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Is Smart city sustainable? A case study of Bodø municipality

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What is the city but the people?

William Shakespeare

Abstract

As the Norwegian government decided to phase out the military aviation base in Bodø, a wave of despair hit the city. The despair soon turned into euphoria with the announcement of the project "New City – New Airport" (ny by, ny flyplass). By moving the airport and building a new city district, Bodø got the opportunity not only to overcome the loss of military jobs but also to build a city for the future, a so-called smart city. The Smart city project was initially planned top-down with a technical approach. There are, however, concerns connected to the sustainability of this development. Is the smart city development properly addressing the challenge of a sustainable future Bodø?

This thesis is a case study of Bodø' Smart city development, analysing the challenges of sustainability within the municipality. The analysis is mainly based on 5 interviews conducted November- December 2018, with different stakeholders working within Bodø municipality, but also draws on secondary literature. This thesis aims to highlight the challenges relating to the Bodø municipality's assessment of Smart city development, along with providing a snapshot of the situation autumn 2018. Moreover, the thesis aims to study how the Smart city development has affected the municipality in terms of the environment, along with the economic and social impacts.

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To Amanda. The world will be yours one day.

I am responsible for any inaccuracies in this thesis.

Line Kristin Haug

Oslo, 01.12.2019

Map over Bodø city peninsular today. Retrieved from Power Point from Bodø Municipality.

The green line = marks where the civilian airport is located today, and where the new city district will be built.

The blue line = marks the location of the new civilian airport, where the military base is presently located.

1. Introduction

When the Norwegian government decided to shut down the military aviation base in Bodø, a wave of despair hit the city. The despair soon turned into euphoria with the announcement of the new project "New City – New Airport" (ny by, ny flyplass). By moving the airport and building an entirely new city district near the historic city centre, Bodø got the opportunity not only to overcome the loss of military jobs but to build a city for the future; a so-called Smart city. The bureaucracy subsequently began designing high-flying future scenarios.

With promising scenarios, who would not like to live in a Smart city? There are, however, concerns connected to this development. Firstly, the new city district was initially planned top-down with a technical approach. It may defy the fact that most cities develop very organically and over a long period of time. Furthermore, it might increase the cost of living and may require collecting excessive big data. It has made some experts raise concerns regarding social and economic sustainability as well as privacy issues. It has been argued that people might prefer to live in a city that they can understand, afford and participate in shaping (theguardian.com).

Urbanisation is an increasing trend worldwide. As more people are moving to the metropolis, city development is gaining a larger role in society's development in general, and in solving our environmental, cultural and economic challenges. As a result, the way we plan our cities today may be a measure of how we envision our society developing and evolving. Is the Smart city development properly addressing the challenges of a sustainable society?

Since 2016, I have been working on Arctic issues. A reoccurring topic has been Smart city; how cities in the circumpolar region shall become prosperous and high tech. Bodø also wants in on the action and aims to "*become the center of the world"* (highnorthnews.com).Choosing a topic for my thesis, I wanted it to be relevant to my employer and interesting for me. The development of an Arctic smart city ticks both boxes The development of an Arctic smart city ticks both boxes.

1.1 *Previous Research*

Most of the existing literature on Smart city is related to "hard" focus, concerning information and communications technology (ICT) (see e.g. Kitchin 2014, Raco & Savini (Eds.) 2019, Vanolo, A. 2014). Recently, the softer side of the development is gaining attention (e.g. Hollands 2008). Few, if any studies have thoroughly addressed the social, environmental, and

financial impact of the development at a municipal level. Despite the importance of future city development, the long-term impact of smart development reform has barely been studied. This thesis seeks to shed light on these issues.

1.2 *Research question*

Initiated as a top-down operation, how is Bodø municipality engaging in the development of the city of the future? How do the different departments communicate within the municipality? What are the significant issues at stake? To limit the scope, I will focus mainly on the municipality itself, not on all the other relevant stakeholders for Smart city development.

To research these questions, I conducted semi-structured interviews with different stakeholders within the municipality. Moreover, I will also use official documents and news media to deepen my understanding of the case. In the context of Bodø's quest to become a Smart city, I hope that the thesis will contribute to a broader understanding of the city's development and the inherent challenges of planning for the future city. Therefore, this thesis will look at whether, and to what degree, the official statements match with "life in practice". The main research question of this thesis is as follows: Is the pursuit for Smart city a sustainable and holistic development policy?

Moreover, I will address the financial, environmental and social implications of developing a sustainable municipality. As I will return to in the theory chapter, I will use Elkington's triple bottom line as a baseline. Also, the following sub-questions will be addressed to clarify important aspects of Smart city development;

- What has been Bodø municipality's strategy for developing their Smart city?
- Has it been a "hard" (e.g. ICT, infrastructure) or "soft" (e.g. education, culture) focus on the city's development?
- How are the environmental aspects handled compared to the economic and social effects of the development?
- How is the internal communication between the different municipal departments?
- How does the Bylab[1] work in practice?

[1] Bylab: meeting place to participate in the development projects as well as other projects by the municipality. The physical meeting place is at Stormen Library in the centrum of Bodø or be accessed digitally on bodobylab.no. I will come back to explaining Bylab later in this chapter.

I will focus on stakeholders within the municipality, conducting semi-structured interviews. For this specific case, I will focus on how the different departments collaborate (or not) to holistically develop Bodø. As I will discuss in the method chapter, the case study has a limited reach, but my thesis seeks to broaden the discourse on a holistic approach to Smart city development. Now, I will give short background information about Bodø.

1.3 *Bodø as a case*

Celebrating its 200th anniversary in 2016, Bodø is not considered to be an old city in a Norwegian context. However, it is the fifteenth most populous city in the country and the second largest in Northern Norway (ssb.no). It is also somewhat of a hub in a national context, with proximity to the airport, the last stop of the railroad Nordland Line (Nordlandsbanen), and as a gateway to the islands of Lofoten. Like most coastal cities, the city initially attracted people due to the fishing industry. Today, Bodø is less dependent on fisheries. In recent decades, the city has attracted business from a wide variety of other sectors such as aviation, military, academia, consulting companies, and more.

Bodø municipality has grown in recent years, mainly due to municipality reforms that have integrated smaller municipalities into bigger ones. From 2007 to 2017, Bodø city increased yearly by 1,1%. By comparison, the county of Nordland only increased by 0, 3 %. Bodø municipality is highly centralised, as about 80% live in the city of Bodø (snl.no). The low population growth is a challenge for social and economic development across the region (businessindexnorth.com).

Looking at the numbers, even though the population in Bodø is slightly increasing, the numbers are still under the national average (indeksnordland.no). This tendency has remained steady even after the ambitious development plans were announced. The challenge is to combine two competing interests. Firstly, how to convince more people to move to Bodø. Secondly, ensuring environmental sustainability – as one would expect that an increasing number of people would produce more traffic and waste. Despite these facts, the municipality is planning for population growth.

Never let a good crisis go to waste. As the military aviation activity is phasing out, it frees up land areas previously occupied by the military. Simultaneously, there was a need to renovate or replace the old civil airstrip. Thus, after the devastating news that Bodø would lose its military aviation base, the municipality proposed that a Smart city development was as a possible solution to remedy losses of jobs, and an opportunity to renew the civilian airport.

The opportunity that presents itself with the predicament of losing its military aviation base is the outset and a precondition for Bodø's Smart city planning.

In June 2017, The Norwegian Parliament (Stortinget) decided that the civilian airport should be moved south of the existing location. The new airport has been dubbed by Avinor as the "smartest airport in the world" (avinor.no). Now, the civilian airport is moving from its present location to where the military base is presently located. The new airport is only a few years away; it is scheduled to be finished already in 2024-2026 (Ibid.).

Removing the military base and moving the airport means freeing up new areas. It is a unique opportunity for the municipality with the potential for creating an entirely new city district near the city centre. This new part of the city is planned to be developed as a zero-emission neighbourhood. Within the new city district, the municipality is planning to construct 15,000 new homes and establish some 20,000 jobs by 2065 (Bodø Kommune 2018, 20—21).

Accordingly, the politicians in charge, together with bureaucracy, began their work by designing future scenarios. These scenarios included high technology solutions in lush green surroundings and with little traffic. As an illustration, the below image displays an abnormal Bodø winter night (it has to be winter as in the summer it does not get dark), with strong northern lights on a cloudless sky and with no snow, only green vegetation:

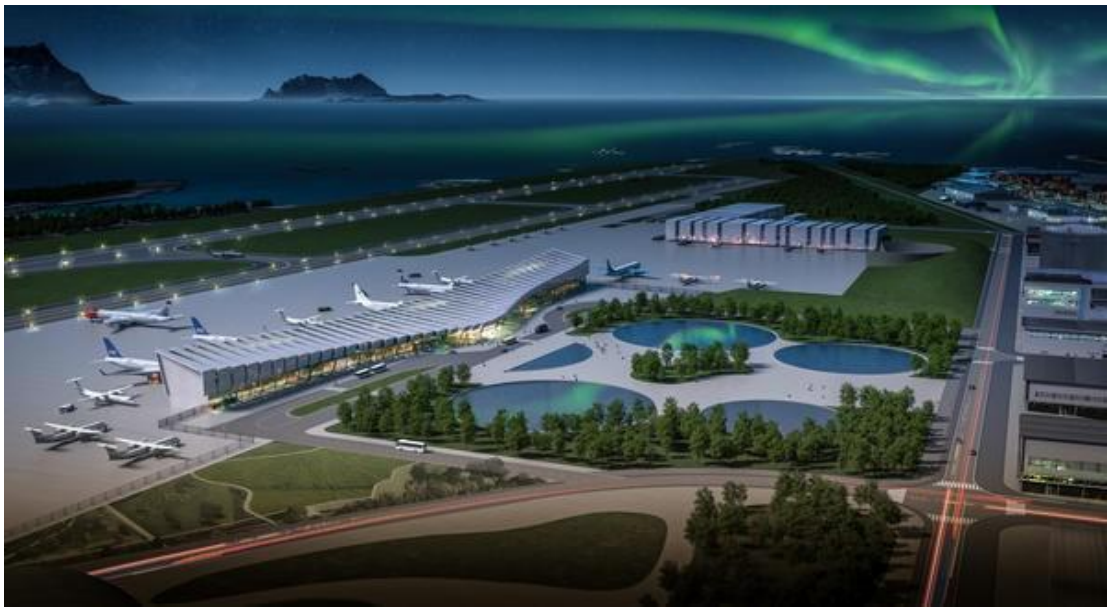


Illustration of New airport - new city. Retrieved from http://nyby.bodo.kommune.no/illustrasjoner/category8292.html, 15.04.2018

As a result, some have raised concerns about the realism of the development, initially planned as a technical top-down approach. Smart city development might increase the cost of living. It creates questions regarding economy and sustainability: is Bodø developing as a city that people want and can afford to live there? How can the municipality encourage job development to match the 700 jobs that are expected to vanish as the military aviation withdraws?

Municipalities such as Bodø deals with law and regulations which affects social life (welfare and cultural), environmental issues (business regulation and trash/ renovation services) and economic framework (certain taxes); how the municipality works matters. Hence, the municipality plays a vital role as a promoter of Corporate Social Responsibility (CSR) and sustainable development in the three aspects mentioned above. When the public sector promotes CRS through public initiatives it enables and strengthens resources so that individual business initiatives may be further developed and enforced to be a part of the long-term sustainability plan (Kakabadse & Morsing (red.) 2010, 137, 143). There are several stakeholders involved in such a process, both externally and internally, within the municipality. To what degree and extent these are involved give insights into what the policy is and in what way it will be implemented in practice.

1.3.1 Smart Bodø

The Bodø Smart city project is somewhat vague. It is an umbrella term for city development projects in the coming years. Firstly, it is the "New city—new airport" initiative. One central part is the new airport. In 2016, Avinor assessed the possibility of a new airport. The new airport will be located 900 meters south of the existing runway (avinor.no). It means that the airport is still in close proximity to the city.

Secondly, there is the "Smart Bodø" initiative, on how the municipality should be developed in the future. It includes both the exiting districts and the new district, planned to be built after the former airport base is removed. In this thesis, I will focus on the Smart city concept rather than New city— new airport. However, as the Smart city development springs out from these projects, in addition to being highly interwoven as part of the municipality's politics, it is hard to distinguish these two. The official documents available do not address the difference between the New city— new Airport" and the Smart Bodø project. Neither does the

interviewees in this thesis. Consequently, I do not make any clear distinction between them in my thesis, but the emphasis lies on general city development.

The main focus will be on how the municipality works to address the aim of the projects — namely developing Bodø into a smart city for the future. Still, due to the scope of this thesis, I will not go into details of the New airport. Moreover, this is also a case were Avinor and the national authorities are the main stakeholders, making it less relevant to the scope of this thesis. As one of the interviewees stated, "*Bodø municipality never said it was to build the world's smartest airport; that was Avinor, it is their mandate*". The municipality has, on the other hand, plainly stated it wants to become the "*smartest city in the world*" (nyby.bodo.kommune.no).

According to the municipality's strategic plan, Smart Bodø is defined as an umbrella for much of the municipality's plans and development work across its departments. An important task is to coordinate various initiatives with external resource environments and suppliers (Bodø kommune 2018, 27). Still, the official documents go into little detail on what the specifics of what a smart Bodø city truly is. Thus, I asked all the interviewees to define "Smart Bodø", and unsurprisingly the answers varied. Some were more comfortable with the term than others. One explained smart Bodø as;

"*It is an umbrella organisation of all of Bodø municipality research, development and innovation projects. (…). It should be within all of Bodø municipality, meaning in every department. That is the internal part. I hope that it will also be evident for the citizens and others within Bodø that this is a commitment. It is the way at Bodø municipality choose to do our city and societal development in order to create a more human and environmentally friendly city*".

This sentiment was reflected in another interviewee's answer;

"Smart Bodø is the umbrella concept, where New city—new airport is a project within this. The vision is to make a more human and environmentally friendly city so that (Bodø) will become a world-class future green city".

A third one also underlined Smart Bodø as an overreaching concept for the municipality.

"Smart Bodø is not about one department being smart (…). What is smart, if we are to use the term smart, it is about everything we do. First, it was about the new city district – new

airport. Now, it has become so much more. We have chosen to organise (smart city) as a part of the municipality".

However, one seemed more ambivalent, stating the following;

"We would have smart development without the term. I believe that it is something that drives the city forward and makes sure innovation happens. We have certain communication challenges regarding that term. (…). A smart city is a city that makes sure it continues to develop and facilitate life in the city for the inhabitants".

Finally, one seemed a bit uneasy about the term smart Bodø, asking "*hasn't the work we have done so far been smart? I think so. The smart term seems a bit Gyro Gearloose*[2]*. What does it consist of, what are the specifics?*"

In conclusion, there are several interpretations of smart Bodø, even among the people working with the concept within the municipality.

Nevertheless, I consider that the overall message of smart city development seems a positive one. Looking at the way the smart city is promoted, it does not force the citizens to make unpleasant decisions regarding their consumption or lifestyle. Seemingly, in Bodø there is no conflict of interest between the economic, social and environmental impact of the development. It is just more of the good stuff. For example, in Oslo municipality, it has been more and more difficult to drive and park in the city centre. However, Bodø has neither addressed nor implemented any such unpopular measurements yet. It is still in the early stages, so perhaps it is natural that the focus is on engaging people, not alienating or making anyone worry about the changes to come. So far, one of the measures taken includes the stakeholders, is the introduction of the Bylab.

1.3.2 Bodø city lab – Bylab

Bylab (City lab) was established by the municipality in order to be a meeting place for dialogue with the citizens of Bodø. It addressed the development plan for Smart Bodø by organising workshops and meetings about the current city development for different stakeholders. Relevant stakeholders include local businesses, state employees, academia and bureaucrats within the municipality. It might be a smart move by the municipality as some literature suggests that it is, not the technology that is the driver for smart urban development.

[2] *Petter Smart in Norwegian,*

Rather, it is indeed the stakeholders themselves that are the driving force for the development (Nilssen 2018, 2). Recently, there have been several “bylabs” popping up across municipalities in Norway. Like in Bodø, many are still figuring out the content of the “bylab” establishment.

Bylab in Bodø opened in early 2018. The goal is that it will be used by organizations and companies from outside the municipality, as part of the participation processes with the city's inhabitants (Bodø kommune 2018, 27). As some of my interviewees confirmed, it is still a work in progress. The municipality will let the Bylab transform to meet Bodø’s needs. Bylab is relevant for the thesis as it addresses how the municipality communicates with the citizens and businesses, but also how it organises itself within the municipality. Thus, we will come back to the role and challenges of the Bylab later in this thesis.

In Bodø, the main meeting place is at Stormen Public Library in the city centre. However, the municipality also arranges meetings at different locations, including fairs and kindergartens, to meet different target groups. Bylab can also be accessed digitally on bodobylab.no. Citizens give feedback and input through Bylab. Feedback can be sent through forms online, email and workshops. The platforms for input are many. However, it is still somewhat unclear how the suggestions brought forward by the citizens or other stakeholders are handled by the municipality.

1.4 *Outline of the thesis*

This thesis has seven chapters, organised into two main parts. The first part consists of chapters one through three. In Chapter One, I introduce the research questions and the case. In Chapter Two, I present the theoretical framework, explaining the context and terms in which the case operates academically. Chapter Three describes the methodological framework I have used for the thesis.

The second part, chapters four through seven of the thesis, will be devoted to presenting and analysing the data I have found. Chapter Four will examine the social sustainability of Bodø municipality. In Chapter Five, I will look at environmental sustainability. Finally, in Chapter Six, the challenges of economic sustainability will be addressed. Summing up in Chapter Seven, the theoretical framework will be re-applied to shed light on my findings.

2 Theory

Here I will give an outline of the theoretical framework, while also explaining some of the vital terms that will be used throughout the thesis.

2.1 *Terminology*

2.1.1 Neoliberal economics versus ecological economics

This thesis will distinguish between neoliberal economics and ecologic economics. The former, neoliberal economy is the dominating economic theory in the world today. It promotes, amongst other ideas, strong property protection, big business and the downscaling of government, in all contexts across the globe. As Lawrence Summers, chief economist of the World Bank in 1991 stated: "spread the truth – the laws of economics are like the laws of engineering. One set of laws works everywhere" (Rose 2009, 2).

As such, neoliberal economics is a "one size fits all" approach. It aims to predict and explain the stakeholder's actions and wants to be a hard science like physics (Dybvig, Dybvig, Døhl, 2013, 71). Some praise this way of thinking as a contribution to growth and development and draws on the experiences of Latin America and the former Soviet republics (Åslund 2007, 30). However, others believe it has an inhuman aspect that undermines the cultural and environmental aspects of society (Rose 2009). Additionally, the economy, unlike the laws of physics, has a moral aspect to it (Dybvig et al., 2013, 71).

Moreover, neoliberal ideas manifest itself in the form of New Public Management, a management style that has influenced many of the Norwegian municipalities and the public sector in recent years (Ingebrigtsen & Jakobsen 2006, 120). It has also had a considerable influence on the municipality's policy path, something I will come back to later in the thesis. Neoclassical economics is the current economic paradigm in the world.

Ecological economics is a different approach to economic theory, challenging the current economic paradigm. One crucial difference is the emphasis on a finite and materially closed but interconnected planet. Interestingly, it makes this theory more connected to physics, existing within the physical limits of our planet, compared to neoliberalism, which sees no limit to growth on this planet. Ecological economics values the efficient allocation of resources and distribution of income, and especially, the scale of the economy relative to the ecosystem (Daly 2007, 85).

Whereas in the neoliberal economic paradigm, GDP is a frequently used way to measure economic growth, ecological economics, on the other hand, questions if this is an effective way of measure growth, arguing that one should not only be focusing on income and allocation but also see the social aspects (e.g. quality of life) and environmental impact (e.g. pollution) (Ibid. 91-92). Regarding the environment, a vital difference is this model's understanding of nature where we all coexist in symbiosis.

Thus, humans must ensure that the natural resources we use do not harm the environment, neither presently nor in the future. The debate over these two economic models and the ways of thinking will follow throughout this thesis. One of the key differences I seek to address between the two is the holistic approach of ecological economics. I will argue that a holistic approach is a precondition for the "smart-ness" of any Smart city.

2.1.2 Smart city

As previously discussed, an essential term for this thesis is Smart city. I have previously presented the interviewees' personal opinions. In the literature, the concept is also defined in several ways and has an opaque feel to it. What further complicates the issue is that Bodø also has no definition of the concept. Thus, it is hard to give a precise definition, as the scope of what has been included under the term Smart city is wide. Deakin (2013, 15) defines the Smart city as one that "*utilises Information and Communications Technologies (ICTs) to meet the demands of the market (the citizens of the city), and that community involvement in the process is necessary for a smart city*".

Technological progress is often mentioned in connection to "smart". Initially, this seemed true for Bodø has well. Others, however, have noted that the concept is indeed a process, which enables the city to continuously adapt to new challenges. Yet others have argued that the term entails conflicting concepts; such as economic growth and the reduction of the environmental footprint which may not always go together (Department for Business, Innovation and Skills, UK 2013).

There are several ways to develop a city. One vital question for this thesis is whether it is a "soft" or a "hard" development. Accordingly, Neirotti et al. (27, 2014) identify two divisions of Smart city development, from which they called one the hard stream, and the other the soft stream. The hard stream includes development aspects such as grids for energy and information flow, waste management, and transport systems. For example, this may include putting into use sensors to show free parking space and introduce driverless vehicles.

On the other hand, the soft stream is focused on aspects such as education, culture, welfare and promoting citizen involvement and facilitating innovation. Most research studies have stressed that both soft and hard components are necessary to drive a meaningful city development. Nevertheless, much of the Smart city literature stresses the function of ICT systems as the core of the city development (Caragliu et al. 2011, 66). ICT may shield citizens of Bodø (or other cities) from the daily discomfort city dwellers might experience. Such as traffic jams and trouble parking. It also addresses the need to keep the population updated on recent technological developments in order to keep up with the societal changes. It is a potential danger that some groups might risk losing out in this development, due to, for instance, old age.

Arguably, Bodø municipality initially focused on hard development, on the infrastructure connected to the new airport and the new city district. E.g. the promotion of future scenarios, including driverless vehicles already in 2018 (bodonu.no). Hollands (2008) have pointed out that the smart city development tends to start with the "hard" aspects, but he calls for city developers to rather start with the soft, meaning "the human side of the equation". As I later will discuss, the focus seemingly has shifted the last year or so in Bodø, from hard to softer approach.

Smart city is also associated with a possibility to generate economic growth, which might be in direct or indirect conflict to the environment and social dimension of Smart city (Nilsen 2018, 3). However, while promoting "triple win" (social, economic and environmental gains), some research seems to suggest that smart growth cannot deliver on all fronts (Gibbs et al, 2013, 2153). It is a difficult job to balance economic growth, environmental protection and social sustainability.

2.1.3 Defining sustainability

Just like smart city, sustainability has become a loose term. As every country in the world seems to claim that they are democratic regardless of their actual standing, it seems like every company addresses their business as sustainable. I would argue that this is a quest for legitimacy, and this applies to, for example, Statoil, changing its name to Equinor, signalling dedication to renewable energy through its new name.

However, as little has been done in relation to renewable energy and the company is considering investing in Arctic drilling, I would argue that the neoliberal paradigm is still dominating business and governmental institutions, focusing on extracting resources at a large

scale and as intensely as possible. This thesis will address whether sustainability is indeed a hollowed-out concept, and is the authorities trying to legitimise their action through so-called "green-washing".

Besides, the municipalities may be more eager to deliver public services today, even though these may not be sustainable in the long term. Like businesses, every country, and municipality seems to claim to have a "sustainable" plan. The motive is simple, who is willing to invest in a non-sustainable business or vote for a politician with a non-sustainable plan? I would argue that most voters in both local and national elections, along with politicians are not thinking more than four years ahead. The vagueness of the definition may lead politicians and businesses to claim anything to be "sustainable", thus leading to making it a meaningless term (Dresner 2009, 70).

Nonetheless, the Brundtland Report from 1987, also known as Our Common Future, defines sustainable development as following;

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

I will use this definition in this thesis for two reasons. Firstly, it is widely known and often referred to by scholars and by the news media. Secondly, it includes the term "generation**s**", underlining the importance of long-term sustainability. This thesis wants to explore the time horizon of the term sustainability in the Bodø case. The Report's definition has been criticized for being too vague and simple. While it certainly has several weaknesses, there is more to the report than just that one sentence (Dresner 2009, 35). Accordingly, I will like to add the following quote of the Report:

(..) sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs. We do not pretend that the process is easy or straightforward. Painful choices have to be made. Thus, in the final analysis, sustainable development must rest on political will."

The quote above helps to illustrate how the municipality must make complex and perhaps unpopular decisions to achieve sustainability in the distant future. Though the Report draws a link between the environment and the economy and stresses the importance of taking

environmental consideration into economic decisions, it is still clear that the Commission supports economic growth. Though it states that there are "ultimate limits", it still expresses a belief in growth and technology (Dresner, 2009, 36—37). As such, it seems to be within the current economic paradigm, not posing radical change but merely stating that difficult decisions should be made some times (if not now, then when?).

This is what I would argue is weak sustainability. Most policies may be "sustainable" in the short term. It means you may pursue a policy for a period without seemly having negative consequences for sustainability. However, over a longer period, little by little, the sustainability will be undermined and indeed under threat. This attitude can be linked to the strong and weak sustainability debate, which I will address in the following.

2.2 *Strong vs weak sustainability*

Daly (1999) has defined strong and weak sustainability as follows:

"Strong sustainability entails that it is sufficient to protect the overall stock of capital because some sorts of environmental and social capital are non-substitutable. It is the integrated combination of factors, the irreversibility and uncertainty that counts in the definition of strong sustainability. Strong sustainability requires that manmade and natural capital each be maintained separately, since they are considered complementary. Weak sustainability requires that only the sum be maintained intact since they are presumed to be substitutes".

Seen in the context of the definition by the Brundtland Commission, it seems it is hard to secure possibilities for future generations with weak sustainability. In a system where you can make trade-offs between environmental capital with economic (and social) capital, there is a substantial risk that we risk prioritizing one aspect, most likely the economic at the expense of environmental capital. However, in the long term, it is impossible to uphold economic activity without natural resources. Even though there is an understanding that economic activities should not lead to social and economic collapse, the lines are blurred and there is little understanding of where the boundaries lie.

However, it is unclear if the economic activities with weak sustainability will provide sustainability in the long term and where the boundaries are pushed, with a system that makes it possible to make trade-offs between environmental and social factors. It is not possible if you have strong sustainability, where economic growth cannot replace social and

environmental aspects (Kvarving 2013, 27). In this thesis, it matters whether economic business activities discussed can be regarded as weak or strong sustainability.

Another reason to refer to the Brundtland Commission definition is that Bodø municipality has included the UN's Sustainable Development Goals, including the sustainable city goal. The Sustainable Development Goals consist of 17 different goals, where number 11 is Sustainable Cities and communities, "*making cities and human settlements inclusive, safe, resilient, and sustainable"* (undp.org). The UN states that *"Sustainable development cannot be achieved without significantly transforming the way we build and manage our urban spaces"…(…) involves investment in public transport, creating green public spaces and management in a way that is both participatory and inclusive*" (undp.org).

In conclusion, to develop a smart and sustainable city, one needs to address all relevant factors. One scholar who holistically addresses the issue of sustainability is John Elkington and his concept of the "triple bottom line".

2.3 *Triple bottom line*

John Elkington is known for his triple bottom line, a concept used within academia as well as in business and entrepreneurship (Jakobsen (red.) 2017, 151). His framework has three parts, social, environmental and economic sustainability. Sometimes referred to as People - Planet - Profit.

Social sustainable may include income security, social safety net, equality and partaking in democratic processes. Mainly, it concerns the welfare of the stakeholder (arthamoney.com). Environmental sustainability is about the protection of the biological system and ensuring a healthy environment for all (Dybvig et al, 2017, 127). It also concerns thinking in a long-term perspective, making sure it does not harm the chances or well-being of future generations. Finally, profit is part of the trio. It may be considered the traditional bottom line. It calculates the financial activities, measuring if there is a financial profit or loss (Dybvig et al, 2017, 127).

It is within these overlapping interests that true sustainability occurs, as illustrated below:

Illustration of the triple bottom line and sustainability, retrieved from
http://www.educontra.com/health/sustainable-development/

According to Elkington, the three aspects are equal, and mutual depended on each other. If one ignores one of the aspects too long, it will have negative spillover effects on the two others. As such, they live in symbiosis and need to be seen together as a whole, not as separate parts. However, as Jakobsen and Ingebrigtsen note, the present economic system tends to prefer economic value-creating over nature and culture, by reducing the two latter to only as inputs to the economy (Jakobsen & Ingebrigtsen, 2004, 13).

Elkington believes that environmental and social responsibility will gain more attention and importance in the coming years. However, he warns, that concepts such as the triple bottom line should not only be a means to enhance a business image (Jakobsen (red.) 2017, 152). Elkington maintains that to achieve sustainability, decisions need to be anchored in the triple bottom line, meaning that social justice, environmental issues, and economic prosperity should be a mandatory value in all decision making (Ibid. 152). Furthermore, Elkington believes the issues are too complex to be solved individually; everyone bears the responsibility, but especially businesses hold an important role (Dybvig et al, 201, 127).

For this thesis, it is interesting to look at how the emphasis on social, environmental and economic development in Bodø municipality, in terms of sustainable development. There has been a tendency to focus much on allocation and streamlining society for efficiency gains, as we will look at in the following.

2.3.1 New Public Management

The Norwegian municipalities are growing in size and scope, they are getting more tasks added to their list of responsibility, such as providing evermore (economic) welfare to their citizens. Additionally, there has been an increased focus on streamlining. To answer this demand, New Public Management has manifested itself in the Norwegian public sector (Ingebrigtsen and Jakobsen 2006, 120). It marks a turn towards a more explicit goal setting, the use of competition, and the use of different market mechanisms (Ibid.). Interestingly, the word "patient" has now been changed to "user", which also indicates a change in the system. It indicates how attitudes towards people have changed.

This streamlining is also visible in the development of Bodø municipality. For example, e.g. in the recent home care development where every home visit is timed down to the minute. Cost-effective perhaps, but does not provide the best social service in the long term. There may be other unmeasurable variants to be considered. Sustainability is vital, but how does the municipality address economic, social and environmental sustainability challenges?

2.4 *Hard vs soft focus*

No doubt, most societies will aim for sustainability. However, its level of commitment to the cause is varied. There is a tendency today that many have a carefree approach to sustainability, as they believe that humans will sort the issues of sustainability in the end.

However, Arne Næss warns against believing that technology will save us. He is not convinced that humans can solve environmental and societal challenges only by developing technological solutions. Rather, he believes that deep ecology will enable us to be able to reflect on the challenges at hand to be able to solve the problems (Næss, 1976, 100). However, Næss notes that technology is developing in a hard way. He refers to Robin Clarke's overview of hard or soft technology, from which I have chosen aspects I believe are relevant to the thesis:

Hard	Soft
High energy consumption	Low energy consumption
Strong contamination	Slight or no pollution

Consumption of materials and energy	Reuse and recycling
Highly specialized	Slightly specialized
Focused on society at large	Community-oriented
Undermines local culture	Compatible with local culture
Too complicated to the general public	Understandable to the general public
Quantitative assets highly appreciated	Qualitative assets highly appreciated

Table 1. Selected characteristics of hard and soft technology (Næss, 1976, s. 124). My translation.

I will return to Arne Næss and this table when I am addressing the question of sustainability in the discussion chapters as well as in the conclusion chapter.

2.5 ***Summary***

This chapter has aimed been to describe the theoretical framework for this thesis. By addressing the differences between the current economic paradigm, neoliberalism, and an alternative approach to economic sustainability, I hope to show that the current trend is not a holistic approach and that economic progress is measured in quantitative terms. I have used the Brundtland Commission's definition of sustainability. This matters in this context, as the UN sustainable goal is a widely used measurement for addressing sustainability. It includes sustainable cities.

Regarding the theoretical framework of the thesis, I will use the triple bottom line as a tool for analyses throughout the thesis. In the next chapter, I will address the methodical approach I have used to gather data for the thesis.

3 Methodical frameworks

This chapter describes the research method I have chosen, as well as the procedure for data collection. I explain the method for gathering information and examine its benefits as well as its limitations.

3.1 *Qualitative methods*

The definitions of qualitative methods are plentiful. In this thesis, I will employ Ragin and Amoroso's classification of a qualitative method as a "basic strategy of social research that usually involves an in-depth examination of a relatively small number of cases" (2011, 230). I have chosen to use a qualitative research approach because the thesis aims to understand the context and obtain a deeper knowledge, and to look beyond a purely quantitative understanding of Smart city development. As such, the aim of the thesis is not to prove a "grand theory", but rather to gain an in-depth understanding and develop ideas based on the empirical findings (Ragin and Amoroso 2011, 113). Thus, I find a qualitative approach suitable.

When gathering information about smart city and Bodø, I soon came to realise that there was limited research material available on the field from an ecological economics' perspective. Mainly the literature focused on the "hard" development. Initially, information on Smart Bodø was more "selling" the concept rather than reflecting on what to be achieved overall and how people could contribute. As such, the sales pitch not to include all the aspects and possible negative consequences of city development. Nevertheless, though lacking in reports, there are several statements from the municipality representatives about how the Smart city will holistically contribute to society's development. Thus, I found that a qualitative approach is a suitable way to see to what degree see if the stakeholders have a holistic plan for smart development of Bodø. As I will come back to, qualitative interviews were indeed the approach I found best to answer the research questions.

3.2 *Case study*

For this thesis, I have Bodø's development towards a Smart city as a single-case design. I find the case study is useful as I gathered information from several sources, as one does in the case study method. The thesis will be qualitative, and as often with case studies, it will contain various literature sources while also rely on interviews as a way of gathering information and finding meaning (Johannessen et al., 2011, 90). By using various sources and methods, I am to highlight the characteristics of the specific case (Ibid, 448).

The single case design may, however, introduce certain weaknesses. I have chosen only one case; still, I am aware that examining two cases may reduce the risk of overlooking or overestimating issues. Arguably, more cases could have been added to this thesis, making it broader in scope (Yin 2009, 61). Nevertheless, the thesis does not seek to generalise the results in a broader sense. The findings reported in this thesis might not be well suited for generalisation; rather, the aim is to contribute to the understanding of the single case (Ibid.). Thus, to evaluate other smart city development projects goes beyond the scope of this thesis.

3.3 *Data*

As Yin (2009, 114) points out, a case study is well suited when using multiple data sources. Accordingly, this thesis about Bodø will draw upon different empirical data. The data sources utilised include primary data such as interviews but also data such as government resolutions and various reports from local, national and international media newspapers. During the analysis, I will try to explore if there are corroborating results in my findings. If so, this might strengthen the findings of my thesis (Yin 2009, 116). The combination of multiple sources of data is called triangulation (Yin 2011, 79). Such a technique contributes to a broader understanding of the data and can make the analysis more robust. However, one should never force a connection and be aware of one's bias when gathering data.

3.4 *Positionality*

As Yin (2009, 72) notes, the case study methodology usually requires previous knowledge, thus often creating some bias. I believe this is true for this case as well. Though I am not from Bodø myself, I know several people who work within Bodø municipality, also connected to the Smart city development. Some of the questions I will ask might seem critical. As the thesis is based on ecological economics, there will be some discussions about the economic perspective of development. As such, some of the findings might not be in accordance with the informant's wishes or perception. As Bodø is an interconnected place, I managed to get the informants I want through worked and social networks. I have however stressed the differences between my daily job and my role as a researcher for this thesis.

The findings in the interview will materialise through the text. Obviously, the positions are my interpretations and some of the nuances may be lost, such as pauses and body language (Johannessen et al. 2011, 104). With regards to the interviews being conducted in Norwegian while writing a thesis in English, I feel comfortable shifting between the two languages. Norwegian is my mother tongue, and I have used English for work and in academic work for

more than ten years. In my previous Master thesis, I also conducted interviews in Russian, a language I master at a considerably lower level. From this experience, I know some of the pitfalls of using several languages. Thus, I might lose some nuances or make some unfortunate translation mistakes when switching between English and Norwegian. Nonetheless, for me, the benefits of writing the thesis in English outweigh these risks. As I raised earlier, there is not much research like this out there, and for me, it is important to make my research available for as broad an audience. I also hope to use the findings at an international Arctic conference. Thus, it has its benefits to write this thesis in English.

3.5 *Validity*

Validity is the question whether of the data found in the material applies to the thesis or not; the relationship between what is been researched and the findings of the study. I believe the external validity is limited as the generalisation is not the goal of this single case study (Johannessen et al. 2011, 73-75). However, it may be some findings or lessons learned that might be interesting for city developers to read. I also hope that the triangulation of data can enhance the validity of the research since multiple sources of evidence provide support for the existence of the same phenomenon (Yin 2009, 116).

It may seem like five interviews are too few. However, qualitative interviews are demanding in time and preparation. Often, one may experience that a "pattern of information" will occur, thus meaning that additional informants will not contribute to anything new. There is always the risk of missing out, so I try to be open to input on the current as well as later stages of the process. In the end, I felt that the number of interviews was adequate to address my research questions, but I cannot know if additional interviews could lead to other insights.

3.6 *Reliability*

With a design with high reliability, it should be possible to repeat and conduct the research, ending up with more or less the same result the second time. With my research question and with a case that is currently under development and based on qualitative semi-structured interviews, there are some challenges with reliability that needs to be addressed. There are, however, several measurements to achieve as high reliability as possible. The informants went through a format with a set of pre-decided questions, but I also had follow-up questions. The interview guide is an attachment to my thesis. I have deleted the audio recordings. However, I will keep the transcription of all interviews available for another six months after the thesis, as well as described method selection, which makes large parts of the research verifiable.

Furthermore, I gave the informants the possibility to read through and confirm their statements, to further enhance the reliability and validity of the thesis. Two of the interviewees asked to be sent the transcripts but they had no corrections nor remarks. I have tried to achieve the best level of reliability as I could manage. However, the nature of the single-case study does not give particularly high reliability. Other researches might come up with different results as they may interpret the qualitative data differently.

3.7 *The interviews*

I conducted interviews with stakeholders within the municipality. I conducted the interviews in a semi-structured way; that is, I started with a set of questions, but I kept the interview questions open so the interviewees could express themselves more freely. It also allowed me to add questions if the answer was unclear or I wanted to follow-up on something the informant brought up. Semi-structured interviews allow flexibility and open the possibility for the informant to bring up points or topics that otherwise could be missed (Yin 2011, 135). Still, I considered that having a set of questions was necessary to answer the research question. Without these questions, there was a risk that the interviews would become a loose conversation around the "importants of sustainable development" or something similarly vague. The prepared questions prevented this from occurring. Thus, I prepared questions to prevent this from occurring.

The qualitative interview is well suited to bring forward nuances and address complexity (Johannessen et al. 2011, 145). As Johannessen et al. (2011, 108) point out; it is difficult to know beforehand how many informants one needs to answer the research question. They suggest that about 10-15 people are sufficient; nevertheless, stress that there is not one single answer to this question. For my thesis, that number may seem reasonable, but for the scope of the thesis, 15 people seemed too demanding. I had a selection of people I would like to interview from the start, rooted in how the municipality is structured. However, I was open for doing more interviews, suggested by the interviewees, my supervisor or others as my work progressed.

Due to capacity limitations, and in order to be able to transcribe the interviews, I planned to have ten informants and ended up with five. The analysis is based on these interviews conducted with different stakeholders in late 2018. The thesis will put Smart city in a broad political and economic context, but the extensive scope of the related issues means I cannot

go into detail about every aspect of the data. I find interviews to be the most useful approach to understand what the stakeholders regard as the key issues.

The interview format is ideal for qualitative explorations of previously unexplored subjects. I used an audio recorder for the interviews and wrote them out on the same day that the interviews were conducted, to minimise the risk that I would forget something. Additionally, I also took notes during the interviews. It enabled me to have follow-up questions during the interview session. Writing out the full transcription the same day was demanding. However, I am glad I did as it made me go through the material one more time and thus, made the analysing part easier. Also, I would forward the transcript to the interviewees the same evening, if they wanted to see the interview transcribed. The interviews spanned between 30 – 40 minutes. Realistically, most working people have limited time to talk to students, so it is better to make the interviews short and to the point. As Johannessen et al. (2011, 108) point out; some informants are of more importance than others are. Thus, some interviews are more vital and may demand more time. Nevertheless, it is necessary not to extend the interview much longer than the projected timeframe, respecting the interviewees' time. The interviews were conducted in Norwegian.

3.7.1 The informants

As I have some knowledge of the municipality and stakeholders involved, I had an idea of who it would be useful to interview, and I started with contacting those people. Then I used the snowball method, asking my informants if they had any suggestions for stakeholders I should interview (Ibid. 113). I tried to aim for a balance between various kinds of stakeholders and departments within the municipality. Also, by interviewing a range of stakeholders, I was trying to detect bias and hidden interest of the interviewees, and perhaps my own.

I had high ambitions for the informants, and as it turned out, I was permitted to interview most of them. As mentioned above, the chosen design is permitting a limited number of informants. Thus, another critical aspect is to choose the right informants. There is one department within the municipality, in which I regret I did not include. It might be a weakness to the thesis, as I think it would have been useful to hear this department's views for this thesis. An interviewed was planned but was postponed twice, and then my maternity leave started.

Initially, I wanted to interview the citizens of Bodø. However, it posed some practical challenges and did not help to answer the research question accurately. To mitigate this weakness, I have included the concerns of the affected population by other means. For example, it has been useful to utilise the records of public meetings projects, news reports, and letters to the editor. Of course, I only interviewed bureaucrats, but I am aware of this fact and the limits it sets on the findings. The stakeholders I interviewed are though drivers and practitioners in the decision-makers in the Smart city process, thus making a real impact on city development. However, I still think that more research on the citizen's attitude and experience would have been interesting. Perhaps as more municipalities are implementing a Bylab, this is increasingly relevant research.

3.8 *Research ethics*

I have an idea of whom I want to interview, but I had no guarantee that they were willing to go through with the interviews. The informants are made anonymous as Bodø is a small place, and I wanted them to be able to speak freely without hesitation. A researcher must always put the informants first, and it is essential to respect their interests. If I could not find the informants I wanted or that someone withdrew after the interview had been conducted, I would, of course, have respected their wishes. Even though it might have weakened the thesis. Such is life, and as a researcher, one has specific responsibilities (Johannessen et al. 2011, 104). I have followed the Norwegian National Committee for Research Ethics' (NESH - den nasjonale forskningsetiske komite for samfunnsvitenskap og humaniora) guideline, with regards to research and protection of privacy of informants (etikkom.no). I applied and got permission for my research design in due time from the NESH before I started conducting the interviews.

3.9 *Other factors*

The thesis seeks to understand a process that is currently under development. This may pose certain challenges. For me, I needed to draw the line at some point and not be tempted to extend in time if and when some new and exciting development occurs before the thesis' deadline.

Additionally, being a process, it might influence the interviews in several ways. Some may change their job or similar, creating new biases and perceptions. While others may be more concerned with guessing what would happen next rather than reflecting on the recent past. I hope that doing the interviews within a relatively short period of two weeks and following my

interview guide, and it might help mitigate the risk of this. Similarly, being a case study, the thesis aims at contribution not only the location of the case but also in time. The thesis thus focuses on giving a snapshot of the situation in late 2018. Hence, the findings are limited in time as well as location.

In addition to interviews, I have attended public meetings organised by the municipality, and I have arranged a debate about the sustainability of Smart city. Also, I have talked to citizens living in Bodø. I believe this also has added to my knowledge about the case and life in the Smart city.

3.10 *Conclusion*

In this chapter, I have addressed the methodical framework of this thesis. I have mainly focused on the interviews, which is the most important data source. Several benefits, as well as drawbacks, have been addressed. I will now move on to the discussion part of the thesis, starting with the first of the tipple bottom line, namely people.

4 People - Social sustainability

In this chapter, I will discuss the social impacts of Smart city development. Mainly, I will look at whether the development will be beneficial in terms of job creation, and the internal and external communication in the municipality will be analysed.

What does it take to be socially sustainable? As mentioned in the theory chapter, social sustainability in the triple bottom line may include several aspects of society. In this case, I have chosen to focus on employment (income security) and participation in democratic processes, in which the focus will be on Bylab. It is interesting to see how the municipality evaluates its citizens, both quantitatively and qualitatively. Thus, another aspect connected to the people dimension that is vital to address is who the people living in the Smart city are presently and how they will be in the future. How does Bodø municipality assess its present and future citizens?

4.1 *Sustainable population*

From all the data on Smart city development in Bodø, one thing remains clear; the municipality wants more citizens. Population growth development is a reoccurring topic in the literature on Smart city in general (e.g. Winters, 2011 and Caragliu & Nijkamp, 2011) as well as in the Smart Bodø discussion. In Norway, it has long been a national policy to ensure that Norwegians live across this elongated country. Nevertheless, Northern Norway has, for a long time, been struggling with an ageing population and low population growth (BIN 2017). Bodø municipality seeks to avoid this trend by opting for Smart city development, hoping that it may foster sustainable population growth.

Initially, when the Smart city concept was rolled out, Bodø municipality chose a quantitative goal for its population. It set itself the goal of reaching 70,000 inhabitants by 2030 (Bodø Kommune, 2014, p.7). As of today, the municipality has about 51,000 citizens, which requires a growth rate of over 2% per year over 12 years. This is not in accordance with current population forecasts, neither for Bodø nor the North of Norway (BIN 2018). Moreover, according to Statistics Norway's predictions, the numbers will surpass 60 000 in 2040, thus predicting slow growth (ssb.no). Looking at the numbers for Bodø, there is a recent population growth detected (nrk.no); however, this is due to the municipality swallowing up nearby municipalities, not immigration to the area.

The stated goal for more growth seems imperative to the municipality. This objective was brought forward as the first of three main goals in the municipality plan work. Therefore, it

could be reasonable to assume that it is a determining factor in present and future policymaking. However, it might seem like this particular goal has in late 2018 gained less attention. Three of the interviewees said it was a "poor goal" and that it was no longer a target for the municipality. Two said they believed it still was a goal but that the numbers had little importance. There is some ambivalence about the goal. However, I have seen representatives from the municipality use this number in recent presentations, including two of which I interviewed for this thesis. Hence, it is unclear how much emphasis the goal has. As one of the interviewees stated;

"It is a goal we have stopped talking about. I have at least removed it from my presentations. It is unlikely that we will reach that goal, as far as I understand".

This view is reflected by another of the interviewees;

"- The main goal in the original strategy was to reach 70 000 inhabitants. And then we revised it and said that might not happen. That maybe it is a poor goal. (…) (It was) revised considering that Smart Bodø and New airport – new city was not featured in the original version. Gone is the number one goal of 70 000 inhabitants. Now, the goal is putting "humans in the centre". Bodø is to be the driving force of the north. It is a better way to do project planning than trying to reach 70 000 inhabitants, no matter what".

However, another stated that the goal still holds some relevance and serves a purpose;

"In the end, we need to set some goals. Not sure, but I think it still is valid. The goal is to create new jobs and build the city. We have a need for growth. If we are to realise the freed-up land area, then we need to fill them with substance and people. But, I am not quite sure if we get them as soon as we initially believed. I believe that are we to develop the area; then there must be added people and jobs".

I would argue that it matters whether this still is to be considered a goal for the municipality. This initial goal is an example of a top-down target in accordance with the neoliberal paradigm, in which the benefit of reaching that number is not based on a specific need. It seems like a strategy for "the bigger is better" but why does it remain unclear. Is an increased population indeed the better sustainable option for Bodø? There is a need to assess the population not only by quantity but rather qualitatively. The numbers only give some insights. Perhaps the municipality should concern itself more with the citizens it already has rather than chasing after new people. Maybe is better to focus more on making sure that the young people

of Bodø stays. Nonetheless, Bodø wants to attract young people to the municipality. However, for young people to settle in Bodø, it needs to be a prospect of attractive employment possibilities.

4.2 *Employment in the Smart city*

Growth is an inherent characteristic of capitalism. Capitalism is the production of goods and services leading to profits, which is reinvested to create new profits in a dynamic system entirely dependent on continuous growth (Schiefloe, 2009, 441-444). It is estimated that approximately 2-3% growth is required annually to avoid recession, which could cause economic problems and unemployment. Full employment is only possible if there is continual creation of new jobs and businesses (Ibid.). Globalisation also means that the job market is flexible and workers more mobile. This idea is echoed in the municipal plan that states: "*Bodø competes with the rest of the world"*(Bodø kommune 2013). This quote was also expressed by one of the interviews to underline the importance of Bodø's commercial drive. Bodø is competing with the rest of Norway and the world to attract skilled labour and businesses.

Economic globalisation intensifies this need for growth, which is essential for development and survival (Schiefloe 2009, 441—444). If there are no relevant job opportunities in Bodø, then it most likely is not a suitable place for most people to live. Thus, as it became evident that about 700 jobs would vanish as the military aviation activity is phasing out, the municipality felt it needed to do something. Consequently, the substantial loss of jobs is the outset for Bodø's Smart city development.

To continually grow despite lost jobs from the relocation of the military airbase, it seems crucial to recruit competence. As an interviewee put it, it is essential to recruit "*bright minds for the future*". One might argue that employment is related to the financial side of Smart city. However, within the triple bottom line, it is placed under livelihood. People need to have an income to sustain themselves. A job is also more than an income; the job is often associated with identity. In Norway, we often ask about what a person is doing, referring to their profession. Thus, having a good job market makes Bodø an attractive place to reside. The municipality has tried in several initiatives to boost its attractiveness.

One such initiative is to be more visible online. The municipality has its promotional webpage called "Bodø i vinden". It roughly translates as Bodø in the wind, a wordplay that apparently only works in Norwegian. The website promotes living in and moving to Bodø. The initiative was taken by the municipality back in 2014. "Bodø i vinden" is a cooperation project between

the municipality and the business sector. Amongst other activities, the webpage posts monthly updates on available jobs in the municipality.

According to Winters (2011, 253), research suggests that there is a definite link between the percentage of the adult population with higher education and future population growth. He states it may be that the money rules; wages in highly educated cities can often be higher, thus attracting more people. However, Winters also suggests that another explanation may be that an educated population might increase the quality of life as they are unlikely to be criminals and more likely to support local arts and culture (Ibid.).

Research suggests that population growth in smart cities is due to students moving to enter universities and staying on after completing their education (Winters 2011, Vanolo 2014). Though most of the research I here refer to is in an American or European context, research from North Norway suggests that it may be accurate for the case of Bodø as well. According to a Norwegian study, about 70 % of students stay in North Norway after completing their education (uit.no). There are two major higher educational institutions within Bodø municipality, namely the Norwegian Police University College and Nord University. Such institutions might have positive spin-off effects. People move to the municipality to study. After finalising their studies, employers may find the expertise they seek locally. Also, it can make the professional network stronger and encourage businesses to settle close to these networks (tfou.no).

Acknowledging this statistic on the importance of educational opportunities could be of use for the municipality policymakers. However, in order to keep or attract young people, it is crucial to offer what they need. One could argue that it could be vital to reflect citizen's wishes to improve the perceived quality of life. A way the municipality is preparing to undertake this task is through Bylab.

4.3 *Citizen involvement with Bylab*

A vital question is how the municipality involves its citizens and how the citizens' feedback is reflected in the development. As mentioned, Bylab (see page 7—8), is a tool for facilitating the different stakeholders to engage in Smart city development and all its interconnected projects. I argue that if used correctly, it can contribute to social sustainability.

Firstly, it is interesting to know how well Bylab is known to the general public. In informal conversations with citizens in my private circles, I have asked about Bylab. Everyone had

heard of it and knew about its location at Stormen public library. However, what it specifically was and how it worked seemed somewhat unclear to the random informants. . This informal question that I have out to people I know in Bodø does not necessarily reflect the population's general perception. Nevertheless, it lends supports to my theory that the Bylab concept could be difficult to grasp. Moreover, I would argue that its mechanism and functions have been hard to formalize. Anyhow, more research on the populations' reflection is needed before I can draw any proper conclusions here.

However, it is a good sign that Bylab is flexible. Thus, it might adapt to the needs for social sustainability. The interviewees all stated that they believed much had happened already since Bylab opened in April 2018. One of the interviewees underlined that the Bylab has great potential, a potential the municipality is slowly but steadily reaching. Also, she expressed that;

"Bylaben has become an easy and obvious meeting place where we can get together. There we are visible with the projects we are doing. It is not always easy to keep track of all the projects. We are about 110 project managers in this municipality. Obviously, there are many projects. Bylab is a good tool for having a better overview of what is going on".

It seemed to entail different things to different bureaucrats, but there seem to be an understanding that Bylab is a work in progress. One of the interviewees nevertheless addressed the need to make it clearer for the population if the municipality wanted improved output;

"- Just today, we talked about how people want to see specific projects, and that it is easier for people to engage in specific projects rather than get involved in the Smart city project. If you ask people about what they want in a Smart city, it is too large a question and hard to answer. But if you ask about smart transport, how you want to travel to work in the future, it is more specific".

Furthermore, the person illustrated how they integrate input from the public with the following anecdote from one of the municipality's followers on Instagram:

"After an event in Stormen where plastic cups were used, he posted a picture asking if this was really the new green Bodø. A clear message. Straight away, for the next meeting, we made sure that our serving from TUR cafe[3] should only be in mugs in the Bylab. People care

[3] TUR café is the café at Stormen Public Library.

about the environment (…). Follow what the population wants- that is green and sustainable".

While this shows the willingness to implement change rapidly, it also illustrates that the measures taken may be random. A transparent way on how suggestions from the stakeholders are handled is essential for social sustainability in the Smart city.

Picture from Bylab, from what seems like creative brainstorming. However, where do the ideas put on the post-its go? Trash or are they somehow collected? Photo: Line Kristin Haug

The Bylab is planned to be further developed in 2019. The goal is that it will also be used by organisations and companies from outside the municipality, as part of the participation processes with the city's inhabitants (Bodø kommune 2018, 27). So far, it has been more focus on the "hard" development of the Smart city, like infrastructure projects. Culture should be more featured in the Bylab.

4.4 *A city of culture*

Culture can make a big contribution to social sustainability. During the time of writing this thesis, Bodø was named European Capital of Culture 2024. While the application sent by the city focussed on Bodø's unique contribution, the application also highlighted the city's

struggles. There are several references to the demographic challenges of being in the corner of Europe. It includes mentioning the declining population, while at the same time stating that "*keeping the culture alive keeps our industries alive*" (2018, 4—6). Hence, the culture department thus underlines how culture plays a larger role in society.

Interestingly, the application include a paragraph on ecological economy, stating they "want to include the idea of a circular, sustainable economy as a concept and an example of how living in the middle of the vulnerable but resourceful environment can influence even scientists and economists in how they view their work, (…) *in developing new ways of organising cultural and civic life and the skills and qualities needed to do so* (Ibid., 25).

While Nordland County has expressed a rather keen interest in a circular economy, it has not been the focus for the municipality, as we will discuss later in the thesis.

From my data, it seemed that the municipality's culture department had been working on the application with little or no direct input from the other departments within the municipality. Nevertheless, the culture department addressed the smart concept in the application to the EU; "*The smart city needs a kind of "cultural smartness" or consciousness in which we capture and use the essential connection between people, architecture, culture and nature. That's what we really want to build"* (Bodø kommune, 8). As such, they have an awareness of the Smart city process. In the interviews, the departments represented in this thesis said that they had not been involved in the early stage of this EU application.

Interestingly, on the one hand, the culture department within the municipality has not been especially involved in the smart city process yet, though on the other hand their stated importance as contributors to the attractiveness and sustainability of Bodø is highlighted. It is interesting to note that some of the interviewees stated that now is the time for collaboration. The representatives from Bodø municipality I interviewed all claimed that there was a need for close collaboration within the municipality.

4.5 *Internal communication*

As the case with the culture department in the paragraph above illustrates, it is still room for more cooperation within the municipality. In my research, there seems to be a consensus about the smart city development within the municipality, and that the actual cross-department cooperation was working great. With some of the interviewees, who are working directly with the Smart Bodø project, this is hardly surprising. Nevertheless, also interviewees

more loosely connected to the project seemed pleased with the current state of cooperation between the departments. Yet, there was some concern about the overall information flow in the municipality. It seemed like most were happy with the cooperation needed to get projects going; however, there were some issues for communication broadly across the municipality and to the general public.

"I think the internal communication is as important as the external. It a municipality with about 4 000 employers, and only two working full-time positions at the communication department. Those in the communication department are very good at pleasing the political leadership. So, when the politicians have something they want to say, they are there straight away. But when the administration has something they want to talk about, it is very far down on their list".

The quote illustrates the frustration some of the bureaucrats might have regarding communication. Two of them expressed it could be challenging to get the point across, especially dealing with technicalities. There might also be a gap between what the administration envisions and what the politicians decide.

Another key question is also how the municipality itself is utilising Bylab. The interviewees explained that they had all attended Bylab events, either directly or indirectly connected to their work. The use varied significantly, from having almost daily task somehow connected to it to have contributed to an event once.

Notably, the Bylab has a good standing with the interviewees. It might indicate that it has become a useful meeting place for the municipality. As a result, it can be or become a useful tool for internal and external communication for discussing the city development, and thus contribute to the social sustainability of Bodø.

4.6 *Conclusion*

In concluding whether or not Bodø is socially sustainable, I will look at the parameters I set. Firstly, when it comes to employment, it is still a work in progress. It seems like only a few jobs have been created directly linked to smart development. However, it might be early stages and hard to measure.

Secondly, thinking long-term about the consistency of the population, it remains clear that the municipality wants to increase the population. As we have explored in this chapter, the initial goal of substantial population growth might not be a very fruitful one. When the municipality

is striving for its goals, and not needs, it is undermining the sustainability and holistic approach they claim to have.

Thirdly, regarding partaking in dialogue about the city development, the municipality has given everyone an opportunity to partaking in democratic processes through Bylab. According to the interviewees, the municipality is working hard to reach its citizens. Nevertheless, there are several challenges at hand. For example, a better way to handle feedback from the population is needed, and internal communication must improve. If these issues are not properly addressed, the municipality risks alienating people and undermines the democratic process, thus reducing social sustainability.

5 Planet - Environmental sustainability

In this chapter on environmental sustainability, I will look at the environmental impacts of Smart city development in Bodø. I will also address one of the sub-research questions of this thesis; how the environmental aspects are handled compared to the economic and social side of the development. As we explored in the previous chapter, the municipality has a development goal of boosting economic activity and population growth, suggesting more construction and traffic in Bodø. How does the municipality plan to protect the environment in this process?

5.1 *Smart environment*

The term Smart city is often linked to sustainable development. The environment is cared for in the Smart city scenario. However, most of the literature on environmental challenges and the Smart city heavily rely on technological solutions (Vabolo 2014). It may be the development Arne Næss warned us against; we are hoping that technology will solve our problems.

Nonetheless, Smart city in regards to the environment has, for example, focused on how to reduce carbon emission by incorporating smarter transport solutions. However, it is not necessarily a direct connection between Smart city and reduced emissions (see. e.g, Yigitcanlar 2018). So far, Bodø hopes to make its citizens less depended on privately-owned cars for mobility. As part of this effort, the municipality introduced a pilot project with rentable electric bikes. This bike-riding service allows users to unlock bikes in the city via an app on their phones.

Additionally, the municipality has been toying with the idea of self-driving, autonomous vehicles that use less fuel. It hopes to become the first city in Norway that introduces self-driving busses (bodo.kommune.no). Smart city development is appealing to sustainability and promise of "triple win scenarios" (Gibbs et al. 2013, 2154). In the following, I will address how the municipality considers the environment.

5.1.1 The status of the environment

The climate and environmental protection effort in the municipality is broad, as it includes strategic planning, environmental accounts, and management of protected areas. The project New city—new airport contains a particular environmental focus. For instance, with the removal of the old military airport, there will be a huge need for handling contaminated

masses. It is a demanding task that requires expertise and is a process which the municipalities will oversee (Bodø kommune 2018, 26).

All the interviewees stated that there had been a shift within the municipality in the last decade regarding the status of the environment. According to my informants, the environmental side of development has certainly gained a larger role than before. Though the plan is to invest heavily to develop Bodø, the environmental side of the development is getting more attention. It is reflected in the recent priorities, as one stated;

« I have worked with these issues for a long time. I think there is much more awareness today than before. For example, when the new national road to Bodø was adopted ten years ago, the priorities back then were accessibility and traffic safety. Today, accessibility is not trendy anymore. Now there is a zero-growth target in the private car traffic. Much has happened over the last ten years in terms of environmental thinking".

In addition, it is worth noting that the word sustainability seemed linked mainly to environmental sustainability to my interviewees. As one expressed:

"We need to evaluate the sustainability in every investment we do. We need to consider if what we are doing is sustainable. (...). First, we must consider the environmental side, if it is sustainable. If the answer is yes, then we might proceed. But, if the answer is no, then we need to stop right there".

It seems from my data that environmental sustainability has increased its importance within the municipality. From papers published by the municipality (e.g. Bodø kommune, 2018), the environment is gaining more attention and likely more protection. Accordingly, there is a growing emphasis on sustainability. However, I still question if the people and profit dimensions of the triple bottom line are evaluated higher than the planet, thus undermining environmental sustainability. As such, the new city district is a compelling case. It has the preconditions to become a so-called green future city, but will it be developed in an environmentally sustainable way?

5.2 *Building green – for whom?*

Within the new city district, Bodø has a pilot ZEN project (zero-emission neighbourhood). The project is led by NTNU and SINTEF, and the aim is to create a zero-emission neighbourhood. As the name indicates, the project "aims to reduce its greenhouse gas emissions towards zero within its life cycle" (fmezen.no). In addition, it has a financial side to

it too. Accordingly, it is stated that the neighbourhood is "to function as a catalyst for the business sector in Bodø, which is mainly characterized by the construction, and consultant sectors, the IT sector, and an export sector based on agricultural products and food (ibid.)". The idea is that building green will accelerate growth within other sectors, thus boosting the greenness of both business and way of life in the new city district.

While building green might be great for the environment, it is a waste of resources to build empty houses. The municipality can facilitate the construction of zero-emission housing rapidly, but is there a real need? There seems to be an understanding of this issue, as one interviewee responded;

«- We cannot build a ghost town that is empty because we are lacking 30 000 inhabitants. (…). Like, if you get the Chinese to build the city within five years, and we still need all those additional inhabitants, I do not think that would be a very green development. But here the municipality has said no to any deal because it is not the green future city we envision. My impression is that the municipality thinks long-term and holistically. We want inhabitants but it has to be rooted locally. Humans in the centre – by and for the inhabitants".

Other interviewees expressed similar opinions. They stated that the goal of 20 000 more citizens was perhaps not realistic in the short-term (see discussion page 25—27), but still addressed the need to develop the new city district. Two of the interviewees linked the construction of a new district to new green jobs, primarily linked to the ICT sector. Furthermore, another underlined that the ZEN project would be developed gradually, to be able to adapt to the real demand for housing. That the project is scalable is good news for sustainability; do not use any more materials than what is necessary.

While it is unlikely that Bodø will end up like certain ghost towns in China, one might ask if the current trend of building more hotels and apartment buildings in the city centre is better for the environment. Sure, some of the new construction may be deemed more environmentally friendly compared to existing construction. However, can it make up for all the energy and materials consumed in the process? I find this question is hard to evaluate and did not find any good evaluations for the issue.

Through the interviews, I am left with the impression that the municipality is thinking of the goal of having greener buildings, but not always the need for it. Though newer buildings tend to be more energy-efficient, it might not necessarily be greener to build new if there is no need for them. In the end, a more sustainable way will always be to reduce, not use. However,

that does not fit into the capitalistic construction of our society. Ironically, while the municipality is pushing for construction in new areas, it also tries to promote Bodø as a pristine destination.

5.3 *Green and pristine – a selling point?*

As previously discussed, Bodø promotes itself as both progressive and green. The promotion film clips made by Bodø i vinden describes an ever-blue sky and practically people free surroundings[4] . Evidently, the promotion videos are meant to be humorous and exaggerated. Nevertheless, it reflects how the municipality promotes itself to attract both more people and businesses.

One of the interviewees, whose work includes promoting Bodø, admitted that they had received some criticism for the promotion videos presenting Bodø only with nice weather. However, accordingly, they had just been lucky with the weather conditions at the time of filming. Nevertheless, the interviewee added that "*we have a strategy for keeping it real. I do not think that people want perfection; it does not have to be picture perfect. People also want to see the challenges. People like what is real*".

Neither people nor businesses want to move for nature itself but are more inclined to do so for specific business opportunities or improved quality of life. Still, the municipality might be sending out a somewhat unfortunate message; the pristine nature is up for grabs. The municipality does express a positive view of the possibilities that technology might bring forward. Again we must remember Arne Næss' (1976, 100) warnings against believing that technology will save us. But then again, are we sure Næss is right? Perhaps new technology makes the conditions for sustainable development better in Bodø.

5.4 *Green technology*

Digitalisation has from the start been a large part of the Smart city discourse. David Gibbs et al. (2013, 2156) point out that while the Smart city way may have a progressive potential, it is also a danger of reducing sustainability to a question of technical discourse. From documents and presentations made by the municipality, I got the impression that digitalisation was vital and that it was a driving force. However, from the interviews, that impression was modified:

[4] See Bodø I Vinden's Instagram for endeless nature pictures of Bodø'(litte about worklife, though), and a short film about park life in Oslo vs. Bodø at https://www.bodo.no/video/parkliv-oslo-vs-parkliv-bodo/

"What I think is cool about the development in Bodø is that we are not so concerned about technology. It might sound that we do not care about technology. But the thing is that technology is not that important. The technology we use needs to benefit the inhabitants. Using technology just for the sake of using technology that makes no sense. It needs to fit into everything else we are doing. In the end, to make it more complicated, it is connected to what we are doing with our digitalisation strategy.

Generally, Smart city development tends to start with the hard development such as ICT. However, it is not too late for the city developers to start focusing on the softer side (Hollands 2008). All interviewees stated that digitalisation is a vital part of developing Smart Bodø. The company DIPS, which has its headquarters in Bodø and is a leading ICT supplier of e-health systems to Norwegian hospitals, was mentioned as a prime example of a company that had created jobs and technical progress. However, having technical development is not considered enough by the interviews. The ICT possibilities today are plentiful when it comes to ICT solutions the municipality might offer its citizens. Today, the challenges are to beat the challenges that come with the use of technology. As expressed by one of the interviewees;

"The technology as such is no longer a challenge. The challenge is now how we collect data. We are looking for software and algorithms to abstract the information we need in order to make the services better. Also, we need to consider privacy issues".

Furthermore, the municipality was also looking at projects that combine digital solutions with environmental measures. For example a project on implementing a system of electric city bikes as one of the interviewees mentioned;

"We are working on introducing city bicycles, which might be up and running by next summer. We are very lucky. We have money for digital projects. It is perhaps why we have humans in the centre. It is not the digital stuff or the digital solutions that are the goal but tools that make life better for the people."

The bicycle project stems from a need expressed by the citizens, rather than a random technical so-called smart solution from above. Moreover, city bicycle might have several positive spillover effects. It could improve health, work for people involved in the process, and fewer private cars meaning less pollution. In the long-term, it could also mean less wear and tear of the existing roads, thus less need for frequent maintenance. The means of transport matters in a sustainable green city, in which I will address in the following paragraphs.

5.5 *Green transport*

Transport is crucial for sustainable development. The municipality is much involved with planning transport, but here one must also distinguish between the responsibility of the municipality, the county, and the national level. For example to the airport is a state road and dealt with at a national level. Nordland county has the primary responsibility for public transports such as buses and ferries within Bodø. The municipality, on the hand, deals with smaller infrastructures such as local roads, bike lanes and pavements.

Nevertheless, an example of cross-sector cooperation that was mentioned by some of the interviewees was "Smartere Transport Bodø". It is a collaboration project between Bodø municipality, Nordland county, Avinor and Telenor. The project's main goal is smarter and more environmentally friendly transport solutions, and the project has heavily invested in utilising new technology solutions. It will collect transport information, in order to be able to give a friendly nudge to residents and visitors to use greener means of transport (smarteretransportbodo.no). The electric city bikes mentioned above are part of this initiative. One of the interviewees mentioned this specific project as an example of a holistic approach, stating;

"Smartere transport Bodø" is an excellent example of that we work together on common challenges and achieving a much bigger impact. (…) And including, all environmental areas. Including the harbour, we are talking about a new main road into the city, a new city district and so on. The divisions within Bodø municipality has in many ways disappeared but so has the boundaries between the municipality and county".

Acknowledging that environmental challenges are beyond that of the municipality, as nature knows no administrative borders. Everything is interconnected, environmental harm may come to the municipality, even if they do not pollute themselves. Blissfully located on the coast, some of the air pollutions have literally "gone with the wind". However, in recent years, high levels of harmful particles in the air have been detected. Reducing the level of pollution is good for the environment, both in the short and long-term. Streamlining public transport will help with this and might also contribute to lessen traffic jams and make life travelling with public transport more comfortable.

5.6 *New vs old*

Opening new projects and buildings are good PR for politicians. Generally, it seems more rewarding to establish something new rather than restoring the old. Bodø municipality wants a

new airport instead of restoring the old one. I will not go into the financial and environmental side of old vs new airport. Still, it an interesting question if it would be better to remodel the old airport, which also was an option Avinor initially considered (Avinor.no).

Similarly, a question we touched upon the previous chapter; is there a real need for a new city district? According to the numbers, there is hardly a dire need for a completely new residential area as there is no housing crisis. Obviously, the new constructions will most likely be substantially more environmentally friendly than the old buildings. In the short-term, new buildings represent an increase in the use of energy and materials. In the long-term, however, they might have a positive impact with less. Building a new city district requires that the process is adaptable to the needs. Though the district often is presented full-scale at conferences, the municipality will likely proceed with caution. As one of the interviewees expressed;

"*We have the possibility to fit 20 – 30, 000 new inhabitants if we make a new city district. (…) While it might not be realistic that we get that many in that short time span, it is necessary if we are to develop the new areas and build the city. I think the municipality is good at thinking long-term. If we connect this to the changing citizens' participatory processes, I think this will be done in a sustainable way".*

According to the Chief Municipal Executive, the municipality is lagging on maintenance on municipal buildings and roads (Bodø 2018, 5). In 2019, the municipality opened a new and top-modern town hall. The old town hall from 1959 had a total inner rehabilitation, but the new building entirely stole the limelight.

5.7 *Cleaning out the old*

What is even less rewarding than restoring something old is the act of cleaning up. Before the construction of a new city district can begin, several clean-up operations need to be dealt with. As mentioned, the new district is to be built where presently, the civilian airport is. A new civilian airport is planned for the area currently home to the military airport. It will require several procedures for cleaning and restoring the sites before new infrastructure will be built (Avinor.no).

According to one of the interviewees, the Norwegian Defence Estates Agency (Forsvarsbygg) has the responsibility for the first part of the environmental clean-up of the former military aviation base. The informant also stated that the municipality would look to the Fornebu

project to learn from the work that has been done there. Especially interesting is the work concerning excavation and handling of polluted masses from the location of the old runways. Fornebu, which is the former main airport of Oslo, is located in Bærum municipality just about 8 kilometres from Oslo. It shares several similarities to Bodø's new city district project. Oslo Airport Fornebu has been transformed from an aviation base to a residential area. The clean-up operation has included excavation and handling of a total of 500,000 m3 of mass. Most of the masses are cleaned and reused, used as the foundation for new roads, and as a basis for new terrain forms at Fornebu.

Moreover, the transformation of Fornebu has been deemed environmentally successful (bygg.no). The informant stressed that the lessons learned from Fornebu could be useful to Bodø;

"We have to deal with a lot of concrete, asphalt and a four-kilometre runway. We must handle these masses within the area and reuse them. Fornebu has done it, so we look at their work. It will be a major environmental project. (...)We are now doing this large project, and the focus on making the most environmentally friendly. Energy is central to this work".

As the interviewee addressed, there is a substantial clean-up operation that needs to be undertaken. One interviewee also stressed that the municipality has an important job choosing the right cooperation partners in the development process. Only companies with "best practice" ought to be granted concessions. The clean-up phase must not be underestimated environmentally. It could also challenge the proposed timeline and planned budget.

5.8 *Green energy*

Access to clean and renewable energy is vital to make Bodø environmentally sustainable. It is one of the top priorities as well as a precondition for a new city district to be environmentally friendly and perhaps reach its zero-emission goal. In Nordland County, there is a large annual surplus of renewable energy[5] (BIN 2017, 66).

The renewable energy sector is often linked to reducing energy-related greenhouse gas emissions. In Norway, it has become an important policy measure to improve the nation's overall emission and promote its image as a green nation. It may also promote competitiveness and economic growth. With the expected changes in energy consumption,

[5] E.g. in 2014, the surplus in Nordland was 5,6 TWh. The renewable energy comes mainly from hydropower (BIN 2017, 66).

including electrification of transportation and energy-efficiency measures in power-intensive industries (data processing and blockchain technology), it matters how Bodø municipality utilises the potential of being near to cheap renewable energy (ibid, 70).

Access to hydropower opens new opportunities; for example, it is possible to build a large hydrogen powerplant. Some stakeholders in Bodø want the city to become a pioneer for hydrogen. It might serve private and public means of transportation, such as ferries, taxies and private cars. In addition, it could contribute to the new city district, building hydroelectric solutions. Particularly the non-electrified Nordlandsbanen would benefit from switching to hydrogen as fuel (SINTEF).

Today, there are no specific plans to build a filling station for hydrogen in Bodø. Nevertheless, that might change. One of the informants expressed hopes for hydrogen in Bodø;

«Bodø is a transport hub. If we get to build hydrogen station here, we have the possibility for railway, ferries and cars. (…) Then we can create future-oriented workplaces, by creating a circle and not just use but also utilise the entire resource chain. We have to start thinking in a completely different way for this kind of project".

However, the informant said that getting the initial financial investment is challenging. Such a project will require strong political will and a substantial budget. Furthermore, the informant stated that such a project likely would have to be initially publicly financed as it will not be profitable in the beginning.

In recent years, the development of hydrogen station networks has accelerated internationally. Initially, Norway early showed a keen interest, but the national initiative has halted. It might contribute to reducing the likelihood of getting hydrogen to Bodø (an.no 2018b). It is a risk for the public to make substantial investments in large infrastructure projects. Nevertheless, renewable energy is essential for constructing a sustainable municipality in the long-term.

5.9 *Conclusion*

From the interviews, it seems like the attitude has changed and that the environmental side of the development is getting more attention. There are signs that Bodø municipality evaluates the value of the environment higher than previously. However, the question remains if it might not be enough in the long-term. Bodø municipality is now developing structures that

will make waves into the future. It must think long and hard on how to develop without compromising the sustainability of the environment and ecosystem.

In the end, there is no such thing as a free lunch. Everything is energy. E.g. the ZEN is expensive. Who can afford to live in the new city districts, is it too expensive to be smart? The environment is essential for our survival but is it costly to be green? Moving on, as the next and final part of the triple bottom line, the financial side of the Smart city will be addressed in the following chapter.

6 Profit - Financial sustainability

Finally, in this chapter, I will discuss the third and last part of the triple bottom line, namely the profit dimension. In the words of James Carville “the economy, stupid” is the foundation of our wellbeing. Economic growth has given us a comfortable lifestyle, even in a cold and harsh corner of the world. As the municipality is mandated to provide services for its citizens, and consequently needs revenue to do so. In Norway, the municipalities manage a substantial part of the country's financial resources, and it accounts for a considerable part of the economic activity. The sector is financed mainly through three sources, namely tax revenues, government transfers and fees (regjeringen.no 2014b). In addition, Bodø is one of the municipalities in Norway that also collects property tax.

In total, the amount of revenue Bodø collect is substantial. However, it is estimated that services like kindergartens, elementary school, and health services make up approximately 70% of the municipality’s expenses (Ibid.). Besides, the municipality provides other essential services within their budget, which includes improving the local roads, safeguard the local environment and promote tourism (ibid.). Bodø’s financial situation has significant implications for the services the municipality has to provide. Moreover, the financial situation of Bodø has implication for the smart Bodø development today and the economic sustainability for the municipality in the long-term.

6.1 *Financing smart*

Currently, the smart project of Bodø is likely the largest municipal development project in Northern Norway. The construction for a new airport and foundations for a new city district is scheduled to start in only a few years. The estimated price tag approximately five billion Norwegian kroner. Through the National Transport Plan, some 2,4 billion has already been granted by the Norwegian government (nrk.no, an.no 2018c). However, the municipality must contribute with a billion, an amount that the municipality currently does not possess.

According to the National Transport Plan, the idea is that the sale of land plots will finance the expenses for the rest of the project. The critical issue at stake is that that money from the land plot will come in only after the airport has moved (ntp.dep.no). It means that the municipality must take the expenses first and hope for the return afterwards. It also means that the municipality needs to finance the transition phase.

If the municipality makes the financial risk and the demand for land is low, it is doing so with a financial risk that could endanger future budgets. It is unclear how much financial risk the

municipality can and should take on when undertaking the Smart city development. It is worth mentioning is that everyone interviewed for this thesis expressed some concern over the municipality's financial situation.

6.2 *The financial state of the municipality*

Within the municipality, the emphasis has been on competition and substantial growth for future city development. The current issue is that the municipality may be spending too much money, and therefore it has has been a discussion regarding financial sustainability in the media (an.no 2015 & 2018d). The numbers show that the municipality's debt ratio is increasing due to the ambitious investment plan. Most of the municipality's projects are financed through borrowed funds. Also, the part of the revenue that the municipality is free to use as it pleases is increasingly used to pay back repayments and interests (Bodø kommune 2018, 3).

Speaking at a seminar in Bodø, the Norwegian Auditor General Per-Kristian Foss stated that *"the municipality's degree of debt is financially sustainable if the municipality can handle the debt short and long term without any consequences for the services it provides both for present and future citizens*" (my translation). Today, Bodø municipality has a higher debt rate than the Office of the Auditor General of Norway recommends. However, the situation is not all bleak; the municipality is not on the infamous ROBEK list[6], where municipalities in Nordland county are highly represented (see the paragraph on the Terra Securities scandal later in this chapter).

Nonetheless, as several of the interviewees discussed, the municipality delivers strong results on several key parameters. In 2016, Bodø was named the most attractive city in Norway. It will become the European Capital of Culture in 2024. It has received national and international attention for its smart city project, and in 2018, Bodø hosted ISOCARP, a major international city-planner conference. However, increasing demand in services and activities combined with lower governmental transfers than expected poses challenges to the municipality's budget. It is true for both the investment and operating budget (Bodø

[6] ROBEK = Register om betinget godkjenning og kontroll (Conditional approval and control register). Municipalities on the ROBEK list are considered to be in financial imbalance. Accordingly, they must have approval from the Ministry of Local Government and Modernization for decisions on loans or long-term lease agreements. Also, the budget must be controlled by the state (regjeringen.no 2007).

kommune 2018, 4). The situation has been challenging for some years now. In a long-term perspective, this is a threat to the financial sustainability (an.no 2018a).

Furthermore, there was some unease when the financial situation was brought up during the interviews. Mainly, I assign this to the fact that none of the interviewees is budget decision-makers, so they do not represent any official opinions as such. Also, they did not seem eager to share their personal opinions on the current financial state. Several said that this was a question to be addressed by the city council, not by them. One stated that "*regarding the economy, you need to ask the mayor. We have another approach to the challenges than the politicians seem to have today* ", illustrating that the bureaucracy may have other concerns and priorities than the politicians.

However, the interviewees all expressed that the need for Smart Bodø remains unchallenged. There was little discussion on cutting back on the projects connected to Smart Bodø. According to my interviewees, Smart Bodø has a broad consensus, both within the bureaucracy and amongst the politicians. This is reflected in the official statements. Although the budget frames remain thigh, the smart project is still a priority within the municipality (Bodø kommune 2018, 6).

Moreover, the two mayoral candidates for the 2019 election both wanted the continuation of the project. Indeed, the initiative for the Smart city development began under a Conservative Party rule but continued after the Labour Party took over the mayor's office. Perhaps the municipality has crossed the point of no-return for Smart city development. Also, as one interviewee rhetorically asked, *"who doesn't want to create a sustainable and great society?"*. The only way seems forward for the municipality; Smart city is the image and plan for Bodø's future. The question for Bodø remains to be how to navigate the development sustainably.

Again, the Smart Bodø project, including the new city district, is, in many respects, an extra activity that the municipality is not obliged to perform. Instead, it is an investment to boost Bodø's attractiveness in the competition for skilled labour and businesses. Other benefits might include smarter operations, meaning more streamlined and hopefully, money saved (an.no 2018a). After years of population stagnation along with the loss of a military base, the municipality felt pressure to encourage growth.

In the interviews, concerns about the current financial situation were voiced. However, it was deemed hard to cut back on expenses. One interviewee expressed hope that smart technology

could provide for some budget savings. Nonetheless, the municipality's investment is intended to encourage other stakeholders to invest, as well. The municipality hopes to attract new businesses to Bodø.

6.3 *The companies*

Smart Bodø has been closely linked to the process of creating new jobs in the municipality (an.no 2018a). It is one of the factors that can attract new citizens. The more people that work and live in Bodø, the more income tax revenue for the municipality. Another issue is creating new jobs outside the public sector. It has been named as one of the critical preconditions for success, for which few results have been achieved so far (an.no 2018c).

Some job creating is expected to occur in the coming year in the construction sector, connected to the new airport and the new city district projects (indeksnordland.no). The local entrepreneurs need to be prepared for this in order to secure local spillover effects. With large construction projects, there is a risk that big companies are handed the job, using external resources.

According to my interviewees, there are frequent meetings between the municipality and the local private sector. All the interviewees underlined the facilitator role of the municipality, such as in the following statement:

«The companies need to innovate and create new jobs. If not, initiatives like Bodø i vinden might as well close down. We also need entrepreneurs and that new companies are established in Bodø. We know that the main reason why people move is for jobs. If we have attractive jobs, people will move here. Bodø i vinden's task is to display the possibilities but it is up to the private sector to do the actual job creation (…). Initiatives like Bodø i vinden can only show the potential, but it is up to the private sector to create jobs"

An issue not addressed in the municipality plan is the challenge that jobs might disappear in the Smart city. Innovation linked to smart development is often presented as a job creator. In fact, some of the innovation the municipality describes in their documents can be a destroyer of jobs (theguardian.com 2015). For example, the focus on driverless vehicles might leave taxi drivers and bus drivers out of employment. Some of these people might have difficulties finding a new job within a high-technology society.

I would argue that the municipality does not adequately address this issue. In the interviews, I discussed this with two interviewees, but they did not agree that this would create challenges.

One even pointed out that technology has not made us work fewer hours during the week. I reckon there will always be a need for human resources. Perhaps, with restructuring our society, like the introduction of universal basic income, could be a meaningful job or activity for more people, but that is a discussion beyond the scope of this thesis.

Nevertheless, in the literature, job creation and Smart city are often linked to ICT, the health sector and temporary construction. If the companies cannot save Bodø alone, maybe some investors might help finance the Smart city development?

6.4 *The investors*

The municipality needs external finances to build Smart Bodø, and it has been in contact with private investors. In spring 2018, the American Danny Hayes made a grand entry onto the Bodø scene, promising to invest substantially in the city. The investor's promises of investment and sponsorship made it to the national news. Nothing has come of his lofty promises (nrk.no). In the interviews, I never asked about Hayes specifically, but in more general terms relating to how the municipality handles the influx of interested parties in this process of building a new city district, including foreign investors. Four of the interviewees mentioned Hayes by name, assuring me that this was nothing but hot air and that the municipality was unaffected by such approaches from foreign investors.

«(…)Danny Hayes and foreign investors want the city to build in five years, max. The municipality has answered that, no, that is not what we want. It is a reason why we call this a 50-100 years project. At the same time, one needs to consider the commercial aspect. It is obvious that Avinor cannot wait 50-100 years to build an airport. Neither can the passengers. The municipality, I believe, thinks long-term and holistic. No, this takes time (..).

Furthermore, another of the interviewees stated that the municipality was open to meet everyone that expressed an interest.

However, one interviewee had met several who "*had arrived in Bodø to which we had to explain the Norwegian system. There are rules about procurement. Also, the City Council makes the decisions. Our system might seem a bit slow, but when the decision is made, it will be implemented".*

The representatives I interviewed had an open no-nonsense approach to being approached by different stakeholders and potential investors. Be that as it may, the leader of Stormen concert hall signed a letter of intent with Hayes, without informing the mayor. Though the legal status

of this deal is unclear, it is still an unfortunate incident. The willingness to go behind the public' back can easily weaken the trust in the municipality's leadership. In addition, recently, several municipalities within Nordland county were involved in the "Terra Securities scandal" which resulted in large sums of public money being lost, based on judgments made on unclear juridical grounds and inadequate understanding of the financial market. The lesson should be that if the money seems easy, but the process of following the money trail is opaque, then it is likely a scam. Secondly, the municipality must make sure that what it is doing is according to the law and do not go behind the public's back. It should always have the citizens' best interest in mind.

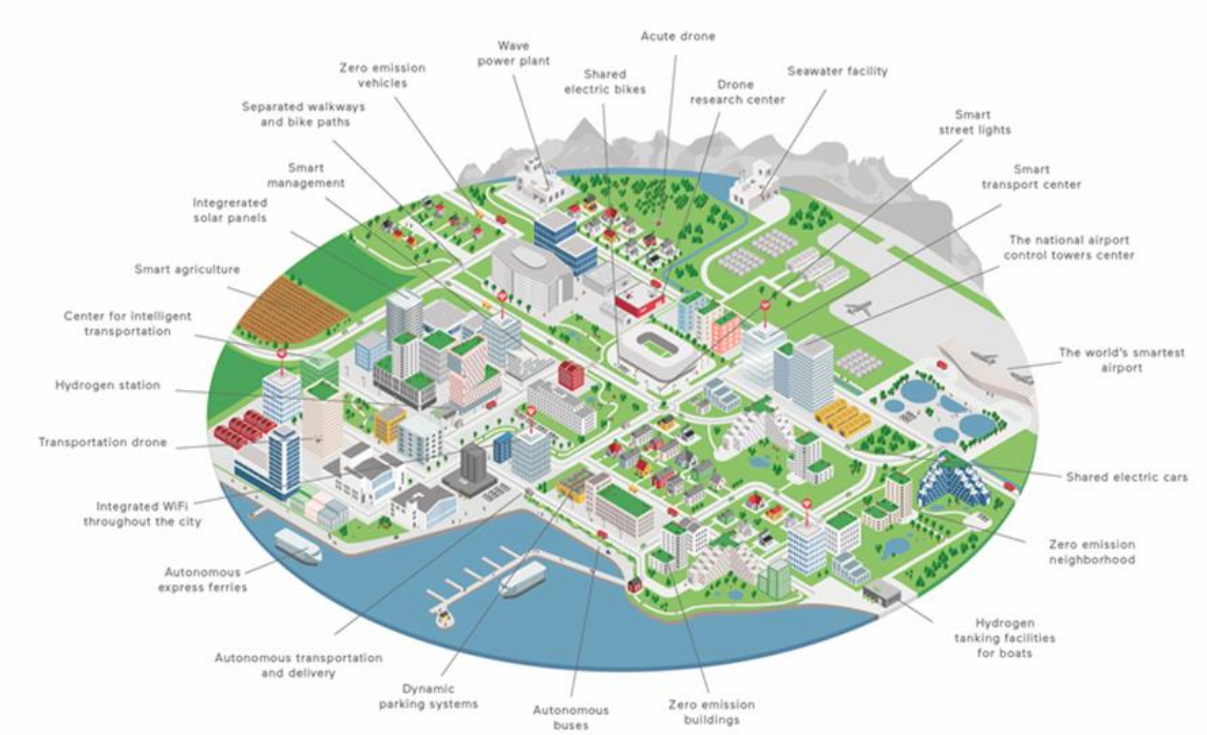
Besides, foreign investors are likely not very interested in the ethical side of investment, such as the environment and people (community/ culture) aspect of city development. Their main concern is profit. Accordingly, it is unlikely to be a saviour for the economic situation of the municipality. Within the neoliberal paradigm, greed may be good, but it also may lead to poor judgment. Nevertheless, the question remains, who or what will pay for the wonders of the Smart city?

6.5 *Bubbles or bust?*

As discussed, Smart City has financial implications; presently, the municipality is making decisions that will impact generations to come. Financially, Bodø municipality may not be considered economically stable in the long-term. At the time of the interviews, the current local discussion was about the new municipality budget for 2019 (see, e.g. an.no 2018b). All interviewees stated that they were not responsible for the budget. As such, I felt some of the questions I asked were deflected. However, some of the interviewees expressed frustration as they felt they were not being listened to when their department had voiced input regarding the budget.

Furthermore, there seemed to be no consensus among the interviewees on what the municipality itself would finance of the Smart city infrastructure. As the discussion on a potential hydro-power plant showed, it is hard to attract finances for large projects. The municipality hopes that the private sector will finance projects, but often the private sector wants more than municipal facilitation; they too are looking for finance. Moreover, as one of the interviewees stated; "*there is an aversion of risk in the municipal sector"*. Indeed, without no risk, there will be no award. Still, the municipality must be careful with its investments, cf. the Terra scandal.

Moreover, there are financial risks associated with pioneering initiatives. The municipality has, however, gained some finances on pioneering work on the zero-emission district. Below is an illustration of some of what Bodø's smart city could contain in the near future:



All smart but all costly?

While some of these efforts might have environmental benefits, the illustration focuses on technology, not people. This image is also in sharp contrast to how Bodø municipality promotes itself on social media, where the focus is on pristine nature. However, I would argue that the municipality is currently undergoing some changes concerning sustainability. Perhaps thinking about a new approach to the economic system could be a sustainable way forward?

6.6 *Towards a new economic paradigm?*

As addressed in the theory chapter, the neoliberal economic model might not be enough if the municipality wants a sustainable and holistic city development. Nordland county has recently set the UN sustainability goals as a baseline for all policies implemented in the next term. The county emphasis the opportunities in the circular economy for sectors such as aquaculture and agriculture. With this, Nordland aims to ensure that the business community in the county may make a livelihood with businesses also saves the planet (nfk.no). If it wants to achieve this goal, Bodø must be included in the process. Nordland county cannot successfully turn

towards a circular economy without Bodø, the largest city in the county. However, in the municipality, the circular economy has gained less attention, something that was reflected in the varied answers between the interviewees.

On the question of circular economy in the municipality one stated that "*Yes, we think about circular economy and work with Nordland County".*

Also, the two others expressed potential for a more circular approach in the future. As one stated;

"We need to think more circular when it comes to the economy. It means that we cannot have a use-and-waste mentality any longer. (…) It means we will have to do things in another way than we previously have. It is so much exciting development going on, everything is supposed to be connected, and that is demanding".

Agreeing that circular economy has entered the agenda, the interviewee said that;

"We are considering it. (…) (new city district) needs to produce more energy than it uses. Here we must put in some effort. For the next phase, there need to be certain standards, so the new building material used can be recycled. So far, we have not considered water and waste as a resource. The waste we produce will likely be utilized in other ways. (…). We have to think in ways we previously have not".

However, one stated that the circular economy was not a widely used term in the context of the municipality's work.

"It has not been brought up in any meetings (…), I have not heard that the Director-General has mentioned this type of economy when dealing with the budget. (…). The term has not been used".

While it is not on the municipality priory list to change the economic system, some of the changes to a circular economy might be costly in the short term. From recent publication from the municipality and my interviews, I reckon there seems to be an understanding that changes are happening. There is a need for thinking new and alternatively, especially in regards to the possibility the new city district presents. I would argue that Bodø municipality cannot achieve sustainability if it does not invest in a circular economy. However, changing the economic focus is not on the agenda. Thus, a circular economy thinking seems limited. The present economic thinking is well within the realm of the neoclassical paradigm.

6.7 *Conclusion*

In conclusion, the findings in this chapter suggest that economic growth has been a priority for Bodø municipality. The empirical evidence indicates that there is a consensus that "bigger is better". On the other hand, the municipality is battling with its budget and has challenges with ensuring long-term financial sustainability.

As discussed in this chapter, it is unclear how the municipality can finance smart city development, including the new airport, in a financially sustainable way. Today, it lacks the finances it needs for the transition phase. Companies might recruit to ICT jobs, as well as (short-term) construction work. However, it is not guaranteed that it will make up for the decreasing demand for low-skilled jobs that a smart ICT-centred society might bring about. There is little focus on these issues.

As the discussion on the circular economy brought forward, there is some notion that the system should change. However, according to my data, the municipality has not rigged itself for a holistic and radical change.

7 Concluding remarks

In this final chapter, I will return to discuss the main research question of this thesis: is the pursuit for smart city sustainable and holistic development? In short, in order to promote smart city development, the municipality has chiefly focused on financial sustainability. It was the initial main goal and has been the most discussed aspect since. It is also visible in terms of political prioritising and some neoliberal-inspired reforms implemented.

Chapter Four focused on the people dimension of the triple bottom line. The chapter began addressing the quest for population growth. I have argued that Bodø's goal of reaching 70 000 residents is not holistic and fruitful. From my research, it seems that a crucial point for sustainability is that the municipality must define the real needs. As such, it is difficult to argue that the municipality needs 20 000 more inhabitants. By setting an arbitrary and seemingly exaggerated number, it may take focus away from the real issues that face the municipality's planning efforts.

On the other hand, e.g. Bylab can make a positive contribution to sustainability as it enables citizens to partake in democratic processes. Seemingly, Bylab is doing rather well but needs a more transparent way to handle feedback. If these issues are not properly addressed, the municipality risks alienating people and undermines the democratic process, thus reducing social sustainability. My interviewees all said the internal communication within the municipality is generally going well, but there is room for improvement. It was most visible in the lack of communication between the Culture and Technical departments.

Chapter Five focused on how the municipality handles issues connected to environmental sustainability. The findings suggest that the awareness of the environmental side of development has increased in recent years. There is an interest to learn from previous successful projects, such as the repurposing of Fornebu airport. It is also vital that the municipality gives preference to companies with a "best practice" standard when granting concessions. Doing this will contribute to an overall positive impact over time.

As discussed, today, the municipality does not need a lot of new housing projects. It looks like the new city districts will not be developing as quickly as first presented. The interviewees voiced the necessity for adjustment and scalability in the development process. By taking it slowly, the municipality may develop Smart city around the needs of the city and its inhabitants.

Of course, any new buildings should be environmentally friendly. However, environment-friendly solutions might be costly and thus challenge financial sustainability. It might also be socially challenging, as increased housing prices might prevent people from residing in the new city district.

In Chapter Six, I addressed the financial side of smart development. I have argued that economic growth has been a priority for Bodø municipality. The empirical evidence indicates that there is a consensus that "bigger is better". Nevertheless, the municipality is already struggling with its budget balance. A decreasing and ageing population is a risk to future tax revenue; the municipality is under pressure to generate growth.

In an effort to simplify the findings, I made an overview of the measures taken to improve sustainability and of the challenges remaining.

3 P's	Challenges	Measures taken
People - Socially sustainable	○ Access to give feedback from all but unclear how to contribute with input ○ The goal of 70 000 inhabitants – a qualitative goal, ○ Fragmentation within the municipality. E.g. little interaction between the cultural & technical departments = not holistic	○ Bylab: citizens involvement. A meeting place for people, business & public sector. More dialogue w/stakeholders ○ New slogan: "humans in the centre" –a new and more inclusive approach? ○ Building down columns within the municipality = more interaction
Planet – environmentally sustainable	○ Plans for more buildings, more flights, more people = more resources used ○ Building for goals, not needs; empty houses in new district? ○ Challenges financing top-notch environmental solution cf. hydrogen	○ Zero-emission neighbourhood (in the new city district) ○ Planning for 50-100 year in mind = long-term / generations ○ Electric city bicycles introduced; start of a shared & low emission transport system

Profit – Financially sustainable	○ Still few new green jobs in the private sector ○ Evermore services provided combined w/ budget limitations ○ Neoliberal economics unchallenged ○ Fewer people, less revenue	○ Bodø i vinden: promoting Bodø as a place for business & livelihood ○ ICT: simpler and equal procedures=money saved+ fair(er)? ○ Some awareness of circular economy

As the table highlights, there are several measures taken that boost sustainable development. However, several challenges have not been properly addressed yet. Within the triple bottom line, the municipality must strike a balance between the three pillars. The pursuit of this balance is an ongoing process. Arguably, it is a good sign for Bodø that there have already been changes in approach and scope. If Smart city development can adapt continuously to the shifting needs and opportunities, it may obtain sustainable development. Moreover, as is evident, the triple bottom line is interwoven. For example, fewer jobs mean less income tax, which again means less money for zero-emissions infrastructure (if that is a political priority).

Bodø municipality must be careful with setting goals just for the sake of it. Efforts must be made to ensure that all the municipality's plans are rooted in thoroughly thought out and fact-based scenarios. Setting a goal of significantly more inhabitants in a short period of time will not lead to qualitative improvements; it only serves to illustrate a top-down, more-is-better approach. Although this initial goal may have lost its importance, some of the informants still believed that it was in use. Moreover, all informants expressed that Bodø does need more people. It demonstrates that there is still a preference for quantitative thinking within the municipality.

Regarding whether it has been a hard or soft approach to Smart city development, the answer is not clear. In some respects, the development certainly has had a harder focus, for example, with plans for higher energy output (new buildings, etc.). Besides, the process seems somewhat complicated for the general public to completely grasp. The Smart city and Bylab concepts are vague. However, the softer development focus seems to gain more of a foothold recently. In some respects, the municipality has shifted from quantitative orientated to

appreciating qualitative qualities. It was reflected both in the interviews I conducted and in the way the municipality has shifted their official focus. Nonetheless, all in all, I deem the municipality to have a weak sustainability cf. definition of Næss and Daly.

Again, returning to the main question of the thesis, I have argued that some environmental and social aspects of the developments have been given less attention. The financial side is most focused on by the municipality. However, it does not mean that Bodø is fiscally sustainable. On the contrary, one of Bodø's main challenges remains striking the right balance of investing and making sure it keeps within the budget frames. During my research, I came to realise that Bodø's Smart city did not have general sustainability as the goal from the outset. It was initiated to remedy the loss of jobs, with a strong preference for technological solutions. However, I believe that, if applied rightly, Smart city can be a tool for Bodø in working towards sustainability.

As discussed in the method chapter, this is a case study with limited scope. Therefore, I am careful not to draw any definite conclusions. The thesis is merely a small contribution to a broader discussion of what kind of society we want and are handing for in the future. As for further research, I think it is useful to learn about the population's experience and how they feel their needs are met in smart city development.

With Smart city, Bodø has taken measures to develop the municipality. In conclusion, though progress has been made in regards to sustainability, there is still a need for improvement. Bodø municipality is striving for smart development but needs to be wiser.

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Appendix

Appendix 1 (Intervjuguide - Norwegian)
Appendix 2 (Interview format- English translation)

Intervjuguiden

Kort presentasjon av intervjuer og oppgave

Oppvarmingsspørsmål
- Kan du kort beskrive dine arbeidsoppgaver / ansvarsområder for Smart city / ny by-ny flyplass-utviklingen? På hvilket tidspunkt ble du involvert i prosessen?

Økonomi
- Hva legger du/ dere i økonomisk bærekraft for Bodø kommune?
- Bodø har en gjeldsgrad over det riksrevisjonen anbefaler – hva er grunnen til dette?
- Skyver kommunen "regningen" foran seg med tanke på investeringsbeslutninger gjort per i dag?
- når antas det at investeringene begynne å gi tilbake?
- Nye boliger er ofte dyrere enn gamle, hvordan sikrer dere at den nye bydelen er oppnåelig for befolkningen?
- Nordland Fylkeskommune er opptatt av sirkulasjonsøkonomien, hvorfor er ikke dette på kommunens agenda?

Miljø
- Hva legger du/ dere i miljømessig bærekraft for Bodø kommune?
- Hvilke kortsiktige og/ eller langsiktige konsekvenser tror du utbyggingen av ny by-ny flyplass vil ha?
- Er det elementer internt i kommunen gjøre det utfordrende å få gjennomført tilstrekkelig miljøtiltak/ undersøkelser? Eksempelvis økonomi eller tidsrammer.
- Vil ikke ambisjonen om eksplosiv vekst (økt økonomisk aktiviteter, utbygging, betydelig befolkningsvekst) ha negative konsekvenser for miljøet rundt Bodø?

Kultur
- Hva legger du/ dere i sosial og kulturell bærekraft for Bodø kommune?
- Hvordan integrere dere lokal kunnskap / lokale ønsker inn i prosessen?
- Fungerer Bylab som intendert; hvordan behandler dere innkommende forslag?
- Samhandling innad: Hvordan er informasjonsflyten innad i kommunen?
- Hvor ofte møtes dere ofte på tvers av avdelingene? Opplever du det som enkelt eller utfordrende å dele informasjon mellom avdelinger/de ansatte i kommunen?
- Deler dere i kommunen informasjon etter kontakt med bedriftene og partnerne utover de formelle møtene? Eventuelt hvorfor, hvorfor ikke?
- Overselger Bodø kommune Ny by-ny flyplass med urealistisk bilder (jf. bilder i media/ kommunens nettsider)?

Avslutningsspørsmål
- Hva oppfatter du som barrierer for å utvikle en bærekraftig by?
- Har du avslutningsvis andre kommentarer eller innspill til temaene vi har berørt?

Interview – English Translation

Presentation – some word about the thesis' aim and interviewer

Opening question
- Can you briefly describe your responsibilities in the Smart city / New city—new airport project? At what point did you get involved in the process?

Economy
- What does financial sustainability mean to Bodø municipality?
- Bodø has a debt ratio above what the Office of the Auditor General recommends; what is the reason for this?
- Is the municipality making investment decisions today, that the future generation will have to finance?
- When do you expected that the (smart) investments make will start to yield?
- How do you ensure that the new district is accessible to the general population, knowing the price for new high-tech housing is stiff?
- Nordland County is working towards a circulation economy, why is this not on the municipality's agenda?

Environment
- What does environmental sustainability mean to Bodø municipality?
- What short-term and/ or long-term consequences do you think the development of the new city-new airport will have?
- Are there challenges that might make it hard to carry out adequate environmental measures? (For example, financing or time frame)
- May the ambition of increased overall growth (e.g. more economic activities and development, plus a wish for a significant population growth) have a negative consequence for the environment in Bodø?

Culture
- What does social and cultural sustainability mean to Bodø municipality?
- How do you integrate local knowledge/ wishes into the process?
- Does Bylab work as intended? How do you handle incoming proposals from the populations and other stakeholders?
- Does Bodø municipality oversell the development plans (cf. unrealistic images pictures fund in the media / at the municipality's website)?
- Internal communication: How is the information flow within the municipality?
- How often do you often meet across the different departments? How do you find information sharing works within the municipality?
- Do you share information internally after contact with companies/stakeholders beyond the formal meetings? Why /why not?

Closing Questions
- What do you perceive as barriers for developing a sustainable smart Bodø?
- Do you have any further comments or input to the topics discussed?