

Ana María Paz Mendoza

A Taxonomy for Indicators Related to the Sustainable Development Goals: A Norwegian Municipality Case Study

Master's thesis in Industrial Ecology

Supervisor: Helge Brattebø

July 2021

NTNU
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Kunnskap for en bedre verden

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Preface

After 2 years my time at NTNU comes to an end, in the blink of an eye. These past years have come with endless adventures, stories, new friends, and huge personal and professional growth.

I would first like to thank my supervisor, Helge Brattebø for his continuous guidance and feedback and for always helping me put my ideas on the right track. I would also like to thank Geir Graff and all my interviewees at the municipalities, for making the case studies possible and sharing their valuable time, knowledge and insights with me.

I am extremely grateful to the Indecol/ Circle bunch, I could not have asked for a better class to go through this masters journey with, thanks for all the support, knowledge sharing, and heart opening experiences to becoming my Norwegian family, you guys have impacted me in a very special way. To my home away from home, Dunia and Juan Carlos who proved to be the best coincidence of meeting outside our home country. Special thanks to Jessica and all the Kueponi team, for being so supportive of this journey before it actually started, for keeping me in the loop and motivated and helping me arise from challenges as always.

I'd also like to thank Marco, *il mio ragazzo*, for becoming my rock, for supporting me throughout stressful periods of time, helping me structure my ideas, and believing in me. And most importantly, I'd like to thank my family (M, F, Grandma and Guachis) for being my #1 supporters and encouraging me to always go further, to step out of my comfort zone, to be fearless and continue following my dreams. I owe it all to you.

Abstract

Global conditions are pushing cities and municipalities to a deeper involvement in sustainability. The 2030 Agenda contributes as a framework for multi-level stakeholders to aim for the Sustainable Development Goals. In efforts to track progress on sustainability, municipalities in Norway have used international indicator sets such as the U4SSC KPIs to track such progress. Although several international sustainability indicator sets provide information on progress and allow tracking, concerns from municipalities have raised in the inability to localize indicators for their municipalities. In 2021 a taxonomy for indicators related to the SDGs has been published to aid in such issue. To understand whether this taxonomy can enable municipalities in localizing indicators and be integrated into their strategies, a case study with 4 Norwegian municipalities was carried out through semi-structured interviews to analyze first-hand information on its application. An analysis of these interviews yields the taxonomy is not as intuitive as desired, however, it is a tool that proposes good questioning and classification methods to discuss and define whether indicators analyzed are appropriate and can contribute to the municipality's future plans and strategies.

List of Abbreviations

ETSI European Telecommunications Standards Institute

ISO International Organization for Standardization

ITU International Telecommunication Union

ITU-T Telecommunication Standardization Sector

KS Norwegian Association of Local and Regional Authorities

KPI Key Performance Indicator

OECD The Organisation for Economic Co-operation and Development

SDG Sustainable Development Goals

SME Small and Medium-Sized Enterprises

TBL Triple Bottom Line

U4SSC United for Smart Sustainable Cities

VLR Voluntary Local Reviews

VNR Voluntary National Review

1 Introduction

This section will provide an introduction to the focus of the project as well as the cases analyzed.

1.1 Background

Current conditions are pushing cities towards a deeper involvement in sustainability (Ibrahim et al. 2015) to find new ways of providing their services in such a way that environmental impacts are reduced, society is more integrated and economic resources turn more efficient (Trindade et al. 2017). These efforts have ultimately led to cities not only searching for other forms of management but also on assessing their performance (Spangenberg et al. 2002).

The sustainable development goals make an emphasis on the need for multi-level governance and multi-stakeholder actions to reach these global goals. As a means to attain them, cities as high-influence areas are critical sites in meeting these local actions that impact globally, reason why at a world-wide scale, cities are concerned and working towards sustainability in different aspects (Fenton & Gustafsson 2017). At a national level, Norway has committed to the Sustainable Development Goals and as a result Norwegian municipalities also align to the 2030 Agenda, to the SDGs along with policies and the inclusion of sustainable development in budget plans, relying not only on federal actions but also on municipal actions (Bondevik 2004) (KS 2020). With current global social, economic and environmental conditions, the demand for city sustainability has increased worldwide, involving issues such as the development of tools and indicators that measure a city's sustainability (Ibrahim et al. 2015) as well as other forms of management to as-

sess their performance (Spangenberg et al. 2002). As an effect, sustainability taxonomies and relevant indicators gain importance as they provide a summary of information about specific sustainability aspects that may help in reaching sustainability targets and also benchmark actions.

In terms of the SDGs, it has been assessed that 105 out of the 169 SDG targets cannot be reached without local and regional authorities (KS 2021). In Norway, KS is the association for Local and Regional Authorities who is responsible for supporting SDGs and sustainability actions at a municipal level. KS current challenge to translate global sustainability goals to a regional level and scope has led them to have measures that connect local actions to global sustainability goals. Through it's voluntary subnational review, KS has assessed all municipalities in terms of the 2030 Agenda to understand the commitments, strains but also success in regionalizing the SDGs. There is a significant variation in maturity in terms of the municipalities and their implementation of the SDGs, where some are global and national leaders while others have just started incorporating sustainability strategies (KS 2021). Although there are strong commitments in local authorities from all around the country, tendency shows larger municipalities have a longer history when working with the SDGs, with further leveraging measures to cooperate with internal and external stakeholders and a more developed implementation strategy related to the SDGs.

Although Norwegian municipalities have been using and reporting KPIs that align to certain sustainability aspects, the U4SSC assessment exercise where municipalities were involved in an international assessment, became a turning point for the use of such KPIs in Norwegian municipalities as well as their relevance. The U4SSC assessment helped to acknowledge the need of further working in such aspects with the purpose of addressing relevant sustainability matters within the municipalities. Through the assessment results and feedback provided from June 2020 onward, came an interest from KS to develop a tool that can better suit the Norwegian context, with the purpose to aid in meaningful decision making to those in use.

With the objective of having a sustainability taxonomy that is applicable and replicable among Norwegian municipalities, KS recurred to Statistics Norway, as the country's

main collector and communicator of official statistics, to assist KS in the development of a new sustainability taxonomy. As a result "A taxonomy for indicators related to the Sustainable Development Goals" was developed by SSB throughout 2020 and became public in February 2021 and March 2021 (English version). The purpose of this newly created taxonomy is to serve as a basis to classify and identify relevant indicators that serve a specific goal, perspective and have an acceptable level of quality, while giving decision makers the flexibility to assess indicators tailored to their needs (SSB 2021). Given that this is a recently published tool, some Norwegian municipalities are now starting to apply it to assess indicators with the purpose to evaluate whether they align to the municipal plans and strategies.

1.2 Research goal and research questions

The focus of this thesis is to understand the taxonomy for indicators related to the Sustainable Development Goals, created by Statistics Norway and analyze its application within the selected municipalities (Ålesund, Asker, Rana and Trondheim).

The aim of the project is to perform an analysis on current application processes and expectations of these municipalities that have already used and could potentially use this tool in their work within the municipalities as well as to advice on approaches for the implementation of the taxonomy in a Norwegian municipal context.

To fulfill the aim of this thesis project, the following goal has been identified:

How is the recently created SSB "Taxonomy for indicators related to the Sustainable Development Goals" (referred to as **The Taxonomy** in the rest of the report) of relevance for assessing indicators used within Norwegian municipalities to report their sustainability performance on significant aspects and for decision making?

To reach the project goal, research is centered on the following research questions.

Research questions 1 and 2 will be addressed through a literature study.

Which are current methods and tools to assess sustainability at a city or municipal level and what information do they provide? (RQ-1)

To what extent will the use of the SSB Taxonomy give different kinds of results to other tools that assess sustainability indicators? (RQ-2)

The case study through semi-structured interviews along with the literature review will approach research question 3 and 4.

How applicable and useful is the SSB Taxonomy and what are some preliminary results of it in the analyzed municipalities? (RQ-3)

From the perspective of the analyzed municipalities, what is the value, strengths and challenges in the application of the SSB Taxonomy? (RQ-4)

This report consists on the definition of problem and scope, followed by a research goal and questions targeted to aim to address the problem. chapter 2 addresses background knowledge and theory found in literature. All details regarding the methodology through which the project was developed, can be found in chapter 3 and chapter 4 focuses on the results from the case studies for the municipalities. chapter 5 is centered on the discussions and findings from the study case and literature study and chapter 6 provides the conclusions for all the project.

2 Theory

In this chapter, information obtained from literature will be addressed to have a general understanding on research done on indicator tools related to sustainability in a city or municipal application level, as well as Norwegian context in terms of the SDGs and the taxonomy of indicators related to the SDGs.

2.1 Cities and Sustainability

Since cities concentrate 70% of population groups and generate 80% of the global GDP, it is no surprise that sustainability is significant and represents a challenge with all businesses, governmental structures and resources gathered in cities (OECD 2001). The increase of consumption patterns as well as climate change as an effect of a rapid increase in cities has had detrimental effects on societies grouped up in cities (Jaeger et al. 2009). As an effect, cities increasingly continue to search for ways to improve their services, infrastructure and actions that boost the social, environmental and economic conditions (Trindade et al. 2017) through strategic plans to make them smarter, more efficient, friendlier for society, while still being cost effective (Carli et al. 2013). This shift in city management has brought up concepts such as intelligent cities, a predecessor of the current concept of smart city (Yigitcanlar 2015), which indicates that in order to meet certain sustainability goals, cities are measured, monitored and managed in an intelligent form (Carli et al. 2013). These are enabled through the digital transformation that applies to significant areas such as the energy, education, human health, and urban governance (Deakin et al. 2002), making ICT and green technologies a necessary tool to tackle current city issues (Lee et al. 2014) which are considered the core idea of concepts

such as eco-cities, smart cities and smart sustainable cities (Yigitcanlar 2014). In efforts to simplify the ongoing discussion of what a smart city and similar concepts represent (Angelidou 2015), the ITU-T Y.4900 has defined "A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental, as well as cultural aspects" (ITU-T 2016*a*).

Research indicates a high complexity in the demands that come from city sustainability, involving the development of tools to manage and measure a city's sustainability performance. However, sets of variables and indicators help to simplify urban management systems by grouping relevant aspects of the city and evaluating them (Spangenberg et al. 2002). To guide and measure a city's sustainable journey, sustainability taxonomies and indicators have been considered a vital tool to assess, report and reorient progress towards goals related to sustainability. The main objective for such indicators is to show the level of sustainability the city has through certain results, that could provide input to guide decisions, policies and communication to the public (Ibrahim et al. 2015).

Cities have had the responsibility of creating, managing and assessing their own indicators which is an important responsibility due to the fact that the city's decisions are based on such (Kitchin et al. 2015). Each city has its own goals making indicators a relevant tool to use as a way to assess the city's performance and intertwine it with relevant goals in efforts to meet the city's needs (Huovila et al. 2019), with three specific purposes; to monitor, control and benchmark current activities in the city in terms of sustainability (Repetti & Desthieux 2005).

However, there is still a dilemma on whether there should be a common standardization of indicators for cities' comparison or if localized indicators are a better target (Moreno Pires et al. 2014). There is questioning whether standardized indicators are able to cover the relevant aspects, ranging from cities with ready-made information to small islands with no-tech infrastructures (Dahl 1997), making the unification of these efforts a challenge to comprehend these common harmonized indicators in various territorial levels (Moreno Pires et al. 2014). On the other hand, although standardized indicators rarely

pinpoint local problems, the identification of a few common matters still provides useful information for comparison analyses among cities (Dhakal & Imura 2003). Standardized sustainability indicators are usually proposed by non-governmental organizations that often have certain interests in regards to sustainability (Sébastien & Bauler 2013). Part of the benefit of standardized indicators is they are simple and easily comparable indicators for high level decision makers and the public in general (Moreno Pires et al. 2014).

The selection of a relevant KPIs for a specific city relies not only on the goals targeted by the city but also on the development of the city, the time scale for evaluation, the spatial scale or scope as well as its purpose (Deakin et al. 2002). Due to differences among context, needs and goals, there is no such sustainability indicator tool that fits all (Dhakal & Imura 2003), these differences must be considered when selecting a specific taxonomy and also to avoid having indicators that are meaningless for a city's strategy as a result of the incompatibility with the context (Borsekova et al. 2018). It is of utmost importance that cities select indicators that align to their needs and are adaptable enough to fulfill and best support their agendas (Moreno Pires et al. 2014), as indicators should reflect the political, cultural, and institutional context of the city (Bakkes 1997). Available indicators should be used to support the fulfillment of a city's needs rather than being used as the main goal approach, KPI results provide specific information about the city but cannot completely grasp all relevant details and aspects about the city (Huovila et al. 2019).

Challenges applicable to these matters lie along the lines that indicator sets are focused on the "what", conceptually involving and addressing what a sustainable city represents and what criteria must be met, in the sense that specific topics suggest the city contributes or sets efforts towards specific matters, however, the "how" which is criticized by (Kaika 2017) as more relevant, is left in uncertainty. It is true that these results provide a sense of reality of certain conditions, yet how a city should or can address these existing conditions to make real change towards the city's agenda, is not considered at all within these applicable KPIs.

2.2 Sustainability Indicator Tools

Before continuing to address these terms, it is important to clarify purposes and applications to the terms such as "indicator" and "taxonomy". Indicators, often times referred as KPIs are measurable aspects that are used for monitoring changes along a certain period of time, indicators alone provide information on specific measured aspects. On the other hand, taxonomies are the grouping and classification scheme of categories and subcategories that enable a more clear and structured understanding of topics (EPA 2012). It is also relevant to acknowledge that taxonomies are the way different aspects are considered or viewed, however, indicators are a way to account and measure for those specific topics. Currently various sets of indicators for sustainable cities are available, making decision makers question themselves which is a better fit. KPIs by themselves support and provide certain information, however due to the differences in existing specific focuses, it is suggested to have expert advisory to make good use of these tools, to understand and manage them properly (Huovila et al. 2019). Taxonomies related to sustainability range from various forms of divisions or categories, research shows that although there may be several forms of classification or division, tendency still relies in the use of the triple bottom line which involves society, environment and economy. Where society, often times referenced as people, involves matters related to the society and persons, whereas the environment or planet considers environmentally related aspects and economy, often referred as prosperity, involves financial and economic aspects of a city's sustainability (Hák et al. 2007). This provides for a relevant focus on indicators as these are able to target the triple bottom line differently.

Research shows studies on aspects relevant to sustainability taxonomies for cities through different approaches such as urban focus, city sectors and indicator types (Huovila et al. 2019). Huovila's study compares 7 different indicator sets, including the ISO, ETSI, ITU-T, and SDG 11. In this comparison, relevant differences can easily be seen through the division of the main categories, as well as the amount of indicators used for each, Figure 2.1 illustrates the flexibility of scope and focus among some relevant indicators, however real impact lies within the aspects involved in the indicators.

Name, type and abbreviation	Main categories	Number of indicators
ISO 37120:2018 sustainable development of communities – indicators for city services and quality of life (ISO, 2018a) International non mandatory standard Abbreviated here "ISO 37120"	Economy, education, energy, environment and climate change, finance, governance, health, housing, population and social conditions, recreation, safety, solid waste, sport and culture, telecommunication, transportation, urban/local agriculture and food security, urban planning, wastewater, water	104
ISO/DIS 37122:2018 sustainable development in communities - indicators for Smart cities (ISO, 2018b) DIS = draft international standard Abbreviated here "ISO 37122"	Economy, education, energy, environment and climate change, finance, governance, health, housing, population and social conditions, recreation, safety, solid waste, sport and culture, telecommunication, transportation, urban/local agriculture and food security, urban planning, wastewater, water	85
ETSI TS 103 463 key performance indicators for sustainable digital multiservice cities (ETSI, 2017a) TS = technical specification Abbreviated here "ETSI indicators"	People, planet, prosperity, governance	76
ITU-T Y.4901/L.1601 key performance indicators related to the use of information and communication technology in Smart sustainable cities (ITU, 2016b) Recommendation Abbreviated here "ITU 4901"	ICT, environmental sustainability, productivity, quality of life, equity and social inclusion, physical infrastructure	48
ITU-T Y.4902/L.1602 key performance indicators related to the sustainability impacts of information and communication technology in Smart sustainable cities (ITU, 2016c) Recommendation Abbreviated here "ITU 4902"	Environmental sustainability, productivity, quality of life, equity and social inclusion, physical infrastructure	30
ITU-T Y.4903/L.1603 key performance indicators for Smart sustainable cities to assess the achievement of sustainable development goals (ITU, 2016d) Recommendation Abbreviated here "ITU 4903"	Economy, environment, society and culture	52
Sustainable Development Goal 11 + monitoring framework (UN-Habitat et al., 2016) UN Inter-Agency Expert Group definition Abbreviated here "UN SDG 11 + indicators"	UN SDG targets 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11a, 11b, 11c, 1.4, 6.3	18

Figure 2.1: Summary of indicator standards on Smart sustainable cities (Huovila et al. 2019)

SDG 11

Indicators related to city sustainability have a strong correlation to SDG 11: Sustainable Cities and Communities that specifically address sustainability aspects in the context and responsibility of a city. City issues that have long before been identified such as transportation, air quality, waste management, cultural heritage to name a few, have now been summed up in another way through SDG 11 to "make cities and human settlements inclusive, safe, resilient and sustainable" (Kaika 2017).

ISO 37120:2018

The ISO 37120:2018 sustainable cities and communities- indicators for city services and quality of life provides a set of standardized indicators to measure and work on achieving sustainable development in cities, without providing any numerical targets or values as thresholds for the indicators. The standard acknowledges that some of the indicators in the list might not be under control of the city's management, but still suggest to report them to have a complete understanding of the city from the perspective of this set of indicators. For the interpretation of such results. This standard promotes considering a contextual analysis as well as approaching the different indicators within one category,

as solely focusing on one specific indicator from a complete compilation could lead to a distorted conclusion (ISO 2018*a*).

ISO 37122:2018

The ISO 37122:2018 - indicators for smart cities was published as a support to ISO 37120:2018 to provide additional indicators along with methodologies on how to approach them. The purpose of combining both standards is to tackle smart city issues such as rapid growth, identifying needs for smart infrastructure, innovation and growth, responding to climate change and the delivery of better services through technology. (ISO 2018*b*).

ETSI TS 103 463

The Key Performance Indicators for Sustainable Digital Multi-service Cities (ETSI TS 103 463 (2017)) is an indicator set proposed to show which smart city-like goals have been met and which others are attainable. 73 indicators are proposed for such purposes, basing 43 of them on existing frameworks and including 30 new indicators to fill gaps that were not met with the previously existing frameworks. This KPI sets approaches sustainable digital cities through people, planet, prosperity, governance and propagation categories (ETSI 2017).

ITU-T

ITU-T Y.4901, ITU-T Y.4902, and ITU-T Y.4903 are sets of recommendations provided by the International Telecommunication Union to provide guidance to cities in aspects relevant to ICT and smart sustainable cities through the use of relevant indicators. One of the purposes of these recommendations is to have a basis to indicate how sustainable a city is. The structure of the indicators are based on 4 main categories involving economics, social, environmental and governance. Indicators are focused on the contribution of ICT in its sustainability performance. These set of recommendation documents suggest an assessment previous to the implementation of ICT and another one post ICT operation. Although scope is the same and target is quite similar, categories and indicators within each recommendation differ, providing for a good complementation among the different recommendations (ITU-T 2016*b*).

U4SSC

Another indicator tool is through the Unites for Smart Sustainable Cities (U4SSC) which is an organization, that belongs to the United Nations who encourages the use of ITCs and similar technologies for a sustainable transition of cities, serving as a knowledge sharing platform through diverse work groups and initiatives. The U4SSC has several objectives such as the facilitating of guidance for decision makers in sustainable urban development, providing platforms for knowledge on SSC, encouraging the development of master plans and other documents for cities in transition, as well as the implementation of the Key performance indicators to assess cities' performance and the development of the Global Smart Sustainable Cities Index as a ranking of cities' smartness and sustainability, to name a few (U4SSC 2016). The U4SSC Implementation Program is divided into two; The assessment and verification of progress towards SSC and the establishment of the Global Smart Sustainable Cities Index. The U4SSC Key Performance Indicators serve to provide cities with a standardized method to collect data and measure their performance and progress in their achievement of the sustainable development goals, as well as the city's smartness and sustainability (ITU-T 2016*a*). As a way to measure the performance, the U4SSC assesses proposed indicators to help cities in understanding their performance in different sustainability city aspects. This set of indicators is based on the ITU-T Y.4903/L.1603; Key performance indicators for smart sustainable cities to assess the achievement of sustainable development goals, which were selected due to their applicability to all cities. Although these are applicable to all, given the targets each city or municipality has towards sustainability and city smartness as well as demographic, environmental and geographical conditions, the ITU-T suggests additional applicable indicators to those proposed within the core indicators list (ITU-T 2016*a*).

IAEG-SDGs

The Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) has developed an indicator framework for the 2030 Agenda, which is annually reviewed. This indicator framework is composed of a total of 247 indicators of which some are repeated among different targets, leaving 231 unique indicators which align to each SDG target. The

indicator framework suggests disaggregating data by income, sex, age, ethnicity, etc. where relevant (IAEG-SDG 2021).

2.3 The SDGs and their performance

In 2015, the UN came together in the definition of the Sustainable Development Goals with multiple member states, as a call to action to shift the world into a sustainable and resilient path (UN 2015). Through the proclamation of the 17 SDGs (Figure 2.2) and 169 targets, the 2030 Agenda was established as a continuation of the Millennium Development Goals to complete what they could not achieve. The goals and targets set promote action in critical importance areas for humanity and the planet, up until 2030. The purpose of this agenda is to guide decisions of every stakeholder involved at all levels and capacities to implement them in their priorities (UN 2015). The SDGs are an intertwined framework consisting of 17 goals which can be divided into 5 different areas or the "5 Ps"; People, Planet, Prosperity, Peace and Partnerships. People targets issues related to human beings such as putting an end to poverty and hunger, and promoting equality and dignity for all. Planet goes in terms of protection of the environment, and a sustainable consumption of resources. Prosperity promotes SDGs that ensure all humans may have a prosperous life with economic and technological progress. Peace fosters just, inclusive and free of violence societies and Partnerships promotes collaboration among countries in a multi-level to interlink the SDGs (UN 2015).

With the adoption of the 2030 Agenda in the implementation of the Sustainable Development Goals, member states have at a general level committed to the diffusion of information on progress related to the SDGs through Voluntary National Reviews (VNRs), which purpose is to present where the country stands in the implementation of the 2030 Agenda and its experience through it (OHCHR 2020). Voluntary National Reviews have an effect not only at a national level but also at a local level, reason why cities and regions from the UN member states have been localizing the SDGs as a tool for their strategies planning and execution. One of the follow up mechanisms of the 2030 Agenda involves reporting on progress in a regular basis, on different levels (national, sub-national) to share their performance on the agenda with relevant stakeholders. In consequence, Voluntary Local



Figure 2.2: The Sustainable Development Goals (UN 2016)

Reviews (VLRs) have increasingly been used to report on current strategies, challenges, and learning of the implementation of the SDGs within their scope. In addition, cities have recognized the local governments have a direct correlation to the SDGs, making this framework a meaningful set of priorities and objectives for cities (Deininger et al. 2019). VLRs within Europe have differences among locations in terms of the presence and type of indicators used. In previous years when a formal SDG monitoring framework was not set in place, VLRs lacked a quantitative approach and the inclusion of indicators. In the past 2 years, there has been an increase of statistical information with metadata in European VLRs (Figure 2.3), although an increasing tendency and work in terms of indicators is reflected, there is still approximately one third that continues to not include any type of statistical data (Ciambra 2021). Monitoring and measuring progress towards the SDGs is challenging, as few countries, including OECD members have data meeting enough requirements to purposefully report on progress. Monitoring this progress often requires the development of statistical capacity, including new types of measurement and data to improve guidance and standards (OECD n.d.).

67% of the European VLRs do not have fully developed statistical annexes presenting

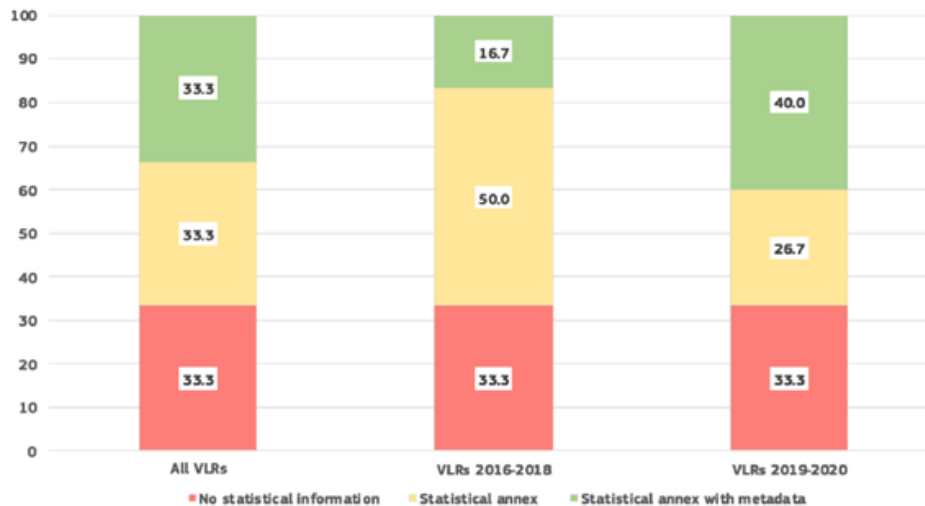


Figure 2.3: Degree of statistical information provided in European VLR (total and at different time splits). (Ciambra 2021)

their indicator structure or metadata, meaning it is not possible to know from documentation how these indicators were defined, designed or structured. Numerous VLRs have edited the official IAEG-SDG indicators to encompass a better local reality of their communities and reports. Indicator design in VLRs may portray to a certain degree the alignment between a regional policy and the SDG framework, through the ability to use local indicators for strategic planning and how it is reflected in the 2030 Agenda on the way the municipality measures its performance. In general, not much focus has been set on the design and selection of indicators for VLRs and statistical annexes. There are only few examples of VLRs who have designed SDG-compatible indicators that meet local purposes with traceable metric data, the most common source of indicators for VLRs rely on the use of official metrics, already collected by national statistics entities, which are often times taken by global data sets. Approximately 52% of all indicators used for European VLRs are locally designed (Ciambra 2021).

In terms of how European VLRs report and approach the SDGs, (Figure 2.4) shows an analysis by Ciambra, SDG 11: Sustainable cities and communities, is the most common goal reported among the localities, followed by SDG 8: Decent work and economic growth, SDG 3: Health and wellbeing and SDG 4: Quality Education. This aligns with local government responsibilities such as housing, roads and transport, supply of social services,

water management, education and healthcare (Ciambra 2021).

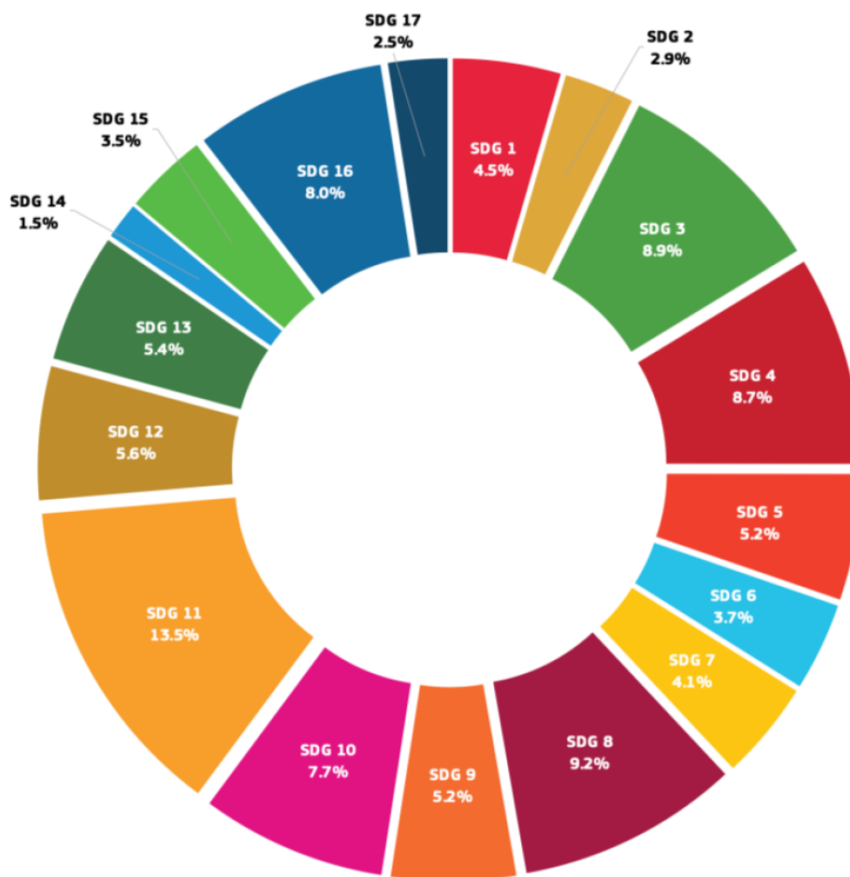


Figure 2.4: Distribution of indicators across all SDGs in European VLRs. (Ciambra 2021)

2.4 The Norwegian Context

Norway as a country has committed to the 2030 Agenda, implementing policies, initiatives and programs that contribute to the Sustainable Development Goals which has had significant results in the past years. Figure 2.5 shows Norway's condensed results where overall performance shows a strong commitment and results for SDG 1, SDG 3, SDG 4, SDG 5, SDG 6, SDG 7, SDG 8, SDG 9, SDG 10, SDG 11, SDG 16 and SDG 17. Although Norway is in the top 10 countries in terms of index, it still faces several major challenges, specially in the SDG 2: Zero hunger which as of 2021 has had stagnating performance; SDG 13: Climate Action with moderate improvements; SDG 15: Life on land which

has also been stagnating and SDG 12; Responsible consumption and production with no progress information available (KS 2021).



Figure 2.5: SDG Index: Norway Overall Performance (D. Sachs et al. 2021)

In order to fulfill and properly meet these goals, federal actions are needed yet there is also a strong reliance on local and regional authorities (Bondevik 2004). In the 2030 Agenda pathway, local authorities play a relevant role, as it has been assessed that 105 of the 169 SDG targets cannot be met without the involvement of local and regional authorities (KS 2021). In Norway, KS (The Association for Local and Regional Authorities) takes this responsibility in supporting sustainability efforts at a local level through

the municipalities and other regional scopes throughout the country. As part of recent efforts to gather and assess sustainability actions, success stories and challenges, KS has recently published a voluntary subnational review. Among the main findings within this review is the fact that although Norway, as a country, ranks #7 in the SDG Global Index (Figure 2.5), there are significant challenges and differences among local authorities throughout the country.

The SDG framework is challenging to set into plans and actions, specially when approaching global goals and actions at a local scale. Municipalities have pointed out a challenge to be able to fulfill this function in a strategically and knowledge-based form. One of the main barriers is access to tools and methods to integrate the SDG framework to current operations helping municipalities in starting with the framework (KS 2021). To counteract this challenge and as part of the main actions in terms of SDGs at a regional level, the Norwegian Network of Excellence on SDG City Transition is an initiative of joint municipalities, regional authorities, other organizations and KS which has the purpose of joining forces to regionalize the SDGs, to adopt them locally and accelerate their impact through these multi-level partnerships. It focuses on 4 main areas, spreading knowledge about the status to the community, develop plans for community development aiding how to meet the SDGs, mobilizes support among citizens, businesses and organizations to contribute to sustainable development and measures and assesses efforts through the implementation of U4SSC program and other methods. Engagement within this network shows significant differences among municipalities in access to relevant tools and methods for implementing the goals, in comparison to those that do not form part of the network (Figure 2.6). The network supports in SDG-related engagement, through the dissemination of guidebooks and tools to implement goals. At least half of municipalities who are members of the Network of Excellence have access to tools and methods for implementing the goals to a certain degree and higher, compared to municipalities who are not part of such network and an approximate of 80% have access to these tools to a certain degree and less. Municipalities within the network include Trondheim, Asker, Rana and Ålesund, among other 12 municipalities (KS 2021). Several larger municipalities lead in terms of sustainability maturity, with a longer history of having measures and approaches with greater leverage measures to involve stakeholders, however, there are also other munic-

ipalities who are now in the process of implementing such sustainability strategies (KS 2021).

The municipality has access to relevant tools and methods for implementing the goals

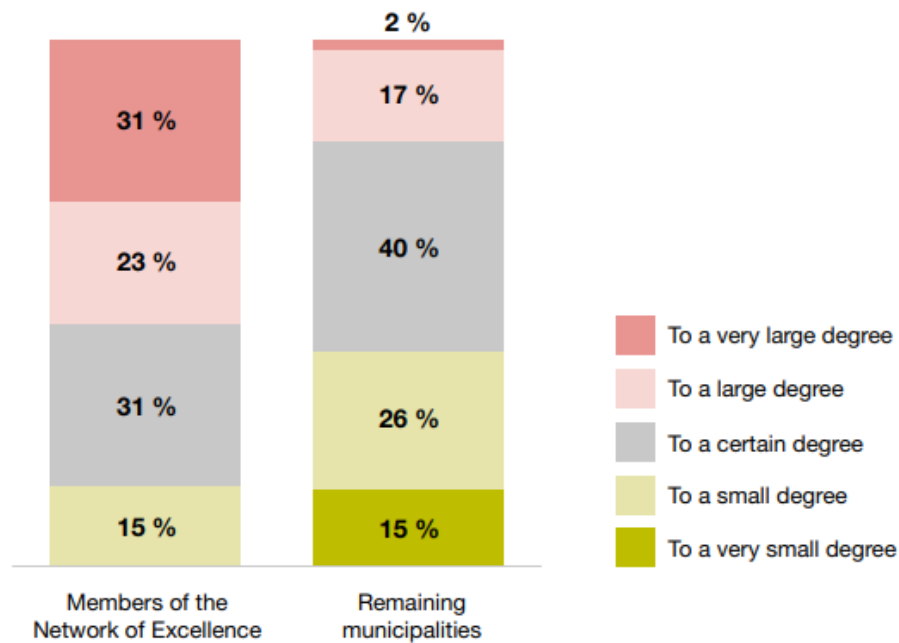


Figure 2.6: Access to tools and methods (KS 2021)

Norwegian municipalities and regional authorities in general perform above average compared to international standards, however, many strive to execute even better (KS 2021). This is reflected in the results obtained by the U4SSC assessment applied to municipalities in 2020 and 2021. More than 30 Norwegian municipalities have applied the U4SSC key performance indicators for smart sustainable cities in efforts to benchmark the municipalities' performance at regional and global level.

Norway's U4SSC Disc (Figure 2.7) displays the summarized performance results for all the municipalities that participated in the U4SSC KPI assessment. However, verification reports for all participating cities are public and available at the U4SSC web page, where these can be downloaded. These reports contain specific results for each KPI answered, as well as information on how well these results compare to the benchmark. In efforts to make these results condensed and holistic, the dashboards were created to show through a color scale how each indicator is evaluated in comparison to the benchmark, considering

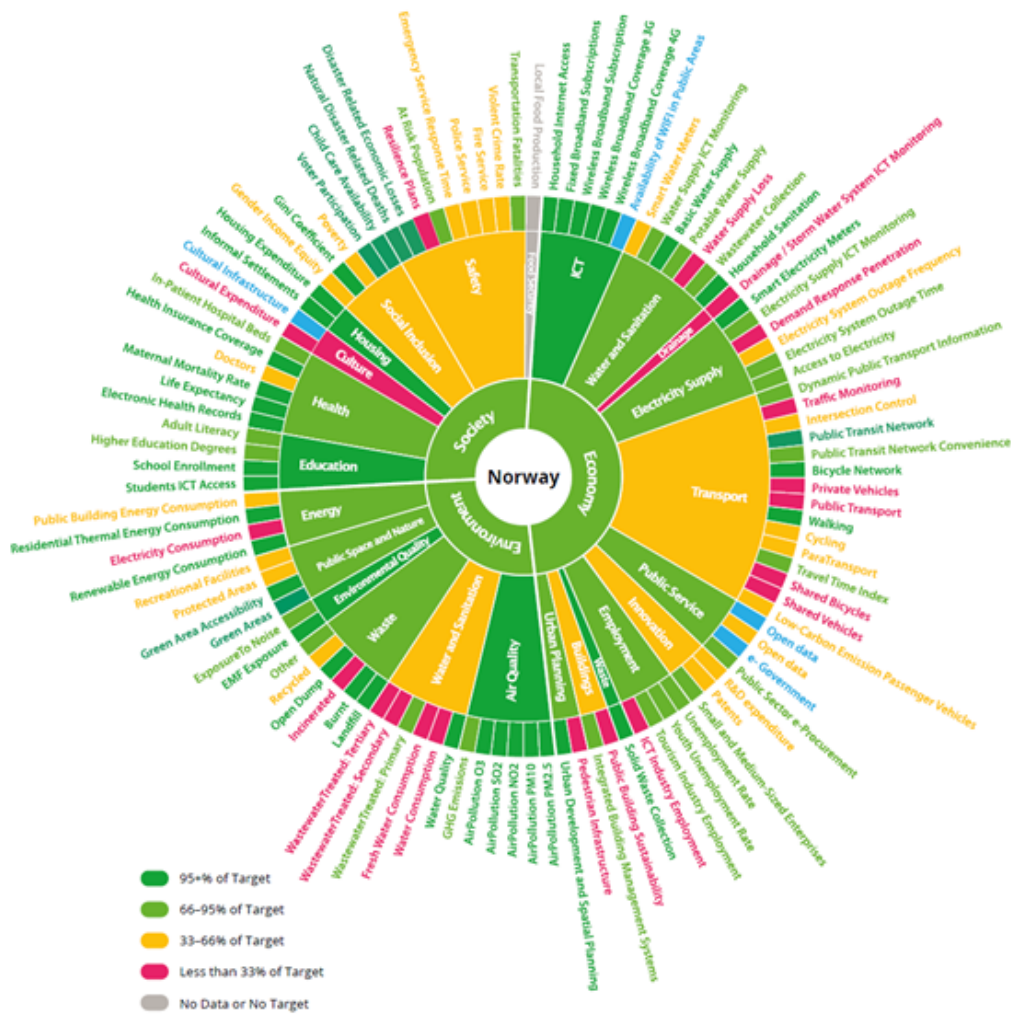


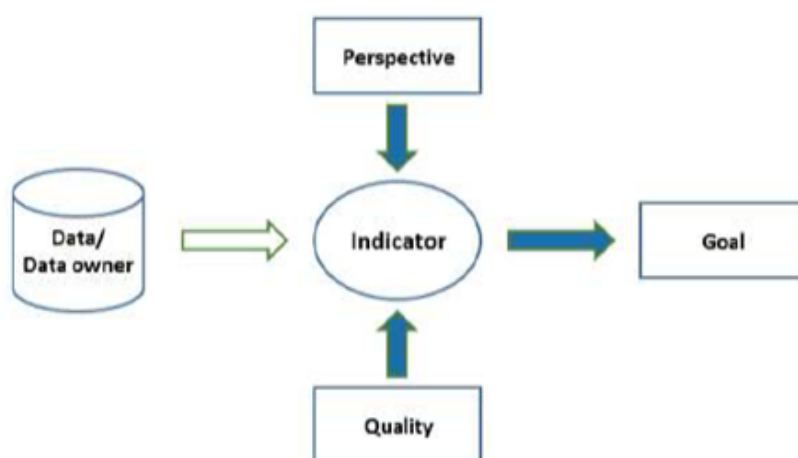
Figure 2.7: U4SSC Norway Disc Source: U4SSC

dark green if 95% of the target or more was met, light green indicates an evaluation of 66% to 95% of the target, yellow is for those that managed 33% to 66% of the target and orange is for those that had a result less than 33% of the target. Gray indicator categories specify the indicator has no data or data target and the blue indicators are those who are not yet reported, or have no available targets yet (U4SSC 2020). In this sense Norway has significantly good results in housing, ICT, education, air quality and environmental quality. A detailed comparison among the same U4SSC color-coding results from Norway and the municipalities of Ålesund, Asker, Rana and Trondheim may be found in Appendix C.

2.5 A Taxonomy for indicators related to the Sustainable Development Goal

The Taxonomy for indicators related to the Sustainable Development Goals was developed in 2020 and 2021 by Statistics Norway in partnership with KS with the purpose of sorting, evaluating and comparing indicators in terms of sustainability. The idea to create such tool came from a need to connect to the 17 SDGs and its 169 targets at regional and local levels (og moderniseringsministeren 2021). SSB as a natural partner for KS became the ideal entity to contribute to the construction of such taxonomy, which was made in respect to KS needs with the purpose of supplementing the taxonomy with additional elements missing in the proposed taxonomy (SSB 2021).

The taxonomy is a classification system which proposes central characteristics to help the user assess and classify an indicator in terms of 3 dimensions proposed; Goal, Perspective and Quality, to further improve its use and usability.



Source: Statistics Norway 2021

Figure 2.8: Conceptual Model for the Taxonomy (SSB 2021)

Figure 2.8 shows the conceptual model for the Taxonomy including its main elements. The principal element behind the use of the taxonomy are indicators, which can be defined as the summary representation of a theme area on a specific period of time, place and

other specific characteristics. On the other hand, a statistical indicator is expressed as a measurable value that provides a quantitative summary based on numerical information (SSB 2021). Indicators can be defined by one single indicator or can be the composition of various indicators, grouped to define one indicator, in such cases the indicator may be evaluated individually or as a group.

Data/Data Owner in the model (Figure 2.8) refers to the data input needed or owner of the indicator information. Perspective helps understand why the indicator is being used or which is the context it is used in. Goal remarks what the indicator is about, in terms of which SDG it contributes to or which aspect of the triple bottom line it can relate to. Quality identifies how useful the indicator is in terms of how well it is meeting its purpose or not (SSB 2021). When assessing an indicator, only the 3 dimensions; Goal, Perspective and Quality will be classified according to the Taxonomy (Figure 2.9)

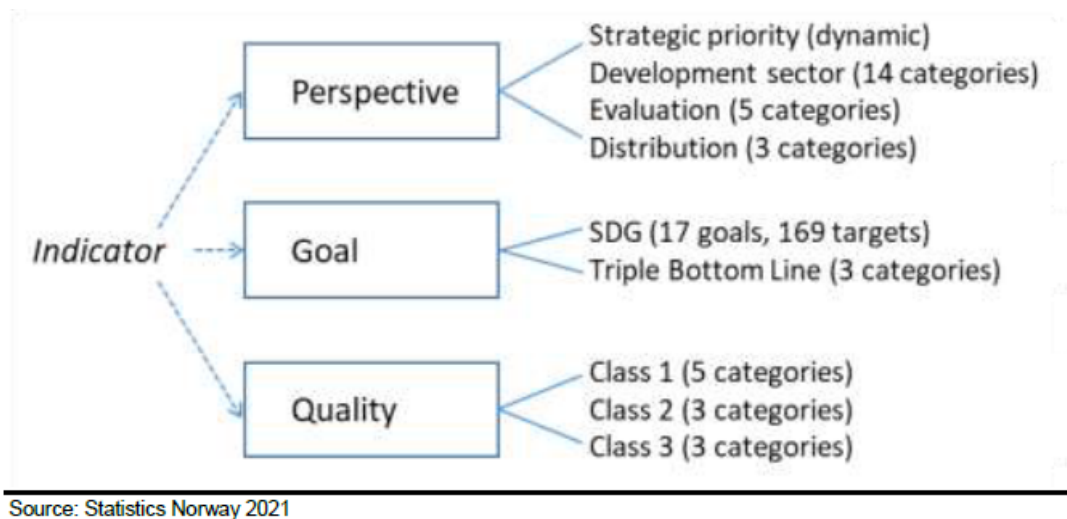


Figure 2.9: Taxonomy for SDG indicators (SSB 2021)

With the purpose of evaluating an indicator that aligns or contributes to a given SDG, the Goal category has been set, which serves as a central reference to the SDG framework. As shown in Table 2.1, the user must classify the indicator in terms of which SDG it relates to or with any of the 169 targets. In addition, the triple bottom line is also acknowledged within this category, meaning the user may classify the indicator in accordance to its contribution to People, Planet or Prosperity. Due to the fact that indicators often times contribute and align to various goals, the user may select more than one SDG, target or

triple bottom line category.

Goal	
Sustainable Development Goals	17 SDGs 169 targets
Triple Bottom Line	People Planet Prosperity

Table 2.1: Goal Categories (SSB 2021)

The perspective dimension aligns to the context of the indicator and relevance to the user. For this dimension, a classification must be met in at least one of the perspective types (Table 2.2); strategic priority, development sector, evaluation and distribution. Strategic priority does not have a given set of sub-categories, this is a dynamic category which means the user may formulate it to their needs. The strategic priority should not be confused with the goal, but rather should be considered as a means for managing the SDGs in the most desirable direction. The development sector category is relevant when allocating responsibility, often times in terms of management and reporting, and practices are divided among departments in the administration. When an indicator is seen from the development sector perspective, the user may further classify into any of the 14 categories (Table 2.2) proposed by the taxonomy for further acknowledgment. The evaluation perspective is most commonly used in a context of monitoring and evaluation, and is based on the econometric input-output model. When choosing this perspective category, the user must then specify under which of the 5 subcategories (input, process, output, outcome and impact) the indicator aligns to. The last perspective, distribution, is suggested when the indicator is needed more than once, whether that be on a different time span, location or different populations. When the user is in need to report on a periodical basis this perspective can be used specifying a starting point and subsequent series. This perspective also applies for the use and comparison of the same indicator among different geographic levels, enabling an approach on national, regional and municipal results for the same indicator. And lastly, it is also relevant when there is an approach to break down an indicator statistically in terms of socio-economic characteristics such

as age and ethnicity, among others (SSB 2021).

Perspective	
Strategic Priority	Dynamic to user needs
Development Sector	Natural environment Built environment Water and waste Transport Energy Economy Industry Work/Employment Childhood and education Culture Health, social services and welfare Safety and preparedness Governance and citizen engagement Digitalisation
Evaluation	Input Process Output Outcome Impact
Distribution	Time interval Lowest level of geography Socio-economic groups

Table 2.2: Perspective Categories (SSB 2021)

The last dimension of the taxonomy is Quality, which indicates how useful the indicator is for the purpose needed. At the point of analysis, the user must identify the indicator under one quality class shown in Table 2.3. An indicator may be classified as class 1 when it is usable as suggested by any well-established quality indicator, and meets all principles: Relevance; statistics correspond to user needs, Accuracy; data reflects reality, Timeliness; statistics are disseminated timely and punctually, Coherence and comparability; statistics

provide a compatible description of reality and Availability and Clarity; statistics are presented in a clear and understandable way, with enough metadata and a user guide. An indicator shall be classified under class 3 when it is not possible to measure it due to lack of data, lack of a proper method or it is simply not a measurable concept. An indicator will fall under class 2 when it is the midpoint between class 1 and class 3. A class 2 indicator does not meet class 1 requisites, and will have some time aspect under completion such as it being either under development, under planning for development or undecided (SSB 2021).

Quality	
Class 1	<p>The indicator can be statistically assessed based on all the following principles:</p> <ul style="list-style-type: none"> Relevance Accuracy Timeliness Coherence and comparability Availability and clarity
Class 2	<p>Does not belong to neither Class 1 or Class 3, and coincides with one of the following states:</p> <ul style="list-style-type: none"> Under development Under planning for development Undecided
Class 3	<p>The indicator is unavailable because least one of the following features is missing:</p> <ul style="list-style-type: none"> Data Method Measurable concept

Table 2.3: Quality Categories (SSB 2021)

3 Methodology

This chapter presents the methodologies used for the development of this thesis. Relevant methodologies are described in sections 3.1 and 3.2.

3.1 Literature Study

A literature review (chapter 2) was conducted to understand, frame and identify previous knowledge on the topic. The purpose of this research methodology is to provide an overview of a specific issue or the problem addressed within the research, addressing previous research with the purpose of researching and justifying new hypotheses and results (Snyder 2019).

To search for literature, key words shown in Table 3.1 were used to determine the main articles for the literature study.

Search words
Norway + Sustainability
Norwegian municipalities + SDGs
Sustainability + Taxonomy
Sustainability + city + indicators

Table 3.1: Literature Review Search Words

As a first step and through the use of the search words, articles with relevant titles to address the research question were considered in databases such as Scopus, Google

Scholar, ScienceDirect and ResearchGate. Consequently, the abstracts of those articles were read to ensure article was relevant for the purpose of this study. Further on a selection process took place, when an article's abstract provided information for the development of this project, it was downloaded. Research sample was selected from the previous steps for full-text reading, as the basis for the literature review. 20 articles were chosen as part of the main sample, from which articles as far back as 2014 were considered, however, in efforts to include relevant aspects a snowball effect was conducted with the main sample, including research older than 2014.

3.2 Case Study

An empirical case study (chapter 4) was conducted to gather first hand- qualitative data as a way to address the proposed research questions. The case study methodology was chosen for its relevance to this project as it provides for empirical inquiries that research on the specific case to a greater extent and with an focus on real-world context (Yin 2014).

Given the time limit to for this study and to be able cover relevant geographical areas of Norway, four municipalities were chosen, one for each region (north, south, east and west). In terms of representativeness, the chosen Norwegian municipalities were Ålesund, Asker, Rana and Trondheim.

Previous to having contact with the municipalities, a meeting was booked with one of the authors of the taxonomy at SSB to discuss general questions on the taxonomy and its application, as a means to have first-hand information in clarification of doubts regarding the taxonomy.

After the municipalities were chosen, a contact person (involved in the application of the U4SSC assessment) from each municipality was contacted through email to briefly explain the purpose of the current study and to request a video call. The contact person was asked to provide an indicator that is relevant to their municipality as well as to invite relevant colleagues that work with such indicator to the video-call with the purpose of sharing their knowledge, experience and takeaways of the "Taxonomy for indicators related to the SDG" by Statistics Norway.

Previous to the video calls with the informant, an interview guide was designed, to ensure key aspects were addressed during the video calls (Appendix A). One video-call was carried out for each municipality involving the positions shown in Table 3.2.

Municipality	Position
Ålesund	Advisor to the municipal director- Environment urban and rural development Strategy society and business advisor
Asker	Program manager of Sustainable Asker Strategy counselor Case worker in mobility and transport GIS specialist Member of the center for innovation and learning
Rana	Municipal planner
Trondheim	Advisor for the CEO- Head of smart city Advisor for the CEO- finance function

Table 3.2: Interview informants

As one of the most common qualitative data-collection tools, an interview was used due to its possibility to obtain in-depth data and its conversational approach (Jamshed (2014)). The semi-structured interview method was applied through 1-hour video calls with each of the informants, focusing on the interview guide (Appendix A) but leading to open discussions. The interview guide consisted of three sections; initial questions, the application of the taxonomy and the end questions. The purpose of the initial questions was to understand at which point each municipality was currently at with the use of the taxonomy. Given that the Taxonomy was published in February 2021, and the level of

application for each municipality and their knowledge on the taxonomy was unknown until the interview date, a brief explanation of the taxonomy was included within the interview as a way to make sure all informants got a general idea about its application to provide inputs for preliminary results on the application of the taxonomy. The third part consisted of open questions to understand some possibilities and limitations of the taxonomy within their municipalities. Responses to the interviews were then gathered for further analysis.

4 Case Results

In this chapter the cases for each municipality will be explained through data provided by the informants of each municipality. Relevant information from each municipality in terms of the application of the taxonomy is incorporated in this section, including a background check to understand the participants' involvement with the taxonomy, preliminary results from the application of the taxonomy and future possibilities of the application of the taxonomy within each municipality as well as assets and challenges. Findings from the cases and analysis involving theoretical background from chapter 2 will be discussed in chapter 5. To understand how results were gathered refer to the methodology in chapter 3.

Interviews with each municipality were carried out in 3 sections as shown in Figure 4.1, a detailed version of the questions and answers provided by the informants may be found in Appendix A and Appendix B. The first part of the interview; **a) Current knowledge of the taxonomy** was based on questions to understand how much the informants knew about the taxonomy at the moment of the interview. Given that each municipality interview was handled with various participants, it was also relevant to understand who, if any of the participants had insights and knowledge on it. Likewise, municipalities have had different approaches to the use of the taxonomy, meaning some have already started implementing it while others have not yet been further involved with it. With the double-purpose of ensuring all municipality interview participants were able to understand the taxonomy and to discuss the thought process behind the use of the taxonomy, **b) The taxonomy in practice** section was implemented. This part of the interview was conformed by a brief explanation of dimensions proposed in the taxonomy, an example and an exercise to practically apply the taxonomy. The exercise consisted in applying the taxonomy on a relevant indicator proposed by the municipality, through a selection of

questions to lead a discussion on which option would be better with each of the dimensions in regards to the indicator selected. After the brief exercise on how the taxonomy may be applied and what type of outputs it provides, informants were asked to provide their insights on c) **The taxonomy as a strategic instrument**, as a way to understand the usefulness of the application of the taxonomy in their municipalities as well as some possible challenges, considering their previous experience and discussion from the exercise applied in the interview.

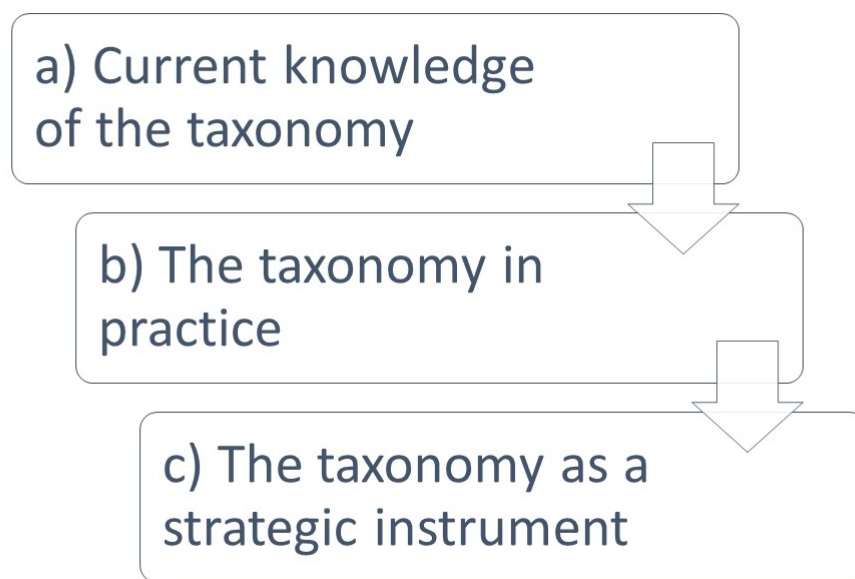


Figure 4.1: Interview Theme Areas (Own elaboration)

4.1 Current knowledge on the taxonomy

This section summarizes current position of each municipality in terms of deployment of the taxonomy and the general background knowledge of the participants within each municipality.

4.1.1 Ålesund

Participants in this municipality specified being involved in initial meetings for the development of the taxonomy, quite some time before the interview for this project. Out of the 2 participants, one had read the taxonomy and another had only heard about it, however, the taxonomy had not yet been implemented within the municipality.

4.1.2 Asker

As one of the leading municipalities who has already started applying the taxonomy to the municipal indicators, Asker had a mix of participants who were very engaged in the application and analysis of the taxonomy, as well as supporting collaborators who had a more general overview of the taxonomy but could contribute to the discussions regarding a specific indicator. Asker must deliver its complete set of indicators at the end of June, reason why they have taken a speedy approach to use the taxonomy, making it their tool to define which indicators are most suitable for the different targets and goals in the municipal plan.

4.1.3 Rana

The participant at Rana specified no current use on the taxonomy at the municipality. In terms of knowledge about the taxonomy, at the moment of the interview, she had heard about it and had an overall idea on it but had not yet read it. At the moment of the interview Rana had not deployed the taxonomy.

4.1.4 Trondheim

This municipality is already in the process of working with the taxonomy with the purpose of assessing the indicators for their 2022 four-year action plan, meaning the indicators selected with the support of the taxonomy will be applied starting in 2022. One of the participants from Trondheim confirmed to be quite familiar with the taxonomy as he had been participating in the action plan to deploy it in Trondheim and also been part of the reference group to develop the taxonomy. Current application of the taxonomy

withing Trondheim municipality, has mostly relied on people who own the indicators, in a top-down approach, where leaders take responsibility on assessing their indicators with his/her team. As an initial step, there was a structure of quality and demands on the organization but now that it is done, it's more up to the different departments to take it from there, to further assess and develop the indicators.

4.2 The Taxonomy in practice

This section presents all results obtained from the exercise of applying the taxonomy to a given indicator for each municipality. A table for each municipality resumes the results and the description focuses on the thought process of how participants chose such options.

4.2.1 Ålesund

Table 4.1: Ålesund Indicator Exercise

Indicator: Share of people cycling in Ålesund		
Goal	Perspective	Quality
SDG 11, SDG 3 and SDG 13 People, Planet and Prosperity	Strategic Priority	Class 2

Goal: This indicator directly aligns to SDG 11: Sustainable cities and communities, however, it can also be linked to SDG 3: Good health and well-being and also SDG 13: Climate action. As a more direct link, SDG 11 would be the main SDG, however a higher degree of cycling may also be linked to SDG 3 as societies with higher amounts of cycling have better health in general. The degree of cycling within a city also leads to economic effects, when comparing costs of using cars and bicycles, bikes represent a general lower cost, which in turn further contributes to reduced inequalities; enabling a larger sample of users to commute at a lower cost. In terms of triple bottom line, this indicator aligns to the People sphere, as an increased cycling share provides an option for people to move effectively and contributes to public health in a long term. The Planet sphere is also aligned to this indicator considering that a bicycle runs on human energy while the use of cars strongly rely on energy sources that affect the environment. The environmental

footprint of using a bicycle is significantly lower than that of a car, considering that its greatest impact phase relies on its production, yet the production phases for bicycles and cars have significant differences, leaving little room for comparison. Furthermore, space required for both (cars and bicycles) also affects the environmental footprint, with reference to the parking spaces and lanes, where bikes also represent a benefit. In terms of prosperity, a car is much more expensive to have (parking, fuels or electricity), specially in bigger cities, while bicycles allow people to save money. In summary, all aspects of the triple bottom line are aligned to this indicator to a certain extent.

Perspective: The chosen indicator (table 4.1) aligns more directly to the strategic priority category because part of the strategy is destined to land use plans, which play an important role, and have a destined budget. In order to successfully meet the goal of getting more people to cycle through the city, work on many fronts needs to be done as well as different stakeholders actions. Current priorities rely on transportation, understanding shares of people commuting by bicycles or cars. This indicator can be addressed through a strategic priority perspective which also contributes to change in policies aligned to those priorities and it is useful to understand whether policy changes were successful or not. As a side element, the goal or target could be reached through other initiatives such as walking instead of cycling, in this sense it is relevant to consider the total package; an increase in active modes of transportation. Although cycling is not the only answer to meet this strategic priority, it is one that strongly contributes to it, therefore the relevance of assessing the indicator in terms of a strategic perspective.

Quality: The quality class can be classified as 2. The method used to gather this data is done through the use of phone calls which are becoming more obsolete, making this data collection not as effective as desired. The municipality however, knows what should be measured to be improved, and there is currently a decent accuracy, but the quality can be at times irregular. Participants indicated that the quality of this indicator could be improved by having a larger sample, to help make it more trustworthy.

Table 4.2: Asker Indicator Exercise

Indicator: Percentage of inhabitants living in areas within less than 500 meters to the nearest public transport		
Goal	Perspective	Quality
SDG 11 Target 11.2 People, Planet and Prosperity	Evaluation (Impact)	Class 2

4.2.2 Asker

Goal: Table 4.2 shows the general results of the application of the taxonomy with the indicator chosen at Asker municipality with focuses on the percentage of inhabitants living in areas within less than 500 meters to the nearest public transport. The Goal dimension was previously defined by the participants at Asker, setting SDG 11: Sustainable cities and communities, as the more direct goal to this indicator, specially aligning to the SDG target 11.2 "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons" (UN 2020). The indicator provides certain insights, meaning this is one of the indicators to be assessed as part of a broader analysis to be able to fully address target 11.2 as a whole. To understand Asker's contribution to target 11.2, other data must be considered, however, this supports it to a certain extent. As a one of the municipality's goals, this indicator aligns to the municipal master plan's goal of good solutions in terms of transport and use of area in the municipality. In terms of triple bottom line, this indicator aligns to all three. Initial thoughts lead to relevance in the planet sphere, as the use of public transport has a direct effect on a decrease in use of cars, however, as secondary effects, the people and prosperity spheres are also indirectly affected by results of the analyzed indicator.

Perspective: Defining the indicator in terms of perspective led to a discussion on the applicability of each perspective. Participants agreed that it could be categorized on any of the 4 options, depending on the context or way of addressing it. It could fit into the strategic priority, but would also be relevant as a development sector perspective as well as an evaluation perspective to be able to compare the effect of strategies applied to it, and to be comparable over time. The context or purpose for this indicator is to

select and apply a strategy to see how it develops over time. Another way to classify this indicator into a perspective would be to compare it among different socioeconomic groups and differences among these; perhaps a socioeconomic group with a lower income would have to rely more on use of public transportation, however, in order to assess this, additional indicator elements would be needed. To fully assess the effects of public transportation, the nearest public transport would require additional information, as it cannot be directly inferred that people will use public transportation just because they have a transport stop near to their house. The indicator provides information on how near a transportation stop is to where people live, rather than how often/full, or whether people decide to take it or not, as well as any other effects the impact of this could have on society. Previous discussion among the municipality participants, on this indicator perspective pointed to the Evaluation category considering aspects among the input and impact, as these could provide a narrower set of results in terms of what the indicator is actually informing about. To be able to fully understand the impact of this indicator and how it can possibly have better results, additional data points would be needed, such as pricing, frequency, reasons for commuting, etc. The combination of this indicator with supporting indicators as sources of data would potentially grasp relevant aspects as why and how public transportation is seen and used by users, as a whole.

Quality: The Quality dimension was defined as class 2 (see Table 4.2) because the municipality currently has a methodology, however informants admitted that certain improvements could be done to the method. Although the quality be improved, it was confirmed by Asker’s participants that it would not require much actions or effort to be able to have the quality of this indicator in a class 1 category.

4.2.3 Rana

Table 4.3: Rana Indicator Exercise

Indicator: School drop-out rate		
Goal	Perspective	Quality
SDG 4, SDG 3 and SDG 10 People, Planet and Prosperity	Development Sector	Class 1

Goal: Participants pointed out the dropout rate within schools relates to three sustainable development goals; SDG 4: Quality Education, SDG3: Good health and well-being and SDG 10: Reduced inequalities. This indicator is linked to these SDGs because the drop out rate directly relates to people who will not go through middle and higher levels of education, leaving them at a risk of being left out from education and employment possibilities. Good quality education is a goal that ensures qualified labor in businesses. This indicator is related to SDG 3 because people who do not have an education or are not part of the workforce tend to have an increased risk of poorer health. In terms of public health work, education is an indicator that correlates to a certain extent to good health and population. Lastly, this indicator also has some share on the reduced inequalities SDG, as inequalities in education tend to reflect in inequalities in possibilities, society and health. In terms of the triple bottom line, it mainly reflects on the people dimension. Dropping out of school and not having a good education is linked to people's health and well-being. However, there's also a relation to the planet sphere, people with a better education are able to have a better quality life and may contribute more towards a sustainable development. In terms of prosperity, businesses need skilled labor, so higher educated people are able to enter workforce and reduce unemployment, when people drop out of school, the opposite effect occurs. This indicator contributes to all 3 triple bottom line spheres.

Perspective: The purpose for looking at this indicator is that there is a strategic priority to reduce exclusion within the municipality, and a lot of work has been done to better develop skills for this purpose. However, if this indicator had to be classified under one of the perspective options, the development sector category would fit it best. Childhood education, social services, welfare and some citizen engagement are the most important in the deployment because businesses need workers, and they all relate to each other.

Quality: This indicator's quality would better fit under the class 1 category because this indicator can be found in the statistic bank for all the municipalities. This indicator has been developed to an extent that it can be compared to other municipalities and at a national level. When looking at the indicator of the school drop-out rate, the parents education level is also available. This type of depth of information on such indicator enables the user to see whether strategies in schools and kindergartens such as the "early

intervention”, have had a positive effect. For years, there has been a correlation showing that children of parents with low education have higher dropout rates. Through this tendency there is a link with SDG 10 and also a possibility to see if strategies to prevent social inequality are working. Up to this point the depth and quality of the indicator are really good.

4.2.4 Trondheim

Table 4.4: Rana Indicator Exercise

Indicator: Percentage of citizens that can ride their bike from their homes to the city center on accessible infrastructure.		
Goal	Perspective	Quality
SDG 11 People and Planet	Evaluation	Class 2

Goal: This indicator relates to SDG 11: Sustainable cities and communities, specially to the 11.2 target; ”By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons” (UN 2020). Last year the municipality did an exercise to set the overall goals for Trondheim municipality, which are 12 goals. Based on these goals, each sector in Trondheim municipality has developed their own four-year goals. Part of the exercise done in the previous year was to look at which SDGs are relevant for each sector, through its possible relevance and impact. Based on this, the different sectors had both SDGs and targets chosen in relation to the existing goals. Currently, Trondheim municipality is using those goals to assess which indicators would be the relevant to really measure the impact or outcome for those goals that have already been set. This indicator naturally aligns to the people sphere but it also has a relation to the planet sphere as one of the main goals in the city is to have more people using bikes and walking instead of using their car.

Perspective: The perspective dimension has been previously discussed with the team at Trondheim municipality, aligning this indicator to a certain extent to the 4 perspectives. However, the evaluation perspective is the one that has been selected above all. The indicator indicates a user effect but as a consequence there is a society effect. In

terms of this indicator, the impact would be reduced emissions from the transport sector because more people would use their bike rather than use their car. As a secondary effect, inhabitants of Trondheim would have a better health by having a more active commuting instead of using the car, so it also has an impact on the health goals for Trondheim. On the other hand, the contribution of each can be broken down by associating its results to other aspects such as air pollution. In this sense it is known that 20% of those emissions come from the transport sector. When the amount of car drivers are accounted for, and there is change in that indicator over time and transport numbers are going down, it can mean that either people are taking the bus, walking or biking. Without having really good counting, monitoring the numbers of bikes in Trondheim is not easy to estimate how many ride the bus and how many are doing other ways of transportation to somewhat master the basic flow looking at correlation.

Quality: The indicator quality as of now would most likely fit under the class 2 category, as this is being measured but not fully. Even in 2021 there is still manual counting. Although there are certain screens around the city that supposedly count the amount of bikes, they are not working as efficient as desired to meet class 1 quality. This is currently a work in progress, to further look at new kinds of technology that can help in the monitoring and collection of this data in a more efficient way.

4.3 The Taxonomy as a strategic instrument

Once the taxonomy was understood through the application of an exercise, the third part of the interview was applied, with a focus on how the use of the taxonomy could contribute to the municipality's strategy. This section shows results obtained from the interviews in terms of the further possible application of the taxonomy.

4.3.1 Ålesund

Participants at Ålesund coincided it is a bit difficult to give an opinion regarding the the value of the taxonomy in terms of its usefulness because they have no experience in the operational implementation of the taxonomy. However, they agreed that this taxonomy is a tool that could help as quality assurance of selected KPIs to value whether they are

relevant for an operation or not. Informants emphasized on the taxonomy being a good starting point to assess and define the meaning behind each indicator, and the possibility in having this taxonomy as a tool that, through its outputs, supply users with some guidance on the right path or better fit. It's main value is sought as a tool to ask proper questions and have a good quality assurance for choosing indicator, as a further step, another benefit would be to assess whether these indicators are applied in a proper way. Informants recalled to their experience with the U4SSC assessment, indicating some indicators were useful but others were very broad and a bit vague. To be able to use indicators such as those proposed by the U4SSC, to meet the organization's needs, these must be operationalized to meet the context. In such a scenario, informants agreed the taxonomy serves as a proper tool to enable discussion based on a tailored KPIs for organizations, creating valuable inputs for questioning what the user is trying to do and achieve. This counteracts the use of given indicators without supported decision on why they are being used, making the taxonomy and its purpose a good practice based on a need or purpose. Politicians and leaders at Ålesund have focused on integrating the U4SSC indicators to the planning system, however this modification could present a lack of connection to local context, in turn this taxonomy may be a good tool to start a talk among colleagues within the organization in defining which U4SSC and other indicators are relevant for use.

As an outcome, if the taxonomy were to be applied to all indicators used within the municipality, it would require running each indicator through an extra loophole, meaning an additional thought process and discussion on each indicator in terms of the taxonomy. However, having this classification would provide additional information for politicians and policymakers; such as ensuring that indicators meet a certain quality, and that the data used for the result is precise. On a more general perspective the application of the taxonomy could support to build a better use of data and to convey the truthfulness in the indicators, which is highly important to avoid false information that could in turn later be proven false, hurting the municipality's goals and preventing it to succeed in meeting their goals to be a greener and more sustainable society.

Although the taxonomy seems useful, there are challenges that come with it. The way the report presents the taxonomy and its dimensions and components leaves them open

for interpretation, meaning there is a large possibility of having answers that are not uniformed. Another challenge in the use of the taxonomy is that as a municipality, there are limited resources, this involves the time aspect, in the sense that the activity of applying this taxonomy to each indicator could be time demanding, and if results of the activity do not provide much reward, it could end up not being implemented.

4.3.2 Asker

The implementation of this taxonomy has been an asset to define usefulness in indicators. In data and assessment work, it is often times difficult for everyone involved to think about the same scope of area. The taxonomy, as a tool sets a common ground and language to discuss topics among various users. In addition, it enables people from different backgrounds and knowledge to be able to make part of the conversation and discussions, specially in how the targets and goals are measured or whether they are not doing so. Municipal plans and current indicator measures establish baselines and sets of goals that would be met in a certain period of time, yet, this taxonomy gives the possibility of looking at things from various perspectives, more importantly, in a knowledge-based way. In addition, selecting indicators is not an easy task, given that there are million numbers and possibilities of adopting indicators, it is good to have a system that can help in the selection process to define the right indicators. The taxonomy does not solve the complete problem of this selection, however, it helps in making it easier to make the right choices. Participants claimed the taxonomy helps in providing quick insights to see indicator sets that have more relevance to the municipality's strategy making this relevant for saving time. For example, the municipality is including local and international indicators to their strategy, and once the data is sorted it will be easier to define those that were selected as more appropriate compared to the rest. This may also help to differentiate those indicators obtained from international indicator sets and those proposed by the municipality to meet local needs.

Participants at Asker agreed that an outcome of the implementation of the taxonomy in the municipality would rely in setting down indicators in a systematic way. The municipality currently has a good basis of documentation, making it easier to later on

include more indicators, and this system supports further work on it. To complement and meet the municipality's needs, Asker has added some categories to the taxonomy in order to classify whether it is possible for leaders to have a target level on each indicator. One of the inputs provided by informants at Asker relies in the involvement of politicians and leaders to set targets that actually fit reality instead of the typical over-achievable 0% target.

One of the already encountered challenges of using this taxonomy relies in being able to draw a line and explain what it is and what it isn't, to make it clear and simple to the users interacting with it. The taxonomy is something that is not perfectly grasped at the first read, therefore practice is needed to be able to apply it and understand better.

4.3.3 Rana

The participant at Rana indicated the exercise of applying the taxonomy to all indicators in the municipality could be useful, however the information provided is not something new for the user.

In terms of value, the taxonomy provides support in defining the usefulness of the indicators when it is in terms of cost indicators. In order to have a good analysis on the indicators, these should be linked to all the dimensions, to the goals and the municipalities biggest challenges. One of the main strengths of the taxonomy is to be able to link an indicator to its three dimensions (goal, perspective and quality).

An outcome of applying the taxonomy to the municipality's indicators could be the confirmation of the importance of having good indicators, and also to be able to interconnect with other indicators and see the complete SDG development as a whole.

A possible challenge is the time requirement to carry it through, a setback in time constrain would be spending more time and effort on the definition of indicators rather than pursuing actions related to the improvement of results of such indicators.

4.3.4 Trondheim

Participants at Trondheim pointed out the value of the application of the taxonomy relies on their need and will to have more useful indicators and increase the impact rate

of what they are currently measuring. In this sense, the taxonomy supports this idea by categorizing but also sorting indicators and providing inputs on the quality of these indicators. The municipality as of now does not have many indicators in class 1 (best quality category), however, participants pointed out that to be able to know that by itself, is already useful.

With a recent deployment of the taxonomy at a municipal level, it is early to speak on the assets the taxonomy provides, however, as of now, it has eased the way on how to discuss priorities, where to work and how to cooperate. The purpose of defining which indicators best meet the needs, will in the future hopefully serve as part of the strategy and in turn define where budget is spent. The municipality is currently not in this position yet, but is aiming to do so in the long term, being able to complement this tool with other initiatives to be able to fully take advantage of the tools. The taxonomy sets grounds to be able to talk about broad topics yet makes it easier to define priorities.

One of the main outcomes of the application of this taxonomy is the possibility to have more systematic discussions and to use selected indicators to measure where good results are taking effect and which others need adjustments at an input level to later have better effects in the indicators. This in turn relates to the use of budget, as often times when there's a new need, the answer goes in terms of economic resources, whereas there could be possible solutions that do not require many economic resources. This approach could be adopted to see how indicators behavior could help the municipality understand other input factors to adjust them versus focusing on money aspects. Likewise, the municipality is implementing impact-based money governance to be more efficient in economic terms while achieving a higher impact, this is increasingly important with limited resources yet ambitious goals. Another aspect in which this tool may contribute is in the interrelation of different sectors; current work among the sectors is isolated to a certain extent. This tool in turn provides potential for understanding how an action in one sector contributes or affects another one, as well as how cooperation can be done to reach overall goals. The indicators could potentially support in a better awareness between different sectors and cost effects across all the municipality.

Due to the current strategy to deploy the taxonomy in the municipality, there has been a challenge of having areas take responsibility for their specific indicators to later follow up.

There is also a need to have certain responsibility on an organization-wide level, using indicators and assessing them through different perspectives. In this sense it is relevant to have both, specialists within each sector but also a municipality-wide responsibility, creating ownership of the indicators both in the municipality as a whole and within the sectors. On a practical level, one of the limitations of the taxonomy in terms of the way the goals are addressed is that it is rather simple to argue and state that whatever you do, you will be impacting on all three TBL spheres.

A lot of the things that are being worked on are cross cutting and the taxonomy is two-dimensional, therefore it may feel like a limitation. This taxonomy as compared against the EU taxonomy for example, does not have much of a normative perspective, it is more of a model to describe and sort different indicators. The taxonomy does not provide guidelines for which type or sort of indicators could be used in a given context.

5 Findings and Discussion

This section considers overall information obtained from the literature review and the cases to provide the final findings and discussion of the whole project.

5.1 Main findings related to research questions

Indicators increasingly continue to support sustainability monitoring and reporting from cities and municipalities across the world. From the examined literature, there are many sustainability indicator tools that propose specific indicator sets to be integrated within local government strategies to measure progress on sustainability such as the SDG 11 indicators, the ISO 37120 and ISO 32122, the ETSI TS, ITU-T, U4SSC and IAEG-SDGs explained in chapter 2. Proposed indicator sets provide insights on a city or municipality's sustainability progress and provide for an easier comparison among various municipalities applying it, however, with the implementation of these, another concern arises; how is it possible to localize or portray local issues when the indicators are more general? Due to the fact that these tools provide fixed indicator sets, they lack the possibility to localize indicators in a way that fits a local purpose and promotes further insights to users and decision makers within such municipalities.

The recently published Taxonomy for indicators related to the SDGs was created with the purpose of assessing existing sustainability indicators to enable a localization of already proposed international sustainability indicators and to assess proposal of new indicators which serves as a complementary tool to analyzed sets of sustainability indicators. The taxonomy suggests an indicator must be aligned to a broader goal in terms of an SDG or a TBL area, but also should be assessed in the context it is in, through a perspective, all while having the possibility to be measurable in a proper statistical way with a good

quality. The case study with 4 Norwegian municipalities provided insights on how the taxonomy has been implemented and how users interact with it at a first approach. Half of the municipalities interviewed for the case study had already started implementing and making use of the taxonomy in their internal teams to define their indicators for the municipal plans. The other half had a first practical experience on the taxonomy through the interview for this project. The classification results obtained from the application of the taxonomy for each municipality differed significantly, however, this is due to the indicator defined by each and the users involved within. Overall, it was easier for participants from municipalities who had already worked with the taxonomy, to classify and define the goal, perspective and quality categories for their indicator, compared to municipalities who had just been explained the use of the taxonomy and were asked to implement it. Many of the newer participants had a harder time selecting a specific category that aligned to their indicator. On a general level the goal dimension for all municipalities showed that each indicator contributed to one or more SDG and all the TBL spheres, in direct and indirect forms. In terms of perspective, it was a harder choice for all municipalities, as it depends on the user and the context given by the user, where any option can be chosen depending on their context and thought process on it. The quality category was on a general basis a category that was more straightforward and municipalities acknowledged there was room for improvement in terms of current quality to measure the indicators chosen. Overall, these are discussions and decisions would require a longer time frame to identify and discuss, whereas in this case participants were on a time limit in selecting an option due to our interview time frame.

In terms of value perceived in the application of the taxonomy, the participants coincided that the taxonomy served as a tool to enable discussion based on tailored indicators for their municipalities by setting a common ground and language, promoted good quality assurance, gives the possibility to look at things from several perspectives, helps setting down indicators in a systematic way and acknowledges connections among several departments or several indicators. Among the challenges perceived in the application of the taxonomy, some highlights are the limitations on how goals are addressed, where it is simple to state whatever the user would like it to be, and therefore impact many goals. Also the time constrain, meaning the application of the taxonomy requires time and there

could be a risk in terms of not having much reward for the time invested. It is not an easy to grasp methodology, it requires time and practice to fully understand it.

5.2 Case study and literature review findings

The 2030 Agenda is a guiding framework in terms of sustainability for all types of stakeholders, municipalities included. Norway has had significant results in terms of the SDGs, but continues to be challenged on how to localize these efforts to a regional and local level. Municipalities in Norway have differences in maturity in terms of sustainability and the access to tools each has, making these a relevant area of improvement if the goals want to be met on a national but also local level. KS, as the entity with guiding efforts in terms of SDGs at regional and local levels, saw a need in having a tool that could help regional and local authorities better define their indicators to meet goals. The taxonomy developed by SSB in partnership with KS contributes to ensure local and regional needs were being met through the guidance of assessing relevant indicators.

Given that the taxonomy was published earlier this year, its application within municipalities has recently started in some cases and in some other municipalities it has not even started yet. Participants from within the municipalities are gradually becoming more familiar with the taxonomy, its use and possible benefits.

Additional findings in terms of the application of the taxonomy from the case study suggest the taxonomy serves as a general guide as to what is relevant to consider when addressing whether an indicator is relevant or not for the municipality's purpose. However, it is not a straightforward guide in terms of how to approach its use, as its categories are open for interpretation and fall into the user's thought process. The taxonomy does not provide guidance on steps to take but is rather more of a classification model. To have results that meet municipality's needs in terms of aligning an indicator to goals, to a perspective and quality, discussions among relevant stakeholders are needed.

5.3 Strengths and Limitations

This thesis is state of the art project that provides first hand information on the relevance of the recently published "Taxonomy for indicators related to the SDGs" applied to 4 Norwegian municipalities, involving different departments from within each municipality. Furthermore, this study covered a wide range of relevant literature related to sustainability indicators applicable for cities and municipalities such as the ones addressed in this project to be able to differentiate among existing sustainability tools related to indicators. Given the fact that only a few municipalities have so far had the experience of working with the taxonomy, having first hand information with people involved in the application of it within each municipality is of great value. The inputs provided by the informant's experience, may be relevant for other municipalities who are considering to later apply this taxonomy. This would provide them with information regarding the usefulness and challenges that come with the application of the taxonomy as well as examples of how a practical application to an indicator may be done, explaining the taxonomy results obtained and the thought process behind it.

One of the most relevant limitations for this project, was a time constrain meaning Statistics Norway had not yet published the taxonomy in English at the time of the start of the project. Once it was made available in March, the first step to addressing it was reading it to make sure all content was understood previous to meeting with the municipalities. Additional support was requested to SSB, where a video-call was done with the main author of the taxonomy to clarify any questions in the use of the taxonomy. Due to this delay and the time limitation to gather results only one video-call per municipality was booked, meaning both the questions on the application and a practical exercise were gathered into one session for each municipality. As part of the time available to develop a study, only 4 municipalities were chosen for the development and case study.

5.4 Further Research

In order to have a more representative analysis of the use of the taxonomy and how it is being implemented along with other initiatives, a similar analysis with a larger scope would be relevant, in efforts to understand any best practices among the municipalities and how it is being implemented throughout different municipalities. Expanding the scope would also inform on the application rate of the taxonomy, as in percentage or areas that have not had access or might be unaware of its existence.

To have a more thorough understanding of the impacts or effects as an outcome of the application of the SSB Taxonomy, a larger time span would be needed to fully consider as decision making post-assessment and the implementation of initiatives relating to it are only visible and acknowledgeable after a few months or years. A suggestion would rely on periodical assurance on the implementation process within the analyzed municipalities, as well as findings.

Likewise, it would be of relevant interest to gather and assess how several SDG and sustainability initiatives are interlinked in the future with the taxonomy.

6 Conclusion

This research aimed to identify how the Taxonomy for indicators related to the SDGs is able to assess sustainability indicators in Norwegian municipalities and its contribution to users. By analyzing relevant literature and conducting interviews for a case study, this thesis has shown there is a relevant need among municipalities to assess their performance, which is mostly done through indicators. International sustainability indicator sets are available and have been used within Norwegian municipalities to measure progress, however, there has been a gap between the information provided for such and what is meaningful and relevant at a local level. The taxonomy has been created with the purpose to complement existing sustainability indicator sets and aid users in a selection process to guide them in choosing those that meet broader goals, but are relevant in a local context, while ensuring they are measurable.

This work contributes to existing literature on the fact that there is no one-tool-fits-all solution in terms of sustainability tools for indicators. Information provided from the case study through interviews with some municipalities in Norway, indicate that it is too early to analyze possible outcomes of the implementation and integration of the taxonomy into municipal strategies. However, results demonstrate this the taxonomy for indicators related to the SDGs contributes in several aspects; providing a common base of knowledge to discuss indicators within municipalities to select appropriate indicators and localize SDG indicators in a methodical and knowledge-based form.

Based on the results obtained from the interviews with the municipalities, and in order to further contribute in the dissemination of the implementation of the taxonomy within municipalities and other regional authorities, it would be relevant to enlarge the scope to gather data from other municipalities and built a partnered network to share best practices in the implementation of the taxonomy to ease its application with new munic-

ipalities. This suggestion could be done in a periodical way to also gather relevant effects or outcomes of the application of the taxonomy from municipalities who have already started with it made progress on it.

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Appendices

A Interview Guide



Taxonomy for indicators related to the SDGs for Norwegian Municipalities: Question Guide



Context

- Industrial Ecology Masters Thesis
- Implementation of the SSB Taxonomy for indicators related to the SDGs
- Study cases with various Norwegian municipalities

Agenda

The next hour will consist of a set of questions, explanations and exercises to apply SSB's recently published: Taxonomy for indicators related to the SDGs. A) Questions to understand in what position you stand in regards to the use of the taxonomy and B) questions on the specific application of the taxonomy on given indicators.

- Initial questions
- Application of the Taxonomy to 1 or 2 selected indicators
- Final questions



Initial questions

Brief round mentioning your positions

- To what extent do you know about SSB's Taxonomy for indicators related to the SDGs?
- If you have started applying the taxonomy at your municipality what has been the approach? Has it been used for all current indicators?
- What are your expectations on the application and usefulness of this taxonomy in your municipality?



Exercise

We will run a brief application of the taxonomy on the previously identified relevant indicators for your municipality for which I will serve as a guide asking and guiding questions so you can assess the application of this taxonomy to the indicators you have chosen.

Since this is a short exercise application of the Taxonomy, the purpose is to hear the thought of ideas that comes along through its use. There are no right or wrong answers! All comments are welcome

Exercise



Indicators chosen for this exercise are:

1. _____ depend on each municipality _____
2. _____ depend on each municipality _____

We will look at the Goal, Perspective, and Quality in regard to this indicator

Exercise

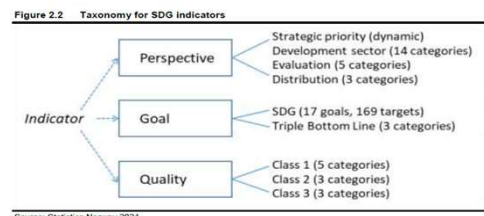


The taxonomy was made with the purpose of sorting, comparing and evaluating different SDG indicators.

The taxonomy is organized under 3 dimensions:

1. **Goal:** Indicates what the indicator is about, which targets it can be related to
2. **Perspective:** Clarifies why or in which context the indicator is used
3. **Quality:** Identifies how the indicator is measured

In order to understand how this taxonomy works we will look at how to classify each with the indicator chosen.





Exercise: Goal

Goal helps us define what the indicator is about.

We may align it to an SDG with its target or simply with the triple bottom line; people, planet and prosperity.



SDGs:

- Does the indicator better relate to a specific SDG?
- Do you know of a specific target within that SDG that this aligns to?

TBL:

- Does this indicator contribute to people? If so, how?
- Does this indicator contribute to planet? If so, how?
- Does this indicator contribute to prosperity? If so, how?



Exercise: Perspective

To identify a perspective type, a context is needed.

Why does the municipality care about this indicator or what is the purpose for having this indicator? What is the context?



Exercise: Perspective → Example

Indicator: drop out from senior high school

Context a: municipality would like to reduce social exclusion

Strategic priority- Aligns to the organization's defined strategy matters (is adaptable to each particular case)

Development sector- Aligns to responsibility for development, management or reporting, divided among government departments and their management structures

- | | |
|-----------------------|---------------------------------------|
| • Natural environment | • Childhood and education |
| • Built environment | • Culture |
| • Water and waste | • Health, social services and welfare |
| • Transport | • Safety and preparedness |
| • Energy | • Governance and citizen engagement |
| • Economy | • Digitalization |
| • Industry | |
| • Work/employment | |

Context b: municipality would like to measure the effect on education reform in recent years

Evaluation- Used for monitoring a project or specific variables such as policy change

- Input
- Process
- Output
- Outcome
- Impact

Distribution- Relevant when the same information is required more than once, whether it be:

- Time interval
- Lowest level of geography
- Socio-economic groups



Exercise: Perspective

Perspective: Clarifies why or in which context the indicator is used

There are 4 Perspective types. The indicator should be placed under at least 1 type of perspective, in regard to the context.

Strategic priority- Aligns to the organization's defined strategy matters (is adaptable to each particular case)

Development sector- Aligns to responsibility for development, management or reporting, divided among government departments and their management structures

- | | |
|-----------------------|---------------------------------------|
| • Natural environment | • Childhood and education |
| • Built environment | • Culture |
| • Water and waste | • Health, social services and welfare |
| • Transport | • Safety and preparedness |
| • Energy | • Governance and citizen engagement |
| • Economy | • Digitalization |
| • Industry | |
| • Work/employment | |

Evaluation- Used for monitoring a project or specific variables such as policy change

- Input
- Process
- Output
- Outcome
- Impact

Distribution- Relevant when the same information is required more than once, whether it be:

- Time interval
- Lowest level of geography
- Socio-economic groups



Exercise: Quality

Quality: Identifies how the indicator is measured
The Quality of the indicator should consider 1 of the classes, depending on the available information

Class 1- (statistical) Can be assessed with respect to the principles shown below:

- Relevance
- Accuracy
- Timeliness
- Coherence and comparability
- Availability and clarity

Class 3- If the indicator is unavailable, because one or several of the following features are missing:

- Data
- Method
- Measurable concept

Class 2- Doesn't belong to class 1 nor class 3, can take one of the 3 states below:

- Under development (expected time to completion of development)
- Under planning for development (expected time to completion of planning)
- Undecided (expected time to decision)



Final Questions

- What value did the application of this taxonomy provide to you regarding your understanding of the usefulness of the indicator?
- Would you consider the implementation of this taxonomy as an asset to define the usefulness of indicators to contribute to your municipality's priorities?
- How applicable do you think this taxonomy is to the different development sectors in your municipality?
- What do you think would be the outcome of applying this taxonomy to all current indicators used at your municipality?
- How was it applied? Strengths and challenges

B Interview Results

To what extent do you know about SSB's Taxonomy for indicators related to the SDGs?

Ålesund	<p>- I heard about it but I have not read it yet.</p> <p>- I was involved in one meeting about it. It was the first setup meeting. And since then, I have not been involved in any further meetings. I think I have read it, but it's quite a while since that so I can't directly remember it.</p>
Asker	<p>-The taxonomy is a model that that helps us classify indicators or data that relate to the SDGs since there are a lot of indicators in different indicator sets (own municipality's indicators, the OECD, from the UN, and from different other organizations).</p> <p>To a small degree, we know exactly what these sets give us, because they don't tell us what these indicators actually do measure. So the taxonomy is a way of looking at them with the same set of glasses to try to compare this indicator sets towards those in sustainability goals helping to identify how some indicators contribute to certain purposes, some measure impacts other inputs. It's a way of sorting indicators to help us choose the ones that are the best for our own applications.</p> <p>-Have read the report and are currently applying it to sort out the indicators for Asker. We have to deliver a complete indicator set by the end of June, so we're using the taxonomy to decide what indicators are good and not for, for the different goals and targets in our municipality plan.</p> <p>-Have not yet fully read the report but knows the content and purpose of the taxonomy.</p> <p>-Have heard about it, have received emails with some information about it, but not that much involved.</p>
Rana	<p>- I have seen it. I have not used it, I haven't read it yet. I have just seen what it's about.</p>
Trondheim	<p>- I know about taxonomy, basically, by working in my previous position and current position. And we have tried to apply the taxonomy when working on the four-year action plan. So we're in the process now. And I think it's also important in that term to say that the four-year action plan that we are working on now will be applicable from 2022. So the indicators that we have looked at now will not be implemented or at least monitored until 2022. So the process we're in is choosing the relevant indicators to be used from 2022.</p> <p>-I'm quite familiar with the taxonomy, I have also been working on the action plan and also in the reference group developing the taxonomy.</p>

What are your expectations on the application and usefulness of this taxonomy in your municipality?

Ålesund	N/A
Asker	<p>-Since we have already started sort of using it, I can already see how it will help us. It helps us to have a good dialogue and discussion on choosing the right indicators, provides information on what it measures. When we have chosen and presented the indicators and someone asks us why you chose these indicators, we have a good systematic documentation of why we chose one over another.</p> <p>-My expectation also follows. I know on the higher level, the work within the indicators for the municipal master plan will be very important and it will be a focus for our politicians as well. Asking how progress is going, if there is progress and if yes, why and if not, why. The taxonomy will help us to standardize and be able to have a narrative around the indicators that follow the municipal master plan. And then again, they will be a tool for me when I work with different topics, either political or in the administration or with the civil society. With the civil society it is also an interesting aspect for me because I've used the KPI assessment and presented it for business communities and they are instantly looking thinking and approaching it like when they have a business that can help solve a certain transport mode challenge. So, it helps us to have a common ground for discussions and the taxonomy will help us to enhance the quality of this common ground because it will be in contextual hold as local government.</p> <p>-I also have the hope that this will help us address and find areas where we have gaps, where we lack indicators and lack knowledge, where we do not have the tools because the taxonomy shows us in this specific area, there's not much that is available. So that we can use it to find those areas and present them to the academic community, to ask them to find out more about a specific aspect, help us with developing indicators help us with finding stuff out so that it has a practical solution for us, that helps us and that it also can bring something structured back to the academic community.</p>
Rana	- I hope this taxonomy can help local municipalities finding good indicators to work with the Sustainable Development Goals. To follow the development on how sustainable the municipality is as a society, so I hope that the report will help us find good indicators for their municipalities.
Trondheim	<p>- I think it's really useful because it helps creating a language or a way to sort the data points. And in a world where we have so much data, and so much information, I think the way we filter it is crucial, and this is a tool that can help with that.</p> <p>- I think specifically it's very helpful for us, as we go forward and want to do more of the crossover analysis, because by using the taxonomy, now we see the indicator in a broader perspective than only within the relevant sector. So then we can aggregate and see this more on a whole perspective. And also if more similar Municipalities also use the taxonomy, it's easier to compare to others who use the same methodology.</p>

Exercise: Indicator

Ålesund	Share of people cycling in Ålesund
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Asker	Percentage of inhabitants living in areas within less than 500 meters to the nearest public transport
Rana	School drop-out rate
Trondheim	Percentage of citizens that can ride their bike from their homes to the city center on accessible infrastructure.

Exercise: Goal

Ålesund	<p>- According to the U4SSC this aligns to SDG 11 but this could be also aligned to SDG 3: Good health and well-being and also SDG 13: Climate Action.</p> <p>-Reference to 11.12 this would be the main SDG target. However, can also say that higher degrees of cycling is also linked to SDG number three, because you know that societies that have high amount of bicycling, have a better public health. And also, you could link a lot to different SDGs. But in transportation, a higher degree of cycling in sustainable cities also leads to economic effects; a bicycle is a lot cheaper than the car so reduced inequalities, but these are the main SDGs according to me.</p> <p>-It contributes to people, maybe because increased cycling share is basically giving people have a choice to move about effectively and also, in the long term it is better for public health. It also contributes to the planet because a bicycle basically runs on fat and saves you money and a car is basically the opposite. So in regard to prosperity, having a car is, at least in the bigger cities a very expensive item to have. Basically, making it possible for people to use the bicycles, as a main mode of transport actually frees up a lot of money that they can rather use on services and more important stuff than paying for parking, gasoline or electricity, no matter what kind it affects all three. But I think, basically, it would affect people and planet the most. In terms of bicycling, apart from the production of the bicycle, which is a lot less than the car, the environmental footprint of using a bicycle is pretty low. And also, we know for a fact that a higher percentage of bicycle transport is good for the public health. So of course, you have some increased accidents, but if you look at the big numbers it's a positive value for the for public health.</p> <p>-Also the contribution to the planet is you need less space when cycling. So the environmental footprint, is also linked to space.</p>
Asker	<p>- We have been working on connecting the indicators to our own targets and goals. And that has been our main focus since we are delivering the set in June. I would think that this belongs to SDG 11, that's how we have linked it in our goals and targets.</p> <p>-It is 11 and the target is 11.2, when it comes to targets, within 2030 make sure that everyone has access to safe, accessible and sustainable systems of transport to an okay price and to make the roads safer and so on. So, it is target 11.2 specifically the one that would be relevant and the one we have to discuss. This indicator will give us some insight, but as mentioned, we need more insights, more indicators perhaps to give a complete analysis on transport to see if 500 meters is at a straight line in the air or is it along the roads or paths and we also have to look at the use sensor that is to understand if the frequency is good enough and if the price good enough. So, this is one piece of data that has to go into a net total analysis to be able to address the full target 11.2 But I think that's where its main relation will be.</p>

	<p>-This indicator would be linked to the municipality's internal goal (from the municipal master plan) which lies in good solutions in terms of transport and the use of area in the municipality, making it an obvious link.</p>
Rana	<p>- I link the dropout relates to three sustainable goals. I link it to SDG4: Quality education, SDG3: Good health and well-being and SDG 10: Reduced inequalities. I link it to these SDGs because dropout indicates that people who don't go through middle and high school levels are in a risk of standing left out from school and employment. So good quality education is a goal to secure that we have qualified labor in the businesses and it's also a goal to secure that people are in a position to work and not outside in the society. Also number three good health; people who don't have education or are not working are also in a risk to stand up to have poorer health. There is a link between education and health. If you look at the public health work, education is an indicator of good health in our population. And SDG 10 because inequalities in a society also depend on inequalities in education which in turn also reflects as inequalities in possibilities and in health.</p> <p>- It contributes to the people dimension because to have a good education, or to not drop out of school is of course linked to the people's health and well being. But there's also a contribution to the planet because if you have a good life and are educated and have a job to go to, you can contribute to a sustainable planet development. And to the prosperity dimension, if young people are able to go through school, and are able to get an education and work, that will also contribute to the prosperity because then the unemployment is lower. Businesses need to skilled labor and so on. So this indicator aligns to all three dimensions, actually.</p>
Trondheim	<p>-The indicator relates to SDG 11 specifically to the 11.2 target</p> <p>- Last year, we did the exercise on some overall goals that we have for Trondheim kommune, which are 12 goals. And based on those goals, each sector in Trondheim kommune has developed their own four-year goals. So the exercise we did last year was to look at what which SDGs are relevant for each sector. And the criteria were relevance and the impact it can have. And based on that, different sectors had both SDG that they choose and also targets, and they made their four-year goals and related to their existing goals or they would make a new goal based on the SDGs. And with that, going forward, we are now using those goals to see what will be the relevant indicators to use if we want to really measure the impact or the outcome for those goals that we have already set.</p> <p>- So that means that we have used a lot of focus this year on the indicators. So the goals are already there. They are linked to SDGs both on goals and targets. And based on that, we want to choose the indicators that we feel are the most important to be able to measure if we are reaching these goals. So for the indicator that we are looking at for this exercise, the four year goal is to make sure we have attractive equal opportunities for mobility for everyone. That is the overall goal. And the indicator we mentioned is linked to SDG 11, Target 11.2</p> <p>- So in the model that we set up the sector that has been working on this handling this indicator to the social aspects, but naturally, it also has impact on the environment since the main goal in our city is to have more people to ride bikes and walk instead of using their car. So it's, also linked to the environmental aspects, I would say.</p>

Exercise: Perspective

Ålesund	<p>- For the bicycling KPI that we have chosen, I think that would more align with our strategic priority. Because we have to have land use plans that are in sync with strategy, we need economic budgeting, we have a city toll pack in cooperation with the county, the National Road administration. So you have to work on many fronts to basically be able to apply the strategy of having more people using their bicycle on a lot more fields, in comparison with the KPI where you just evaluate how many water meters you have installed, and how you have done it. So I would say the focus is on road use KPIs whether it's bicycling or how many are using private cars. That's a strategic priority.</p> <p>- But it can also be an easy way or not so easy when it comes to measuring to see on a time interval if your politics works, to measure it with a specific number. But I also agree that it is a strategic priority perspective.</p> <p>-This KPI is seen as a strategic priority, but you can evaluate it using specific numbers. The strategic priority is meant to be a policy change for us. And thereby, by measuring the percentage of people using bicycle is basically a test for how successful that policy change is. So it's basically strategic priority, but we have to evaluate it to measure the results.</p> <p>-On the other hand, we could also reach our goals on public health when people walk instead of a cycle. So I think that transportation mode should address the total package: increase active transport. Cycling is not the only answer on the strategic priorities, walking and other active transportation modes could also be the answer.</p>
Asker	<p>-I think all four are interesting perspectives and it depends on where you stand when you do an assessment. Some people would say that this is strategic priority. But I would say that its relevant in the development sector perspective. It's also relevant for evaluation of society effects, and user effects. And also, to see development over time to see, because we have a theory that by fulfilling the indicator, then we will have some effect to find the right information. We want to choose this strategy to see how that would develop over time, we could be also looking if there is any difference in socio economic groups. For instance, people who have low income, maybe don't have access to a car. But its too vague to say that if you had a bus stop 500 meters from where you live, then you'll probably use it to get to work, that's too farfetched. However, it's one of the elements that we maybe think has something to do with the possibility to work.</p> <p>- And we discussed this, me and my colleagues, we have used the category evaluation a lot, because it helps us really sort you know, What is it telling you? What is it not telling you? Because this indicator tells us how far the nearest bus stop is from people's houses, but it doesn't say anything on how much they take the bus. It's the municipality and the region, and bus companies are, all together with planning and the municipality, and the companies put their best parts here and there, and it's a collaboration and that gives a service a product to the inhabitants. And they may choose to take the bus, but it's not sure they will. So we placed it in the middle from input to impact. When we come to doing an analysis on this indicator, we can't just say that now, everything is better, because we have so many bus stops, it still doesn't tell us what people do and if the pollution goes down.</p>

	<p>- I agree, this is the right point on how we could pursue this indicator. Because it only measures how many people live within what we will normally accept as walking distance, where 500 meters would be okay but one kilometer is considered a bit of a stretch for people.</p> <p>- There are many data points that we would need to be able to say something about evaluation criteria higher up in the chain like outcome or impact. If we wanted to know something about the impact or society effect, we would have to know more about addressing when it comes to free frequency. Because if it's just one bus hour, and those buses are always full, it is not a good thing. If it had been full every 30 minutes, or every five minutes, then we would be able to say something about impact, because then we would know there were a lot of people that actually used it, because it was a good way of doing it. We would also need new data on the fares, to understand if it's too cheap or too expensive, because all these data are needed to say something meaningful about impacts. So then this is an indicator that in itself just provides us with information that is very little but when we combine it with other indicators, will be able to make an analysis based on more data points, to be able to address the impact. These discussions are actually quite interesting to hear what where people put things and why.</p>
Rana	<p>-The context or reason we're looking at this indicator is because we have a strategic priority to reduce exclusion and we have done a lot of work to develop better skills within the municipality.</p> <p>The development sector category would fit it best. And I think childhood education, social services and welfare and some citizens engagement is the most important in the deployment because businesses need workers. They link to each other.</p> <p>Also industry because we are an industry municipality and the industry also need skilled labor in the future.</p>
Trondheim	<p>- Just to align what we did with what we should have done in regards to perspective. We chose because this is a four part dimension perspective; strategic priority development area and evaluation and distribution. So we chose the evaluation part, so that's the one we have actually done.</p> <p>- We previously discussed if it's a result indicator or outcome indicator.</p> <p>- Just to be fair, I think it's important context information is that Trondheim in the same way as most other municipalities, doesn't always have everything in order, the way we measure things and governance but what we do in Miljøpakken, that's a strategic priority even if it's not explicit in our planning system that we as a city want to collaborate with the county and national authorities on roads, building infrastructure in Trondheim, that's important both for the politicians and administration. So in that way actions within Miljøpakken, that's a strategic priority on its own.</p> <p>- The sector that owns these goals and also these indicators, they are part of the whole collaboration within Miljøpakken. So in Trondheim kommune, we have our own units that represent, so to say, Trondheim kommune, in Miljøpakken, and the unit is responsible of suggesting and making sure that the projects that are suggested and approved by Miljøpakken are being followed up and implemented. That's the responsibility of this unit.</p>

	<p>- That indicator indicates user effect. But it's quite obvious that when, when or if we get that user effect, it quite quickly leads to society effects, as a consequence of the user effect. And also, the society effects might have different, let's say, connotations or links to other cities.</p> <p>-So the impact here would be reduced emissions from the transport sector because most more people use their bike rather than using their car. But it's also I think, linked to how the inhabitants in Trondheim will have a better health by using their bikes or walking more instead of using the car. So it also has an impact on the health goals for Trondheim, I would say.</p> <p>- we know if we start in the other end and look at the air pollution, and the indicators for emissions and so on, we can break that down. And we know that 20% of those emissions come from the transport sector. And then we can count how many car drivers are out there and when we see change in that indicator over time and transport numbers are going down... we know that either people are taking the bus, or they were they are walking or they're biking. Without having really good counting, monitoring the numbers of bikes in Trondheim, it's not that easy to say how many ride the bus and how many are doing other ways of transportation to kind of master the basic flow looking at correlation</p>
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Exercise: Quality

Ålesund	<p>- I'll place between one and two. Because it used to be collected by calling people on the telephone and people don't answer telephones anymore.</p> <p>- Its between one or two, because we know what is supposed to be measured, we have a decent accuracy, but the data quality can be a bit irregular sometimes, but it's on a level that is a bit abstract. But if you have enough respondents, it's basically more like the law of large numbers to get a decent indication that you're on the right track.</p>
Asker	<p>- We have measured it already, so we already have a methodology. But I think if we should use it further, I guess we're between class one and two because we could still work on our method. For example, if we define that we only include the bus stops with high frequency buses for example, we could do some things like that. And I think already the analysis is made in walking distance. It wouldn't take much to have it under the class one category.</p>
Rana	<p>- I would consider it under class 1, because we can find the indicator on a statistic bank for all the municipalities. And we can compare ourselves to other municipalities and also to the country. And the indicators also show the parents background, the parents education level. That's a positive aspect about this indicator because it shows that we have also a strategy in school and kindergarten the "early intervention" in school and kindergarten. This helps to follow up if there are kids that have a problem. We can show if the strategies early intervention works through the dropout indicator. For years, we have seen that the children of parents with low education have higher levels of dropout rates. If we can see this tendency, then we are able to see the link with SDG 10, reduce social inequalities and see if strategies to prevent the social inequality works. So I think, yes, class one, the current indicator is now is really good.</p>
Trondheim	<p>- I think it falls under tier 2. For these types of indicators, we still in 2021 are doing the manual counting. So I don't know if you've seen like the screens around the city</p>

	<p>that are supposed to count the bikes that are not working as efficiently. So that means that we're still doing a lot of manual counting. But this is a work in progress now to look at new kind of technology that can help us monitor and collect this data in a more efficient way.</p> <p>-We're measuring some of this as of today but not fully.</p>
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What value did the application of this taxonomy provide to you regarding your understanding of the usefulness of the indicator?

Ålesund	<p>- It's a bit difficult to answer because I have not worked so much in the operational implementation of KPIs. But I think using this tool could help as quality assurance to run through the KPIs that you're choosing to understand whether they relevant for your operation or not. Cause as for the U4SSC KPIs, they are basically on a city level, that means not just a municipality, as a business or organization, it's a city as a whole, so not all indicators are useful for us. But also, in operational sense, a lot of the indicators are very broad and a bit vague. So you need to operationalize them in a more strict context to use them in the organization. So this tool can help maybe in having a discussion that are basically the tailored KPI you're choosing for your organization, is that a valuable input for what you're trying to do? It's a good question to ask, I don't have an answer for it but also I think, a bit down to earth approach on how you're using the KPIs is a good practice to have because if you're just choosing indicators for choosing indicators, you're just choosing them and not thinking about how you're going to use them for. And I think that's important to do, to think how you are going to use them.</p> <p>- I really missed someone to discuss on the KPIs from the U4SSC with because of their relevance for the municipality. The politicians and leaders want us to integrate these indicators into the planning system and that whole leadership system so for now it's very much up to the boards, and it doesn't change anything, it's just the addition of some nice words. However, I wish to find indicators that are relevant. My first impression is that maybe this is a nice tool to start to talk about what indicators we should use, and which indicators are relevant. I want to look more into it and discuss it with my colleagues working on the overall leadership of municipality or those that manage the goals into the organization. The politicians want to use the SDGs and the U4SSC first, but maybe we should discuss how we should operate it in the municipalities. Maybe I want to use it, but I have to dig a little bit deeper into it before I can make an opinion, this is just my first impression.</p>
Asker	<p>- The thing that created the most discussion was the perspective. The input and output, which is very helpful in all the discussions we're having, and has been most important for us when we choose our indicators. So far, we've put on some more categories, but that's what's important for us in our work now, for example, is it possible for our leaders to put target level? For example with families with low income, we have a 7% can we expect our leaders to say, okay, we want to do something, can they set anything else, but 0% as a target?</p> <p>And we have a category, trying to say something about that, whether it is possible for our leaders to put a target level on it, we have to have a target level on all our indicators, and we want the politicians to be firsthand. Some data are important, but maybe more as knowledge, as with a target level. Also on a timeline perspective, will</p>

	<p>these data change over time or will they change only every four years when we go through our plans again, because if it changes only every four years, would it be then important to watch every year.</p> <p>-Data post Corona pandemic will be quite different. For our home office will be much more common, at least for the time being, and for short, inferencing future public transport will be less than before. And we might have a couple of years before we see a new normal.</p> <p>-In the place where I live, we used to have these very small buses that connect people to the train station, they stopped going during the pandemic because most people are working from home. So that's a concrete thing that affects that indicator. I think also one of the classifications that's going to raise the largest controversy, but that's where people will disagree the most whether this fits into this or that category because some of those things, at least if you separate them in these five categories such as the report suggests, it might be tough to distinguish if this is output or outcome, however, these things will make people talk at least. So I think that's maybe one of the largest values of this, it gives us a tool for communication, it gives us a tool to talk about things in a way that makes it possible to discuss inside the municipality, across municipalities and understand it in the same way.</p>
Rana	<p>- I think this exercise could be useful on all the indicator indicators. However, I knew all these things about this indicator, it's nothing new.</p>
Trondheim	<p>- When we had our first presentation in the leader group with the directors in Trondheim, was said that we wanted to make the indicators more useful and increase the impact rate on what we were measuring, I think it was something along those lines. And I think the taxonomy helps us doing that by like, categorizing it, but also by sorting, and giving us a picture of the quality. Because we don't have that many indicators in call in class one and knowing that by itself is quite useful. And it also seems to be quite interesting for businesses to discuss this, because the whole sustainability thing is about everything. Just being able to narrow the scope and talk about some indicators related to some goals in a given context is useful.</p> <p>And from a more technical perspective, yesterday we had students from NTNU presenting their anthology. So taxonomy is a classification system and the anthology also shows the relationship between the classes. So when you have a taxonomy and an anthology, then you can create knowledge graphs, which is how Facebook and Google runs. My point being, you are actually able to include the technical people in the discussion. People developing new technology and AI and stuff by starting with the taxonomy that they can build stuff on. So this part of the digitalization strategy. I think this shows how, if you agree on a taxonomy or you can further develop this to accelerate the move towards reaching the SDGs.</p>

Would you consider that the implementation of this taxonomy as an asset to define the usefulness of indicators to contribute to your municipality's priorities?

Ålesund	<p>- Maybe it could. I'm not that involved into operationally analyzing, it's more such as department, but it could be because it's always good to ask yourself a question of what's the meaning behind this indicator, and guidance from the taxonomy report could maybe put you on the right course. For now, it's difficult to answer, you have to basically try it first. But, as it looks now, I think it's at least a good tool to ask the questions. Because if its good or not, that depends on the application. Yet, there are some questions being asked. I think that's a good quality assurance for choosing indicators</p> <p>- I'm looking at the report now and I will certainly take it to my colleagues to discuss if it can be useful in work with indicators.</p>
Asker	<p>Yes, definitely. And I think one of the challenges with working with data and assessments is that it's easy to think for us. This gives us a common ground and a language for actually discussing these things. Even though I'm not statistically trained, I can still be part of the discussions and especially in the field between how we measure the goals and the targets and if we aren't doing so. We have a baseline and goals we want to meet in five years, or 10 years, and so on. It gives the possibility of looking at things from different perspectives, but knowledge based.</p>
Rana	<p>- Yes. When it's cost indicators, yes. You have to have to link the indicators to the dimensions and also to the goals and also to the municipalities' biggest challenges.</p>
Trondheim	<p>-I think we're in the face now that it's a bit early to speak since this is the process now and this will be implemented from next year. But I mean, the main goal for us is that the indicators are actually used to discuss what kind of priorities we should do and how that should affect where we spend money, that's kind of the overall goal. Make it easier for us when we are discussing priorities, on how should we work, how should we cooperate, where is it natural that we spend more money, where should we use less money, and so on. But to be honest I have to say that we are not there yet. But the main goal is that this should come as we go, to use this in a sophisticated way.</p> <p>- It's a tool not to talk about everything at the same time that makes it easier to do priorities.</p>

How applicable do you think this taxonomy is to the different development sectors in your municipality?

Ålesund	<p>- I think it's pretty universal approach. It depends really on the indicator how well it fits. But with what we saw today it basically a sets some guidance for almost anything because if the indicator is only evaluated, the answer gives itself, so I think it looks at first glance to be pretty universal and that's a good thing.</p>
Asker	<p>-It is applicable because when we look at transport as a topic, as well, it's an area that is interlinked with so many things in other sectors as well. So, we need to also have a framework that can help us talk about things across sectors, see transport when building a perspective, or from everyday perspective, including a social inequality perspective, and so on. It helps us simplify quite a lot of discussions.</p>
Rana	<p>-I think it could definitely be applied to different areas within the municipality</p>

Trondheim	- It's applicable, but it's easier to apply in some, some areas than others. And for example, I think a lot of the indicators related to SMEs are easier to apply in Norwegian context when they talk about urban development. But for education and healthcare, we're already so far so developed, and it's not even help that much.
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What do you think would be the outcome of applying this taxonomy to all current indicators used at your municipality?

Ålesund	<p>- It would mean more work as every indicator should be run through an extra loophole. But I think having the classification is maybe a good tool for us so that we can have information available for politicians and the policymakers, that we can make sure the indicator is of a certain quality, that we know the data behind it is true and pretty precise. And also, we can say for some indicators, that this is more of a broad indicator, that it's not precise, so it could be a method to convey to the policymakers on how accurate and truthful the data behind each indicator is, because we always get questions about the quality and the data, at least when we have data that some are very skeptical of and if you have basically maybe an exercise classifying it to how good it is, data wise, it can help in our ability to convey the truthfulness in the in the indicators, because when we're working with the SDGs it's very important that we convey the truthfulness of the indicators that were not covered and say something that is basically false. But if we share a fact that is later proven false, it hurts our goals in maybe succeeding more rapidly in our goals to be a greener and more sustainable society. So it's important that we convey the truth to the to the policymakers and that we have systems in place that help have some sort of quality assurance towards that.</p> <p>- I think the taxonomy is useful in starting to discuss and talk about the indicators. So it can start a reflection process among the people who work with indicators. And maybe that's more important than classifying all the indicators we have. I don't see the usefulness of that right now, maybe I could do that later.</p>
Asker	- Since we're already doing it, I guess it's back to my expectations that this will put all indicators in a systematic way. We have good documentation, and it's easier to maybe include more or other indicators later on. I guess that system really helps us to work further on it.
Rana	- I think it could lead us to confirm the importance of good indicators. And also, to see all the indicators in connection to each other, to see the whole SDG development as a whole.
Trondheim	-Perhaps to be able to do a more systematic discussion on the priorities at Trondheim kommune. And to use those indicators to measure where we are doing well and where we have more issues that needs to be tackled, by that helping us in the discussions on what kind of adjustments should we do in the input level here to be able to have better effects on the indicators. The whole privacy discussion related also to the use of money, because quite often, I feel so that if we have a specific area within Trondheim kommune that are struggling with something, the answer is quite often, we should spend more money. But I think the indicators also will help us to see that there might be other input factors that we rather should adjust them than just focusing on the money aspect.

	<p>-We talked about the finance director introducing a concept called impact-based money governance, something like that. Like use the authority money to get more impact. And I think this kind of examine this kind of KPIs can help with that. And I think it's also increasingly important for Norwegian municipalities to measure impact, because we will have less money in the future than we have right now.</p> <p>-I think another aspect that I can add as well is that it will help us in discovering because now we're working sector by sector. And we have a lot of potential in looking much more on how does my work affect the other sectors work. And how can we better cooperate in reaching the overall goals. So I think the indicators also will help us to a better awareness between the different sectors and what kind of cost effects we have across all of Trondheim kommune.</p>
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How has the application of the taxonomy been carried out? What are some strengths and challenges?

Ålesund	<p>- We talked a bit about the positive aspects of the taxonomy. In terms of challenges, as they're a bit outlined now in the SSB report, they're a bit open for interpretation meaning you can have answers that are not very uniform. Also, for our end, we are in a municipality, meaning we have limited resources. So the time aspect of doing this is also something that should not be underestimated. Because if it's an exercise that demands a lot of time with very little reward, if it's construed with a very little reward, it will not be done. That's basically maybe the two problems I can see, but we haven't really used it, so it's a bit difficult to answer.</p>
Asker	<p>-A challenge would be the knowledge about the taxonomy to explain what it is and isn't. There should at least be one meeting with people to explain how things are interrelated. I think that's the first strain, it's not something that you just sit down, and grasp immediately, you have to apply it to understand it bit by bit.</p> <p>- But then again, it's not easy. Choosing the right indicators is really hard. And there are about millions of numbers out there that you can use as the indicator. So it's really good to have a system to apply them into to help you choose the right indicators. So it's complicated, but it makes it easier to make the right choices.</p> <p>- I also think time is such an important factor here. Because in a few months, at least, we will have many indicator sets including the use of the International ones that are sorted. It makes it easier for us to gain the insights quicker to see that we might have 10 indicator sets with 1326 indicators here. For example, we have indicators that measure municipal data, we have others that are measured each year. So, it's easier for us to make selections, rather than looking at all those 1326 and start make sense of them. So, when we have sorted data, it will make it easier for us to say that we can use these ones, but not the rest. Also meaning that besides the chosen indicators, we need to have something on our own. It's easier for us to then define what's just for us and what insights can we gain from other sets.</p>
Rana	<p>- It has not yet been applied within the municipality. I think both a strength is to link an indicator to three dimensions (goal, perspective and quality), but that can also be challenging. A challenge I see is that should be simple for the municipality to apply, it</p>

	<p>could end up being too much work in the sense that the municipality uses too much time on the indicators instead of going forward.</p>
Trondheim	<p>- Current application of the taxonomy has mostly relied on people who own the indicators it has been more of a leader of this indicator takes responsibility on assessing it with his/her team. It has been more of a top-down approach. it started with us kind of applying or forcing the taxonomy and the structuring and the quality and demands on the organization. And now when we have done this process, it's more up to the different departments to take it from here.</p> <p>-We need the people in charge of different areas to feel responsibility to follow up on specific indicators. But we also need somebody to be responsible for the more organization-wide system measure and using indicators and looking at this from several perspectives. So, I think you need both. But if you have a few people talking about indicators, and you forget about creating ownership in different departments than it will definitely not work.</p> <p>-What we have discussed a lot during this process is that we want to have indicators that measure the outcome level, and not only does it look at the output level, and then the taxonomy helps us by categorizing the different indicators and what kind of level the indicators are related to so that's a very positive thing about taxonomy. Also, it helps us to define indicators based on the SDGs, which is another positive thing. When it comes to more negative aspects, I'm not quite sure but we have had some feedback from other people in the organization, it may be that the taxonomy forces you to choose between the different, like the social aspects, economic aspect than the environmental aspect. But what a lot of people have given feedback on this, that a lot of these indicators are relevant for more than one of the aspects. And that's the taxonomy and doesn't let you to choose that in the same.</p> <p>- Actually the taxonomy allows, the way we're implementing it; our spreadsheet doesn't allow it. It's more of an issue on the internal implementation</p> <p>-About choosing it also think when in use, it kind of forces people to take a stand. And that can be little uncomfortable. It's true that a lot of the things we're working on is cross cutting and the taxonomy is a two-dimensional model. So I can understand why people argue it feels like some sort of limitation. And also, I think one of the things that makes the Norwegian taxonomy different from, for example, the EU taxonomy on sustainable finance, is that the Norwegian taxonomy doesn't really have that much of a normative perspective. I guess it's a model to describe it to sort different indicators. But then, we aim to have indicators on societal effects or societal impact. That's our choice. So the taxonomy doesn't really give any guidelines for what sort of indicators you would like in a given context. Besides the quality aspect, that's self explanatory.</p> <p>-I think this is one of the like, not the limitations, but challenges in using the taxonomy. Because it's quite easy to argue that whatever you do, it will have impact on all three dimensions. And of course, that's kind of the way this so how do you, like make necessary choices to at least highlight one or more of them?</p>

C U4SSC Comparison

U4SSC Comparison

Ranking Norway	Ranking Asker	Ranking Rana	Ranking Trondheim	Ranking Alesund
Housing	Housing	Housing	Housing	Housing
Air Quality	Waste	Health	Public Space and Nature	Health
Waste	ICT	Public Space and Nature	Air Quality	Environmental Quality
ICT	Safety	Environmental Quality	Waste	Waste
Health	Social Inclusion	Waste	Public Service	Safety
Education	Health	Public Service	ICT	Education
Public Space and Nature	Education	Safety	Health	Energy
Environmental Quality	Energy	Social Inclusion	Education	Waste (ENV)
Waste (ENV)	Public Space and Nature	Education	Energy	Air Quality
Employment	Environmental Quality	Energy	Environmental Quality	Employment
Public Service	Waste (ENV)	Waste (ENV)	Waste (ENV)	Innovation
Electricity Supply	Water and Sanitation (ENV)	Air Quality	Employment	Public Service
Water and Sanitation (ENV)	Air Quality	Buildings	Innovation	Electricity Supply
Safety	Employment	Employment	Electricity Supply	ICT
Social Inclusion	Innovation	Electricity Supply	Water and Sanitation	Social Inclusion
Energy	Public Service	Water and Sanitation	Safety	Public Space and Nature
Water and Sanitation (ENV)	Transport	ICT	Social Inclusion	Water and Sanitation (ENV)
Urban Planning	Electricity Supply	Water and Sanitation (ENV)	Water and Sanitation (ENV)	Urban Planning
Buildings	Water and Sanitation	Urban Planning	Urban Planning	Buildings
Innovation	Urban Planning	Innovation	Buildings	Transport
Transport	Buildings	Transport	Transport	Water and Sanitation (ENV)
Culture	Culture	Culture	Culture	Culture
Drainage	Drainage	Drainage	Drainage	Drainage
Food Security	Food Security	Food Security	Food Security	Food Security

D Thesis Description

THESIS WORK

for

student Ana María Paz Mendoza

Spring 2021

Sustainability Taxonomy application in Norwegian Municipalities

Background and objective

The United Nations Sustainable Development Goals as a set of objectives for 2030, have become leading and decisive towards sustainable development at a global extent in efforts to face or counteract today's and future's greatest challenges ranging from inequality and poverty to climate change. SDGs continue to gain force as leverage points to mitigate possible global catastrophes and risks.

However, a unique quality of these goals is that they require the world's ability to transform towards a sustainable development, which strongly rely on multi-sector Stakeholders within a social context, from private to public as well as individual to large scale and decision-making parts. Each goal has a set of targets which must be worked on by relevant Stakeholders in order to be successfully met. However, improvements or setbacks on the SDGs cannot be scaled at a global extent unless they are measured and reported in shorter instances, to then be extended and compared at a global level.

Through the previous experience of the application of the U4SSC assessment in various Norwegian municipalities, to assess the ITC and sustainability performance, relevant aspects have been acknowledged such as the value of having a standard that is comparable and provides a global lens, however, other opportunities were also acknowledged such as the lack of information provided through a local context lens and the low applicability to base sustainable strategy decisions on it, are some of the main aspects.

SSB in partnership with KS has developed a taxonomy providing certain flexibility allowing users to work with a structure that enables adaptability to what is relevant to them and their strategies and goals. In order to deepen into the previous project work, the proposal is to continue working with the case municipalities, through a basis on the taxonomy to identify material aspects for each municipality to then gather and assess specific KPIs that are relevant to target and measure problem areas, specific to that municipality. This, with the purpose of have a greater depth in the understanding of the taxonomy's operation and the use of KPIs.

The overall objective of this master's thesis is to contribute to the understanding of the taxonomy proposed by SSB in partnership with KS to understand its relevance in its application in decision making for selected Norwegian case municipalities. To further contribute to the taxonomy application, of particular interest is the use of applicable KPIs to each municipality through the use of the taxonomy, in efforts to also understand how decision making processes and strategies can be benefitted from the use of these tools to improve or target sustainability challenges in the municipalities.

The following tasks are to be considered:

1. Develop a set of research questions that can form a basis for the thesis and perform a literature study relevant to it.
2. Examine the use of SSB Taxonomy report to fully understand its scope and application.
3. Develop an interview guide and carry out a set of interviews for selected cities, and KS, in order to inform yourself on how the taxonomy could be implemented for each municipality.
4. Report your overall findings and discuss how they inform your research questions and add knowledge to what is found in literature.
5. Discuss strengths and weaknesses of the work, and suggestions for follow-up research.

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The thesis comprises 30 ECTS credits.

The work shall be edited as a scientific report, including a table of contents, a summary in Norwegian, conclusion, an index of literature etc. When writing the report, the candidate must emphasise a clearly arranged and well-written text. To facilitate the reading of the report, it is important that references for corresponding text, tables and figures are clearly stated both places.

By the evaluation of the work the following will be greatly emphasised: The results should be thoroughly treated, presented in clearly arranged tables and/or graphics and discussed in detail.

The candidate is responsible for keeping contact with the subject teacher and teaching supervisors.

Risk assessment of the candidate's work shall be carried out according to the department's procedures. The risk assessment must be documented and included as part of the final report. Events related to the candidate's work adversely affecting the health, safety or security, must be documented and included as part of the final report. If the documentation on risk assessment represents a large number of pages, the full version is to be submitted electronically to the supervisor and an excerpt is included in the report.

According to “Utfyllende regler til studieforskriften for teknologistudiet/sivilingeniørstudiet ved NTNU” § 20, the Department of Energy and Process Engineering reserves all rights to use the results and data for lectures, research and future publications.

Submission deadline:

- Work to be done in lab (Water power lab, Fluids engineering lab, Thermal engineering lab)
- Field work

Department for Energy and Process Engineering,

H. Brattebø

Helge Brattebø
Supervisor

Co-Supervisor(s):

