or service it is communicated to customers that the KPN Box 12 (internet modem) is made of recycled plastic which is sustainable. However, this is not communicated for other products such as the TV box (figure 25). Furthermore, there are no sustainability touchpoints to be found on the KPN Zakelijk website.

Figure 25. Sustainability touchpoint when choosing a subscription plan

The SME can ask for advice via a phone call or web chat to make a purchase decision. At KPN, data is gathered about the topics of conversations in calls and what customers ask about when speaking to a KPN employee. By analysing the speech-to-text data on the words "duurzaam" and "duurzaamheid", almost nothing was to be found in the calls of the last 6 months (P. Von Aesch, email, April 6, 2022). On the other hand, analysing the data on the words "milieu", "energie", "energieverbruik" and "energiebesparing" gives us the indication of concerns regarding telecom use related to the environment. However, these words hardly appear in the speech-to-text data, and if they do occur, then in a context other than that of sustainability (B. Bouri, Microsoft teams call, July 28, 2022).

The data indicate that customers do not ask questions or advice about environmental sustainability at KPN in phone calls. Thereby, it suggests that KPN service and sales employees also do not mention the sustainability of the telecom to make customers aware of this benefit of choosing KPN.

When the decision is made to purchase products from KPN, equipment sent to the business customer is sent in the packaging provided by the manufacturer in an outer box. The outer box is usually grey with a photo print on the inside, and if a larger box is required, this is a grey model (P. Van Leeuwen, email, July 26, 2022). Unfortunately, the packaging does not communicate anything about the importance of sustainability at KPN, while this seems a perfect opportunity to introduce the importance of sustainable use of telecom equipment.

Being a customer

The second phase indicates the period in which the customer uses the products that KPN provides. We consider using telecom products and services, need for support, changing subscription, adding to subscription, removing from subscription and renewing contract as customer journey steps in this phase.

Sustainability touchpoint analysis

In the daily use of telecom services, the customer uses the telecom provided by KPN. For SMEs, this is mainly internet, telephony and TV (chapter 2.2).

Typically, few touchpoints lead to KPN in this customer journey stage. For example, if there is no need for support, change, add, remove or renew,

there only is email communication with KPN to pay invoices and informative emails are sent. However, the more interactive touchpoints in this use phase are the interaction with devices (modem, router, wifi point, TV box, phone, etc.) and services (telephony, internet, wifi, etc.) provided by KPN.

For support, change, add, remove or renew, possible touchpoints include customer channels, getting a new device, the mechanic coming by to install it and sending the device back to KPN.

There are no sustainability touchpoints to be found in the being a customer phase of the customer journey.

End being a customer

The third phase indicates the cancellation of the subscription at KPN. The customer makes the decision, which results in the end of the customer relationship.

Sustainability touchpoint analysis

As soon as the subscription has stopped, the customers are asked to send back the "borrowed" devices. In figure 50, the customer communication is shown for sending back the device. Although this seems to be a perfect moment to include circular economy reasons in touch for sending back the device, there is nothing about sustainability in the instruction letter. Instead, KPN chose to have a monetary incentive for returning devices.

Conclusion

If a customer is interested in a sustainable telecom provider, very few touchpoints can guide the customer towards choosing KPN.

Throughout the customer journeys, there is little communication to KPN's customers about sustainability. As KPN is not sharing sustainability values with customers, these remain unknown to them.

The insights of the customer journey analysis show that in the becoming a customer phase, more attention can be drawn to sustainability to start informing customers about KPN's sustainability status. In addition, in this phase, KPN can inspire customers to make the connection between sustainability and telecom.

Furthermore, in the being a customer phase, there is nothing yet communicated about sustainability and there are also not many ways to do so apart from email listings. KPN could communicate about sustainable products and services that KPN provides, educate customers about how to use telecom more sustainable and provide extra information about sustainability while using KPN's telecom.

Lastly, customers are asked to return borrowed devices in the end being a customer phase. However, there is no sustainability incentive for customers to comprehend why this is important. KPN could communicate their values for circularity as motivation to return devices.

Opportunities for KPN derived from the customer journey

It would be ideal if KPN constantly prioritises sustainability in their communication with customers to show what is done. However, because sustainability is not yet a priority in the customer journey at KPN, customers do not recognise that sustainability and telecom can be connected. This shows in the few touchpoints communicating something about sustainability to the SME customer. Communicating KPN's sustainability practices to customers will create understanding and provide knowledge about sustainable telecom for SMEs.

The insights gathered are mainly focused on communication, but there is currently nothing available in the being a customer phase to use telecom more sustainable. This presents an opportunity to implement something new for more customer engagement with sustainability while considering the values of SMEs. Figure 26 shows the opportunity space in the customer journey.

From here on, there is a focus on the use phase of sustainable telecom and what KPN can do in this phase to provide the customers with inspiration, knowledge and guidance to use their telecom more sustainably.

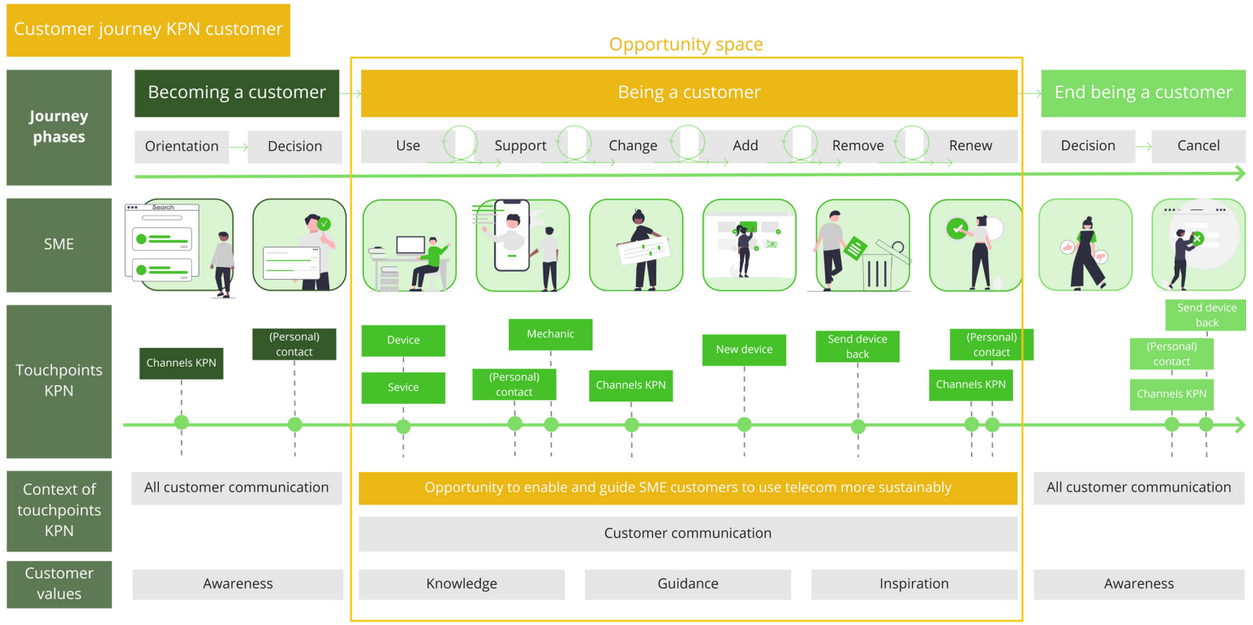


Figure 26. Opportunity space in the customer journey

4.2 Sustainable telecom

In the literature part of this project, research is conducted to find ways to use telecom sustainably. However, despite the search, it turns out that there is little to be found about what an SME can practically do once they are interested in using telecom more sustainably. Therefore, a list of possible sustainable practices that SMEs can carry out with the help of a sustainable telecom expert has been drawn up (J. Cox, Microsoft Teams call, May 19, 2022). Please note that this is not a complete list but roughly indicates what sustainable telecom practices can be carried out in the context of SMEs to use telecom more sustainable.

The list has been drawn to understand how KPN could help SMEs to use their telecom more sustainably. In the next chapter, the possibilities to use telecom more sustainably are tested with SMEs.

Sustainable telecom practices

Delete data (eg. mails)

This pollution is due to the storage of each e-mail saved on multiple servers for security. To minimise impact, regularly classify and file e-mails to avoid unnecessary storage in data centres. In addition, avoid sending attachment files to many recipients and cancel subscriptions.

Dematerialisation (e.g. less printing)

Dematerialisation occurs when changing physical processes to virtual ones. For example, digital technologies reduce paper use and music from CDs is digitalised. Significant environmental savings entail avoiding packaging, transport, material production and shop space.

Limit energy consumption of electrical appliances

Don't leave devices on all the time and even better to turn off devices as frequently as possible. On your telephone, deactivate the GPS, Wi-Fi, Bluetooth functions when not in use. You can also put them in airplane mode.

Fiber-optic internet

Fiber consists of more sustainable materials, is more durable, uses less energy and consumes less power in manufacturing than cable internet. Switching to 5G networks can reduce energy consumption by up to 90%.

Green energy contract
A contract under which a SME agrees to purchase electricity directly from a renewable energy generator. Renewable energy is energy that is collected from renewable resources that are naturally replenished. It includes sunlight, wind, rain, tides, waves, and geothermal heat.

"Green" search engine
For eco-responsible web usage. An example is Ecosia. Ecosia is the biggest green search engine out there. Ecosia uses 80% of its advertising revenue to plant trees. Trees capture carbon and have the potential to mitigate climate change.

Light sensors
An example of IoT sensors are light sensors. Over a 5G network, sensors automatically turn lights off when not needed and adjust the lighting per the natural lighting. As a result, it reduces energy consumption by up to 70%.

Online meetings
Meeting each other online has the advantage that the people in the meeting do not have to commute to the meeting location. Less commute prevents emissions depending on distance, means of transportation used and the number of people in the meeting.

Preserve equipment for longer
It is crucial to avoid unnecessary substitution of digital equipment and to favour repair over substitution in case of damage. Extending the lifetime of all smartphones by just 1 year can already save Megatons of CO2 per year.

Recycle or send back devices
Preserve and use equipment and devices for as long as possible and when the device no longer works, ensure it can be recycled. Recycling can often be done by returning the device to the supplier or taking it to a nearby environmental park.

Reduce business travel
Including business air travel, personal cars for business travel and business travel via public transport. If every employee who would book a flight, would replace travel with video conferencing, it could save many greenhouse gas emissions.

Remote diagnostics
Provide the means for a system or expert to monitor in real-time without regard to the physical location. It allows people to avoid commutes which prevents emissions depending on distance, means of transportation used and the number of people commuting.

Remote maintenance
Electronic equipment, including computers, laptops, monitors, and TVs, consume a significant amount of wasted energy when left on while not in the office. Don't leave devices on all the time; even better, turn off devices as frequently as possible.

Unplug the power cord
Most emissions from mobile devices come from standby mode, the power (sometimes known as phantom power) used by chargers plugged in but not in use. Unplugging devices reduces energy demand and carbon emissions.

Webshop / selling online
An online store can help customers determine whether the store is of interest without travelling there. Offering online reduces (unnecessary) traffic to a store and can therefore reduce emissions.

Working from home
Working from home and working digitally has the advantage of no commute to a (flex)working location. Less commute prevents emissions depending on distance, means of transportation used, and the number of people commuting.

Working digitally (e.g. cloud)
Working digital in the (green) cloud, run by a cloud server instead of a local processor, can leverage significant power savings when used in a large environment. Less hardware running fewer workloads means less electricity consumed.

4.3 Context challenges SMEs face

The context in which SMEs operate regarding digitalisation and sustainability was researched in chapter 3.3. However, the results include little knowledge of sustainability and telecom in the SME, so a connection is not easily made between the two. Also, sustainability comes from personal interest in the subject or because management changes something in the SME policy.

However, when SMEs are interested in adopting sustainability practices, it is still unclear whether they can immediately start implementing them. It is also unclear what exactly causes challenges to do so for them. SMEs' context challenges and needs to adopt sustainable telecom use are not yet researched. These factors (context challenges and SME needs) determine if an SME can adopt sustainable telecom practices to use telecom sustainably. This section aims to explore the elements of influence and if a division can be made between the telecom practices that can be implemented today once interested and which ones can be implemented in the future. Therefore, explorative research is conducted to explore SMEs' challenges and better understand the problems SMEs face in implementing sustainable telecom practices.

Explorative research

Interactive, explorative research with SMEs is conducted to see whether the SMEs can adopt sustainable telecom practices. In addition, the participants are given a small assignment to indicate at what time frame the SME can implement a more sustainable telecom practice in the SME.

The research is conducted to collect rich, qualitative data about the ability of SMEs to work with sustainable telecom practices. The goal is to determine if it is within an SME's ability to implement certain sustainability practices directly and whether this applies to all SMEs interviewed. Furthermore, suppose a specific sustainability practice can be adopted in the future. It is discovered what possible constraints for the SME are that withdrawal the SME to implement sustainability in the short term. Three SMEs are interviewed to create ground and knowledge from the SME perspective on using telecom more sustainably.

Method

Interactive qualitative interviews are conducted with three SMEs in Rotterdam to understand the factors influencing SMEs' adoption ability. As the research is focused on a broad range of SMEs, there were no requirements to participate in the study, apart from being a small- or medium-sized enterprise.

Regarding the number of participants, three SMEs were chosen to gather insights into their thoughts on sustainable telecom practices. The participants included SMEs operating in different sectors of various sizes. Table 3 provides an overview of the participants with their characteristics. The interviews were conducted with the SMEs' employees. The selection of participants was based on convenience sampling, but it also considered respondents' heterogeneity.

The sessions started with a short introduction to sustainable telecom use, after which the researcher explained the research method to the participant.

SME	Size	# FTE	Sector	Description
C9	Small	21	Tax Administration Consulting	Administration and tax consultancy
C10	Small	8	Information Technology	Start-up in blockchain technology
C11	Medium	102	Support Services	Financial and strategic real estate advice

Table 3. Overview of research participants

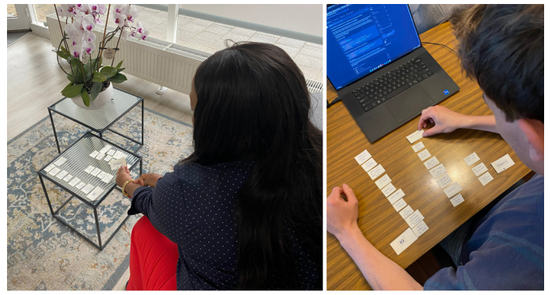


Figure 27a. Context of research setup

The participant was asked to fill in the consent form as shown in Appendix L. First, the research setup is created by placing cards with the words “present” and “future” on a table with the present on the left and the future on the right. These cards form a timeline where the participant will indicate where the card with the sustainable telecom practice can be placed for their SME. In advance, the researcher has prepared cards with one sustainable telecom practice per card. During the research, the researcher holds the cards with practices to use telecom more sustainably. The practice on the card will be read out loud to the participant after which the card is given to the participant. Then, the participant speaks out loud about what they think about the topic and whether the SME can start implementing it in the present or the future.

The participant is asked to place the card with the sustainable telecom practice on the timeline on the table. The research setup is shown in figure 27a and in figure 27b an overview of the cards and timeline is shown. Every time a new sustainable practice is given to the participant, the card is placed on the timeline. Two interviews were carried out in the SME’s company building, and one interview was carried out on Microsoft Teams with a miro board. The process was kept the same but digitally. The interviews lasted about 35 minutes.

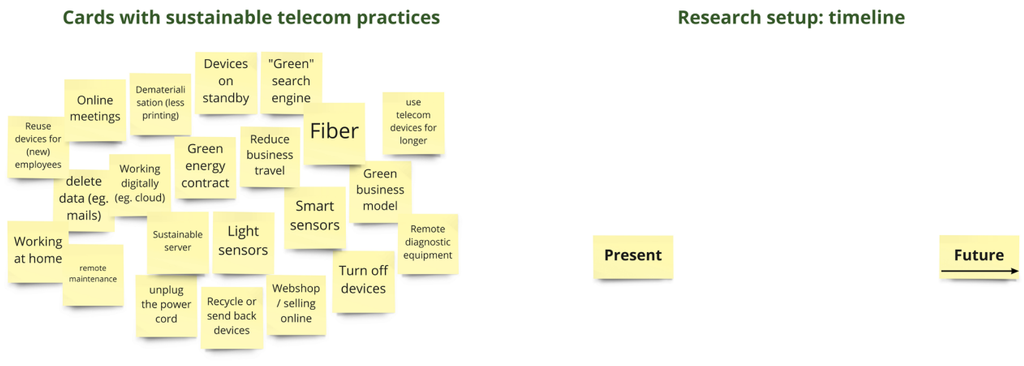


Figure 27b. Overview of cards and the timeline

The interviews were recorded by the researcher and pictures are taken of the timeline results for further analysis.

Analysis

The timeline with sustainable telecom practices the participants have made is replicated in a miro board for further analysis. The three individual timelines made by the participants are compared to see if the timespan to implement a possible sustainable telecom practice overlaps.

The recordings are transcribed and coded to analyse the insights gathered from the interviews. Based on the telecom practice and corresponding codes, the telecom practices are clustered into six themes that reflect the factors influencing whether an SME can implement sustainable telecom practices. These factors are written down as contribution challenges that SMEs face. The coding and clusters can be found in Appendix M.

Results

The results of the timeline comparison indicate that there is no significant overlap between the three SMEs in adopting sustainability practices. As only three SMEs have participated in the research, it is impossible to quantify the timespan and decide how far a specific sustainable telecom practice can be carried out in the future. However, it appears that it is very different per SME if they are already doing some of the sustainability practices or not yet, as well as the reason why the participant thinks it can be implemented now or in the future for their SME.

Sustainability priority of participants

SME C9 is not concerned with sustainability and is doing nothing on sustainable telecom but is very open to becoming more sustainable. The primary sustainability considerations arise from other priorities that make sustainability a side effect, such as the rising energy prices. SME C10 is a highly digital company and has already implemented many sustainability practices, mainly for other reasons than sustainability. They have a digital business model and work, for example, from home because of efficiency reasons. C11 is very concerned with sustainability but is not very digitalised. They are not yet using telecom to be more sustainable. However, all three SMEs have in common that they do not know anything about sustainability and telecom yet. They are open to implementing sustainability practices if the circumstances of their company allow them.

Contributing factors to adopt sustainability practices

The interviews reveal factors contributing to the adoption of the various possible sustainable telecom practices. The themes corresponding to the factors are the right means for an online way of working, collaborative effort, educating digital sustainability, management decisions for sustainability, office building restrictions, and reducing physical presence. The possibilities to use telecom more sustainably, as described in chapter 4.2, are connected to the themes. By doing so, the factors corresponding with the theme are directly applied and related to adopting the possibilities of using telecom more sustainably.

The outcomes of the research represent the reason for SMEs that possibilities to use telecom more sustainably are not yet adopted and which factors contribute to this. The themes and corresponding challenges are explained. In table 4, themes and possibilities to use telecom more sustainably are grouped.

Themes

The right means for an online way of working

Online meetings and working at home are mainly done for practical reasons (e.g. save time and money) and out of efficiency. The way of working is primarily dependent on one’s personal preference. It can also depend on the work responsibilities to what extent the way of working can be transferred to an online environment.

“There’s not that much for me to do at distance [as secretary]”

For companies more used to working online, meetings at the office are precisely planned on so-called “office days”. Working at home is not tolerated for important discussions or meetings with decision-making because;

“digital meetings are less efficient”.

Meeting physically is still the preferred way of meeting each other for work.

Collaborative effort

Personal motivation to use devices more sustainable and doing it together with colleagues seem most important to be able to use telecom more sustainable. Employees indicate that personal impact will be minimal and everyone should take responsibility.

“That’s more, that’s more of a user issue than a business issue as far as we’re concerned because there are no devices at the office of the company”

However, collectively using telecom more sustainable is an important motivation to do it within the company. Challenges are that the employees have to put effort into using devices more sustainably, they are unaware or have other priorities.

“We learned here to put nothing on standby but to turn everything off, but no one is doing that for their laptop”

Some practices are more sustainable already carried out by employees. Mainly because of different reasons than sustainability, e.g. cost efficiency or habits. Awareness about sustainability on this topic can help employees become more thoughtful about their use of devices.

“Yes well, it’s more that you, yourself, … that we ourselves should be more aware of it and be made

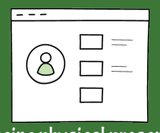
Themes	 The right means for an online way of working	 Collaborative effort	 Educate digital sustainability
Sustainability practices	• Working at home • "Green" search engine • Online meetings • Dematerialisation (less printing) • Working digitally	• Turn off devices • Devices on standby • Reuse devices for (new) employees • Unplug the power cord • Use telecom devices for longer • Recycle or send back devices	• Delete data (e.g. emails) • Sustainable server • "Green" search engine
Factors that contribute to challenges	• If the work itself allows being done online. • If the SME has experience in working online and if the SME already has adoption means to do so.	• Employees do not want to do it alone • Together more impact can be made • Doing something differently takes effort and only if other people do it as well it can be worth it • No insight into why something is sustainable, need for help	• Lack of knowledge about sustainable telecom practices • Priority is the quality of the alternative • Unawareness of sustainability practices already adopted and why this is (more) sustainable.
Themes	 Management decisions for sustainability	 Office building restrictions	 Reducing physical presence
Sustainability practices	• Webshop/selling online • Smart sensors • Green business model	• Light sensors • Fiber • Green energy contract	• Reduce business travel • Remote maintenance • Remote diagnostic equipment • Working at home
Factors that contribute to challenges	• Convince management of sustainability implementation • There are currently other priorities in the SME	• Not everything is in the hands of the SME, external circumstances • No crucial need for change	• Change the existing way of working • Actively keep in mind sustainability

Table 4. Themes, sustainability practices and factors that contribute to challenges shown in a table

aware of it [referring to sustainably using telecom]"

Educate digital sustainability

Lack of knowledge about sustainability and telecom seems to be the biggest reason for not being conscious online. Working digitally, dematerialisation, choosing sustainable hosting and using a "green" search engine are topics employees do not know much about the sustainability practice or are not familiar with. Priority is the quality of the alternative and if it does not take extra effort to switch.

The existing way of working already supports sustainability practices because of company policy or how a system works, but the reason is mainly unclear to the employee. SMEs consider the future to be more digital and use sustainable digital means such as the cloud and virtualisation. However, the employees need to be educated to work towards that future.

"I think this is interesting research, I had never thought of storing.. and eh your cloud and everything can be sustainable."

Management decisions for sustainability

The management is making critical decisions for the SME. Most of those decisions are thought out by the management and rely on the existing way of working. Management decisions primarily depend on customer needs, company ambitions and competitiveness.

"It depends on what the customer wants and if we can help them with that"

Therefore, decisions can be made counter sustainability-wise, as sales and the current (successful) way of working are more important than implementing sustainability.

"Still, it doesn't matter, because the functionality is more important than sustainability"

Not all employees know the level of sustainability in everyday business operations or think it is a complex subject to be tackled by the management.

"We could do it, if I had to decide, and now I am aware of course."

However, SME company policy can help employees change their current behaviour.

Office building restrictions

The SME employees indicate that the building owner of the building where the SMEs' office is located is responsible for what can be done. Changing the building is out of hand for SMEs as some rent office space in an office location. This also means that most employees are unaware of the current sustainability state of the facilities in the office. Examples are fiber, light sensors and green energy contracts. It is also mentioned that the existing way of working does not require any adjustments to the building, so there is no critical need for change. Insight into the benefits of a sustainable office could move SMEs to change, but implementing these practices should be practical for them.

Reducing physical presence

Employees can reduce business travel and maintenance and do diagnostics remotely to become more sustainable. Employees show that they ask for digital help and that it is highly dependent on the situation if maintenance and diagnostics can be done digitally. Software-wise, assistance can be given digitally through updates and support at a distance. Maintenance is also not needed daily or monthly, thus, physical appointments are considered;

"better and easier".

To reduce business travel, the existing way of working should be changed. SMEs believe that, for example, sales will be better when physically present. However, sometimes it is not in the employees' power to decide about a company's policy on this topic. Other reasons for not reducing business travel can be efficiency, practical reasons, other priorities than sustainability or being unaware of (sustainability) benefits.

Other insights gathered

While analysing the data collected from the interviews, other interesting patterns emerged in the data. It became clear that sustainability in relation to telecom is not necessary for an SME's business operations. This means that for SMEs, sustainability does not directly add to their core business, which is likely the reason that they are not adopting all sustainable telecom practices today. The SMEs are unaware of the benefits of sustainable telecom and the possibilities as they mostly have other priorities over sustainability. As seen from earlier interviews, this can be linked to the SMEs' being super busy already, so there is no time to learn about new topics as the possibilities and benefits are not immediately clear to them.

Conclusion

First, the different SMEs face challenges when open to adopting possible sustainability practices. These challenges, related to as factors, are other per SME but can be clustered and related to the themes. In this way, it might become more accessible for an SME to

decide which telecom practice can be implemented quickly without conflicting with business interests. It can be up to the SME to determine what is possible with the resources, capabilities and knowledge available to the particular SME.

Two ways to use telecom more sustainably

Furthermore, a distinction can be made in ways to use telecom more sustainably. The sustainability practices are analysed on how the participants can use the telecom to become more sustainable. This emerges in the division that there are two ways telecom can help its users use their telecom more environmentally sustainable; with and through telecom (figure 28).

The first way users can use telecom more sustainable is with the use of telecom. With these sustainable telecom practices, SMEs can deal more sustainably with the telecom devices available within the SME. After purchasing the product, the device should be used in the most sustainable way possible and the user should behave sustainably with it to reduce the energy consumption of the device and the amount of waste. Examples are; turning devices off when not in use to save energy and reusing telecom devices for other users, or increasing the lifetime of products to avoid waste.

The other option to use telecom more sustainable is through the use of telecom, which means that the devices are used for work in a more sustainable way. The devices, therefore, enable you to work more sustainably than without the telecom device. Of course, this does not necessarily mean that energy consumption is reduced as it can result in more device use. However, it can help to emit less CO2. Examples are; the possibility of meeting online and working at home in the cloud, which allows people to avoid commute and business travel. In addition, digitalisation allows for dematerialisation, making users print less paper and reducing their CO2 emissions.

Sustainability adoption

Furthermore, it occurs that not only a personal interest in sustainability practices of employees is essential to change the way of working (chapter 3.4), but also the management and building restrictions play a role in what the SME can do. The combination of management support and personal interest in sustainability seems to push employees to do something differently.

The first thing that has to happen to achieve this joint shift in work is to educate the SMEs what sustainable telecom is and how to apply this knowledge in the context of the SME.

In earlier research is found that inspiration, knowledge and guidance are important values for SMEs to use telecom more sustainably (chapter 4.1). In addition, the explorative research found that the community is another essential aspect in adopting sustainability practices.

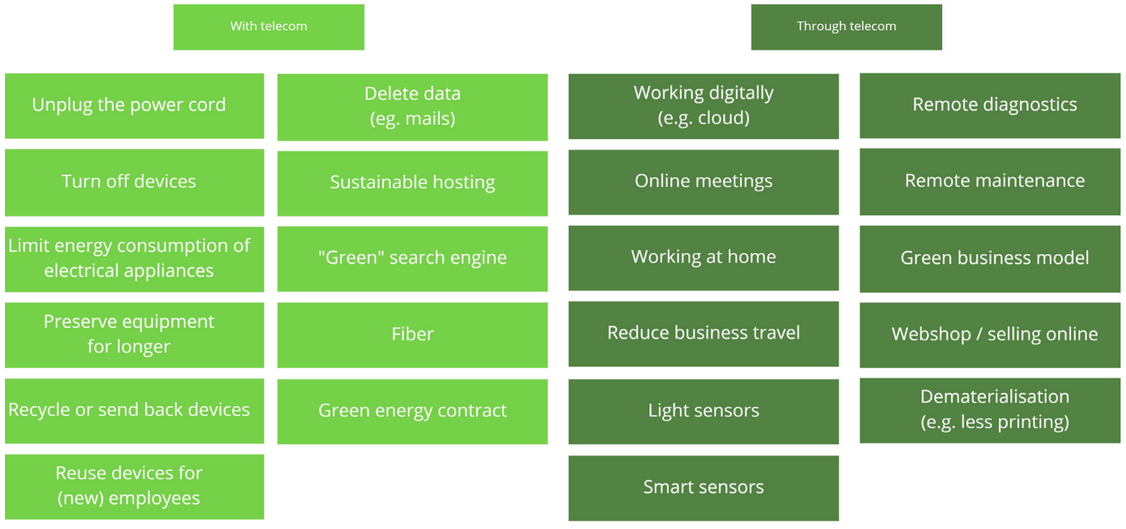


Figure 28. Distinction between sustainable with and through telecom

Further research

The context challenges that arise from the research in this chapter can be used to discover the desired solution space for KPN for sustainable telecom enablement. The challenges are translated to design requirements in chapter 5.3.

4.4 Chapter conclusion

In this chapter, the customer journey analysis showed an opportunity to implement sustainability in the being a customer phase. By implementing sustainability in this phase, KPN could create more customer engagement with sustainability while considering the values of SMEs.

In the phase of being a customer, SMEs are using their telecom. A list of sustainable telecom practices that SMEs can carry out is formed to show how SMEs could use their telecom in a sustainable manner, answering research question 4. Explorative research is conducted to understand the possible challenges SMEs' have while implementing sustainable telecom practices.

The explorative research has shown that six different factors influence whether an SME can adopt the sustainable telecom practice to use telecom in a more sustainable manner. This result answers research question 5. Themes that represent challenges that SMEs face that contribute to the (not) environmentally sustainable use of telecom have to do with the following themes:

- The right means for an online way of working
- Collaborative effort
- Educate digital sustainability
- Management decisions for sustainability
- Office building restrictions
- Reducing physical presence

The insights add to the previous finding about what SMEs value for using telecom more sustainably. Besides inspiration, knowledge and guidance, SMEs find it important to conduct sustainability practices together. Hence, this indicates that SMEs value a community aspect for using telecom more sustainably.

5. Problem definition

In this chapter, all learnings from previous sections are captured to come to the problem definition. The problem is defined to create an overview of which problem there is to solve.

First, a focus is created on which SME segment to target to understand for who the problem can be solved.

In this chapter

5.1 Market segmentation

The SME sector is complex to segment and address with value-added sustainability services. Previous research has shown that the variety of enterprises is very different in size, complexity, ICT needs and resources available. In addition, various factors also contribute to challenges and thus the possibility of adopting more sustainable telecom practices for SMEs.

However, to add value and target the right SMEs by solving their problems, an SME market segmentation is carried out with the insights gathered from both types of field research (chapter 2.3 & 4.3). The goal of creating a market segment focus is to address the needs of the SMEs in the chosen market segment and to show on which SMEs KPN can focus to introduce sustainable telecom solutions to them.

SME Segmentation

The context of this research is sustainable telecom for KPN's SME customers. Therefore, the market segment KPN serves with their SME telecom products is chosen. These SMEs in the Netherlands are KPN customers and have up to 150 employees.

Serving customers

To delve deeper into SME segmentation, a distinction has been made in ways to use telecom more sustainably. There are two ways telecom can help its users use their telecom more environmentally sustainable as emerged from the research in chapter 4.3.

Digitalisation and sustainability are two recurring themes when exploring sustainable telecom: the two themes are linked to each other when sustainably using telecom. The knowledge that most SMEs use approximately the same telecom products (chapter 4.2) and that most SMEs do not yet do much with digitalisation (chapter 4.1) and sustainability (chapter 3.1), makes it possible to distinguish between the various SMEs.

Figure 29 shows four different quadrants that will include the majority of SMEs. The quadrants show what an SME within that quadrant can do with sustainable telecom. The figure indicates if the SMEs in that quadrant can become more sustainable with or through telecom. Due to the many properties of SMEs, it seems most logical to classify them as low sustainability priority, high sustainability priority, less digitalised and more digitalised. Of course, an SME can indicate the degree of sustainability priority itself; there is a focus on sustainability, the SME is actively working on sustainability and, for example, has set sustainable goals and targets for the company. The degree of digitalisation is mapped in figure 7 (chapter 2.2 .

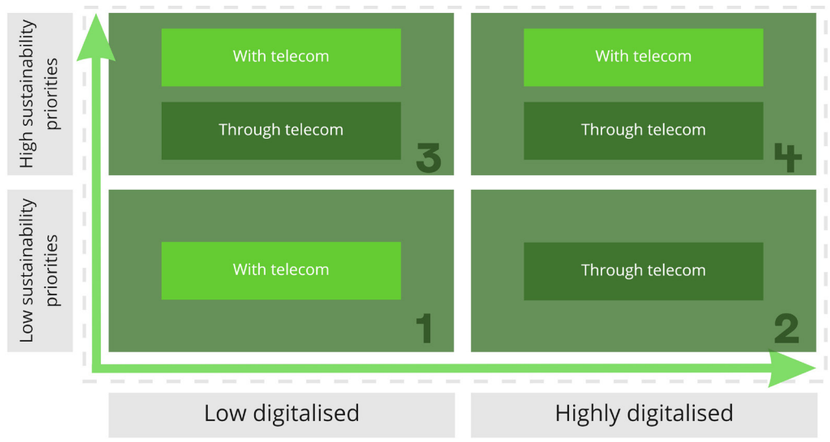


Figure 29. Characteristics of SMEs that determine which SME can adopt which telecom practices to use telecom more sustainable

Market segment focus

The division of with and through telecom distinguishes what different SMEs can do. The 3rd and 4th quadrants in figure 55 are the first segments to focus on for this project. The focus is determined by the construct of domain-specific innovativeness, which proposes that people with insider knowledge or interest in a particular topic (in this project sustainability) are more likely to identify innovations when released (Araujo et al., 2016).

First, as sustainability is a high priority for the SMEs in segments 3 and 4, KPN can maintain a stronger relationship with those customers by meeting their values. As they are KPN customers, they already use KPN's telecom. The transition to using the telecom they already own more sustainable can be easily implemented when there is a priority given to sustainability in the SMEs' business.

5.2 Design problem

To be the one provider of sustainable customer enablement in telecom, there are some problems KPN has to overcome. Defining the design problem allows to develop user-centered solutions that fit the insights gathered in previous chapters.

The problem

KPN wants to introduce their sustainable telecom to the SME market to achieve sustainability goals and stay ahead of the competition in this market. However, KPN is not yet doing anything with sustainable telecom for their SME customers. As a result, KPN does not know what is needed, which SMEs to target and how these SMEs can be helped.

To solve the problem, the first sub-problem to look into is:

Many employees of KPN are not concerned with prioritising sustainability in their work towards customers. Employees are unaware of KPN as a sustainability frontrunner, meaning they currently do not sufficiently integrate sustainability into their work for customers.

This results in lacking sustainability touchpoints in contact with SME customers within the customer journey.

Then, a problem for SMEs occurs. This marks the second sub-problem:

Within SMEs, there is no knowledge, awareness and priority for the sustainable use of telecom. If there is interest, SME-specific challenges prevent SMEs from implementing sustainable telecom practices.

This means that if KPN enables SMEs to use telecom more sustainably, the SMEs do not have knowledge about what to do. The unawareness and lack of knowledge contribute to the fact that they currently do not limit their digital pollution.

6. Design Brief

The design brief is formulated to guide to the solution space and is created based on the research insights. The design challenge is redefined in the design brief, and a future vision and design requirements are completed for direction.

With the formation of the design brief, the inspiration phase of the Human-Centered Design approach is concluded.

In this chapter

6.1 Future vision

A future vision for KPN is created to provide direction for KPN. In addition, the vision will help to create more clarity about the future by making the goals and purpose of the design come to life.

Solution space

The design aims to guide SMEs to use their telecom more sustainably. This goal has two components to it;

1) to increase KPN employee awareness by educating them to do their work with sustainability in mind, and

2) to guide SME customers by enabling inspiration and education about sustainable telecom, resulting in a more sustainable use of telecom services.

Design vision

As concluded in chapter 3.2, competitors quickly followed KPN with more ambitious sustainability goals. Therefore, a future vision is created that helps KPN achieve their goals and helps them prioritise sustainability in the SME market. This will result to create a design that contributes to the SMEs' circumstances in which they operate.

In the future vision for KPN, various insights from earlier phases of research are included. Besides, it is taken into account that the vision does fit with KPN's company strategy ("to connect everyone in the Netherlands to a sustainable future").

Future vision for KPN:

Your partner in sustainable telecom use

KPN is the provider that connects telecom to sustainability by facilitating SME customers with inspiration, guidance and education on suited sustainable telecom practices while considering specific context challenges of SMEs

6.2 Design goal

Earlier in this report, the design challenge is described:

Design a strategy for KPN to enable its SME customers to use telecom more sustainably.

This design challenge is further specified in a design goal.

The goal

The goal is:

guide SMEs in using their telecom in a more environmentally sustainable manner with the help of KPN's sustainability expertise in telecom.

Therefore, the design should allow SME customers to access knowledge about possibilities to use telecom more sustainably tailored to the context-specific challenges of the SME and guided by KPN as an expert partner. Furthermore, the design should meet the requirements as stated in the design requirements (chapter 6.3).

Sub-goal

A sub-goal to include stakeholder engagement is formulated to create a design solution for the design goal. This sub-goal serves to assure that KPN can implement solutions. As we have seen in the problem definition, many of KPN's employees are unaware or not concerned with KPN's sustainability performance.

The sub-goal is:

ensure that KPN's employees can implement sustainability in the customer journey for SME customers of KPN.

Therefore, the design should help KPN employees to integrate sustainability into every customer journey that SMEs go through while being a customer at KPN, beginning with a focus on integrating the designed solution into the customer journey of SME customers.

With the final concept design, KPN should be able to create a positive impact on their business customers and add value, reduce their scope 3 emissions and reduce SMEs' environmental footprint.

6.3 Design Requirements

From the insights gathered, design requirements can be created to help SMEs use their telecom more sustainably.

The design requirements are:

1. The design should create awareness about the possibilities and benefits of sustainable telecom for SMEs, e.g. reducing energy consumption and saving costs
2. The design should lead to inspire SMEs to use their telecom more sustainably and to adopt (new) sustainable telecom practices
3. The design should evoke sustainably actions while using telecom
4. The design aims to connect SMEs with knowledge networks and sets a supportive environment
5. The design should be tailored to the specific context-related challenges SMEs face. To overcome challenges, the design should:
    - Fit with the SME's current way of working
    - Allows employees and- or groups of SMEs to act sustainably with telecom together
    - Provide SMEs with proficient knowledge about using telecom sustainably
    - Include SME management to be actively involved
    - Not interfere with particular operational context restrictions of SMEs, e.g. building management and current subscriptions
    - Work with the resources available to the SMEs
6. The design should be integrated into the telecom use phase of the customer journey SME customers of KPN go through
7. The design should provoke the feeling for SMEs that KPN is an expert in sustainable telecom use

Furthermore,

8. KPN should be able to educate their employees to design for sustainability integrated into the SME customer journey.

Ideation

The project's second phase is the ideation phase, which serves to brainstorm and identify design opportunities and prototype possible solutions. During this phase, possibilities for enabling the reduction of SMEs' environmental impact when using telecom are ideated.

Creative sessions with KPN employees and design students are done to develop ideas that meet the design brief. The ideas are directly validated with stakeholders on desirability at KPN. Once the ideas are tested, a promising idea is conceptualised. Finally, the desirability of the concept is validated by testing the prototype with SMEs.

Furthermore, a design principle for KPN's employees is created to meet the sub-goal of the design brief as described in chapter 6.2. Finally, this design principle is tested with KPN's employees in the customer journey team to test its clarity and usability.

The insights gathered through the user test provide the necessary information to create the final concepts. Two concepts are made, one for the project goal and one for the sub-goal.

Sub-research questions answered in the inspiration phase are question 6 and 7.

7. Ideate
8. Conceptualisation

7. Ideate

In this chapter, ideas are generated for the design brief. Creative sessions are held to come up with ideas to solve the design problem. First, a session is done with employees of KPN's SME customer journey team. The goal of this session is to engage project stakeholders in designing for sustainability in the SME market and to discover what their ideas are about sustainability for KPN's SME customers.

A second creative session is organised with four master design students from the faculty of Industrial Design Engineering. This session mainly serves as inspiration for design concepts. The session results in four elaborated ideas. These elaborated ideas are discussed with a stakeholder at KPN to gather feedback about their solution direction.

In this chapter

7.1 Creative sessions

To come up with creative ideas, two creative sessions are facilitated. The first session is done with employees of KPN's SME customer journey team. The goal of this session is to involve the employees in designing for sustainability in the SME market and to discover what their ideas are about sustainability for KPN's SME customers.

Furthermore, a creative session is organised with four master design students from the faculty of Industrial Design Engineering (Delft University of Technology). This session mainly serves as inspiration for design concepts. The goal of the creative session is to come up with elaborate ideas that provide a solution to the problem defined in chapter 5.2. From these elaborate ideas, ideally, one is chosen to work out in further detail into a concept that suits the design requirements.

Ideation with KPN employees

The session started with an introduction about KPN's current sustainability status including some examples of what KPN is already doing to be more sustainable. After a quick warm-up exercise (ice-breaker), a brainstorm was initiated to get the employees to think about sustainability in their daily work themselves (figure 30a & 30b).

The participants were divided into four groups of around six people. The brainstorm is set up as a walking brainstorm, a technique that helps participants to build on each other's ideas and generate new ideas in a dynamic setting. Everyone is provided with markers, paper and post-its.

The topic of the brainstorm is "sustainability by design" and to every team, a sheet of paper is handed out with a focus word. The four focus words on the paper are; simulate sustainability, SME, CJ (customer journey) and digitalisation. A timer was set to keep track of time and the teams started coming up with ideas which they wrote out on post its onto the paper. The teams then switched papers and brainstormed again with a new focus word building on the previous group's ideas or adding new ideas. We circulated the papers twice and then someone from every group presented the outcome, the best or craziest idea that the group had come up with.

Figure 30a. Impression of the session

Figure 30b. Impression of the session

Session outcomes

Ideas were generated that provided insight into the current sustainability ability of KPN by its employees in this particular team. Ideas per topic are shown in figure 31.

The ideas are clustered as some overlapping idea directions occur. A visual representation of the clustered ideas is shown in figure 32. The visual representation shows us multiple idea directions for KPN to implement sustainability by design.

The clusters are placed on a line to indicate what KPN can do for their customers and what can be a result of this for customers. One workshop participant wrote, "SME entrepreneurs do not have the knowledge and time". This is more a problem definition than an idea, so it is used as a starting point in the visual.

The team's ideas indicate that KPN could create awareness about sustainability by sharing what KPN does in customer communication. Furthermore, KPN could include sustainability in the customer journey by including values for SMEs and testing them with customers.

An overarching idea is KPN working together with SMEs on sustainability. In this scenario, KPN can be the SMEs' helping hand and include benefits and partnerships for sustainability for SME customers.

Another thing KPN can do is aimed at their business practices such as enabling customers to act circular with devices, innovate with new, more sustainable technologies and become paperless. By implementing those ideas, KPN can become a customer-centered service provider. As a result, SMEs can get insights about CO2 reduction for their business and can achieve customer rewards by being sustainable customers at KPN.

Session conclusion

Interestingly, some of the ideas the employees came up with are not "new" to KPN, although they seem new to the employee. For example, KPN is already innovating with sustainability technologies and its devices' circularity (chapter 3.2). However, it appears that the team is unaware of those practices by KPN. Furthermore, some other ideas include applying existing in-house knowledge to communicate with customers and in customer service.

Figure 31. Ideation with KPN employees, ideas per topic

Concludingly, already some ideas have emerged on what can be done in the SME market with sustainability in the customer journey. Most ideas are standalone and can be part of an overarching sustainable design by KPN. However, how these isolated ideas can be translated into a larger whole has not yet been figured out. In addition, it must become clear how the ideas fit within the context of SME, whereby it shows how these ideas contribute to the SME's sustainable use of telecom.

Furthermore, the session brought up an important insight. The SME customer journey team employees should be taught how to implement sustainability in their work. The insights generated from the session show that employees can come up with many ideas about how KPN can reflect sustainability in design, but these are not yet applied.

*A blog post about the session with KPN's SME customer journey team employees is written for the Circular Design Lab of the Delft University of Technology. The blog post provides insight into how creative sessions can inspire and engage stakeholders.

The blog post can be read via the webpage of the Circular Design Lab: https://delftdesignlabs.org/news/how-creative-sessions-can-inspire-and-engage-stakeholders/

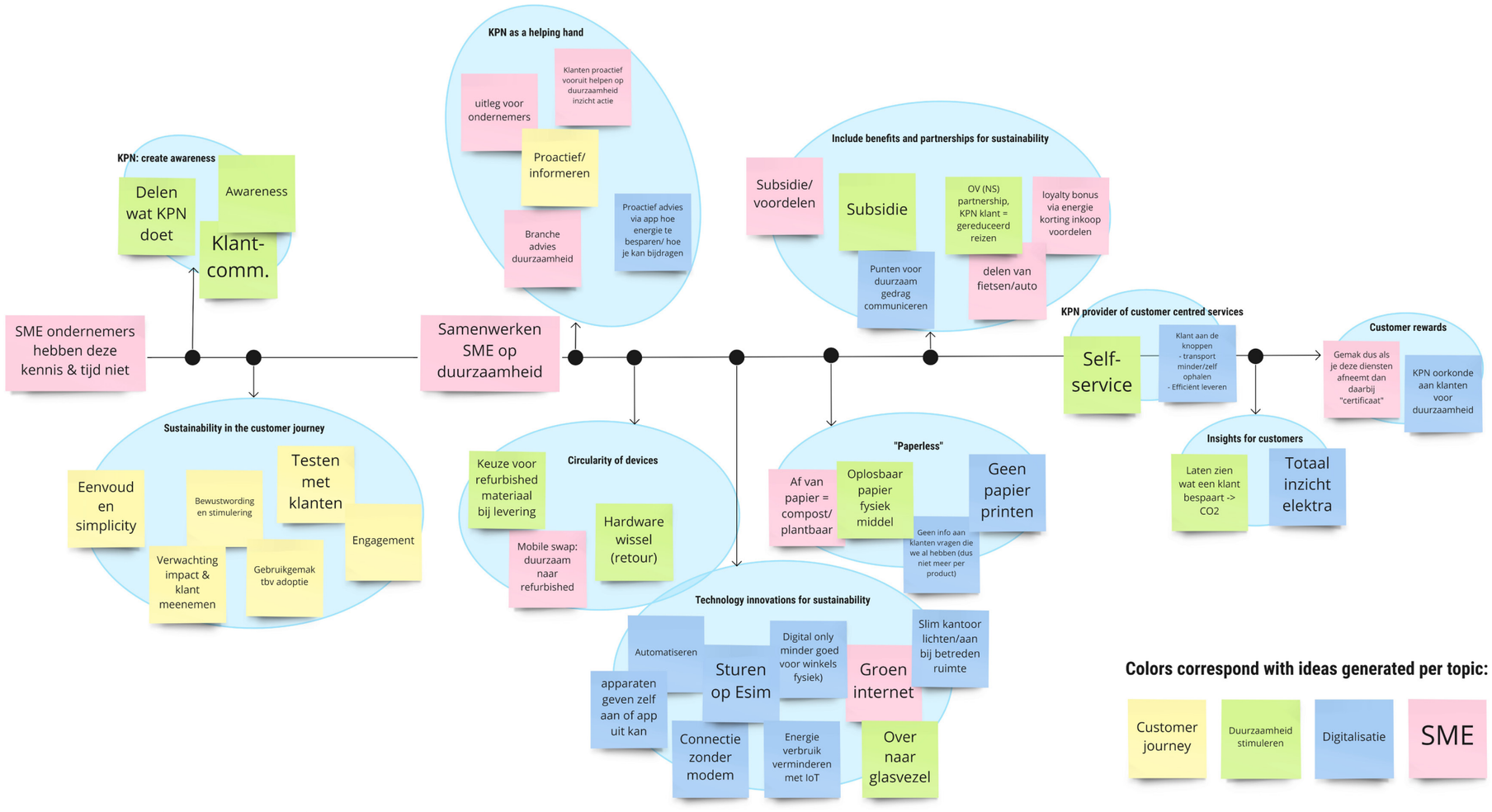


Figure 32. Visual overview of ideas generated by KPN's SME customer journey team for what KPN can do for sustainability by design

Ideation with design students

A session with design students is organised to gain refreshing insights about how to solve the design problem. Furthermore, the session's goal is to come up with elaborate ideas that can be converted into a concept for the final concept. It is chosen to conduct the session with design students to get creative, new ideas emerging outside of KPN's context.

Method

The participants didn't get an introduction to the topic to avoid bias about the ideation direction. However, they did know the session was about how SMEs can use telecom for sustainability; the subject is urgency for implementing sustainability practices for SMEs. First, the creative session and planning were explained (figure 33). As the students were design students, they were familiar with the different brainstorming techniques. Still, nevertheless, a quick heads-up was given to ensure everyone knew what was expected from them. The session started with an icebreaker to warm up for the first brainstorming round. Then, the brainstorming technique used for the first exercise is called forward-backwards planning with the topic; SME's urgency for sustainability practice. This technique serves the participants to find their problem definition by brainstorming about what prevented the urgency of sustainability practice by SMEs and brainstorming if there would be the urgency of sustainability practice, what could be done. An impression of the session set up is shown in figure 34.

The problem definition is reformulated into "how to" questions that support the idea generation and focus on two aspects of the problem found. The two "how to" questions:

- How to help SME's deal with the effort for sustainability?
- How can SMEs be made aware about sustainability practices?

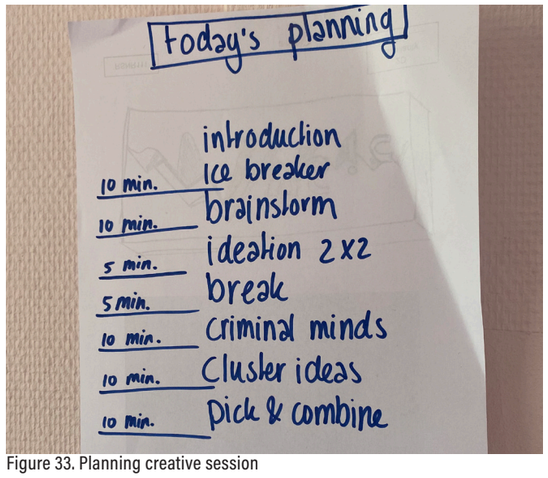


Figure 33. Planning creative session

Figure 34. Impression of the set-up of the session

With the how to questions, a walking brainstorm is conducted. The students are divided into two teams of two participants and together, they come up with as many ideas as possible to the question. After 2 minutes, the teams switch.

The session went on with a brainstorm technique called criminal minds, this technique forces the participants to think about how not to solve the problem. The two previously written down how to questions are converted in:

- How to make it super hard to be sustainable?
- How to make the SMEs unaware?

After a round of out loud brainstorming per question together, everyone chose two of the "bad ideas". Then, these "bad ideas" were clustered and another brainstorming round was done to transform the "bad ideas" into good ideas applicable to solving the problem. In this brainstorm, the "bad idea" inspires the brainstorming process in which the idea is transformed into a good one.

As many ideas are generated with the whole creative session, the ideas are clustered one last time into five different clusters. The clusters are made to give insight into the session results and review the overarching themes of the ideas. A visual representation of the clusters is shown in figure 35.

Figure 35. Clusters of the ideas

The power of the group represents the idea of being sustainable together as a community, where tips and progress are shared among the members to work together towards goals.

Asking for commitment includes SMEs committing to sustainability goals. Ideas include ways to make the SMEs engaged in the process. For example, with events, a loan, showcases and intermediary feedback. Help in the process indicates that it is beneficial for SMEs to get help in their sustainability journey. It is based on the idea that if SMEs get the proper support, it would be easier to be sustainable with small steps by setting measurable goals and a target.

Old vs New is an idea cluster representing the SME's future vision with sustainability. It is focused on showing how an SME can change for the better; they could see sustainability as an opportunity, gains can be demonstrated and long-term rewards. Conversely, showing the consequences of not acting can remind SMEs that change might be food.

The feedback loop helps SMEs to gather actionable feedback to follow up with. This idea cluster is based on setting goals and targets while getting information about the SMEs' performance on a task for improvement.

Results: session outcomes

Combinations are made of two cluster themes to come up with more elaborate ideas as a result of the creative session. Every participant develops one more elaborate idea based on combining two themes. This idea is individually worked out, and a drawing is made to support the idea. The four developed ideas from the creative session with design students are further explained.

Idea 1

The first idea combines the clusters, power of the group and the feedback loop (figure 36a).

The idea includes that there is a different expert in every stage of the SME's sustainability journey. The idea is based on a community that constantly gives feedback about what can be done with sustainability. It is not always the case that one person can help you with your questions or learnings, so in this idea there is a network of different experts that can help you with probably different challenges. There are three experts available. First, the SME who is an expert on their own business, then there is a community of other SMEs where questions can be asked, and tips and tricks can be shared with peers. Allowing SMEs to actively establish contacts. There also is the expert, KPN, an expert on telecom who can help with telecom specific sustainability questions or concerns. In this idea, every expert has input that provides feedback which can apply to the SME, and the expert and community can learn from.

Figure 36a. Visual of idea 1

Idea 2

The second idea combines the clusters power of the group and help in the process (figure 36b).

For this idea, network sessions with other SMEs are organised to make new contacts and get to know each other. In the sessions, problems, goals and achievements are shared within the group. In this group, every SME has an "SME buddy" who is a direct point of contact to share tips and as a sparring partner. Buddies are available to help each other and get the feeling of achieving something together and learning from each other. The idea is also about sharing knowledge by sharing templates, contracts or resources for sustainability. This idea ensures that a close group of SMEs are helping and learning from each other.

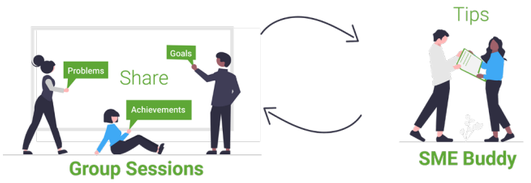


Figure 36b. Visual of idea 2

Idea 3

The third idea combines the clusters asking for commitment and feedback loop (figure 36c).

This idea means that SMEs commit to participating in a sustainable telecom program of KPN. First, the participants commit; for example, a kick-off party is organized with an onboarding meeting in the form of lunch, dinner or coffee. Goals are set that can be achieved within KPN's programme. Then there are moments to get feedback on the goals and adjust them if necessary with the program's help. The idea is based on the commitment of the participant and where KPN can be a knowledge partner actively helping the SME. The SME has one point of contact and KPN can provide extra service to help the SME.

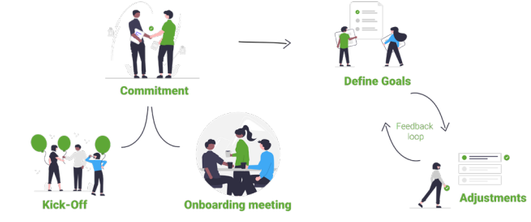


Figure 36c. Visual of idea 3

Idea 4

The fourth idea combines the clusters old vs. new and asking for commitment (figure 36d).

This idea is a coaching programme for SMEs organised by KPN. There will be a campaign that attracts SMEs to sign up. The programme includes insights into what will happen if SMEs do not take sustainability actions, what SMEs can do and how they will be benefitted. When this coaching and learning module is successfully completed, the SME will receive a certificate of commitment to show others that the SME is actively involved with sustainability practices organised by KPN.

Figure 36d. Visual of idea 4

Stakeholder feedback

A meeting with the Strategic Lead Energy and Environment of KPN is set up to determine the desirability of the elaborated ideas with KPN. The four ideas are presented and fully explained and feedback is requested. The session aims to generate feedback on the four ideas to develop a concept contributing to solving the design problem with a fit to KPN. During the session, feedback is discussed and new design directions emerge that add to the elaborated ideas. Ensuring that an influential stakeholder is engaged in the ideation process can test whether the concept is viable and desirable for KPN.

After discussing the ideas, we quickly started brainstorming about an exciting outcome for creating a concept. As parts of the different ideas seemed to fit well with KPN's desires, the idea arose to combine elements of the four ideas into one concept where the different interesting aspects can come together.
General feedback about the different ideas was taken into account and input for the new concept included:

- Ideally, the concept has a focus on the self-service of SMEs
- For SME customers, it takes as little effort as possible to participate
- Include communication about KPN's existing propositions in the design, such as devices made from recycled materials, the deep sleep mode of the TV box and retour and recycle processes.
- Think about integrating ideas in existing channels (store/app/website)

To add to the elaborate ideas and with the feedback in mind, another look is given to the ideas from the employees of KPN. Ideally, those ideas are included in the developed concept. Furthermore, after evaluating ideas, the ideas are tested with the design requirements (chapter 6.3). An overview is shown in figure 37.

Ideas	Design requirements						
Idea 1	1	2	3	4	5	6	7
Idea 2	1	2	3	4	5	6	7
Idea 3	1	2	3	4	5	6	7
Idea 4	1	2	3	4	5	6	7
Does the idea meet the requirement?					Yes	Could be	No

Figure 37. Ideas and Design requirements

7.2 Conclusion sessions

All insights gathered combined, tested and connected led to incorporating parts of the four ideas into one concept design. In addition, the insights resulted in a selection of aspects that added value to all stakeholders included in the project.

The session with stakeholder feedback ensured to keep KPN engaged in the process and has helped to highlight input for further design iterations. In figure 38 is an overview provided of what to keep and what to develop per idea.

Figure 38. What to keep and what to develop

8. Conceptualisation

In this chapter, a concept from the elaborated ideas is created to enable SME customers to use their telecom more sustainably. With stakeholder feedback, the idea arose to combine elements of the four ideas conceived in chapter 7.1 into one concept. In this concept, the different interesting aspects of the four ideas have come together. A concept is created that is prototyped for evaluation with SMEs.

Furthermore, a concept is developed to ensure that KPN's employees can implement sustainability in the customer journey for SME customers of KPN. Also, this concept is prototyped for evaluation with KPN's employees.

This chapter aims to test whether the findings integrated into the concepts help its users understand and interpret its intentions. The concepts are further finalised in the final concepts.

In this chapter

8.1 Platform concept

A concept is made that combines the valuable aspects of the four elaborate ideas, as described in chapter 7.1. This concept emerged from the ideas and is further detailed in this chapter.

Enablement platform

The first idea (idea 1) forms the basis of the concept as this idea promises to involve all important stakeholders to use telecom more sustainable for SMEs. Furthermore, this concept allows for self-service and constant communication and feedback between the stakeholders that can help the SME. The proposition of KPN as an expert adds value to KPN as part of the concept. Furthermore, idea 1 is used to provide guidance and knowledge to SMEs.

From idea 2, we keep the aspect of customer responsibility and the community where SMEs can help each other with problems by giving tips. KPN can connect this community through a medium for communication.

To make SMEs committed to the design, we take the community and goals aspect from idea 3. Goals can be put on a calendar to remind and engage customers to use their telecom more sustainably. The commitment of SME customers can add to the customer loyalty of KPN's customers. Besides, KPN can show its sustainability proposition to its customers, which can add to the sustainability character of KPN.

The focus on positive impact in idea 4 was favoured with the stakeholder feedback. Benefits of sustainable telecom use are communicated and SMEs can be inspired to start acting. In addition, KPN can share new sustainable solutions and SMEs get insights into use cases that could benefit their business.

All described aspects are combined in one concept: a digital platform. KPN can provide this platform to enable, inspire and educate SME customers to use their telecom more sustainably.

* Throughout the chapter, the term platform is used to describe the concept. The term platform represents an undefined (digital) medium. It can be thought of as a place for exchanging information, product or services between KPN and its customers. The form and or space of the medium is undefined.

As technology evolves fast and innovations are constantly adopted, a digital platform provides the dynamics for constant new content representation. The platform aims to connect SMEs so they can access up-to-date information about the sustainable use of telecom. Sustainability-driven innovations can constantly be updated on the platform to keep the SMEs involved. As a result, the SMEs stay up to date with the newest developments that help them use their telecom more sustainably.

KPN GreenHub

The platform is named "KPN GreenHub". KPN GreenHub aims to be a digital space where SMEs can come together to access and exchange knowledge about sustainable telecom use. KPN provides SMEs with the necessities to include sustainability in their daily operations. The name "GreenHub" is chosen to represent a sustainable, effective centre of activity ("Hub") to use telecom more sustainably. "Green" refers to the environmental sustainability aspect of the information provided. With KPN GreenHub, KPN creates a space where it is possible to communicate sustainability priorities directly to SMEs. This way, KPN delivers value to SMEs with in-house knowledge about sustainability while taking the expert role in sustainability for telecom.

The platform is based on the idea that multiple stakeholders are involved, the SME itself, the SME community and KPN. Goal of connecting stakeholders is to benefit each other by sharing information.

The platform consists of four main components. These components cover the community, knowledge, inspiration and guidance aspects (figure 39). KPN GreenHub is further explained based on the four aspects included.

1. Inspiration

As SMEs have not connected sustainability with telecom, sustainably using telecom is mainly new to them. This function of the platform serves to inspire SMEs by showing them use cases where telecom is put to sustainable use. SME customers can explore the opportunities that telecom holds for sustainability in this area of the platform. Furthermore, this section is where KPN can put information about the newest technology innovations and update customers about new or existing sustainable products and services that KPN offers.

2. Knowledge

The function of this section is to provide knowledge about sustainable telecom to customers. When customers are inspired by KPN to do more with sustainability through telecom, this is the place to get to know more about the possibilities. Webinars and blog posts communicate the sustainable impact of devices KPN offers and what can be done with its services. This is also where the opportunities to use telecom more sustainably are displayed. The SME can access sustainability practices that suit the current context of their SME.

3. Guidance

While using the platform, SMEs get guidance from KPN on what they can do for sustainability using telecom. KPN helps the SME to set goals which can help SMEs become more environmentally sustainable with or through their telecom. These goals are added to a calendar and provide an overview of tasks directly executable or demand the SMEs to act. As soon as SMEs set goals, KPN will provide them with a digital certificate of participation. This certificate is issued to show that SMEs are involved in using their telecom more sustainably. As this is a process that is never "ended", the certificate is already awarded upon participation in the platform to show that the SME prioritizes sustainability through telecom.

4. Community

The community is where SMEs can come together digitally to discuss how they use their telecom more sustainably or ask each other questions. This platform section consists of a medium that allows SMEs to communicate with each other. There is a forum where questions can be asked. A chat function is available with groups where SMEs can connect and contact each other. The community connects like-minded SMEs that consider sustainability through telecom an essential practice for their SMEs.

KPN GreenHub goals

The main incentive for the platform is to create a place where all information about sustainable telecom available can be found that is relevant for SMEs. It is not meant to be a sales platform or marketing, although it can serve as a more substantial brand relation with sustainability for KPN. Previous user research shows that SMEs would consider the four essential aspects to start using their telecom more sustainably. Therefore, all four elements are included in the platform to provide a solution that fits the SME's wishes.

The added value that the platform can provide to KPN includes increased customer engagement with the telecom. Furthermore, it adds to customer value management by providing SMEs with a new service that adds to their desires.

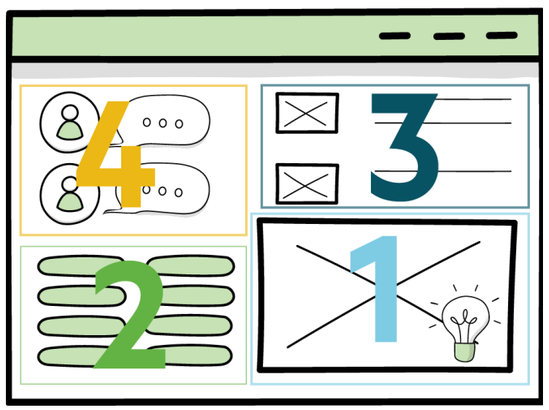


Figure 39. Platform components

8.2 Platform concept evaluation

A low-fidelity prototype of the concept is made to evaluate the platform by making it tangible. The prototype presents the design and allows us to see it in action in the context. In addition, prototyping the concept helps ensure that the design concept works as intended and to determine if users can use it.

The goal for concept evaluation is to gather feedback from SMEs as they use the prototype of the platform. In addition, testing the prototype is relevant to improving customer usability. Therefore, a research experiment is set up with SMEs.

Goal

The prototype aims to test whether the platform conveys the essential aspects of the platform, as covered in chapter 8.1. Furthermore, the prototype is used to test the usability and desirability of such a platform with SMEs. Finally, the concept's evaluation will be considered for the further development of the concept into a final concept design.

Figure 40. GreenHub platform prototype

Method

Research with the prototype is conducted to test whether SMEs can use the platform with desired outcomes. The study consisted of two parts, usability testing through an experiment with a prototype where the participants were given a task and, afterwards, a user evaluation of the task through semi-structured interviews.

Prototype

A low-fidelity prototype of the platform, as described in chapter 8.1, is made to test its usability. Prototyping in low fidelity is an easy way to translate high-level concepts into testable artefacts. Therefore, it is chosen to prototype the idea in low fidelity to produce the prototype quickly and to test the four aspects (inspiration, communication, knowledge and guidance) with the target group.

The platform is made in physical form, as shown in figure 40. Three identical prototypes are made, one for every one of the research participants (figure 41).

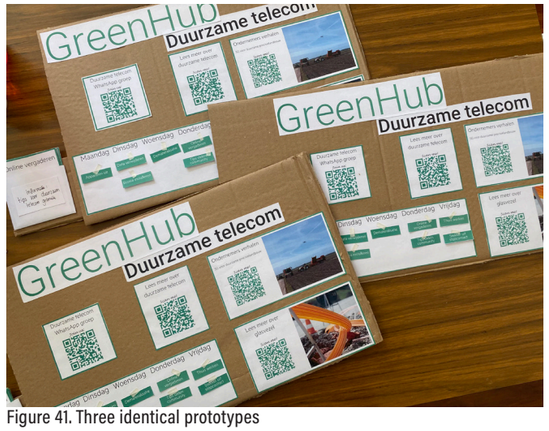


Figure 41. Three identical prototypes

QR codes are developed for the participants to scan to get access to inspiration materials about sustainable telecom. These can be scanned with mobile phones and lead to different sustainability pages. For example, one of the QR codes leads to a digital article about the sustainability of fibre optic internet. This page is obtained from the website of KPN. Another QR code that serves as inspiration is linked to a use case of precision farming for sustainability (figure 42).

Figure 42. QR code fibre optic internet (left) & QR code precision farming (right)

For the knowledge element, there is a QR code linked to a page where KPN explains about sustainability practices that KPN considers important (figure 37). Here, the information on the page is used to provide SMEs with knowledge about the sustainable products that KPN offers. Furthermore, informative cards that give SMEs information about the sustainability practice they can start carrying out are included. These cards are displayed in Appendix O.

For the community part, a WhatsApp group is created. Participants of the research can scan a QR code to enter the group. In this group, SMEs could share tips and they could ask questions if necessary. The WhatsApp group served to imitate a community feeling for SMEs (figure 43).

Figure 43. QR code sustainability KPN (left) & QR code Whatsapp group (right)

Furthermore, a calendar with tips and goals is visible on the prototype. This calendar includes tasks and possibilities to use telecom more sustainably. The tasks on the calendar overlap with the informative cards that provide further information to educate SMEs about the sustainability practices they can carry out.

Participants

Regarding the participants, the test is done with three SMEs in Rotterdam. In every SME, there is one person point of contact. The selection of participants was based on convenience sampling but considered the homogeneity of the sector in which the participants operate. Table 5 provides an overview of the characteristics of the participants included in the research.

While recruiting participants, it is asked if the SME considers sustainability important and if they are already focusing on any sustainability practice. If so, the SME is viable for participation.

The participants that participated were unfamiliar with telecom sustainability. However, they might have already been conducting some sustainable telecom practices without actively thinking about doing it for sustainability reasons.

Set up

The first part of the test included usability testing. The SMEs got the task of using the platform for one week. To set this up, an introduction meeting was initiated with every SME individually to explain the setup of the experiment and the course of the research. The meeting took place in the SME's office and was held at the beginning of the week. The participants gave consent to participate in the experiment and a brief introduction of the topic was given. During the meeting, a physical prototype is handed to the participant. The prototype, as shown in figure 40, is used.

It is discussed with the participant which sustainability practices can be carried out on which day of the week and whether they are already conducting some of the sustainability practices included. After the explanation and filling in the calendar with goals, any remaining questions could be asked.

In the introduction meeting, another meeting is scheduled for the end of the same week. This period of one week is chosen to allow the participants some

SME	Size	# FTE	Sector	Description
C12	Small	21	Repare and replacement	Glass shop
C13	Small	5	Property industry	Estate agency
C14	Medium	12	Retail	Flower and gift shop

Table 5. Overview of participants

time to get familiar with the prototype and conduct different sustainability practices daily.

At the end of this week, the researcher returned to the participants' company building. User evaluations are done through semi-structured interviews to gather data about the user interactions with the prototype as research outcomes. These interviews lasted about half an hour and were recorded for analysis. During the interviews, notes are taken. A photo is taken of the prototype to capture how the participants placed the prototype in their office building during the research. The interview questions can be found in appendix P.

Analysis

To analyse the usability and user research results, the recordings are listened to again while new notes about the answers are taken. Finally, the responses from the participants are compared to each other and conclusions are drawn from those answers.

Results

Relevance and awareness

The participants indicated that the purpose of the prototype is clear to them; to use electronic appliances in a sustainable way for the environment. The name "GreenHub" helps them to understand the purpose. One participant said,

"sustainability makes the name speak; I see a hub as a means of connection"

and another participant:

"it is a collection of sustainability for all your electronics with the hub as a collection of things".

The participants were generally optimistic about the concept; they acknowledged that the topic is important and relevant to their business. The subject's relevance is also clear, as one participant said:

"I did not link telecom to sustainability yet; there was no connection for me, you think more about the known problems. […] Still, I think that if you start reading in, it could have a lot of effect on the foundation [of the business]. It would be an easy first step to have a good basis".

In addition, the informative, knowledge aspect seems to have come across well. For example, a participant indicated,

"KPN came by to mention that fibre optic internet would become available to us; now that I know it is also more sustainable, that is attractive".

The prototype helped the participants to give them some awareness about the subject and guidance on how to deal with telecom sustainably. A mentioned takeaway was,

"you try to work on sustainability; now there is more awareness on what to do".

Applicability for SME

The information and possibilities for using telecom more sustainable applied to the participants. The information provided was relevant for them to think about and to take action. However, sustainability is not yet the primary motivation for SMEs. The most important for them is to save costs, efficiency and convenience. Sustainability is a nice bonus and seen as a positive side-effect. The biggest reason for using a platform would therefore be to reduce costs.

Furthermore, sustainability practices still take effort, so it could be clearer why doing it is important and beneficial. The prototype does not indicate what will happen when using telecom more sustainably. The SMEs understand that sustainability is important to them and to fight climate change, but how this relates to their SMEs can be further explained.

In addition, the employees are not constantly thinking about the platform and doing something different as they are busy with their work. One of the participants did not have enough time to examine the prototype in detail and indicated that change takes time. Another participant supports this by saying,

"it's good to see what could be done differently, although you quickly end up back in your regular pattern."

The participants confirm that you need to be reminded to do something differently. It is also indicated that the calendar could help with this.

"By adding it to your work calendar, you can put more pressure on it with deadlines and notifications about when to conduct particular possibilities".

The week-long test was too short to change anything as change takes time. The participant indicated that it seems better to have a service that helps you for longer.

Inspiration

There is a lot of information available on the prototype. The participants described that information could be gathered about the various topics at their interest and time pace, making the platform accessible. However, the platform could be improved on the inspiration aspect of the provided information. For now, scanning the QR codes does not seem very attractive. It is not yet easy in the prototype to consult the different sources. It would be preferred to have everything together.

Centralizing the information can provide guidance and a place to look for inspiration. It is practical to the SMEs that all the information is in one place can serve to help them. Images or positive associations can help inspire and think about applying things in your own company.

Community

The participants did not use the community aspect of the WhatsApp group. The threshold of joining the group seemed too high during the test phase, and the participants didn't have concrete questions. For them, it felt more like an exploration phase where they didn't feel familiar with the sustainability practices yet but started exploring if it would work for their company. However, the prototype evoked conversation among the SME employees within the SME. They mention that a physical prototype asks for attention. At one of the SMEs, the employees discussed the prototype and gave opinions about using the sustainability practices that could be carried out with all employees during their lunch break.

Form of prototype

A participant indicated that the prototype had been standing on the cabinet for a few days and then ended up in the cupboard (figure 44). The physical form of the prototype was acceptable to the participants for now. However, they would not want anything placed in their company building. There is not that much place and as it is not directed at customers, it should not take up too much space (figure 45).

Role of KPN

The platform did not evoke any new feelings related to KPN. A participant said,

"KPN is big, so you are already expecting that they do something with sustainability".

It would not surprise the participants if KPN invested in such a platform.

Conclusion

Overall, the participants were optimistic about the platform. The name of the platform and its goal were understood. It turns out to be appreciated that there is a lot of information available and easy to reach in one place. Sufficient knowledge was available that could also inspire the participants. However, not all information was consulted because it takes too much effort to be referred to other pages through QR

Figure 44. Platform standing on the cabinet in the SME

Figure 45. To illustrate, the platform taking up space in the SME

codes. The information displayed should be easily accessible and provide a quick overview of why it should be implemented.

The community aspect has not been used; this appears to be too big a step in the test phase. Instead, it seemed that the participants were looking more for passive information they could read and consult in their own time.

In addition, the participants would not want to have anything physical in the office since it takes up space. However, there must be a constant reminder that it is essential to use telecoms sustainably. This could be done by placing the sustainability tasks in the work calendar. The sustainability tips can be used here so that participants receive notifications and reminders. It would therefore be preferred if it was possible to add this to your schedule.

Cost savings remain the primary motivation to do something differently, in addition to efficiency and convenience. However, it can help SMEs to know how something more sustainable can be done to make a more sustainable choice.

The usability and user research goal was to gather feedback for the concept to be put into a final concept design. Then, as the research has provided new input for further development, the final concept can be created.

8.3 Design principle concept

To create a sustainability platform as described in the prototype and to create more sustainability awareness among SME customers, the employees of KPN have to know how to design for sustainability. Currently, there is no awareness within the team about KPN's sustainability practices (SWOT chapter 3.2). Therefore, another look is taken at the current way of working of the team and how to ensure sustainability is taken into account while the SME customer journey employees of KPN do their work.

Way of working

The team's current working method is based on seven innovation principles representing KPN's brand value for customers. A principle influences the way of working and aligns departments and teams within KPN. Furthermore, the principles ensure a certain level of quality and consistency through the design. Design principles then indicate how the brand value is created. A division of design principles is made between the customer and KPN. Both have six supporting design principles. Figure 46 shows an overview of the innovation and design principles.

Creating a customer journey is done with a standardized process with multiple team members involved, but with at least a CX process designer, IT architect, Product owner and IT back-end developer. Figure 47 shows what such a design process looks like in the team. In the final session, the concept is tested with the design principles. The innovation and design principles should therefore be discussed with every new customer journey.

Design principle sustainability

To ensure that a sustainability focus can be applied in the work of the employees of the SME customer journey team of KPN, a way is devised to integrate sustainability into their work. With the knowledge that the team uses customer journeys to test their customer journeys, sustainability should be considered a design principle. By making sustainability a design principle, there will be more knowledge about it and it is made sure that the customer journeys designed are tested on sustainability.

Sustainability is added to the existing principles. However, there is no clear definition for sustainability yet and no objective of the customer experience on this principle. Therefore, a design principle is designed to inform and educate employees at the SME customer journey team at KPN on how to design with sustainability in mind. The main goal of the

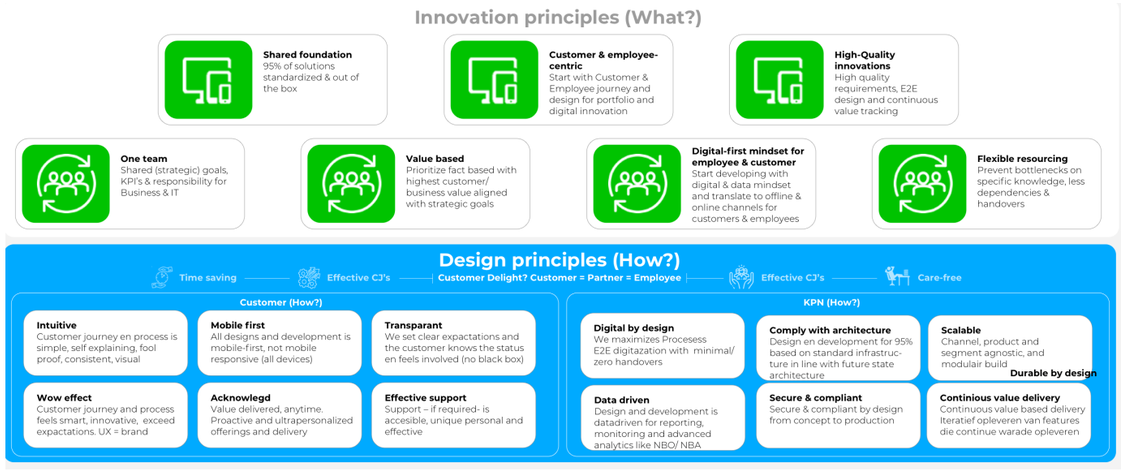


Figure 46. Innovation and design principles KPN (source: work method presentation KPN, 2022)

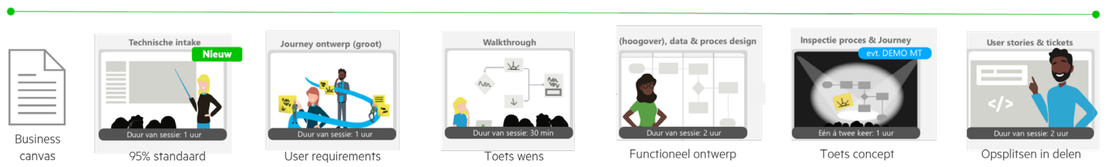


Figure 47. Work Method KPN (source: work method presentation KPN, 2022)

principle is to provide an overview of sustainability at KPN, showing what sustainability is and what can be done at KPN.

The design principle aims to help KPN employees design customer journeys that enable KPN's SME customers use telecom more sustainable.

The design principle serves to condense what is learnt from SME customers and to guide the design of future customer journeys. The principle is based on the research done in this project. It summarizes the most important aspects which SMEs consider valuable while implementing sustainability practices. When KPN employees are aware of the SME values, the customer journey can seamlessly fit the SMEs' needs. Therefore, the principle should guide the employees so they can design every new customer journey with sustainability as design criteria.

A new principle

The strategic choice for a separate design principle is made to mark the importance of sustainability. Of course, it would be relevant to incorporate sustainability in every principle that the employees work with. However, as the employees are already familiar with the current principles, the focus on sustainability has the potential to fail. By creating a new design principle, sustainability will be actively discussed and tested on sustainability. Furthermore, the sustainability design principle will constantly remind the people in the team to think about sustainability.

The sustainability design principle is shown in figure 48.

Figure 48. Design Principle Sustainability

8.4 Design principle evaluation

The design principle is evaluated with employees with employees of the SME department of KPN. The evaluation is done with four process and chain managers, who are responsible for the way of working and the technical design process of the customer journeys at KPN. Furthermore, a product owner and a quality manager (SME market) are asked to provide feedback on the design principle. All participants included in this session already had an introduction to sustainability at KPN as they were participating in the ideation session with KPN employees described in chapter 7.1.

Method

A short oral introduction to the design principle is given and the session is explained. The participants will receive the design principle via Microsoft Teams chat with a digital questionnaire consisting of seven questions and space for comments. The questionnaire can be seen in Appendix Q. The session lasted about 15 minutes each. The participants fill in the questionnaire anonymously and at their own time pace.

Analysis

The questionnaire answers are compared and summarized after which they are written out to display the opinions of the team members.

Results

Clarity

The answers to the first question about the sustainability design principle indicate that the design principle is understood by the employees that filled in the questionnaire. One odd answer does not overlap with the information provided in the design principle. However, from the other responses can be made up that the overall message communicated is clear.

However, there is more need to explain sustainable operations and the six steps to design for SMEs. In addition, the terms used in the design principle could be more consistent. The participants miss the details about how to work with sustainability rather than only what sustainability is. The employees want it easy for them to know what to do. To illustrate, one participant mentions that the interpretation of the design principle lies with him. He indicates that he has little guidance on what sustainability is specifically aimed at.

The design principle in their work

The principle helps the employees think about sustainability in their work and allows them to communicate around KPN. The principle goes more in-depth than the employee’s first thoughts. However, an extra in-depth view can be given with specific hands-on tasks including sustainability.

All participants indicated that the design principle suits their work activities. For example, one suggests that sustainability should be part of the work in the customer journey team and another one that their job in the team is to determine how customers can be better informed digitally constantly.

The participants indicate that the strength of KPN in helping SMEs is to transfer sustainability knowledge to others. SMEs can be educated about sustainability and KPN can help them. KPN could even compete with others with this advantage.

Furthermore, it is stirred to serve customers with products that increase sustainability. Two examples are given that seem very relevant to sustainability provided by KPN.

Conclusion

Interestingly, one of the participants indicates that the design principle focuses on its own interpretation of sustainability. Although the context of the answer implies that more guidance is needed, personal interpretation is exactly what the design principle was designed for.

Future customer journeys will not all have the same sustainability touchpoints because every change in service or new service will constantly create a

different customer journey. That is why it seems more appropriate to offer the employee the right tools so that they can think for themselves about how sustainability would like to be reflected in the customer journal. Of course, it would be interesting to have someone on the team entirely focused on sustainability and who can design specific touchpoints. Nevertheless, because the strategy implies that KPN should have full sustainability priority, it is more appropriate if all employees know how to integrate sustainability into their work. Examples of sustainable products and services are mentioned that help make a customer more digital and, at the same time, more sustainable.

There is a need for more guidance and factual knowledge about the given information. On the one hand, this is interesting to cover in a design principle. On the other hand, it is also relevant to introduce the design principle with more information that allows employees to read up on how sustainability is reflected for SME customers. Therefore, it has been decided to add an introduction with more information separately to the design principle in the form of a brochure. This way, the brochure can be sent to all employees within the different teams in KPN's SME market department. The information in the brochure can help the employees become familiar with sustainability and understand it. Then, the information in the design principle provides an overview of the sustainability principle to test the customer journey.

8.5 Final concepts

With the results of the evaluations, the final concepts are made.

The platform

The platform is shown in figure 49.

The platform guides SMEs in using their telecom in a more environmentally sustainable manner with the help of KPN's sustainability expertise in telecom.

The brochure

The brochure is shown in figure 50a, with the design principle in figure 50b.

The brochure ensures that KPN's employees can implement sustainability in the customer journey for SME customers of KPN. The brochure provides the SME customer journey team with all information needed to comprehend sustainability in the telecom sector for SME customers.

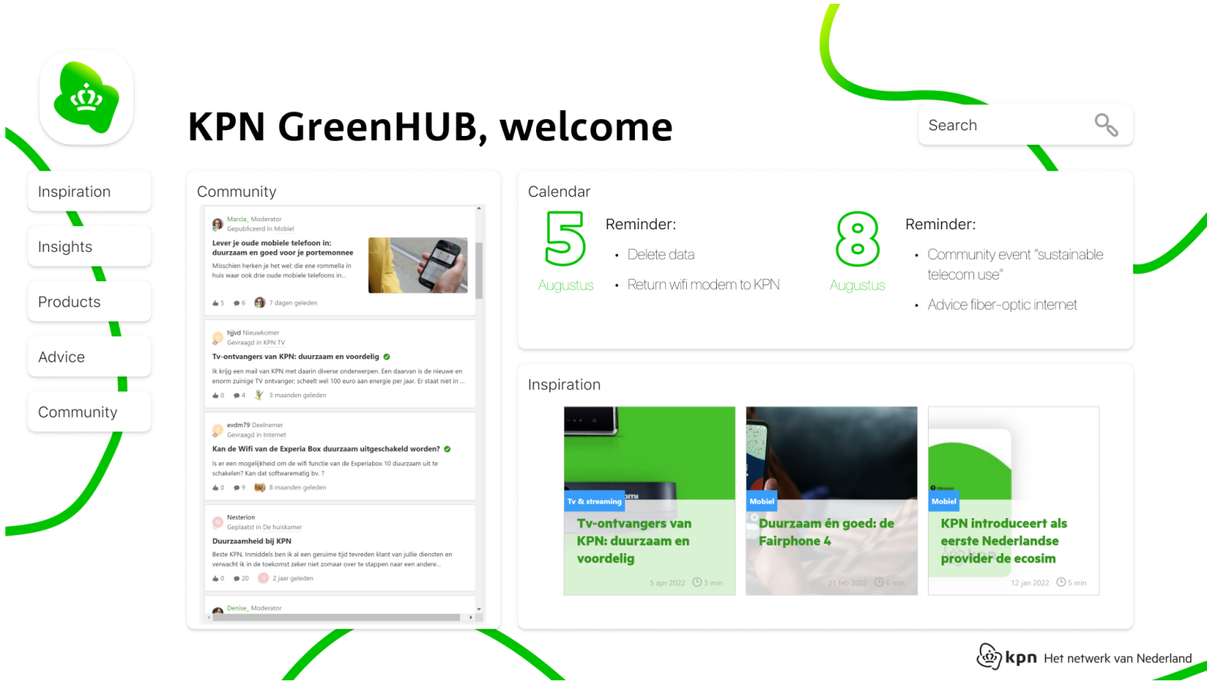


Figure 49. Overview KPN GreenHub

Design for sustainability

An overview for KPN's employees to design sustainable customer journeys

kpn

Sustainability at KPN

Our goal is to be the trusted partner for sustainable telecom use

We start by ensuring our own services are as energy efficient and circular as possible while working hard to create solutions that enable other businesses more sustainable. KPN is the provider that connects telecom to sustainability by facilitating SME customers with inspiration, guidance and education on suited sustainable telecom practices while considering specific context challenges that SMEs face.

Designing for our SME customers

It is our job to help SMEs where possible to enable them to use their telecom more sustainably. Six topics influence whether an SME can adopt a sustainable telecom practice. We help the SMEs overcome challenges by designing for sustainability in the customer journey.

What can we do?

Inspire SMEs

When KPN inspires customers to do more with sustainability through telecom, they want to know more about the possibilities.

Provide SMEs with knowledge

When customers are inspired by KPN to do more with sustainability through telecom, they want to know more about the possibilities.

Guide SMEs

SMEs need guidance from KPN on how to use telecom sustainably. We guide the SMEs to become more environmentally sustainable through telecom.

Education of digital sustainability

Lack of knowledge seems to be the biggest reason for not being sustainably online. Our job is to educate the SMEs in our customer journeys for enough knowledge about implementing sustainability. Communicate sustainability!

The right means for an online way of working

Provide SMEs with the proper means to work online. We offer many digitalisation services with 'KPN EEN mkb' that help SMEs be more sustainable. Promote them with sustainability!

Management decisions for sustainability

The management of the SME makes important decisions for the SME. The customer journey should convince management of the importance of sustainability implementation as SMEs have many other priorities.

Reducing physical presence

By reducing physical presence, fuel, gas and energy consumption can be reduced. Design for customer journeys that can change the existing way of working for environmental sustainability

Office building restrictions

There might be external circumstances out of the hands of the SME that withhold them from taking sustainability actions. Keep this in mind while designing customer journeys by thinking about multiple scenarios

Collaborative effort

SMEs want to contribute to the environment by doing it together. Show customers in journeys that they are not alone in working towards climate goals. Together we work on sustainability.

Figure 50a. Brochure Design for sustainabiltiy, SME customer journey team KPN

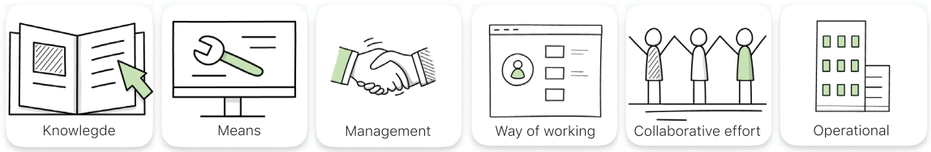
Design principle
Sustainability

Sustainability at KPN
At KPN we've been working for years to contribute to a sustainable world. We invent, research and develop the networks and services of the future. KPN's technology is an important tool for helping existing processes run smarter and more efficiently. That way, we save time, reduce costs, and save energy.

We are proud that we have been completely carbon neutral since 2015. KPN is the Green Connector and the world's most sustainable telecom company. That is why we continue to research and invest in innovative, sustainable technology and help customers be more sustainable and more environmentally friendly with our products and services.

SME customers have not yet made the connection between sustainability and what telecom can do in it. It is up to us to show them what is possible with sustainable telecom.

Sustainability by design in the customer journey
To integrate sustainability into the customer journey of SME customers, context-specific challenges that SMEs face are taken into account. We integrate sustainability into customer communication with which we inspire SME customers to use telecom more sustainably.
KPN is a partner in sustainable telecom for SMEs.



Design goals KPN SME

Inspiration | Communication | Knowledge | Guidance

We enable SME customers to use telecom in a sustainable way.

"KPN is the provider that connects telecom to sustainability by providing SME customers with inspiration, guidance and education on suitable sustainable telecom practices, taking into account context-specific challenges of SMEs."

kpn Het netwerk van Nederland

Figure 50b. Design principle sustainabiltiy, SME customer journey team KPN

8.6 Conclusion

The two concepts created in the chapter provide the answer to the last research questions. KPN can support its SME customers to use telecom more environmentally friendly with developing the GreenHub platform (answer to research question 6). With the platform, KPN can guide its customers to use telecom more sustainably by taking the expert role in sustainable telecom. KPN educates its SME customers by communicating sustainability information to provide the customers with sufficient knowledge to start acting. The SME customers of KPN can be inspired to use telecom more sustainably by making the connection between sustainability and telecom relevant to their business. Furthermore does the platform include a community of stakeholders connecting KPN to customers and customers to each other to exchange sustainability knowledge.

To incorporate sustainability at KPN, the SME team needs a brochure with all necessary information about sustainability with a design principle summarizing the information so it can be tested on customer journeys (answer to research question 7). With the new knowledge, the employees can prioritise sustainability more in their work which can result in its implementation to customers.

Implementation

The last phase of the project is the implementation phase. This phase is focused on bringing the designed solution to life.

The most suitable solution is created with the final concepts in chapter 8.5. In the implementation phase, the project zooms out to provide strategic recommendations for KPN to enable SMEs to use telecom more sustainably with the help of KPN GreenHub.

A strategy combining the previous phases' findings supports the solution and implementation of the design at KPN. The strategy is visualised in a strategic roadmap that has three horizons and a future vision to work towards. The strategy roadmap is evaluated with stakeholders to determine if the desired solution is feasible and viable for KPN.

Finally, the project is concluded. Directions for future research are indicated and recommendations are given to KPN. The report ends with a personal evaluation looking back on the project.

9. Implementation
10. Evaluation
11. Project conclusion

9. Implementation

In this chapter, a strategic roadmap is designed to visualise the actions required by KPN to enable them to accomplish the strategic sustainability objectives in the SME market. In addition, the vision created in chapter 6.1 gives KPN direction for the future. Furthermore, the three horizons of the roadmap are explained and the time pacing is discussed.

Finally, the designed roadmap is evaluated with three stakeholders for implementation. It is tested if the time pacing would fit with KPN and to understand better how an innovation process at KPN is set up and what resources are needed.

In this chapter

9.1 Implementation strategy KPN

A strategy for implementation is needed to communicate and implement the design made in this project. A step-by-step approach plan is made to map out the necessary actions that have to be taken to work towards the desired future vision for KPN. This plan is made for the implementation and further development of KPN GreenHub.

Design roadmap

A design roadmap is created to strategically explore future design innovations and provide KPN with visualisation and decision support for these plans (Simonse et al., 2017). This roadmap is shown in figure 51.

The futures technique of the Three Horizons model is used as described by Simonse et al. (2017). The model comprehends three scenarios that build on each other. Based on a timeline, each scenario conceptualises innovations for new developments for businesses. The first phase focuses on enhancing the current business values by extending the company's core in existing markets and technologies. This phase mainly focuses on improvements and incremental innovations, which are mostly already well known. In the next phase, new opportunities are explored for development to focus on and prepare the company for the third phase. The second phase serves as a bridging phase for a smooth transition for new product development, which is user tested in existing markets. This phase includes innovations which are new to the company. The third phase is the vision toward new value propositions and to create viable options for disruptive innovations, new to the world.

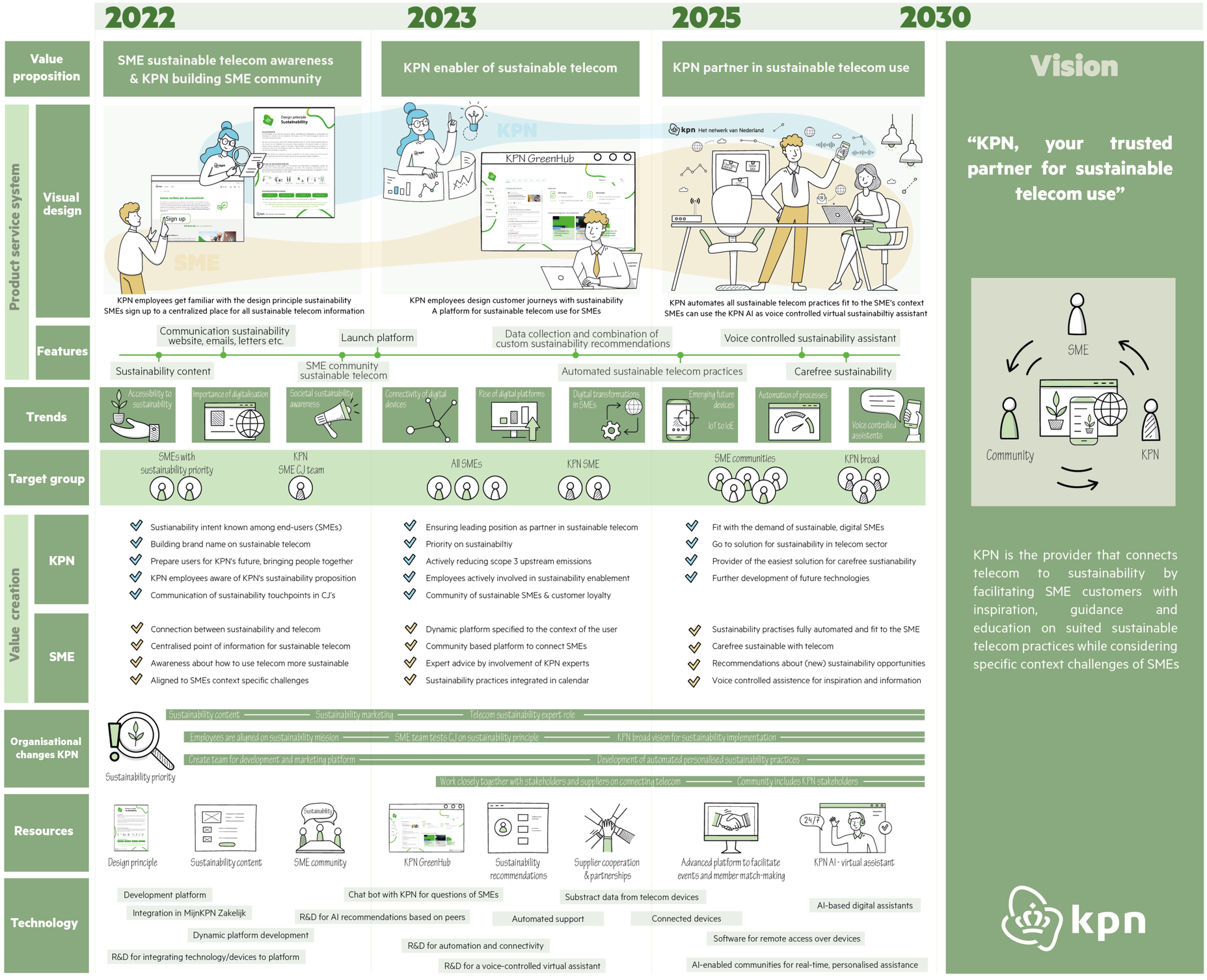


Figure 51. Roadmap KPN GreenHub

9.2 Horizons

Three horizons are designed to work towards the future vision created for KPN in chapter 6.1.

Future vision

KPN is the provider that connects telecom to sustainability by facilitating SME customers with inspiration, guidance and education on suited sustainable telecom practices while considering specific context challenges of SMEs

The goal of this future vision is for KPN to be the trusted partner to SMEs for sustainable telecom use. The three horizons are further explained below.

Horizon 1

SME sustainable telecom awareness & KPN building SME community

The first horizon is focused on the transition towards more sustainability awareness within KPN and sustainability communication to customers and in marketing. This phase represents the organisational change needed to adapt to the new direction for KPN's SME customers. Internal roadmaps and storylines must be adjusted, and sustainability must be prioritised. At KPN, a new project innovation starts with pitching the ideas to project and team stakeholders. It takes time for a corporate like KPN to adapt and accept changes in focus.

The horizon focuses on preparing KPN for being an enabler of sustainability in telecom and building a community of SMEs that find sustainability necessary. KPN has to start building a brand name for sustainability with SMEs. To help the transition toward more sustainability-driven, a design principle is used to support KPN's employees to design customer journeys with sustainability in place. The design principle is aimed at the employees in the customer journey team to design for SMEs with a sustainability priority. Sustainability content is created and put in one place, integrated into the platform of MijnKPN Zakelijk.

***MijnKPN Zakelijk is a digital service platform to view, download or share invoices, and get insight into consumption and security, extra costs and products and services. It can also be used to order telecom products (figure 52).**

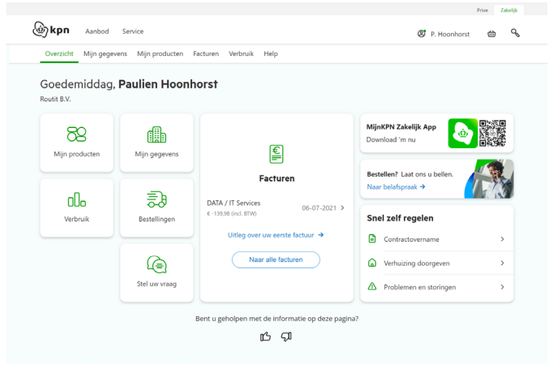


Figure 52. MijnKPN Zakelijk

Sustainability touchpoints are created in customer communication to guide SMEs with knowledge about how telecom can be used more sustainably. The first horizon aims to create a community to present further sustainability developments to SMEs. The phase lasts one year; this gives time to KPN to create teams and resources to focus on sustainability for SME customers.

Horizon 2

KPN enabler of sustainable telecom

In the next phase, horizon two, a platform for sustainable telecom use is launched for SMEs: KPN GreenHub. This platform is integrated into MijnKPN Zakelijk and is more extensive than in horizon one. The platform aims to connect SMEs to enable them to access knowledge and expert advice to use telecom sustainably. A community has been built of companies working on sustainable telecom and more companies will join. In this phase, KPN claims the expert role for sustainable telecom. KPN introduces a chatbot that can help SMEs with sustainability-related questions and provides 24/7 expert advice. The platform is dynamic to ensure it keeps up with fast-paced innovations and up-to-date information. This information includes automated recommendations for sustainable telecom practices tailored to the context of the specific SME.

Research and design are done to discover how telecom devices can be connected to the platform and to automate sustainability practices. Data is subtracted from telecom devices to provide a more personalised experience fit to the SME. As the data needed (data about turning the device on and off and energy consumption) is already available, KPN should cooperate with suppliers like cisco to create partnerships to develop software to access data and connect to the telecom devices.

The second horizon also serves as an opportunity to test SMEs' wishes and demands and gather data about using such a platform for KPN. Based on that data, KPN can decide what to incorporate in further stages and innovations suitable to SMEs.

Horizon 3

KPN partner in sustainable telecom use

The third horizon captures the strategic road to the future vision.

Throughout the user research with SMEs, it appears they are swamped and do not have time or resources to explore sustainability practices that suit their business entirely. To overcome this, a solution has been considered for the third horizon. In this horizon, KPN has hugely automated conducting sustainable telecom practices. This ensures that the SMEs can be carefree regarding sustainability related to their telecom. The scenario includes a KPN virtual assistant that arranges all telecom sustainability. To make this work, the customer's telecom devices are connected to the GreenHub platform.

The virtual assistant can, for example, turn off all telecom devices at the end of the working day and turn them on when needed the next morning again. Think about the wifi modem, routers, tv boxes, screens and computer desktops. The KPN virtual assistant can be controlled by voice to interact with customers. The SME customer will be engaged with KPN by communicating with a personalised virtual assistant.

The assistant will be talking to the SME to communicate relevant sustainability practices which can be put directly in the SMEs' calendar. Reminders can be given; for example, to delete emails and other data no longer needed. Other reminders can include a recommendation for a match-making event to connect to similar sustainable SMEs or about new sustainable product innovations launched by KPN.
The scenario in the third horizon includes no need for active interaction with the platform if there is no time or need. However, the platform will remain active for service and data insights. The insights show where the SME can make improvements in sustainability; the data also helps with recommending sustainability events, practices and tips that similar businesses are carrying out. Furthermore, the data insights allow SMEs to make data-driven decisions on how to improve sustainability for the creation of new technologies or business models.

Finally, the third horizon is focused on scaling up and further development. SMEs are highly digitalised sustainably. The better the recommendations for sustainable telecom use become, the more SMEs can be helped with the new technologies provided by KPN.

Time pacing

The horizons' time pacing is chosen to ensure KPN is fully prepared for the future. Technologically, KPN should be able to develop the horizons quickly as KPN is primarily a software company. However, it is not only relevant to consider building the technology but also to incorporate the new strategy into current timelines and priorities within KPN. Besides, it takes time to educate the employees of KPN about what can be done for customers while incorporating sustainability. Therefore, the first phase covers the organisational transition to prioritise sustainability and get used to the new vision.

As reserached, SMEs have not yet made the link between sustainability and telecom. Therefore, in the first phase, we also prepare the SMEs for the future with the message that sustainability can be achieved through telecom. Then, early adopters that consider sustainability a priority will already jump in. Whenever the public is exposed to the status of KPN being an expert in sustainable telecom, KPN has time for developing the platform and researching how to provide SMEs with helpful and valuable recommendations for telecom sustainability.

By the time more and more businesses are digitalised, sustainability becomes relevant. Chapter 2.2 stated that only 30% of SMEs were highly digitalised in 2020 in the Netherlands and 75% had a basic level of digitalisation. The more digital an SME is, the higher the chances that sustainability through telecom can make an impact. By 2030, the EU aims to have at least 90% of SMEs reach the basic level of digital intensity. It seems relevant for KPN to ensure the platform is fully ready and functional by then. By this time, KPN has further developed the platform into an automated digital assistant and there is no more need for active participation if the SME does not need that.

Furthermore, the sustainability strategy of KPN (chapter 3.2) includes reducing scope 3 emissions by 30% (compared to 2014). Therefore, enhancing SMEs to use their telecom more sustainably will help reduce downstream use of electricity by users for scope 3 emissions, impacting the sustainability goals of KPN by 2030.

9.3 Implementation strategy for KPN evaluation

The roadmap as designed in chapter 9.1 is evaluated with stakeholders for validation. The evaluation is meant to test whether it is possible to implement the platform for sustainable use of telecom in the SME market by KPN. Therefore, the evaluation helps to test the roadmap on validity and feasibility at KPN. Besides, it is an additional test of validation of the finalised idea. Furthermore, it is evaluated if any adjustments should be made to fully integrate the roadmap into the business plans of KPN and what can be recommended to KPN.

The roadmap as proposed is evaluated with three employees of KPN who could be direct stakeholders of the project if it is implemented at KPN. The goal of the validation with stakeholders is to test if the time pacing would fit with KPN and to understand better how an innovation process at KPN is set up and what resources are needed.

Method

There are three stakeholders included in the design implementation evaluation within KPN. The first stakeholder is the Strategic Lead Energy and Environment to determine if the roadmap fits into the strategic sustainability goals of KPN. The next stakeholder is a digital Marketing Manager active in the SME team to determine how a marketing campaign with content is set up and how a community is created. The last stakeholder is a Developer in the SME team. This developer is asked to give feedback on the technical aspects of the roadmap and to understand better how technical teams are set up within KPN.

Three separate online meetings via Microsoft Teams are set up: one meeting with every stakeholder. The interviewees did not have to prepare anything in advance. The meeting has an open format. First, the roadmap is shown and explained as shown in chapter 9.1. A general overview of the ideas and horizons is presented, after which a more detailed view is given depending on the employee's function with whom the interview is held.

With the Strategic Lead Energy and Environment, the general strategy is discussed while working towards the vision and how this would work within KPN. With the Marketing Manager, the conversation included questions about the people needed to create content, what team would be responsible for the launch and marketing message and whether the planning would fit to develop sufficient marketing materials. Finally, with the Developer, the conversation is zoomed in on the technical aspect. Every meeting lasted for about half an hour. The question set-up can be found in appendix R. During the interviews notes are taken and directly after the interviews, the notes are written out and summarized for analysis.

Results

The first thing that pops up when discussing the timeline of the roadmap is that all three stakeholders indicate that it is a matter of priority and resources at KPN whether they can carry out the proposed plan.

The timeline of the roadmap would be perfectly viable if enough people were available to do the job. Currently, KPN is camping with a massive shortage of employees (the number of vacancies is at a record high due to staff shortages across the labour market (NOS, 2022)). To illustrate, even in the sales department, there is a shortage of employees, while this department is essential to the core of KPN. This situation also leads to prioritising; future plans are put on hold until more people are available.

Strategic Lead Energy and Environment

The roadmap seems to fit with existing objectives within KPN, although it would be preferable to integrate the roadmaps strategy into existing value propositions that KPN has to match with other themes. It would depend on management's priorities about how fast sustainability could be implemented. If sustainability would be a top priority from now on, the roadmap can be put to use immediately and teams can be formed to tackle it.

Furthermore, the last phase (horizon three) should be focused on scaling up and IT developments to prepare for a digital future. To scale up, it is interesting to see what data can be extracted from the platform, such as how much time a customer spends on the platform, how often they view it, information that is needed and to collect user feedback. With this information, KPN can better respond to customer needs and increase customer loyalty, thereby increasing the satisfaction of existing customers. In addition, this data can be used to make positive recommendations for new customers. An extra sales step could be made by considering which existing services match each phase.

The calendar function is approved because it can help drag customers back to the platform for interaction. Furthermore, an interesting aspect is the functionality to bring people together with the same values for their SME. At KPN, the slogan "samen vooruit" is used in customer communication, which fits with the community aspect.

Something unclear at this stage is what kind of data would be sufficient to connect the telecom devices to the platform. Therefore, research should be done in cooperation with hardware suppliers to understand which data is available and which technology components are already in the devices to ensure KPN can build an application that can control the devices with the platform, e.g. your mobile phone.

Marketing Manager SME

The first thing mentioned is that it would be interesting to discover if the inspirational aspect can be used broader than only for sustainability. For example, within MijnKPN Zakelijk, customer activation could be increased and the existing platforms could be used to inform customers about their interests.

Timewise, the most challenging would be organisational to get the right team and resources in place. Already around 2,5 months will go by to ensure everyone is on board. There are many other activities for which capacity is reserved, so it can be challenging to push sustainability through. As it is currently August 2022, it would be more realistic to have the platform finished by the end of 2023 in a simple form. A plan has to be made about the how and what and to get access to the needed budgets.

Creating the sustainability content would not be very challenging as this could be outsourced. For marketing, KPN mostly hires external marketing agencies to develop a marketing message, campaign and content. Then, primarily freelance copywriters must be hired to create sustainability content when the message is clear. A team can be put together when the plan is made and the message is clear. The team would exist of a Developer, UX Designer, Graphic Designer, Marketeer, Content Manager, Marcom Employee (Marketing and Communication), Media manager, App Manager, MijnKPN Manager and a Product Owner.

Budget-wise, it is not expected there will be issues. KPN has many resources and it seems clear a sustainability direction is desired. Developing and getting the marketing message right into the market will take a bit more time. 2023 will be a bit soon to make the platform fully actional with all content included.

Furthermore, the development and maintenance of the platform would be a concern. A development team has to be "reserved" to develop the platform technology, indicating that the organisational change will take the most work. When the platform is live, personalised banners can be implemented quickly to attract more interaction to the platform. So, in theory, service messages about sustainability can be implemented already.

An interesting insight emerges when thinking about the user adoption of sustainable solutions. With the current timeline, it would mean that in 7 years from now, the late adopters should also embrace sustainability through telecom. This indicates that the marketing message and platform should be fully operational and ready for the late majority by then. It can be made sure that before 2030, the tech is fully prepared to anticipate the success of the marketing process already. Technology can be tested and further developed for adoption by the late majority. Dates for successful reception can be analysed to make it tangible and help make KPN unique.

Developer SME

The technology should not be too difficult for KPN to develop. If there are people available, the platform could be technically set up in around two months. However, in reality, this always takes more time. It is not only the development team that is included in the work but also communication-wise, the project should be set up and content creators should be involved. Therefore, it would be more realistic to have the platform ready in around a year.

The development team will likely consist of a Frontend and Backend Developer, a Copywriter and a Designer. As KPN mostly likes to work in teams with two people in every profession, this would include a group of eight people. Furthermore, a Scrum Master and Product Owner should be involved for project management.

Furthermore, a Hardware Developer should be consulted to extract data from the devices to connect them. The Hardware Developer should discuss with the Software Developers how the connection between the devices and an app would work and if this data is already available.

An app could be made to turn off the router automatically when no devices are connected. The router already collects data about how many devices are connected. Other devices should be researched to discover if they carry the same functionalities. Building an app with this unique service could improve the uniqueness of KPN and sustainability.

The timeline for implementation is dependent on cooperation with hardware suppliers as well. KPN can build the software to develop an app to connect devices. This process can take two years to create software-wise; the app has to be made so customers can regulate devices connected to networks.

Working towards 2030 is technically sound, not complicated or a lot of work; it depends more on management decisions. Developing an innovation within a big corporation such as KPN is about finding the right people to execute it. The timeline could be realised in two years entirely based on technical functioning. The development and setup to build the platform would take half a year, and making the virtual assistant could be done in one and a half years. If KPN starts developing the virtual KPN assistant in 2023, it could be finalised by 2024/2025. However, it would take longer to collect more data to provide better recommendations and suggestions.

A suggestion made by the Developer is to add a feature that would make it possible to display the platform in dark mode, improving sustainability.

Conclusion

The roadmap's time pacing seems feasible for KPN. It could be adjusted based on the project's exact starting data, which is likely determined by solving the barrier of the shortage of personnel at KPN. The team that will be working on the development of KPN GreenHub is more extensive than expected. As roughly 20 employees would be working on the project, making it possible that organisational factors take more time than the roadmap indicates. It is, therefore, hard to say if the timeline would be feasible at this point.

The concept of the platform seems valuable to KPN because of the engagement with customers that it can bring about. This makes introducing the platform as a medium for customer interaction interesting to KPN. In addition, the community aspect, in particular, appears to be in line with KPN's goals because the slogan "samen vooruit" is often used.

Furthermore, there will likely be no marketing and budgeting problems to expected as the priority on sustainability and the platform's goals are clear.

Further technology research should be done with hardware and software developers to validate the feasibility of the technical aspects of horizon three. MijnKPN Zakelijk is available via een app and via a website. The KPN GreenHub platform should be integrated into the app and website. An excellent addition would be to add a dark mode to the app and website.

Integrating other value propositions besides sustainability can help prioritise the platform's development. For example, at KPN, a preference is given to incorporate as much as possible in existing means. Therefore, integrating the platform as a subpage of MijnKPN Zakelijk would make it more plausible that the platform is developed.

Another plus would be to make it possible to extend the platform with other relevant telecom-related subjects instead of treating sustainability as a separate theme.

For KPN, it would also be valuable to subtract customer data from the platform. The value of data subtraction lies with insights into customer needs to increase customer loyalty.

***Additional note; the timing of the thesis with presenting the roadmap seems relevant as corporate email communication (August 2022) communicates that: "The making of the planning for 2023 and beyond are currently in full swing." Indicating that the sustainability roadmap for the SME department is just in time to be incorporated into the planning for 2023.**

10. Project conclusion

In this chapter the project is concluded. The chapter answers the research questions and recommendations for future research and KPN are provided.

Finally, a personal reflection on the project is given.

In this chapter

10.1 To conclude

This research aimed to identify how KPN can enable its SME customers to use telecom in a more environmentally sustainable manner. Based on the qualitative analysis of the research methods, it can be concluded that there is potential for KPN to enable, inspire and educate its SME customers with its knowledge and expertise to use telecom more sustainably. The solution directs in creating a platform that integrates the four elements (inspiration, knowledge, guidance and community) important to SMEs to provide a solution that fits the SME's wishes.

Sub-research questions

To answer the research question, the respective sub-questions are answered.

1. In which sustainability and digitalisation context do SMEs operate?

Insights are gathered about SMEs and their current state in the transition towards environmental sustainability. It is found that SMEs are responsible for many emissions emitted. As almost all companies in the Netherlands are SMEs, this presents an urgent call for change. The sustainability adoption of sustainability practices is currently low for SMEs, while they must do their part to become more environmentally sustainable. Many SMEs are not prioritising sustainability which is not without cause. Many limitations within SMEs withhold them from taking action. The most significant hurdle for SMEs is their size which comes with limited human, financial and technical resources.

Furthermore, the same limitations result in SMEs' lagging use of digital technologies. A fourth of Dutch SMEs is not digitalised at all and most are still low digitalised. The lagging use of digital technologies is unfortunate because ICT can positively contribute to environmental goals if an SME uses ICT in their business. A way to improve environmental sustainability with ICT is through telecom. When the SME has incorporated digitalisation, sustainable telecom can enhance the SME's environmental sustainability. However, SMEs do not have sufficient knowledge about sustainability and digitalisation, which can cause adoption risks for their SMEs. Therefore, SMEs prefer an easily implementable, lower-cost sustainability strategy.

Moreover, barriers for SMEs have to be taken away. Knowledge, time and personal interest in sustainability practices in day-to-day operations can guide employees toward sustainable telecom usage with the potential to change the company's way of working more sustainably. Currently, the connection between sustainability and telecom is not yet made, but employees are open to implementing sustainability when it is easy and convenient for them.

2. What are the current sustainability developments in the telecom industry?

Sustainability is an emergent topic in the telecom industry. Stakeholders expect telcos to report on their sustainability status and goals. Current sustainability developments in the telecom industry are mainly targeted at reducing scope 1 and 2 emissions, while a telco can reduce its emission emitted in all three scopes of greenhouse gas emissions. Trends show that sustainability as a strategic priority is more relevant than ever due to increased demand for digitalisation and connectivity. This also shines a light on the responsibility of telcos for the increased emissions emitted in scope 3. However, the reduction of scope 3 emissions is still far off while they account for almost two-thirds of the industry's overall emissions.

A massive part of emissions generated in scope 3 consists of emissions generated with the downstream activities that occur during the phase where customers use the company's products or services. The telecom sector is in a position where it can enable its customers to become more sustainable and reduce scope 3 downstream emissions. However, as the role of enabler is not yet optimally utilised by telcos, customers are not yet decreasing their emissions. This finding presents an opportunity to further develop sustainability in the telecom sector.

3. What is the role of KPN in the transition toward enabling SME customers to use telecom more sustainably?

KPN seems to be a trusted partner for sustainability as perceived by its customers, which makes sense as KPN used to have a leading position and started implementing sustainable practices years earlier than competitors. To ensure KPN can compete with its competitors, they must live up to their sustainability reputation. Besides KPN, VodafoneZiggo and T-Mobile are the largest telcos in the Netherlands in the business market. They are all working on making their company more sustainable. VodafoneZiggo has taken its first moderate steps to reduce scope 3 emissions with a marketing campaign. This step makes VodafoneZiggo a direct competitor for KPN as they have already introduced the topic of sustainability in their SME market.

Opportunities are found for KPN to educate and communicate sustainable use of telecom to its SME customers. Therefore, KPN should prioritise sustainability and introduce it in the SME market. To do so, KPN should educate and teach its employees about sustainable telecom practices KPN conducts. KPN can inspire SMEs to raise their personal interest in using telecom more sustainably. KPN's role could be to provide SMEs with inspiration, knowledge and guidance to implement sustainable telecom practices to become more sustainable. Furthermore, KPN is in the perfect position to make the connection between sustainability and telecom. Both topics lie in KPN's expertise in how telecom could be more sustainable.

4. How can telecom be used sustainably?

There are multiple ways in which telecom can be used sustainably. A list has been drawn up with sustainability practices that can be carried out to reduce the environmental impact of telecom. The sustainable telecom practices are shown in chapter 4.2.

The sustainability practices are analysed on how the participants can use the telecom to become more sustainable in chapter 4.3. This emerges in the division that there are two ways telecom can help its users use their telecom more environmentally sustainable; with and through telecom.

The first way users can use telecom more sustainable is with the use of telecom. With these sustainable telecom practices, SMEs can deal more sustainably with the telecom devices available within the SME. After purchasing the product, the device should be used in the most sustainable way possible and the user should behave sustainably with it to reduce the energy consumption of the device and the amount of waste. Examples are; turning devices off when not in use to save energy and reusing telecom devices for other users, or increasing the lifetime of products to avoid waste.

The other option to use telecom more sustainably is through the use of telecom, which means that the devices are used to work more sustainably. The devices, therefore, enable you to work more sustainably than without the telecom device. Of course, this does not necessarily mean that energy consumption is reduced as it can result in more device use. However, it can help to emit less CO2. Examples are; the possibility of meeting online and working at home in the cloud, which allows people to avoid commute and business travel. In addition, digitalisation allows for dematerialisation, making users print less paper and reducing their CO2 emissions.

5. Which challenges do SMEs face that contribute to the (not) environmentally sustainable use of telecom for SMEs?

SMEs face challenges when open to adopting possible sustainability practices. Of course, the challenges are different per SME, but by clustering them, it might become more accessible for an SME to decide which telecom practice can be implemented quickly without conflicting with business interests.

The explorative research has shown that six different factors influence whether an SME can adopt the sustainable telecom practice to use telecom more sustainably. Challenges that SMEs face that contribute have to do with the following themes.

First, an SME should have the right means for an online way of working. The work itself should allow

working online and it would depend on if the SME has experience in working online and has the adoption means to do so.

Second, there should be a collaborative effort. Employees do not want to practice sustainability alone, as doing something different takes effort. By doing it together, more impact can be made and doing it is worth it if more impact can be created collaboratively. Furthermore, the employees can help each other by working together.

Third, digital sustainability should be educated. There currently is no awareness about sustainable telecom practices causing a lack of knowledge within SMEs.
Fourth, the management decisions for sustainability. There are currently other priorities for many SMEs, and the management's convincement of sustainability could help whether the SME implements sustainability practices.

Fifth, office building restrictions. Not everything an SME can do lies within its own hands. There might be operational restrictions that cause a reason not to adopt sustainability practices simply because the SME does not have any influence on it. Furthermore, this challenge can be enforced by the idea that there is no crucial need for change, so it does not happen immediately.

Sixth, reducing physical presence. This could be a behaviour change as the existing way of working has to be changed. As the current way of working is mainly preferred within the SMEs, participants should actively think about sustainability to reduce their physical presence by, for example, working at home or reducing business travel.

6. How can KPN support these SMEs in using telecom environmentally sustainable?

There is still no broadly adopted manner in which SMEs can use current telecom technologies to be less harmful to the environment. Therefore, there is potential for KPN to guide SMEs with their sustainability expertise in telecom to transition SMEs towards sustainability through the use phase of using their telecom. KPN can be a partner in sustainable telecom use for SMEs.

KPN can support SMEs by being the provider that connects telecom to sustainability by facilitating SME customers with inspiration, guidance and education on suited sustainable telecom practices while considering specific context challenges that SMEs face. This can be done by developing the GreenHub platform, as presented in chapter 8. With the platform, KPN educates its SME customers by communicating sustainability information to provide the customers with sufficient knowledge to start acting. The SME customers of KPN can be inspired to use telecom more sustainably by making the connection between sustainability and telecom relevant to their business. Furthermore, does the platform include a community of stakeholders connecting KPN to customers and customers to each other to exchange sustainability knowledge. There are four aspects important to supporting SMEs. These are inspiration, guidance, community and knowledge. By considering the four elements in the solution, SMEs can be supported to use their telecom environmentally sustainable.

7. What does the SME team at KPN need to implement sustainability in their work?

To support SME customers to use telecom more environmentally sustainable, KPN should increase employee awareness by educating them to do their work with sustainability in mind. To incorporate sustainability at KPN, a new design principle is designed that communicates sustainability. The SME team needs a brochure with all necessary information about sustainability to implement the learnings from the design principle in the work the employees do. This brochure also shows the design principle in it. The design principle summarises information about SME customer values for sustainability so it can be tested on customer journeys. With the new knowledge, the employees can prioritise sustainability more in their work, resulting in its implementation in customer journeys.

10.2 Recommendations

Future research

Sustainable telecom practices

In chapter 4.2, a list of sustainable telecom practices has been created as there is little to be found about how telecom can be used sustainably. However, this is not a complete list. To help SMEs with more practices about how to use telecom more sustainably, it would be interesting to dive deeper into what can be done with telecom to use it more sustainably and provide a complete list of everything an SME could do. This would improve the applicability for SMEs because there might be more practices that SMEs can carry out but are currently unknown to them.

The platform

The platform concept usability research lasted one week. However, as one of the main characteristics of an SME is that they are busy and a week is a relatively short period to start doing something different, it would be interesting to see whether more or less attention is given to research topic while using the platform for a more extended period. Therefore, the suggestion is to research if knowing that there is a platform available for sustainable telecom would be helpful for SMEs in the long term to adopt sustainable telecom practices.

Furthermore, the SMEs with who the usability tests were conducted are relatively small. Therefore, it would also be interesting to test the platform with medium-sized enterprises to discover if they would simultaneously use the platform or if other features should be included, e.g. a function to communicate sustainability among SME employees.

Design principle

For the implementation of sustainability in the SME team, it would be helpful to take one more step to research the implementation of a design principle about sustainability in the team. First, the sustainability design principle can be tested with existing customer journeys to specify how the design principle helps to implement sustainability touchpoints. This would also be good to test if the team members can implement sustainability with the help of the design principle.

Furthermore, as new customer journeys are designed, it would be helpful to emerge in the customer journey design process to fully understand how the design principles influence the customer journeys and how the test phase is conducted in the work method of the team.

To improve KPN's sustainability status towards customers, it would be helpful to communicate sustainability in all phases of the customer journey. In this thesis, there is a focus on the use phase of telecom for sustainable use of telecom. However, in every phase of the customer journey, sustainability can play a role in emphasizing KPN's sustainability message. Therefore, a communication strategy can be designed to help KPN even further.

Broader use of the research

The chances are high that the context-related challenges found for implementing sustainability not only apply to sustainability but also to other themes. Research can be set up to understand where the challenges come into play. For example, do SMEs always want to "do it together" when implementing something new, or is this only applicable to sustainability? Perhaps KPN can do something with the six insights found to serve SMEs with their services better. Other elements that can be put to use are: "KPN taking an expert role", "building a community", "centralising information", "inspiration for SME customers".

Further company implementation and a business model can be developed for KPN to clarify what it will take to work towards the future vision. Finally, a team can be put together to manage the project and the budgets can be discussed.

There are opportunities to implement existing propositions, products and services as recommendations for upselling and cross-sell to customers. For example, via KPN, Microsoft

Teams licences can be supplied and promoted for sustainability reasons as it can reduce business travel. Another example is recommending IoT solutions for sustainability to sell more services to customers.

Other recommendations for KPN

Talk to customers

The first recommendation for KPN is to talk to customers. It has surprised me a lot that within the customer journey team (as well as in other departments but later more about that), no one is directly in touch with the customers for who is designed. Most team members have never talked with one of the customers, although they create the customer journeys the customers go through. It appears that most of the insights are based on assumptions and are never validated with customers. Therefore, it was tough to reach SME customers for the research in this thesis. As there were no SME customer bases to approach, all research participants had to be scouted by me. Many attempts were made to find SME customers of KPN to conduct the research. However, although the data should be available about which companies are a customer at KPN, none of the departments could or wanted to reach out to their clients (sales departments, data departments, market intelligence/ research departments) to approach them for research purposes.

Customer journey

You can hardly get the sustainability touchpoints in the customer journey specific because new customer journeys are created with every innovation and new storyline. This also means that you can not yet predict what these customer journeys will look like. That is why it is good to keep the sustainability design principle open to own interpretation and inspiration, while it does provide guidance on the design method. When presenting concepts, it turned out that many KPN employees were inspired to think along and brainstorm new ideas that could be relevant to KPN's future. Therefore, presenting a vision applied to KPN invites innovation and the development of new ideas. Of course, this does not mean that the ideas are directly implemented, but it is an inspiration for future activities and offers them perspective on the possibilities.

Sustainability

Furthermore, it is recommended to focus more on awareness and education about sustainability to KPN's employees. There is a lot of corporate communication about sustainability on corporate websites and annual reports, but sustainability is not yet prioritised enough on the inside at KPN. Sustainability communication has to start within KPN to ensure that the topic's importance is externally communicated to customers.

A good step would be to make the employees of KPN also conduct the sustainable telecom practices presented. This way, they can start using their telecom more sustainably and learn how the adoption of it would be for SMEs.

Design outcomes

To inform KPN's employees about sustainability, the designed brochure can be shown to create further awareness about sustainability at KPN. Sustainability should thereby be more prominently represented in plans for the upcoming year.

Currently, the platform idea is directed at sustainability and creating a community for sustainable telecom practices. However, it would be interesting and relevant for KPN to create a platform where SMEs can not only be informed, inspired and guided about sustainability but also about other important telecom-related themes. Therefore, it is recommended to put the design to broader use. This is interesting to KPN as there is currently no way to interact with customers or that customers can lowkey interact with KPN. Community and inspiration elements can be added to existing channels whether or not concerning sustainability. These aspects can come forward to bring about more interaction with employees of SMEs.

However, it would be important to measure the traction achieved on the platform and if customers would have a need to interact more with a telecom provider. Research shows that the EU is looking for a higher level of digitalisation within SMEs and it could be that the telecom provider is in a suitable position to help towards this digital transformation.

Furthermore, making future designs for SMEs as flexible as possible is recommended. In this way, the SME customer can apply its use to fit its needs.

10.3 Personal reflection

My personal motivation for the project was to provide a human-centered solution that fits the end-user. Although it was not always easy for me, throughout the project, I have worked towards my goals as a designer to support others and make a positive contribution while solving (design) problems. In this project, I have learned more about how companies can participate in the transition to improve environmental sustainability and how possible solutions can be designed for customers.

From the start, the topic of the project remained quite vague and in the "fuzzy front end." I did not know much about telecom, sustainability and SMEs, so I had to step out of my comfort zone and analyse the topics more in-depth to come up with a better understanding of the possibilities. During this phase, it has been challenging for me to zoom out and see the bigger picture. As I felt lost, I tried different design methods to get a grip on the project overview again. I started with the 1:10:100 method by doing a design sprint in one day and one in ten days. However, I did not continue working with the method as it did not feel suitable for me at that moment to make already many decisions based on assumptions. Therefore, I started with the Double Diamond Method, which did help me structure the project better but did not suit what I was doing. I started talking to many SMEs to dive deeper into their context and understand their views. As I was doing many things simultaneously, some results were unstructured and remained vague. Nevertheless, looking back, it seems apparent that I was naturally using a more Human-Centered design approach. Only later everything came together and resulted in a complete thesis report.

Furthermore, I have enjoyed my experiences at KPN. The employees have been very welcoming and willing to help. I got many enthusiastic reactions while discussing and presenting ideas and people (at all company levels) were genuinely interested. This motivated me to reach out to even more people. The engagement with stakeholders allowed me to gather constant feedback while presenting ideas valuable to designing a desired and valuable solution for both KPN and SMEs.

Doing my project at KPN has helped me see a strategic designer's value as creative thinking can inspire others with ideas. Furthermore, it appears that not all terms taught mean the same within a company (e.g. roadmap and customer journey). The customer journey at KPN is more focused on the technical than the human process, which I was very confused about. Working at KPN has given me insight into how it is to work in a corporate environment and could be helpful for my future career steps.

Although I enjoyed working at KPN, the most challenging for me was working alone on the project. I like to discuss ideas and brainstorm with others to get new insights and inspiration for the project. I get enthusiastic by engaging with others, which helps me stay motivated throughout the project.

Due to the broad scope and use of different methods, the planning was not always on point. For future projects, I should manage the time in the project better and accept that there will always be more to know, but making decisions quickly helps to make progress earlier, resulting in the ability to gather more feedback about design directions.

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Appendices

Appendix A: **Project brief**

DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name: Hoonhorst
initials: P.A.A. given name: Paulien
student number: 4546814
street & no.:
zipcode & city:
country:
phone:
email:

Your master programme (only select the options that apply to you):

IDE master(s): ( ) IPD ( ) DfI (★) SPD
2nd non-IDE master:
individual programme: - - (give date of approval)
honours programme: ( ) Honours Programme Master
specialisation / annotation: ( ) Medisign ( ) Tech. in Sustainable Design ( ) Entrepeneurship

SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair: Ruth Mugge dept. / section: DOS/MCR
** mentor: Erik-Jan Hultink dept. / section: DOS/MCR
2nd mentor: Jeroen Cox
organisation: KPN
city: Rotterdam country: The Netherlands

comments (optional): My chair and mentor both have a unique point of view on my topic. Ruth can help me with sustainable customer behavior and user experience and Erik-Jan can coach me with his expertise on sustainable business model innovation.

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

TU Delft

Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Ruth Mugge date - - signature

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: _____ EC
Of which, taking the conditional requirements into account, can be part of the exam programme _____ EC
List of electives obtained before the third semester without approval of the BoE

(★) YES all 1st year master courses passed
( ) NO missing 1st year master courses are:

name date - - signature

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: ( ) APPROVED ( ) NOT APPROVED
Procedure: ( ) APPROVED ( ) NOT APPROVED
comments

name date - - signature

Design of a CX strategy for KPN's SME customers in sustainable telecom — project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 10 - 02 - 2022 — 14 - 07 - 2022 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

The Dutch telecom provider KPN is one of the world's greenest companies. Since 2015, KPN is 100% climate-neutral and they only use green energy. KPN has set high goals as a company to make a greater contribution to a sustainable world (KPN, n.d). They are constantly looking at where to make improvements in their own organization, as well as to their customers and for society. As the topic of sustainability was first seen as a megatrend by society, it nowadays evolves to "the norm". We see that more companies are not only operating more sustainable themselves but also stimulate consumers and other companies to become more sustainable.

Offering more sustainable solutions and alternatives for telecom is a major topic of interest at KPN. In the consumer market, progress is being made to create more sustainable telecom. KPN is offering circular products to consumers and reuses and recycles materials (e.g. "eco sim": sim card made of recycled fridges, "deep sleep mode" to save 80% more energy in standby mode, wifi modem made of recycled plastics and less paper/cardboard used for packaging etc. (image 1)). Through smart design and lower energy usage, KPN can reduce negative environmental impact and through their services KPN increases their positive impact on the environment.

However, when we look at the business markets that KPN serves, there is no sustainable customer strategy yet and the existing circular products are not yet being used. SMEs (Small and Medium-Sized Enterprises) form the largest business market: In 2018, there were 1,2 million active companies in the Netherlands, of which 99,9% SMEs (CBS, 2021). In the SME market, there is little research done about the SME's sustainability needs, drivers and decision-making process to make sustainable choices in telecom. At the same time, SMEs have a huge negative impact on the climate, they account for almost 60% of CO_2 emissions (Ernst et al., 2022). According to the research of Kautonen et al. (2020), a transition towards sustainability orientation for SMEs might be possible if it entails minimal conflict with business interest and it can result in improvement of company performance. A simple way to become more sustainable as a SME is through their telecom supplier.

The main stakeholders for this project will be KPN and SME customer market. The opportunity for KPN is to create a CX strategy for the SME market to stimulate SMEs to make sustainable choices in telecom. KPN hopes to create added value on the topic of sustainability for their current and potentially new SME customers. For SMEs, there is an opportunity to be more sustainable with the telecom products and services that KPN offers as well as being inspired to behave more sustainable as a company.

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introduction (continued): space for images

image / figure 1: KPN's circular products and more sustainable packages

TO PLACE YOUR IMAGE IN THIS AREA:
- **SAVE THIS DOCUMENT TO YOUR COMPUTER AND OPEN IT IN ADOBE READER**
- **CLICK AREA TO PLACE IMAGE / FIGURE**

PLEASE NOTE:
- **IMAGE WILL SCALE TO FIT AUTOMATICALLY**
- **NATIVE IMAGE RATIO IS 16:10**
- **IF YOU EXPERIENCE PROBLEMS IN UPLOADING, COVERT IMAGE TO PDF AND TRY AGAIN**

image / figure 2:

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

KPN is constantly trying to reduce its own climate impact and to help reduce the impact of the organizations and resources they're working with to achieve its climate goals. Therefore, sustainable solutions are desired for the different customer markets they are active in. To create more value for KPN's customers in the SME market, KPN wants to offer them sustainable options for telecom.

KPN has the resources and knowledge available about recycling materials, reusing products and more sustainable services etc. to target the customers in the consumer market that care about sustainability to provide them with sustainable telecom. Unfortunately, customers in the SME market are not yet making a choice for telecom based on sustainability. In addition, KPN doesn't communicate enough about their products and services being sustainable towards their SME customers. So, in the SME market, KPN has no sustainable customer strategy yet. This is partly because there is no dedicated sustainability team available in the SME department of KPN and this must therefore be tackled out of personal interest and necessity.

The problem is that SMEs do not necessarily include sustainability in their choice of telecom. As a result, KPN can not provide them with suitable, sustainable telecom. This means that KPN must focus more on the needs and desires of the customers in the SME market to provide them with sustainable telecom solutions. For KPN, it is not clear what the different SME customer segments are and how those value sustainability (if already) in their consideration of telecom suppliers and make decisions for sustainable telecom. In this project there is a focus on three SME sectors (given by KPN) where KPN can make the most (and fast) impact.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

I focus on the decision-making process that SMEs in three sectors go through to make sustainable choices in telecom. I will design a CX strategy for KPN so SME customers are more likely to adopt sustainable telecom offerings.

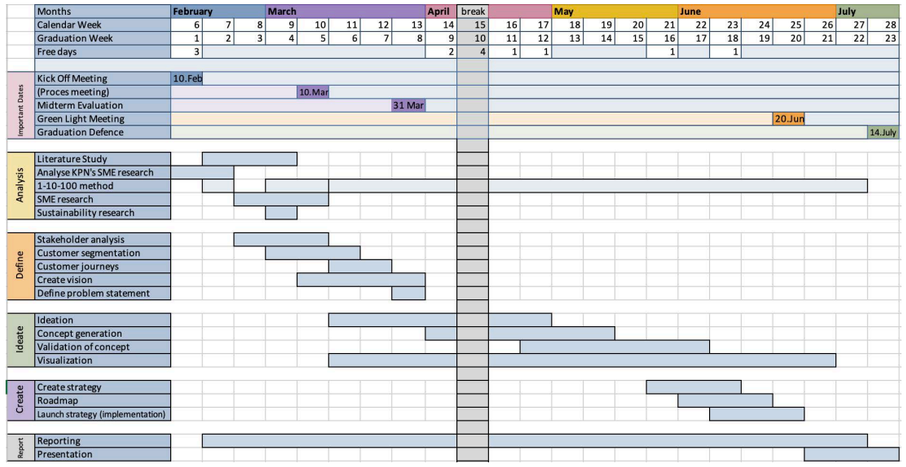
In this project, the SMEs decision processes and needs for a sustainable telecom provider will be researched. The goal is to include the SME market in a sustainable future and stimulate them to make more sustainable decisions through telecom. To do this, I will first do quick and dirty research on SMEs, stakeholder analysis (KPN and SMEs) and use tools such as interviews & questionnaires, personas and user tests to orientate and create a funnel. Then I will go more in depth and focus on the customer experience and customer journey of the SMEs sector specific. With those insights I can form customer segments and figure out their sustainability needs for telecom.

I will design a customer sustainability strategy for customer segments within three sectors in the SME market for KPN. This includes customer journeys and customer experiences which will be the basis for the roadmap for implementation and communication of the strategy. The result of this project for KPN are strategic recommendations to create added value for sustainable telecom choices for KPN's SME customers. For the SME customers that KPN has, the result of this project will be visible in the KPN channel communication, such as KPN app, instore or other means.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 10 - 2 - 2022 14 - 7 - 2022 end date



I plan to graduate full-time from February till mid-July with a break in the second week of April. During this period of time, there are multiple Dutch national holidays. Those are also included in my planning as "free days". I am fully able to focus on graduation as I completed all my mandatory courses.

Important dates:
Kickoff: 10 Feb, Mid term: 31 March, Green light: 20 June, Graduation: 14 July

My project approach includes different phases with the goal to create a clear solution for KPN. As my project direction is still very broad, I'm going to use the 1-10-100 method to narrow down my scope and define my projects direction for myself and to show stakeholders.

I structured my design process in different phases. In the analysis phase, I'm orientating and doing research on SMEs, decision-making processes, sustainable telecom solutions and KPN's SME research to dive deeper into the context of my research. In the next phase, I'm generating customer insights by analysing the stakeholders and mapping the SME customers to define the problem statement. At the Mid-term meeting, I will present my solution direction for KPN's SME customers based on the research and analysis done. With those insights, I plan to ideate and quickly create concepts that I can directly validate with the different stakeholders and work towards a suitable solution. In the create phase, I will continue with creating a strategy that combines the findings from the previous phases. Here I will work towards my final outcome by constantly improving and testing desirability, viability and feasibility.

Personal Project Brief - IDE Master Graduation

TU Delft

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

During my master, I became interested in the topic of consumer behaviour and underlying decision making processes. I'm interested in why people do certain things and how they feel satisfied with the choices they make. I think this is very important to know for companies to provide a human-centred solution that fits the end-user. When looking back at my master courses, I feel like I haven't been doing projects on the topic of sustainability, so that is what I want to dive deeper into during my graduation project. I want to learn more about how a company can be more sustainable and how we can stimulate this. We know sustainability is going to be an important topic to design for now and in the future, so I want to contribute to the transition and make a change where possible.

With this graduation project, I combine the two topics I'm interested in. I'm very happy that I got the opportunity to do my graduation at KPN. After my bachelor, I did a board year at YES!Delft Students where I fulfilled the function of Business Affairs. I visited a lot of large companies and I was very interested in their way of working and how different that was than I initially thought. I've worked at YES!Delft, which is an incubator for tech startups, and started my own company in giving away a cup of coffee. However, I don't have working experience in large organisations yet as I didn't do an internship, while I did like to do projects for large companies during the master courses. With KPN I hope to make an impact on a larger scale and design a strategy that KPN can quickly execute and implement. Besides, I want to explore if working in a big company would be a fit for my professional career.

I plan to apply the knowledge learnt during my master courses and more specifically during the Design Strategy Project, Design Roadmapping, Consumer Behavior and Context and Conceptualisation. I also did a course on Creative Facilitation and want to create a session resulting in new creative insights coming from KPN employees or SMEs.
A challenge for me will be to start writing everything down and make what I'm doing concrete with quick concepts. I also want to make a lot of visuals to practice visualisation skills and show stakeholders what I'm working on.

Personal learning ambitions are to trust the process and to trust myself, to not get too stressed about it if something doesn't completely go as planned. Sometimes I can get quite nervous and forget to have fun. It is an individual project with a lot of freedom, which is challenging but I have to make it fun to work on for myself.

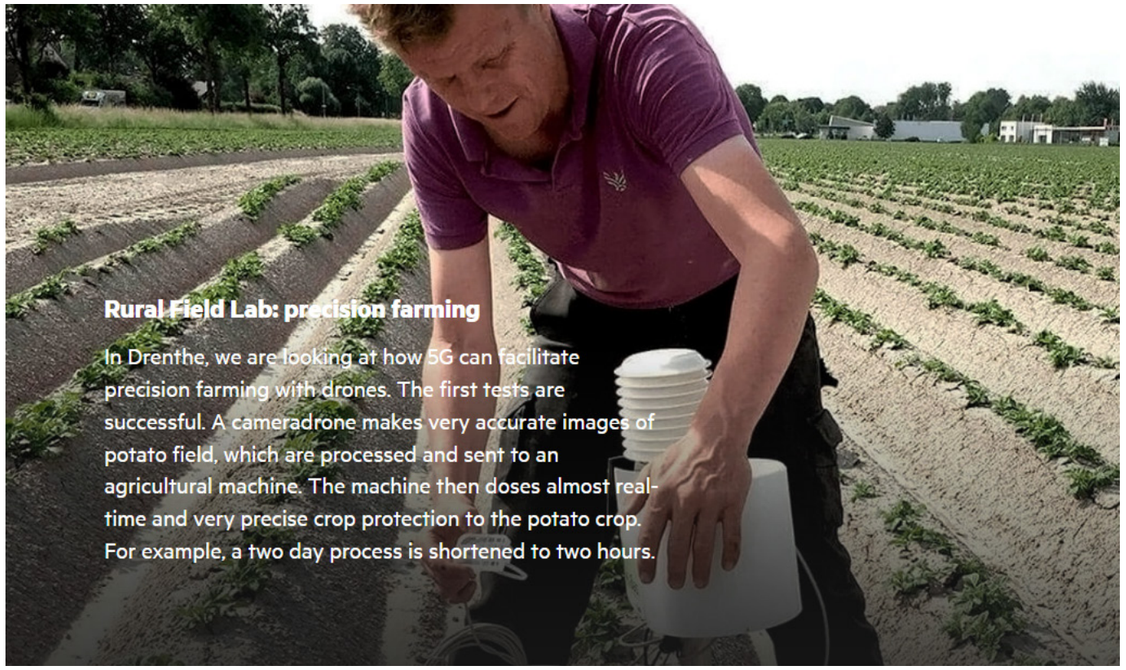
FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

Initials & Name P.A.A. Hoonhorst Student number 4546814

Title of Project Design of a CX strategy for KPN's SME customers in sustainable telecom

Appendix B: KPN sustainable example



Appendix C: Most used KPN products/services by SMEs

FTEs: 10-49

Name	Aantal producten :
SIM-kaart (3-in-1)	16800
KPN ÉÉN Kantoor	8387
Onbeperkt bellen voor KPN ÉÉN kantoor	7470
Combinatie Voordelen: Dubbele data, minuten en SMS	4580
Extra Veilig Internet t.w.v. EUR 6	4026
Totaal	**149919**

FTEs: 50-99

Name	Aantal producten :
SIM-kaart (3-in-1)	6311
KPN ÉÉN Kantoor	1743
Onbeperkt bellen voor KPN ÉÉN kantoor	1626
Combinatie Voordelen: Dubbele data, minuten en SMS	1259
Extra Veilig Internet t.w.v. EUR 6	1207
Totaal	**41152**

FTEs: 100-199

Name	Aantal producten :
SIM-kaart (3-in-1)	3599
Extra Veilig Internet t.w.v. EUR 6	978
KPN ÉÉN Kantoor	974
Onbeperkt bellen voor KPN ÉÉN kantoor	876
Combinatie Voordelen: Dubbele data, minuten en SMS	738
Totaal	**26017**

FTEs: 200-499

Name	Aantal producten :
SIM-kaart (3-in-1)	2566
Extra Veilig Internet t.w.v. EUR 6	806
Combinatie Voordelen: Dubbele data, minuten en SMS	792
Zakelijk Mobiel Onbeperkt SIM Only 2016	616
KPN EEN Anywhere profiel	584
Totaal	**16988**

Most used products:

- SIM-kaart
- KPN ÉÉN Kantoor
- Onbeperkt bellen voor KPN ÉÉN kantoor
- Combinatie Voordelen: Dubbele data, minuten en SMS
- Extra Veilig Internet t.w.v. EUR 6

Appendix D: Interview Guide initial field research

The interview guide below was used to collect data and better understand SMEs, their telecom and sustainability status. This interview guide is used in the initial field research with SMEs. As the interviews were semi-structured, not in all discussions the same order of questions was used and sometimes there were follow-up questions specified to the answer given to the question.

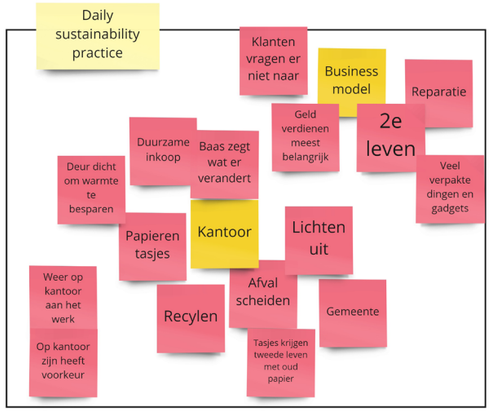
Telecom:
Maken jullie gebruik van telecom?
Welke telecom gebruiken jullie?
Hoe gebruiken jullie telecom?
Waar gebruiken jullie die telecom voor?
Voor welke activiteiten zijn jullie afhankelijk van telecom?

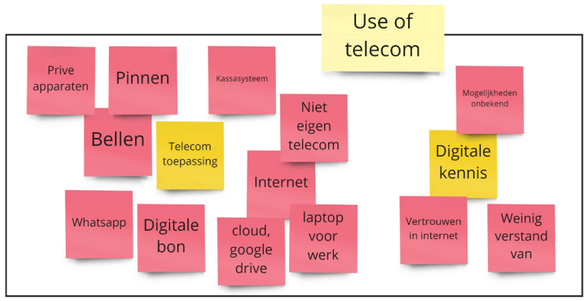
Duurzaamheid:
Kun je voorbeelden noemen over wat jullie doen met duurzaamheid?
Wat is jullie motivatie om dit te doen?
Hebben jullie de motivatie om duurzaam te zijn met het bedrijf?
Waarom nu (nog) niet?

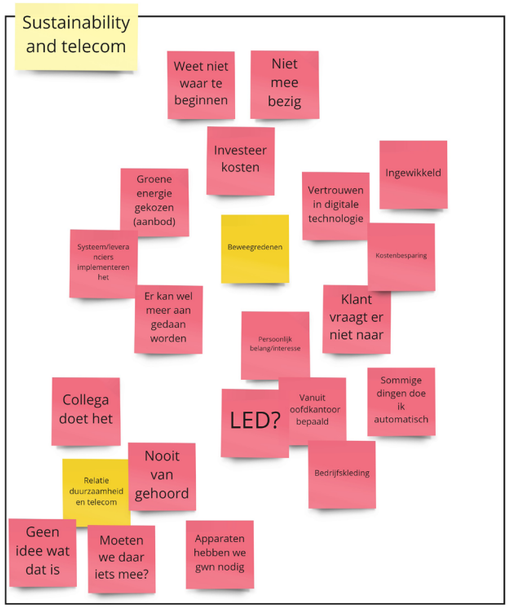
Duurzame telecom:
Kan je beschrijven wat je denkt dat duurzame telecom betekent?
Weet je iets over verduurzaming door telecom?
Gebruiken jullie telecom zoals eerder beschreven om te verduurzamen?
Kan je me vertellen hoe jullie telecom duurzamer in zouden kunnen zetten?
Zouden jullie behoefte hebben aan het duurzamer inzetten van telecom in jullie bedrijf?

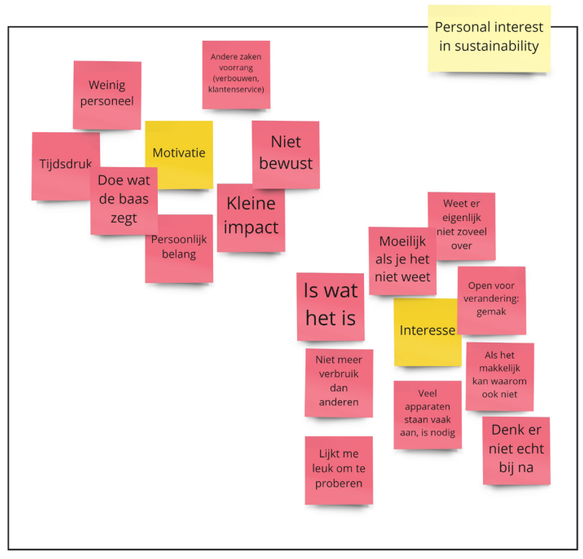
Toevoegingen:
Is er nog iets wat we niet hebben besproken tijdens het gesprek of iets wat je toe wil voegen?
Wat vind je van het onderwerp van het interview?
Wil je verder nog iets weten?

Appendix E: Clusters initial field research





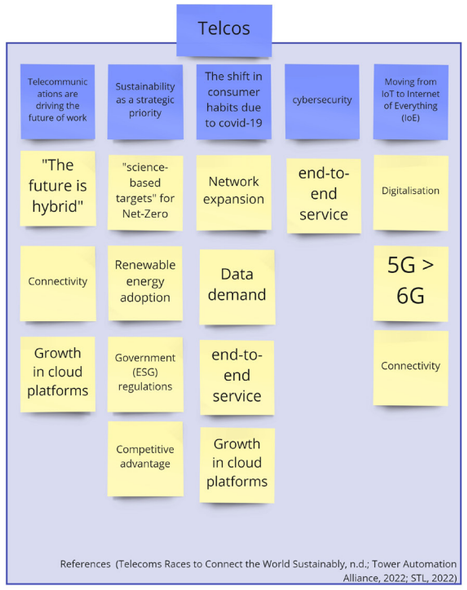


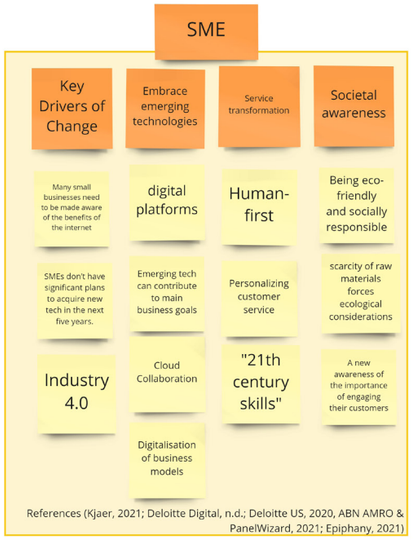


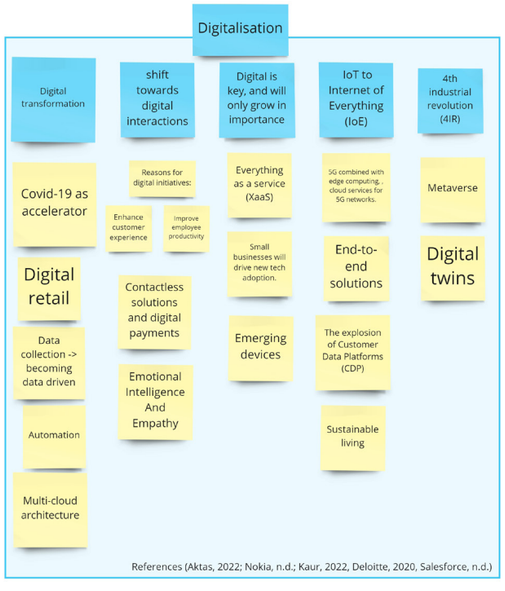
Appendix F: Trend research

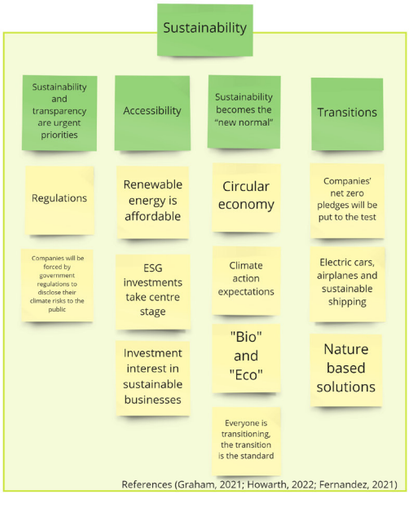
Creative trend research is conducted to detect changes in the telecom industry. The trends can give an indication of where opportunities for the future lie. The trend research is focused on Telcos, SMEs, Digitalisation and Sustainability.

Trend analysis

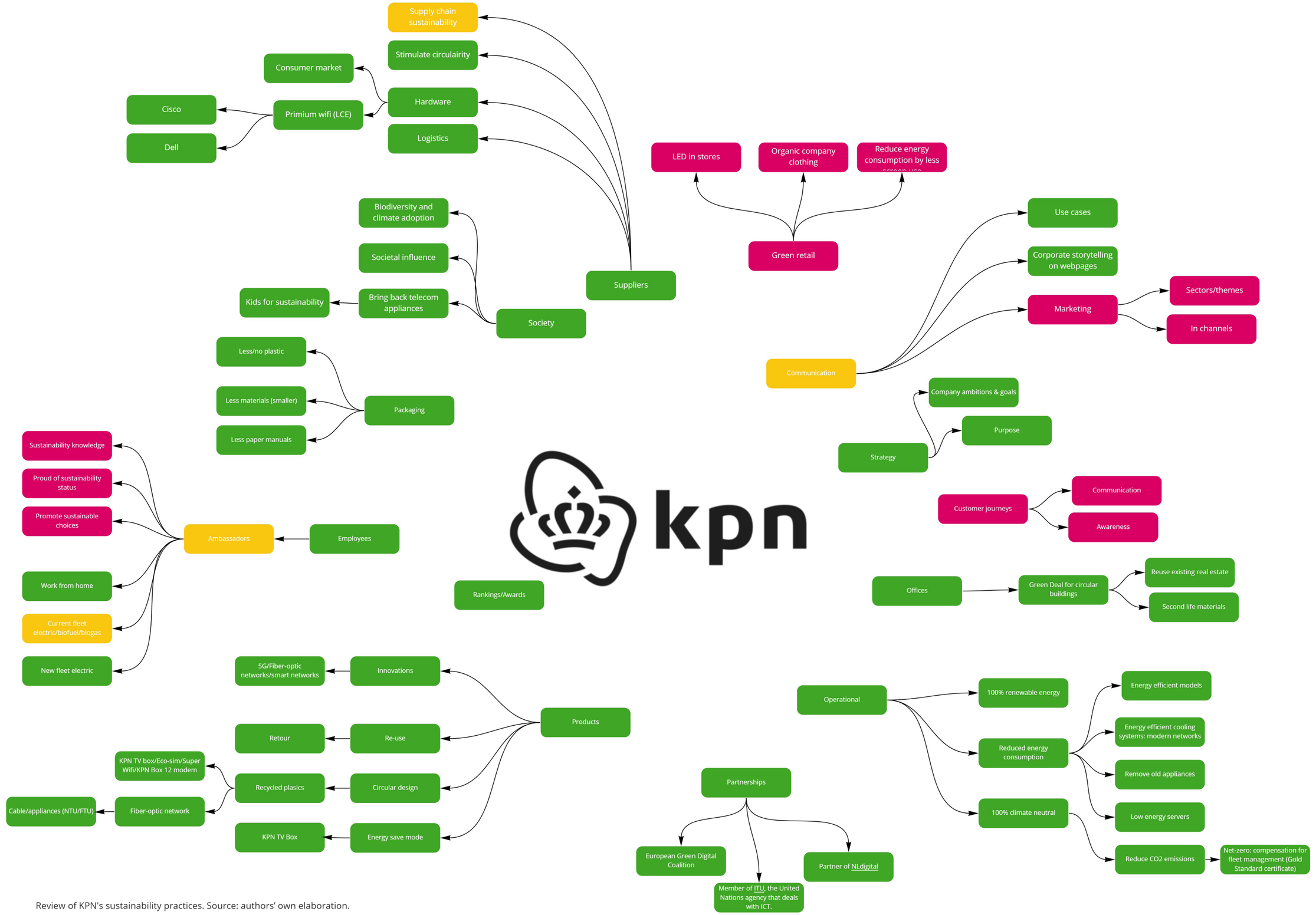








Appendix G: Everything KPN does to operate more sustainable



Review of KPN's sustainability practices. Source: authors' own elaboration.

Appendix H: KPN ESG rankings 2021 (KPN, n.d.)

Overview KPN ESG Rankings 2021

Rating agency	Index/rating/ranking	2021	2020	2019	2018	2017
S&P SAM	DJSI World	✓	✓	✓	✓	✓
CDP	Supplier Engagement A-/A List	✓	✓	✓	✓	✓
MSCI	ESG Universal Indices	✓	✓	✓	✓	✓
ISS-Oekom	"Prime" (Sector Leader)		✓	✓	✓	✓
Sustainalytics	Leader/Top 10 position	✓	✓	✓	✓	×
FTSE Financial Times Stock Exchange	FTSE4Good	✓	✓	✓	✓	✓
Ethibel Vigeo Eiris	Euronext Vigeo Europe 120	×	×	×	✓	×
	Euronext Vigeo Eurozone 120	✓	✓	✓	✓	✓
	Euronext Vigeo Benelux 20	✓	✓	✓	✓	✓
Ethibel Sustainability Index (ESI) Excellence Europe	Constituent		✓	✓	✓	✓
Transparantiebenchmark (Min. BiZa)	Koploper (top 20)	✓	✓	✓	✓	✓
Corporate Knights Global Top 100	Listed	✓	✓	✓	×	×
Workforce Disclosure Initiative	Listed	✓	✓	-	-	-
Sustainable Brands	Listed	✓	✓	-	-	-
Ecovadis	≥ Gold	✓	✓	✓	✓	✓
✓	Succesfully listed					
×	Not listed					
-	Not requested					

Appendix I: Competitor analysis

VodafoneZiggo

The telco Vodafone operates worldwide and its sustainable business goals are mainly formulated at a corporate (ESG) level. In the Netherlands, Vodafone operates under the name of VodafoneZiggo. In the figure on the right, an overview is provided of Vodafone's own business practices (scope 1&2) to limit pollution. Because of the company's size, Vodafone can make a significant impact by creating more sustainable products and services for society. One of the goals of their strategy is to focus on business customers to reduce their carbon emissions by 2030 (Vodafone Group Plc, 2021).

Vodafone states that the core of its purpose is its commitment to sustainability and that one of its strategy's pillars, therefore, focuses on the planet. Vodafone's brand position is "Together we can", indicating they want to help customers drive positive change for the environment. They say that their technologies help their customers become more efficient and reduce emissions (Vodafone Business, n.d.). The sustainability strategy focuses on smart, sustainable applications that help customers reduce emissions. For example, with Vodafone's Internet of Things (IoT) services, case studies to reduce emissions have started with the focus on energy and utility management and smart cities and public services.
In April 2022, VodafoneZiggo did a "switch to green" Earth Day campaign. This campaign encouraged customers, businesses and wider society to "switch to green" to emit less CO2. Meaning that through technology the customers can switch to greener choices (Vodafone, 2022). Since April (2022), Vodafone has included a reference to sustainability for smartphones on their business customer website. They give advice to make smartphones last longer and they make it easier to recycle and buy refurbished devices (Vodafone, 2022).

T-Mobile

Also T-Mobile operates worldwide and is active in the Netherlands with T-Mobile Netherlands. On the Dutch T-Mobile website, there is almost nothing to be found about sustainability. There is one page with a CSR report and some information about what they're doing on the topic. Sustainable business goals are all formulated on a corporate level.

The 2021 CSR report states that T-Mobile's sustainability is a top priority as a high-impact theme. Their motto is: *"We won't stop until sustainability is at the core of everything we do"*

This means they empower people to do global business without the traditional corresponding carbon footprint (T-Mobile Netherlands, 2022). They focus on using renewable energy and working with suppliers to reduce material usage and avoid waste. T-Mobile's climate protection strategy is to collaborate with suppliers and sharpen sustainability criteria, indicating that they are working hard on their circular supply chain

VodafoneZiggo

(T-Mobile, n.d.). T-Mobile responsibly recycles waste and asks customers to return network equipment for reuse. Furthermore, T-Mobile focuses on green retail, e.g. by using all led lights, no giveaways and the use of organic company clothing. T-Mobile's main results over 2021 and goals for 2022 are shown.

However, there is nothing to be found about how sustainability becomes the core of everything done at T-Mobile and how to empower people exactly to lower their carbon footprint.

Our impact in 2021

The activities designed to help us achieve our environmental and climate targets have been divided across six sustainability focus areas. In the section below, we explain our main results in 2021 per focus area and goals for 2022.

Focus area	Main results 2021	Goals 2022
Company-wide	▪ 100% renewable electricity	▪ 100% renewable electricity ▪ 20% reduction of our CO2e footprint ▪ Launching a system to measure our Scope 3 CO2e emissions
Sustainable network management	▪ Total 5.4% reduction of electricity consumption ▪ Production of 47,731 kWh renewable electricity production with 300 of our own solar panels	▪ Increase in the energy efficiency and savings in a growing network (increased number of users and increase in data use)
Circular Supply Chain	▪ FSC certified & recycled packaging ▪ 53.6% of the returned customer network equipment is reused ▪ 542 tonnes of eWaste was responsibly recycled	▪ Introduce eco-plastic packaging ▪ Optimization of the refurbishment/ retake logistics of Customer equipment, such as modems and servers of Business customers. ▪ Follow up with refurbishment/retake of network equipment, such as modems and servers, from business customers
Green retail	▪ 100% LED lighting ▪ 100% organic or recycled company clothing ▪ No give-aways	▪ Increase in the sustainability of the shop consumables. ▪ Launch of a consumer engagement awareness on sustainability program
Green offer	▪ 2.559 devices have been bought back via the Recycle Deal ▪ Introduction of the Fairphone 4	▪ Introduction of more digital product solutions
Green facilities & mobility management	▪ Renewed mobility management policy ▪ 18.4% increase of CO2e related to the fleet ▪ 41.1% increase of CO2e related to buildings ▪ Waste Reduction program launched in offices (and shops) ▪ Green construction of new T-Mobile office in Diemen (from Label D to A)	▪ Reduction of the CO2 footprint of our car fleet by electrification of our fleet. ▪ Reduction of energy consumption in our offices.
Sustainable procurement	▪ New sustainable procurement program launched	▪ >95% of strategic suppliers enrolled in sustainable procurement program

T-Mobile

Comparing competitors

KPN	T-mobile	VodafoneZiggo
Net-zero in full value chain goal	**Focus on circular supply chain**	**Path to net-zero described**
Sustainability only on corporate webpages	**Sustainability only on corporate webpages**	**Sustainability also on business webpage**
Certificates and industry rankings on sustainability	**Greening of retail**	**Enabling customers + tips to reduce CO2 impact**
	Sustainability partnerships	
Eco friendly design of devices	**Eco-rating of mobile devices**	**Eco-rating of mobile devices**
Eco-sim		**Eco-sim**

Appendix J: Vodafone Switch for Green tips

Switch For Green

Met **Switch for Green** werk je samen met ons aan een duurzame toekomst. Door kleine aanpassingen, maken we samen een grote impact. Benieuwd? Lees hieronder hoe we dit voor elkaar gaan krijgen.

- **Reduce:** Maak langer gebruik van je telefoon door de **smartphone scan**. Zo weet je hoe lang je nog effectief gebruik kan maken van je telefoon en wanneer het écht tijd wordt voor een nieuw model. Hierdoor haal je alles uit jouw toestel.
- **Re-pair:** Je telefoon laten vallen? Geen probleem, Vodafone staat namelijk **garant** als je een verzekering hebt. Zo repareren wij je toestel en hoef jij voorlopig geen nieuw model te kopen.
- **Re-use:** Je hoeft niet altijd een nieuw model te kopen. Sterker nog, refurbished modellen (dit kan via hollandsnieuwe) zijn bijna net zo goed én worden tegen een veel lagere prijs verkocht. Zo hou jij extra geld in je zak en draag je bij aan een beter milieu.
- **Re-cycle:** Kies je ervoor om een nieuwe telefoon aan te schaffen terwijl je huidige toestel nog niet op is. Lever dan jouw oude model in de Vodafone winkel via de inruildeals. Zo kunnen wij er iemand anders blij mee maken of het materiaal recyclen.

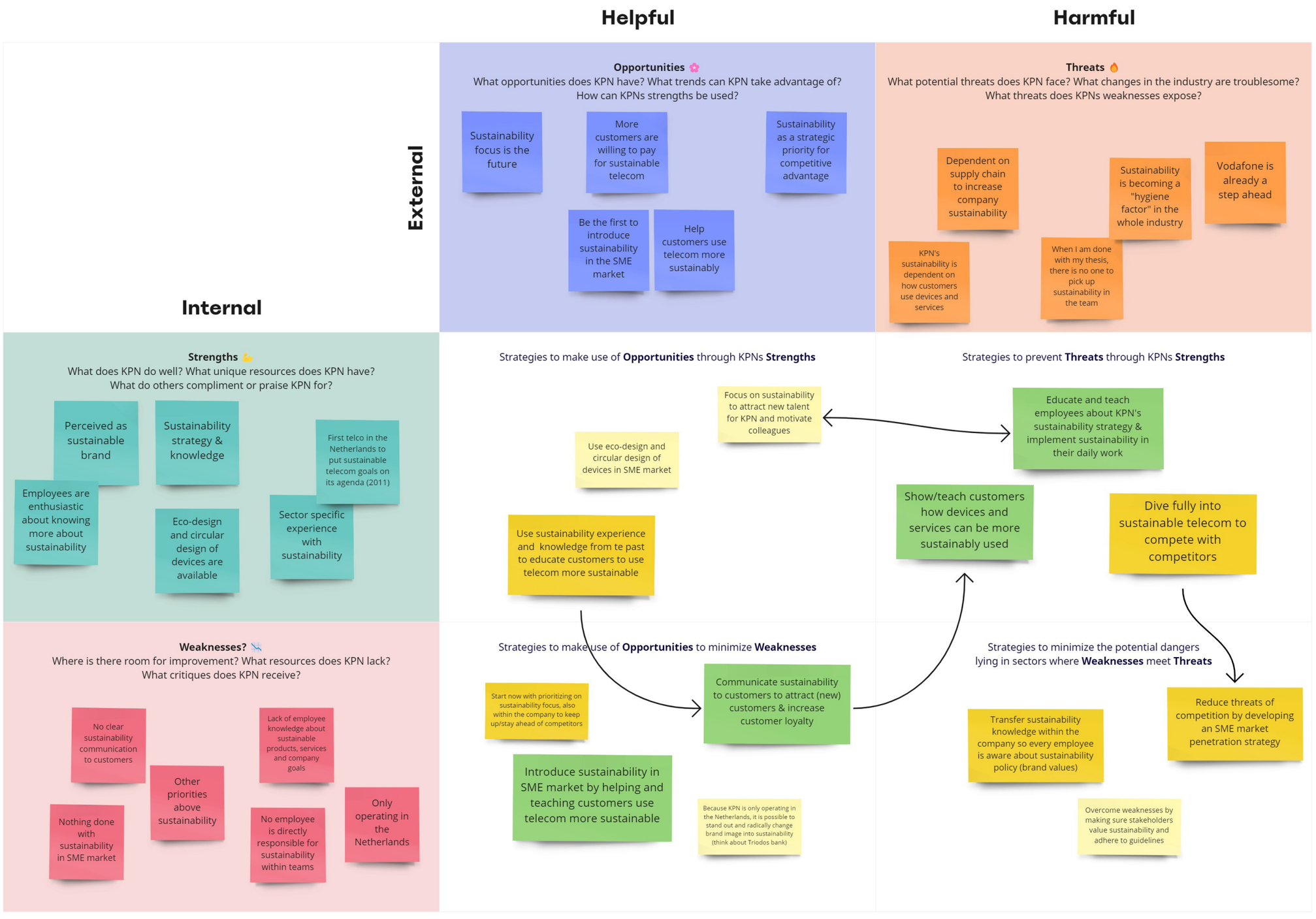
Een circulaire economie

We werken mee aan de transitie naar een circulaire economie. Via de werken mee aan een circulaire economie, door:

- Een aanbod van **inruildeals**, zodat klanten hun oude telefoons kunnen inruilen.
- Inzet van de **Smartphone Scan**. Zo stimuleren we klanten smartphoneproblemen gericht aan te pakken en hun telefoon langer te gebruiken.
- Het **recyclen** van oude of kapotte apparatuur, zoals laptops, smartphones en accu's en kapotte telefoons van klanten.
- Steeds **minder verpakkingsmaterialen** te gebruiken. O.a. door slimmer te verpakken (minder loze ruimte). Hierdoor rijdt de vervoerder ook relatief minder.
- **Elektronische** klant- en leveranciers**communicatie** i.p.v. op papier.
- **Biologisch afbreekbare materialen** te gebruiken in onze logistieke processen.

Appendix D: SWOT analysis

Sustainability for KPN's SME market



Appendix L: Consent form

Consent Form for SPD Graduation Project

You are invited to participate in a research study conducted by Paulien Hoonhorst who is an MSc student in Strategic Product Design at TU Delft. This study is conducted for the master's graduation project in collaboration with Royal KPN N.V. and Delft University of Technology.

Your participation in this study is entirely voluntary. You should read the information below and ask questions about anything you do not understand, before deciding whether or not to participate. You are being asked to participate in this study because you [the company] fit the research criteria.

Purpose of the study

The purpose of this study is to answer the research question of the study, which is:

How can a telecommunications company enable small- and medium-sized enterprises to become more sustainable through the use of telecommunication?

Potential risks and discomforts

Any risk, discomforts, or inconveniences will be minor and it is believed that they are not likely to happen. If discomforts become a problem, you may discontinue participation.

Confidentiality

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of a code number to let the researcher know who you are. We will not use your name in any information we get from this study or in any of the research reports. Information that can identify you individually will not be released to anyone outside the study.

Participation and withdrawal

You can choose whether or not to be in this study. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you do not want to answer. There is no penalty if you withdraw from the study.

Consent

Please confirm that you agree with the following statements:

Taking part in the study

- I have read and understood the study information dated 19/05/2022, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.
- I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.
- I understand that taking part in this study involves an exercise and requires an explanation of thoughts.
- I understand that the interview will be recorded.
- I understand that information is recorded through photos made by the researcher and/or if the photos include people, they will be shown anonymously.

Use of information in the study

- I understand that information I provide will be used for the research in the context of the graduation project, within the Strategic Product Design Master's programme at the TU Delft.
- I understand that personal information collected about me that can identify me, such as [e.g. my name, company name or function], will not be shared beyond the researcher.
- I agree that my information can be quoted in research outputs

Future use and reuse of the information by others

I give permission for the [anonymised transcript] data that I provide to be archived in the education repository of the TU Delft so it can be used for future research and learning.

Signatures

_____	_____	_____
Name of participant	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Reseracher name	Signature	Date

Study contact details for further information:

Paulien Hoonhorst, [redacted]

Appendix M: Codes and clusters Interactive, explorative research

An online way of working

Working at home
- Working at distance when other employees are not in the same country (Practical reasons)
- Collaborative office days (Physically presence preference)
- No work at home policy (Company policy)
- personal preference (Personal preference)
- Important meetings at the office (Physically presence preference)
- Why we work digital or physical is not clear because of covid regulations (Knowledge gap)
- Boss works from home, other employees aren't (Management decisions)
- "There's not that much for me to do at distance (as secretary)"/ (Work responsibilities)
- Office telephone is not connected to personal phones
- Also during covid, we stayed at the office (Company policy)
- Other employees can work at home due to their responsibilities and tasks (Work responsibilities)
- Prefer not to work at home (Physically presence preference)
- Efficient for traveltime (Efficiency)
- Because of covid, working at home (External circumstances)
- Compared to other companies working less at hom (Company policy)
- wanting a at home working policy (Company policy)
- Unclarity at hybrid meetings (Knowledge gap)
- less efficient conversations (Digital + less efficient)
- for important decisions working at home is not tolerated (Physically presence preference)

"Green" search engine
- Not used, but can be used (Personal effort)
- Not sure about what other employees do (Knowledge gap)
- Quality has priority (Other priorities)
- No we're not doing it (Existing way of working)
- Not familiar with green search en (Lack of sustainability knowledge) using google

Online meetings
- Important meetings at the office, every other meeting online (Physically presence preference)
- Boss loves face to face meetings (Management decisions)
- We can do it in the future (Future prospect)
- Online meetings to not waste time in traffic and waste of gas costs (Practical reasons) (Cost effecient)
- acting out of efficiency (Efficiency)

Dematerialisation (less printing)
- Working digital to use information at distance (Practical reasons)
- Digitalisation urge because of being at home with covid (External circumstances)
- Not having to walk somewhere to see documents (Practical reasons)
- Administrative office, paper remains "handy" (Practical reasons) (Accustomed)
- Two versions of every document (printed & digital) (Customer demand)
- Elderly people want something on paper (Customer needs)
- dependent on the customer (Accustomed)
- Most customers still stop by to arrange or deliver documents although it is possible digitally (Shift)
- Sector-wide change to digitalisation (Movement)
- "paperless"
- Not loosing written notes (Practical reasons) (Doing it together)
- get your colleagues along

Working digitally
- We already do those things (Existing way of working)
- We work mostly digital as we are a software company (Digital product)
- Working on digitalisation (Proces)
- Customers are not complaining about traveling to come to the office (Customer demand)
- "Sometimes I'm also surprised [if customers are coming from far red.], but I don't hear them complain, you know" (Customer demand)
- While being present physically, presenting digitally (Practical reasons)

Reducing physical presence

Reduce business travel
- A lot of work trave (Existing way of working)
- "Physical appointments are better and easie (Physically presence preference)
- Sales will be better physically selling the product and showing a der (Physically presence preference)
- I'm not the one responsible for company decisions and sustainabiilty (Out of hands)
- No business travel (Existing way of working)
- brainstorms about traveling less (Sustainability awareness)
- effciency driven (Efficiency)
- Show others a sustainable image with electric cars or public transport subscription (Sustainability Image)
- Budget too small for electric cars (Cost effecient)
- project locations are not reachable with public transport (Practical reasons)
- Conscious, but efficiency is more important than sustainability (Other priorities)

Remote maintenance
- Online for software (Software dependent)
- Automatic software product updates (Collective indifference)
- No one is going to do it
- Maybe in the future for new business models (Future prospect)
- Physically presence is easier (Physically presence preference)
- Maintenance for work is digital (Digital help)
- There is someone available for ICT related questions, mostly digital help (Asking for help) (Digital help)

Remote diagnostic equipment
- We are not doing it (Existing way of working)
- software support at distance (Software dependent)
- We go to the store for maintenance (accustomed)
- New supplies because the company is quite new, so no maintenance needed yet (Knowledge gap)
- technician who helps with ICT (Asking for help)
- Will be something for in the future (Future prospect)
- Sometimes it happens, sometimes not, not daily or montly (Digital help)
- All through calls (Situation dependent)

Office building restrictions

Light sensors
- Building owner does this (Out of hands)
- Every light is turned off on with the same switc (Practical reasons)
- "We could do it, if I had to decide, and now I am aware of course." (Sustainability awareness)
- Yes, 'It is annoying, because if you are not moving, the lights turn off automatically" (Practical reasons)

Fiber
- Not aware, because of the building owner (Out of hands)
- No need for fiber, maybe in future (Existing way of working) (Future prospect)
- Building policy (Out of hands)
- Possible to suggest something to the building own (Doing it together)

Green energy contract
- Hard, because building owner is responsible (Out of hands)
- Not aware (Knowledge gap)
- Not included in company decisions (Management decisions)
- Building owner is also trying to become more sustainable (External circumstances)

Management decisions for sustainability

Webshop / selling online
- People are always coming to the office (Existing way of working)
- From website to physical materials (Shift)
- "It works better to put a book in front of someone than having a television screen behind you projecting exactly the same thing." (Other priorities)
- It is a conscious choice to not be sustainable, but it does work better, so we keep doing it (Sustainability awareness)
- "sustainable" goodies (sustainable straws) (Sustainability Image)
- Competitors are doing it, so we have to do it as well (Collective indifference)
- collectively banning goodies (Doing it together)

Smart sensors
- not applied, should be considered in the future (Future prospect)
- No need for smart sensors, far in the future (Existing way of working)
- Smart sensors in the office for light, temperature, air circulation (22th floor) (Practical reasons)
- Influence of buidling owner (External circumstances)
- Showing your company competences with the office (Sustainability Image)

Green business model
- "one of the focus points is energy reduction [..] b (Sustainability awareness) g it online, you can save energy".
- "Not sure about sustainability reasons" (Other priorities)
- The business model takes into account sustainability benefit (Sustainability awareness)
- "Still, it doesn't matter, because functionality is more important than sustainability" (Other priorities)
- Something that is going to happen, we're in the process (Proces)
- Always first physically now (accustomed)
- Customer needs (Customer needs)
- "It depends on what the customer wants and we can help them with that" (Customer demand)
- Future driven to more digitalisation
- sustainability is a core value of the company (Company policy)
- sustainability is a complicated concept in our sector (Sustainability awareness)
- Trying to be sustainable within what is possible with government regulations (Within boundaries)
- Constantly improving business case on sustainability (within what is possible) (Sustainability awareness)
- Sustainability for the future (Future oriented)
- Young employees are educated with sustainability values (Sustainability awareness)
- sustainability to recruit new employees and etics (Sustainability purposes)
- Company changes with employees (Shift)

Educate digital sustainability

Delete data (eg. mails)
- When someone leaves, all data is deleted (Practical reasons)
- Dependent on the email software used (Software dependent)
- yes we delete data (Existing way of working)
- Not sure why data has to be deleted (knowledge gap)
- Reminded to delete as much data as possible (Company policy)
- Is it more sustainable? (Lack of) sustainability knowledge)

"Green" search engine
- Not used, but can be used (Personal effort)
- Not sure about what other employees do (Knowledge gap)
- Quality has priority (Other priorities)
- No we're not doing it (Existing way of working)
- Not familiar with green search engines, using google (Lack of) sustainability knowledge)

Sustainable server
- "Is it sustainable?" (Lack of) sustainability knowledge)
- "No I don't know anything about it and I don't know what else I should do.." (Knowledge gap)
- Technical functionality without thought about sustainability (Practical reasons)
- Not consciously chosen for sustainability (Sustainability awareness)
- Hard to say what is exactly meant with sustainability (Lack of) sustainability knowledge)
- Security of documents is most important (Other priorities)
- security updates
- No idea where documents are stored (Knowledge gap)
- Sustainability consideration are not shared in the group (Knowledge gap)
- "It may sound very harsh, but we do it almost all out of efficiency" (Efficiency)
- Reuse of office devices is what we aim to keep sustainable
- Sustainability is not promoted, but efficiency and speed are (Other priorities)
- "I think this is interesting research, I had never thought of storing.. and eh your cloud and everything can be sustainable." (Lack of) sustainability knowledge)

Collaborative effort

Turn off devices
- No one is doing it now
- Future (Future prospect)
- We can pay more attentio (Personal effort)
- Printers are turned off at the end of the day
- Laptop stays always on (Collective indifference)
- policy of building owner (Out of hands)

Reuse devices for (new) employees (Practical reasons) (Practical reasons)
- Company laptops, so they are reused when people leave reuse for practical reasons

Devices on standby
- "That's more, that's more of a user issue than a business issue as far as we're concerned because there are no devices at the office at the company"
- We're not conscious o (Collective indifference) inability (Sustainability awareness)
- Impact becomes bigger with more devices (Impact driven) (Personal effort)
- We don't do it now, would be for the future (Future prospect)
- No need for it (Customer needs)
- Need of the boss? (Management decisions)
- Can be something to implement asap for other reasons than sustainability (Other priorities)
- Turning off devices (Existing way of working)
- Presentations screens have a note that says to turn them off (Company policy)
- "We learnt here to put nothing on standby but to turn everything off, but no one is doing that for their laptop" (Collective indifference)

Use telecom devices for longer
- Based on costs, not sustainability reasons (Cost effecient)
- Using devices till they are dead (Existing way of working)
- Not the newest devices
- Nothing is thrown away (accustomed)

Recycle or send back devices
- Not noticed yet, doens't happen (Knowledge gap)
- Second life for devices (Existing way of working)
- Devices are never thrown away (accustomed)

Unplug the power cord
- Could be implemented directly (Other priorities)
- I can directly do it right now
- "Yes well, it's more that you, yourself, ... that we ourselve (Sustainability awareness) should be more aware of it and be made aware of it" (Personal effort)
- Not sure if others do it as well (Collective indifference)
- Responsible for own work space (Personal effort)
- Everyone could directly do it (Personal effort)
- Extension cords are put in extension cords, causing troubl (Knowledge gap) with the firemen
- "HR or secretary doesn't do it, not attention is paid" (Collective indifference)
- "removing the plugs from the socket is a fairly easy procedure" (Personal effort)

Appendix O: Information cards

Data verwijderen

Duurzamer omgaan met telecom kan door data te verwijderen.

Data vervuiling is te wijten aan de opslag van elke e-mail die voor de veiligheid op meerdere servers is opgeslagen. Om de impact te minimaliseren, kun je regelmatig e-mails verwijderen om onnodige opslag in datacenters te voorkomen. Vermijd bovendien het verzenden van bijlagebestanden naar veel ontvangers en zeg e-mail abonnementen op.

Dematerialisatie

bv. minder printen

Duurzamer omgaan met telecom kan door te dematerialiseren.

Dematerialisatie is bijvoorbeeld mogelijk door het veranderen van fysieke processen naar digitale. Zo verminderen digitale technologieën het papierverbruik en wordt muziek van cd's gedigitaliseerd. Aanzienlijke milieubesparingen zijn het vermijden van verpakking, papier, transport, materiaalproductie en winkelruimte.

Apparaten uitzetten

Duurzamer omgaan met telecom kan door apparaten uit te zetten.

Elektronische apparatuur, waaronder computers, laptops, monitoren en tv's, verbruiken een aanzienlijke hoeveelheid energie wanneer ze aanstaan terwijl er niemand op kantoor is of als ze niet gebruikt worden. Laat apparaten niet altijd aan staan; nog beter, zet apparaten zo vaak mogelijk uit. Dit helpt ook kosten voor energie te besparen.

Online vergaderen

Duurzamer omgaan met telecom kan door online te vergaderen.

Online afspreken heeft als voordeel dat de mensen in de vergadering niet naar de vergaderlocatie hoeven te reizen. Minder woon-werkverkeer voorkomt uitstoot afhankelijk van de afstand, het gebruikte vervoermiddel en het aantal mensen in de vergadering. Daarnaast kan online afspreken in een aantal gevallen praktischer zijn en kan het helpen kosten besparen van bijvoorbeeld brandstof.

Stekker uit stopcontact

Duurzamer omgaan met telecom kan door de stekkers van apparaten uit het stopcontact te halen.

De meeste vervuiling van mobiele apparaten is te wijten aan de stand-by modus. In de stand-by modus wordt er stroom gebruikt door opladers die zijn aangesloten aan het stopcontact maar niet wordt gebruikt. Het loskoppelen van apparaten uit het stopcontact vermindert de vraag naar energie en de CO2-uitstoot.

Thuis werken

Duurzamer omgaan met telecom kan door thuis te werken.

Thuiswerken en digitaal werken heeft als voordeel dat je niet hoeft te pendelen naar een (flex)werklocatie. Minder woon-werkverkeer voorkomt uitstoot afhankelijk van de afstand, het gebruikte vervoermiddel en het aantal mensen dat heen en weer reist. Daarnaast kan het kosten voor brandstof besparen.

Groene zoekmachine

Duurzamer omgaan met telecom kan door te een groene zoekmachine te gebruiken.

Een groene zoekmachine zorgt voor ecologisch verantwoord internetgebruik. Een voorbeeld is Ecosia. Ecosia is de grootste groene zoekmachine die er is en gebruikt 80% van de advertentie-inkomsten om bomen te planten. Bomen vangen koolstof op en hebben daarmee het potentieel om de klimaatverandering te verminderen.

Groen energiecontract

Duurzamer omgaan met telecom kan door een groen energiecontract aan te gaan.

Een groen energiecontract is een contract waarbij een bedrijf ermee instemt om elektriciteit rechtstreeks af te nemen van een opwekker van hernieuwbare energie. Hernieuwbare energie is energie die wordt verzameld uit hernieuwbare bronnen die op natuurlijke wijze worden aangevuld. Het omvat energie uit zonlicht, wind, regen, golven en aardwarmte.

Glasvezel

Duurzamer omgaan met telecom kan door de aanleg van glasvezel.

Glasvezel bestaat uit duurzamere materialen, is langer houdbaar, verbruikt minder energie en verbruikt bij de fabricage minder stroom dan kabelinternet. Overstappen op 5G-netwerken kan het energieverbruik tot 90% verminderen.

Slimme sensoren

Duurzamer omgaan met telecom kan door de inzet van slimme sensoren.

Slimme sensoren die zijn verbonden met netwerken maken bijvoorbeeld gebruikt van automatisering, energie besparing, verminderen van de CO2-uitstoot en het bestrijden van klimaatverandering. Veel sensoren brengen slimme energie besparende functies met zich mee. Denk aan lichtsensoren die het licht alleen aanzetten als het donker is of bewegingssensoren die een apparaat pas aanzetten als er iemand aanwezig is.

Appendix P: Platform evaluation interview questions

Ik ben vooral benieuwd naar jullie ervaringen met het platform zodat ik kan onderzoeken of een platform zoals dit bedrijven zou kunnen helpen om telecom op een duurzamere manier te gebruiken. Daarnaast ben ik benieuwd naar de interactie met het platform.

Communicatie

- Zou je me iets willen vertellen over je ervaring met het platform?
- Waarvoor dient het platform naar jou idee?
- Wat zijn je belangrijkste takeaways nadat het platform hier een week heeft gestaan?
- Welke aspecten van het platform hebben geholpen?
- Wat communiceert het platform?
- Is dat relevant voor dit bedrijf?
- Wat suggereert de naam van het platform?
- Was er iets onduidelijk?

Kennis

- Op welke manier de informatie nuttig en van toepassing voor jullie?
- Bood het platform voldoende houvast om iets te veranderen?
- Heb jij of een collega de QR codes gescand om informatie te bekijken?
- Welke dingen die in de kalender staan hebben jullie uit kunnen voeren?
- En waarom de andere dingen niet?
- Wat zou de voornaamste reden voor jullie zijn om duurzamer met telecom om te gaan?

Inspiratie

- Hebben jullie gedurende de week iets anders gedaan met jullie telecom?
- Hebben jullie het intern over duurzaamheid gehad?
- Is er een manier hoe het platform heeft geïnspireerd om duurzaam om te gaan met telecom?

Begeleiding

- Op welke manier zou een platform relevant kunnen zijn voor het bedrijf?
- Hoe zie je dit op de lange termijn?
- Hoe denk je dat een telecom provider bedrijven kan helpen te verduurzamen?
- Wat zou je graag anders willen zien?

Over bedrijf

- Hoeveel mensen werken hier?
- Wat doen jullie al met duurzaamheid?

Appendix Q: Questionnaire design principle evaluation

Na het design principle bekeken te hebben, wat houdt het design principle duurzaamheid in? Zou je dit in eigen woorden op willen schrijven:

6 antwoorden

- Klanten helpen bij het kiezen van duurzame telecomoplossingen
- Een werkwijze om vanuit intern duurzaamheid te laten leven en te laten ontwikkelen tot een externe strategie.
- Het geeft een missie weer die KPN wil bereiken op gebied van duurzaamheid voor het SME-segment
- Klanten ondersteunen met kennis en tools om duurzamer te werk te gaan
- Bij KPN proberen we het mileu niet onnodig te belasten. Dit doen we door energie te besparen (en mogelijk zelf op te wekken) en onnodig transport (van mensen of goederen) te beperken.
- Dat wij als KPN en onze klanten stimuleren om duurzaam te ondernemen.

Geeft het design principle je houvast om iets te doen met duurzaamheid in je werk? En waarom?

6 antwoorden

- Door het bewust te noemen ga je in ieder geval nadenken over duurzaamheid
- Ja, als in de teams duidelijk is wat we doen, waarom we het doen, hoe we het doen en hoe het KPN uniek maakt, helpt het de teams om de communicatie rondom KPN te vormen
- Niet zozeer houvast, daarvoor zou er een verdiepingsslag moeten volgen met specifieke handvatten
- Ja, de genoemde categorieën helpen om ideeën te genereren op een breder vlak dan je eerste ingevingen
- Ja, al is het nog vrij hoog over. Nadenken over de impact die keuzes hebben op de wereld is sowieso iets waar we meer en meer iets mee moeten, dan is dit nog vrij generiek.
- Ja, je kan op basis hiervan nagaan of we onze processen, communicatie etc. al duurzaam inzetten.

Is alles in het design principle duidelijk? En zo niet, wat zou je graag nog duidelijker willen zien?

6 antwoorden

- Ja
- Ik zou nog behoefte hebben aan hoe de duurzame operatie er daadwerkelijk uit ziet, wat doen we nou echt en wat is het resultaat daarvan
- De 6 stappen zouden een toelichting kunnen gebruiken. Daarnaast zou het helpen om het principe SMART te formuleren, met name hetgeen we aan klanten communiceren.
- Naast het woord 'duurzaam' zie ik zo snel 1x het woord 'mileuvriendelijk' en 1x 'klimaatneutraal'. Wat me nog meer zou helpen is houvast waar ik dan allemaal aan moet denken (hoe doen we dit dan?). Gaat het over zelf opwekken van energie? Gaat het over het stoppen van papieren communicatie? Gaat het over het beperken van transport? Meer thuiswerken? Verbeterde retourflow op oude apparatuur? Het recyclen / upcyclen uit afvalstromen? Nu zeggen we vooral dat we duurzaam zijn, maar ligt de invulling wat dat betekent en waar we dat laten zien bij mij. Als de focus bijvoorbeeld alleen op energie zou zijn, is dat wat mij betreft wat beperkt.
- Het is zeker duidelijk maar een mooi voorbeeld hieraan toevoegen kan het nog beter verduidelijken.

Past de informatie weergegeven in het design principle bij je werkzaamheden? En waarom wel/niet?

6 antwoorden

- We zijn onderdeel van het klantreizen team, dus duurzaamheid zou hier zeker in terug moeten komen denk ik.
- Ja, hoog over past het. Als het breed inzetbaar moet zijn is het wellicht handig om gericht tot de vakgebieden te specificeren. Als dit moet gaan leven is de praktische toepasbaarheid zeer belangrijk verwacht ik
- Hoog-over geeft het guidance en past het bij mijn werkzaamheden.
- Ja
- Het deels thuiswerken (hoe ik werk) en verder digitaliseren van processen (wat ik doe) zijn hier voorbeelden van. Denk dus dat vanuit klantreizen we continu kijken hoe we de klant beter en slimmer kunnen informeren op een digitale manier.
- Jazeker, dit kunnen we mooi meenemen in onze customer journeys.

Met de kennis uit het design principle, hoe kan KPN SMEs verder helpen met verduurzamen?

6 antwoorden

KPN is kennelijk al sinds 2015 klimaatneutraal, volgens mij kunnen hier veel bedrijven nog iets van leren.

Het proces van verduurzaming is ook een kennisbron voor anderen. Net zoals Tesla alle patenten heeft opengesteld. Het helpt andere ook te ontwikkelen.

Door een voortrekkersrol te pakken en hierop te differentieren tov de concurrentie.

Door ze te onderwijzen over duurzame manieren om te opereren en ze te begeleiden in dit proces

Ik denk dat we het design principle veel concreter kunnen maken om echt duurzaamheid te uiten richting klant. Welke producten heeft KPN die een klant digitaler kunnen maken?

Bijvoorbeeld
1. Cloud oplossingen in plaats van extra techniek op de werkvloer. Dus wel de functionele behoefte invullen (een telefooncentrale), maar dit digitaal en op basis van de mobiele telefoons van de klant in te richten: geen extra hardware / toestellen, maar wel de functionaliteit die de klant wenst.
2. Breder dan het telecom/IT portfolio diensten aanbieden, bijv. retourstromen van oude (niet-KPN) apparatuur zodat deze ook optimaal verwerkt kunnen worden

Door dit steeds weer aan te kaarten en ook goede tips / hulpmiddelen voor aan te bieden.

Is er iets wat je mist of nog zou willen aanvullen?

6 antwoorden

-

Vooral focus op hoe dit werknemers daadwerkelijk praktisch verder helpt. gemak dient de mens.

Er mist voor mijn gevoel alleen een ontwerpdoel dat aansluit op "middelen", kpn ontwikkelt ook de techniek zelf om duurzaam te werken

Zoals hierboven aangegeven lijkt het me goed om iets meer in detail te treden in het 'hoe', naast het 'wat': zeggen dat we duurzaam zijn zonder aan te geven waar mensen aan moeten denken, laat dusdanig veel in het midden dat het lastig wordt om door te borduren op de gegeven input.

nee

Wat vind je van het design principle?

6 antwoorden

Relevant, gezien de wereldwijde trend 'duurzaamheid'.

Cool :)

Het geeft een mooie richting van waar we naartoe willen met duurzaamheid

Een handige tool

Goed, maar mag concreter wat mij betreft. Help de lezer een handje :) Is misschien een dieper detailniveau dat niet in een design principle hoort, maar het concreet maken van een principe draagt bij aan de uitvoerbaarheid (en ik denk dus ook resultaten) daarvan.

prima

Ruimte voor andere opmerkingen en/of aanvullingen voor het design principle:

3 antwoorden

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X

Appendix R: Questions set up roadmap evaluation

Digitaal ontwerp met Marketing Manager KPN

Hoe zet je een marketing campagne op bij KPN?
Hoe zou je iets nieuws als KPN GreenHub promoten?
Hoe werkt dat met bestaande gebruikers en aanmeldingen?
Hoe zorg je voor het creeëren van nieuwe content?
Wat voor team zou je nodig hebben?

Technische ontwikkeling met Developer KPN

Hoe werkt het om een platform te bouwen bij KPN?
Hoe wordt iets nieuws opgepakt, een nieuwe innovatie (technisch gezien)?
Hoe werkt het om een technisch geheel te maken en hoe creeer je dit?
Denk je dat er aanpassingen in de tijdlijn nodig zijn voor implementatie?
Welke data kan er uitgelezen worden uit de bestaande apparaten die KPN gebruikt?
Is integratie in de MijnKPN Zakelijk omgeving mogelijk?
Wat voor team zou je nodig hebben?