Measuring and improving the impact of sustainable public procurement of immunization cold chain equipment by UNICEF
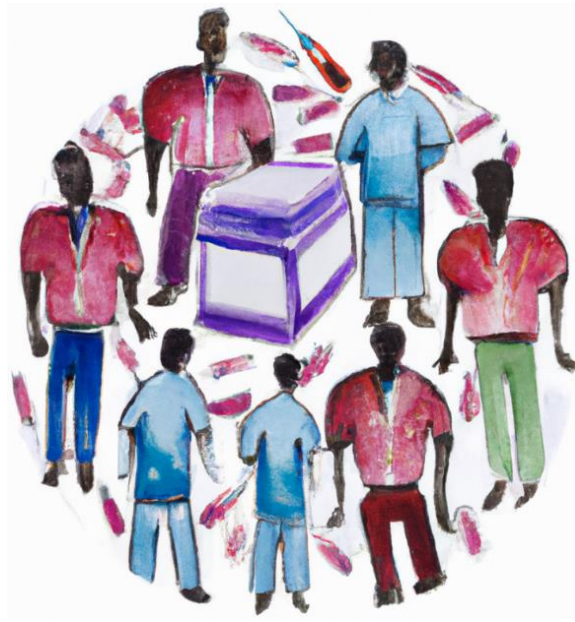
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Abstract

If used strategically, the significant volume of public procurement can drive markets to adopt sustainable practices to help achieve the United Nations Sustainable Development Goals. However, the literature has shown gaps on effectiveness and impact of sustainable procurement and imprecise definition of sustainability criteria. This thesis explores the sustainable procurement of immunization Cold Chain Equipment by UNICEF to determine what made this case successful and related measurements. This study contributes to the literature by adding definitions of sustainability criteria, testing and developing the theoretical foundation, and providing guidance based on original data from the public humanitarian sector to advance sustainable procurement within UNICEF. The research methodology is based on an inductive case study approach, using thematic analysis of semi-structured interview results, systematic literature review and data collection to relate sustainability criteria with factors of the Sustainability Transition Procurement Model. This study successfully tests SDG indicator 12.7.1 to measure the sustainable procurement level at organizational level. It identifies that existing sustainability criteria are predominantly at the output level and the literature gaps exist at the impact level. It specifies social and environmental indicators to measure sustainability impact and found four new sustainable procurement drivers specific to cold chain equipment that are effective due to a broad coverage of factors critical to establishing socio-technical system change. The study concludes that UNICEF uses a robust, sustainable procurement framework and has clear evidence of use of sustainability criteria but still lacks specific goals, actions, monitoring, evaluation, and enforcement. Finally, it provides nine recommendations to enable UNICEF to improve the impact and measurement of sustainable procurement, of which some may have wider applicability within the UN.

Keywords: Sustainable public procurement, Green procurement, Socio-technical transitions, Sustainability criteria, immunization cold chain equipment, UN SDGs, UNICEF.

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List of abbreviations

BMGF	Bill and Melinda Gates Foundation
EC	European Commission
EU	European Union
EMS	Environmental Management System
CCE	Cold Chain Equipment
CCEOP	Cold Chain Equipment Optimization Platform
CEED	Climate, Energy, Environment and Disaster risk reduction
CPP	Circular Public Procurement
CSR	Corporate Social Responsibility
Gavi	Gavi, The Vaccine Alliance
GDP	Gross Domestic Product
GHG	Green House Gas
GRI	Global Reporting Initiative
GPP	Green Public Procurement
HLCM PN	High-Level Committee on Management Procurement Network
IPR	Intellectual Property Rights
IRRF	Integrated Results and Resources Framework
ITC	Immunisation Technology Centre
LCC	Life Cycle Costs
MSDEC	Monitoring, Strategic Data and Evidence Centre
MSFC	Markets and Supplier Financing Centre
MLP	Multi-Level Perspective Framework
PATH	Program for Appropriate Technology in Health
PIC	Product Innovation Centre
PQS	Performance, Quality, and Safety standard
QAC	Quality Assurance Centre
Scopus	Scopus database of scientific literature
SDD	Solar Direct Drive
SDG	Sustainable Development Goal
SME	Small and Medium Enterprise
SPKC	Strategic Partnerships and Knowledge Centre
SPP	Sustainable Public Procurement
STP	Sustainability Transition Procurement Model
TCO	Total Cost of Ownership
OECD	Organisation for Economic Co-operation and Development
UNICEF	United Nations Children's Fund
UNGM	United Nations Global Marketplace
WHO	World Health Organisation

Acknowledgements

1 Introduction

1.1 Importance

Public procurement could be regarded as one of government's most essential tools (Morgan & Sonnino, 2013). If used strategically, it can contribute to helping achieve the 2030 Sustainable Development Goals (OECD, 2021). Many researchers have studied public procurement and considered it an effective policy instrument that can trigger the market to adopt more sustainable practices and increase the market for sustainable products and services (Li & Geiser, 2005; Testa et al., 2012). Previous studies have focused on discovering which factors influence successful sustainable procurement, but there are still gaps in evidence on its effectiveness and impact and imprecise definition of how sustainability criteria should be used (Cheng et al., 2018; Testa et al., 2012).

1.2 Background

This research focuses on the procurement of solar-powered immunization cold chain equipment by UNICEF because it serves as a successful case of sustainable public procurement. It is widely acknowledged that a well-functioning cold chain is essential to achieving life-saving and equitable vaccination coverage. UNICEF is one of the UN's largest procurers of supplies and services, with $US 4.47 billion in global procurement in 2020 (UNICEF, 2021c). UNICEF Supply Division functions as its procurement and logistics headquarters, operating the world's largest humanitarian warehouse in Copenhagen (UNICEF, 2021c). UNICEF first formulated a climate-neutral strategy to track and reduce Greenhouse Gas (GHG) emissions of their global activities (UNICEF, 2015), followed by a sustainable procurement procedure (UNICEF, 2018) and specific guidance in 2021 (UNICEF, 2021d). UNICEF's strategic goals are to make sustainable procurement a fundamental approach to its operations and to become a leading practitioner and contributor to UN sustainable procurement by 2023. By 2030, its sustainable procurement should demonstrate measurable contributions to achieving the SDGs (UNICEF, 2018). However, according to its management, a 17% surge in emergency-focused procurement driven by the COVID-19 pandemic in 2020 led to a delay in implementing its sustainable procurement goals (UNICEF, 2022c).

Immunisation Cold Chain Equipment (CCE), used for transport and storage of vaccines, has undergone numerous new technological developments to improve temperature monitoring and control, system quality, reliability, and appropriate use and maintenance. Starting in the 1970s, remote locations without access to an electrical grid or intermittent power supply could only use absorption-type refrigerators running on kerosene or gas (Robertson et al., 2017). These devices have a high risk of freezing, require frequent maintenance and can have limited ice-making capacity (McCarney et al., 2013). In the 1980s, solar battery-powered refrigerators started to be used, but they also experienced challenges regarding maintenance, a short lifetime of the batteries, and theft of solar panels. Solar Direct Drive (SDD) refrigerators were introduced in 2000, powered directly by solar panels and eliminated batteries by using an internal lining of ice in containers to help maintain temperature. In 2007, the WHO issued a new Performance Quality and Safety (PQS) standard for SDD refrigerators and collaborated with PATH under project Optimize to challenge the industry to further develop SDD equipment (Robertson et al., 2017).

UNICEF Supply Division started procuring SDD refrigerators in 2010 and, with WHO, PATH, and Clinton Health Access Initiative, had an important influence on the development of the cold chain equipment market by monitoring performance and collecting feedback through field evaluations. As a result, procurement of SDD systems has significantly increased since 2013 (Robertson et al., 2017). In addition, solar-powered refrigeration demonstrated to have lower lifetime costs than absorption systems, be increasingly competitive with grid power and that it may be better for the environment by eliminating the use of fossil fuels (McCarney et al., 2013). Also, a lack of maintenance and trained staff caused WHO and UNICEF to develop and provide training and maintenance programs to ensure long-term sustainability (Lloyd & Cheyne, 2017). Because UNICEF's procurement of immunisation cold chain equipment has improved social, environmental and economic aspects of sustainability, it can be considered a successful example of sustainable procurement and has therefore been selected as the focus of this case study.

1.3   Contribution

This study makes three contributions. First, it aims to contribute to a more precise definition of sustainability criteria by clarifying social, environmental, and economic criteria for

procurement of cold chain equipment and fill gaps in literature on effectiveness by collecting evidence on their impact, based on literature review and case study data of immunization cold chain equipment procured by UNICEF. Second, it contributes to developing the theoretical foundation of sustainable procurement by testing and suggesting improvements to the Sustainability Transition Procurement Model (Trindade et al., 2018). Third, this study aims to contribute to UNICEF's vision to become a leading practitioner of UN sustainable procurement (UNICEF, 2021) by providing guidance based on original data from the public humanitarian sector that can be used to raise awareness and advance sustainable procurement within UNICEF. To achieve these objectives, this research aimed to answer the research question: How can the environmental, social, and economic impact of sustainable public procurement of immunisation cold chain equipment be measured and improved?

This study introduced use of the SDG 12.7.1 index to measure the level of sustainable procurement at organizational instead of country level. It echoes findings from the literature, confirming that the UNICEF CCEOP project lacks evidence of SPP impact due to insufficient definition of sustainability goals, targets, and criteria. Analysis based on the Sustainability Transition Procurement model found evidence of 76 functional sustainability criteria embedded in procurement specifications and found a significant social impact of jobs created by CCEOP that was unreported. New sustainability impact indicators are proposed to measure environmental, social, and economic impact on society. Furthermore, based on the findings, some changes are proposed to improve the STP model to cover missing sustainability procurement factors.

1.4   Structure

This report is organised into five sections. First, the introduction discussed the background of sustainable procurement by UNICEF and the importance and contribution of this study. Second, the literature review section describes the broader perspective of sustainable public procurement, the key concepts, the use and benefits of standards and criteria, the theoretical framework, and the research question. Third, the methodology explains the method and tools used for data collection, analysis, and limitations of this study. The fourth section, findings, details the study's data collection and analysis results. Finally, the fifth section, discussion,

summarises results and recommendations, discusses the methodology and makes suggestions for further research.

2 Literature review

2.1 Concepts and definitions

This chapter describes what is understood by **Sustainable Public Procurement (SPP)**, the key concepts, challenges, drivers, missing concepts in literature, the value of standards and criteria, and finally, the theoretical framework and research question for this study.

One of the main concepts, public procurement, is conducted by governments, state-owned enterprises and international organisations in the public interest. Due to its significant volume, it can be seen as a critical policy instrument to influence the market to become more sustainable (Sönnichsen & Clement, 2020). EU authorities spent around 14.9% of GDP ($US 2.55 trillion) in 2020 on procurement, and all OECD members around 12.6% ($US 6.8 trillion) in 2019 (OECD, 2021). This large volume directly affects citizens' well-being (Sönnichsen & Clement, 2020).

Further specifying procurement, Sustainable Public Procurement (SPP) can be considered a category of public procurement that aims to achieve the best balance between social, environmental, and economic sustainability (Cheng et al., 2018; Grandia & Voncken, 2019). The Sustainable Procurement Task Force of the United Kingdom was one of the first to define sustainable procurement as a process that aims to achieve the best value for money on a whole lifecycle basis to generate benefits to the economy and society while minimising the negative impact on the environment (Defra, 2006, p. 10). It can include subcategories, such as green, circular, and innovation procurement. Green Public Procurement (GPP) focuses on reducing environmental impact throughout a product life cycle (European Commission, 2008, para. 3.1). Circular procurement aims to procure goods or services contributing to circular material and energy loops to avoid damaging the environment and creating waste over their life cycle (EC, 2017). Lastly, innovation procurement promotes innovative solutions with better performance and added value to deliver a meaningful impact in a market or to help solve societal challenges (EC, 2021b).

Innovation is needed to develop greener, more circular products and disruptive business models to fast-track a transformation to a circular economy (MacArthur, 2013). Research shows that sustainable procurement can trigger innovative solutions and new green markets (Cheng et al., 2018; Sönnichsen & Clement, 2020). For example, a life cycle assessment can start dialogue with suppliers to reduce carbon emissions, which can be used to pilot new, innovative solutions. By procurement of new sustainable products, suppliers are given an opportunity to expand supply toward private market consumers (Morley, 2021). Sustainability practices can be adopted along the product supply chain as a spill-over effect, encouraging implementation by spreading ideas, values, and knowledge on sustainability practices and reducing inequalities among businesses, workers and consumers (Morley, 2021). Procurement of innovative products and services requires iterative processes that involve more dialogue with suppliers, such as procurement of research & development and competitive dialogue (Sönnichsen & Clement, 2020). Procurement can target innovation by clearly identifying expected benefits and risks per business case, engaging with suppliers to develop innovation ecosystems, and using smaller lots and more flexible selection criteria (EC, 2021b).

The presence of an Environmental Management System (EMS) is often used as a key environmental criterion to select suppliers. An EMS is a system of processes and procedures for improving, training, monitoring, and reporting on environmental performance. Although implementing an EMS can result in significant environmental improvements, research shows that having a certified EMS does not always guarantee good environmental performance (Ammenberg et al., 2002).

2.2   Sustainable public procurement

A meta-analysis of 67 studies on public procurement found that SPP has gained most relevance in recent years, with the number of studies growing since 2000 that used the terms "green", "sustainable", and "environmental" as synonyms (Cheng et al., 2018). Circular principles in public procurement have been introduced more recently, for example, by the European Commission with a circular procurement action plan (EC, 2017). Circular public procurement shares many similarities with green and sustainable procurement, as it aims to minimize waste and the negative environmental impact of procurement (Sönnichsen & Clement, 2020). In addition, UNICEF introduced a guideline aiming for sustainable public procurement

that also aims to drive progress on circular economies (UNICEF, 2021d). Therefore, this study will combine these three types of procurement and refer to them jointly as Sustainable Public Procurement (SPP).

SPP has been encouraged through legislation, national policies, and strategies. SPP has been implemented in the EU (EC, 2021a), by local authorities in the UK, and in multiple countries in Asia, such as China, Japan, Korea, Thailand and Hong Kong (Ho et al., 2010). National and international SPP policies and legislation are found to be primary factors influencing to what extent the public sector implements sustainable procurement, for example by mandatory environmental targets (Italy, Belgium) and policies for specific products like wood and paper (Denmark, France, Netherlands), (Brammer & Walker, 2011).

Many challenges need to be overcome to implement SPP effectively, such as a lack of specific goals and organisational structures, a lack of knowledge and awareness, political commitment, and financial issues. To elaborate, financial constraints due to a short-term focus on value for money have been a main barrier (Brammer & Walker, 2011; UNEP, 2021b). Furthermore, small organisational size can be a barrier due to a lack of resources and time available to devote to GPP (Michelsen & de Boer, 2009). Moreover, studies in Europe found that environmental criteria used in procurement lacked precise definitions and common application, but also that procurers depended strongly on environmental standards used (Cheng et al., 2018). Implementation of SPP in developing countries encounters similar barriers as in developed countries. However, developing countries have less SPP awareness and knowledge, less focus on environmental sustainability and more focus on local businesses (SMEs) and occupational health and safety (McMurray et al., 2014).

Important drivers for successful implementation of SPP are top-level management support, good awareness and knowledge of existing standards and tools, and an individual procurers' beliefs and commitment (Grandia et al., 2015; Sönnichsen & Clement, 2020), including the presence of change agents who help start or manage change initiatives (Grandia, 2015). Prioritisation and measurement tools, such as eco-labels, life cycle assessments, Total Cost of Ownership (TCO), and carbon emission standards, create transparency and facilitate the implementation of SPP.

Missing concepts in the field of SPP research are a lack of research and empirical data measuring its impact, resulting in the efficiency and effectiveness of SPP as an environmental policy instrument being questioned. Data is lacking on the impact of environmental and sustainability criteria in supplier selection and tender award, on tracking performance and measuring sustainability of purchases. Researchers claim that SPP can stimulate innovation of environmentally friendly products and services, but this also lacks empirical evidence (Cheng et al., 2018). The function of market dialogue with suppliers in diverse contexts to stimulate innovation is also highlighted as a research gap (Sönnichsen & Clement, 2020). In addition, vague definitions on how environmental standards should be used is seen as a key factor that reduces the effectiveness of sustainable procurement (Cheng et al., 2018), highlighting a need for guidance to public authorities to promote the adoption of green and sustainable procurement practices (Trindade et al., 2018). Further development and implementation of sustainability standards and indicators are deemed critical to the success of SPP because this can push the demand for eco-technologies and promote the diffusion of improved products and services (Rainville, 2017).

2.3   Standardization in sustainable public procurement

Using standards in tenders can encourage competition between vendors by having to meet the same minimum requirements. Requiring environmental standards can drive their implementation in private markets and stimulate environmental innovations (EC, 2008). Using standards promotes market diffusion by overcoming fragmented demands of users and stimulating greater environmental awareness among companies (Rainville, 2017). Use of organisational standards that measure organisational instead of product criteria, such as (ISO-14001) for environmental management and the UN Global Compact for social sustainability (UNGC, 2022), is expected to improve green and sustainable practices. However, research suggests that using specific standards and criteria for products or services has a better impact on their performance (Rainville, 2017). As an example of a product standard, the WHO Performance, Quality, and Safety Standard (PQS) for immunisation cold chain equipment played a vital role in new product development and building market demand. It was also important to measure performance post-procurement to incorporate feedback, improve designs, and update the PQS standard (Robertson et al., 2017). Application of existing standards in practice also

depends on the procurers' capabilities and knowledge. Adoption of SPP has been constrained by uncertainty on methods and legality of applying them in procurement processes (EC, 2008).

2.4   Sustainable procurement criteria

Public procurement relates to multiple Sustainable Development Goals (SDGs), but specifically to SDG 12, to stimulate sustainable consumption and production, and target 12.7 to *"promote public procurement practices that are sustainable, following national policies and priorities"* (UNGM, 2019; UNICEF, 2018). Sustainable public procurement can potentially improve 82% of the SDG targets, with the highest potential to affect SDG 11, Sustainable Cities and Communities (Nordic, 2021). A global sustainable procurement review of 41 countries by UNEP found that national governments monitor different aspects of SPP and the most frequently used outcome indicators were GHG emission reduction, job creation, and cost reduction (UNEP, 2017). Therefore, we can divide sustainable procurement standards and criteria into the three basic categories of sustainability *-the triple bottom line-* namely: environmental, social, and economic criteria.

2.4.1   Environmental criteria

Frequently used environmental criteria are the presence of an EMS such as an (ISO-14001, 2015) certified system, Life Cycle Assessments (ISO-14040, 2006), and recognized Eco-labels (ISO-14021, 2016) aiming at sustainable resource use, protection of the environment and biodiversity (UNGM, 2019). Additionally, carbon accounting (ISO-14064-1, 2018) and energy management criteria (ISO-50001, 2018) can be used to assess suppliers. Relevant education, professional qualifications of the staff, certificates of conformance and samples of products (EC, 2016) can be used as pass-fail criteria or weighted and scored during tender evaluation. The European Commission issued GPP criteria for 14 product and services groups based on a whole lifecycle approach (EC, 2021a). Non-compliance with applicable environmental laws is often used as an exclusion criterion (EC, 2016).

2.4.2   Social criteria

Social criteria that can be used are, for example, ISO's "Guidance on sustainable procurement" (ISO-20400, 2017), "Guidance on social responsibility" (ISO-26000, 2010), and

the "Occupational health and safety management standard" (ISO-45001, 2018). The UN's e-procurement platform, the Global Marketplace, uses five primary level social criteria out of 12 criteria: 'human rights and labour issues', disability inclusion, gender issues, 'social health and well-being' and 'local communities and SMEs' (UNGM, 2019). The UN Global Compact is a standard that businesses can subscribe to, that is built on ten key principles, three of which are environmental and seven that are socially oriented: protection of human rights, avoiding human rights abuse, abolition of child labour, elimination of forced labour, freedom of association, eliminate discrimination and anti-corruption (UNGC, 2022). Reputable, fair trade certification can also be used as a requirement (EU, 2005). Another option is to select suppliers based on a social mandate, such as working with disadvantaged employees or communities (Clement et al., 2016). Private sector corporate social responsibility and fair-trade standards are numerous and contain some duplication, as found by a study that compared 665 social sustainability indicators (Knebel & Seele, 2021). Also, the UN-sponsored International Trade Centre hosts an online platform with 320 sustainability standards[1]. Therefore, selection of relevant sustainability criteria for this study will be focused by relating them to the sustainability issues as prioritized by UNICEF, explained in *§3.3 data analysis*.

2.4.3   *Economic criteria*

Economic criteria strive to get the best value for money, as expressed in the Total Cost of Ownership (TCO), also called whole Lifecycle Costs (LCC), of a product or service (UNICEF, 2018). Cost reductions over the life cycle are measured due to eliminating waste, reducing material costs, maintenance, energy use, extending lifetime, and reducing cost of disposal (EC, 2021b). PATH developed a TCO tool for cold chain equipment in 2019 (PATH, 2019). Optimizing material use and waste reduction is usually not mentioned in technical specifications but can be included in price-quality criteria (Lozano et al., 2019). For example, to select the Most Economically Advantageous Tender for a construction project, a Dutch public authority used whole life cycle CO_2 reduction as a quality criterion, monetized it, and deducted it from bidding prices (EC, 2016).

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[1] ITC Sustainability Standards Map: *https://standardsmap.org/*

2.5   Theoretical framework

The previous paragraph gave examples of sustainability criteria that can be applied to SPP. However, because suppliers will need to adapt to these new criteria, this requires large-scale system changes involving a transition from existing technology, standards, and criteria. The "Multi-Level Perspective" (MLP) Framework (Geels, 2002) has emerged as one of the main approaches to study and help us understand how large social, economic, and technological system changes can be achieved as we transition toward a more sustainable society (McMeekin & Southerton, 2012). Geels (2002) suggested that established socio-technical systems are stable due to the activities of social groups who preserve and expand these systems, conceptualized in a multi-level nested model. In the MLP framework, changes start with innovations at the niche level *(Figure 1)*. Innovations can establish successful system changes through interaction and alignment with the regime and landscape levels. These so-called regime shifts require external stakeholders to replace a dominant design embedded in an existing socio-technological system with a new innovative design (Geels, 2002).
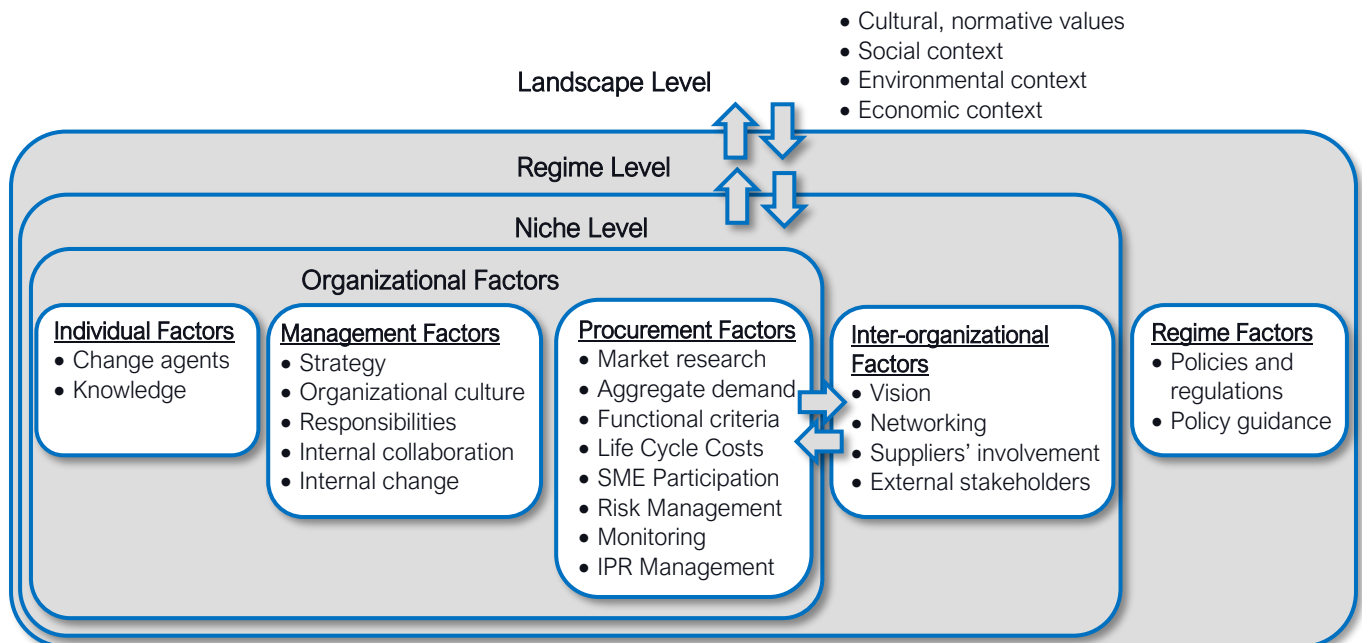

Figure 1. The "Sustainability Transition Procurement" (STP) Model (Cayolla Trindade et al., 2018, p. 5)

The "Sustainability Transition Procurement" Model *(Figure 1)* applied the MLP framework's theory to the institutionalisation and operationalisation of sustainable procurement. At the niche level, it describes the critical organisational and inter-organisational factors; at the

regime level, it lists the key policy factors of public organisations, and at the landscape level, it contains the factors that influence the broader context of public organisations and society (Trindade et al., 2018). The STP model was developed by Trindade through a systematic analysis of 52 papers and tested in three case studies between 2012 to 2014. The STP model adds value to this study by listing the key procurement factors influencing sustainability that are used as guidance and framework for the SPP criteria and case analysis.

2.6   Research question

This study examined sustainable public procurement of immunization cold chain equipment to determine what made this case successful and how it was measured. This study collaborated with UNICEF because its management sought scientific, evidence-based criteria, indicators and lessons learned to track and measure the impact of sustainable procurement and help raise awareness and advance sustainable procurement practices across its organisation. This study aims to contribute to UNICEF's vision to become a leading practitioner and contributor to UN sustainable procurement (UNICEF, 2021d). Furthermore, this study aims to contribute to literature to fill a gap in evidence on the impact of SPP as a policy tool by measuring the effectiveness of sustainability standards and criteria in improving the performance of sustainable purchases (Cheng et al., 2018). Therefore, the scope of this research is based on the case example of successful sustainable procurement of immunisation cold chain equipment through UNICEF's and Gavi's Cold Chain Equipment Optimization Platform (CCEOP) between 2017 to 2021. The objectives are: To collect evidence of criteria and factors that successfully created environmental, social, and economic impact in society, to develop the theoretical foundation for sustainable procurement by filling gaps in existing literature, and to contribute to achieving UNICEF's vision to become a leading sustainable procurement practitioner. Consequently, the following research question is asked:

"How can the environmental, social, and economic impact of sustainable public procurement of immunisation cold chain equipment be measured and improved?"

3   Methodology

3.1   Methods and tools

This chapter explains the research plan and methodology used for the data collection, analysis, and limitations of this research. This study applied a qualitative, inductive case study method. The inductive approach (Eisenhardt et al., 2016) is a frequently used methodology for sustainable procurement because this field is relatively new and is still developing new practices (Cheng et al., 2018). Using the inductive approach, "how" and "why" questions can be addressed by seeking evidence of relevant successful practices. A quantitative approach was initially considered but was later decided to be inappropriate. Conducting a quantitative study is likely to unsuccessful due to the lower number of sample size because practices are still in development and due to a broad scope of products and services, which all can have different sustainability criteria.

This study adopts a conceptual approach through literature review and an operational approach through interviews and data collection. First, a systematic literature review was done to analyse the main SPP standards and criteria using the "Preferred Reporting Items for Systematic reviews and Meta-Analyses" method (PRISMA). PRISMA is a scientific method to carry out a systematic review that ensures the review will be complete, accurate and transparent (Page et al., 2021). Secondly, semi-structured interviews and data collection will be conducted, guided by the main factors of the STP model, as seen in the research plan *(Figure 2)*.

Research objective
Identify how the environmental, social, and economic impact of sustainable public procurement of cold chain equipment, can be measured and improved

Methods and tools

Framework for analysis, according to:
- Inductive case study method (Eisenhardt KM et al, 2016)
- Sustainability Transition Procurement Model (Cayolla Trindade et al., 2018)

Step 1: Criteria analysis
SPP standards, indicators, and criteria
As set by UN, EU, ISO
- PRISMA literature review in Scopus
- Relate SPP criteria to STP model factors

Step 2: Thematic analysis
UNICEF CCEOP project 2017 – 2021
- Semi-structured interviews with staff (13), partners (3) and suppliers (3)
- Analysis of documentary evidence

Results and discussion

- Identify environmental, social, and economic indicators to measure impact
- Identify factors that can improve impact (environmental, social, economic value)

- SPP indicators and methods used by UNICEF to implement SPP
- Factors & methods that improved environmental, social, economic impact
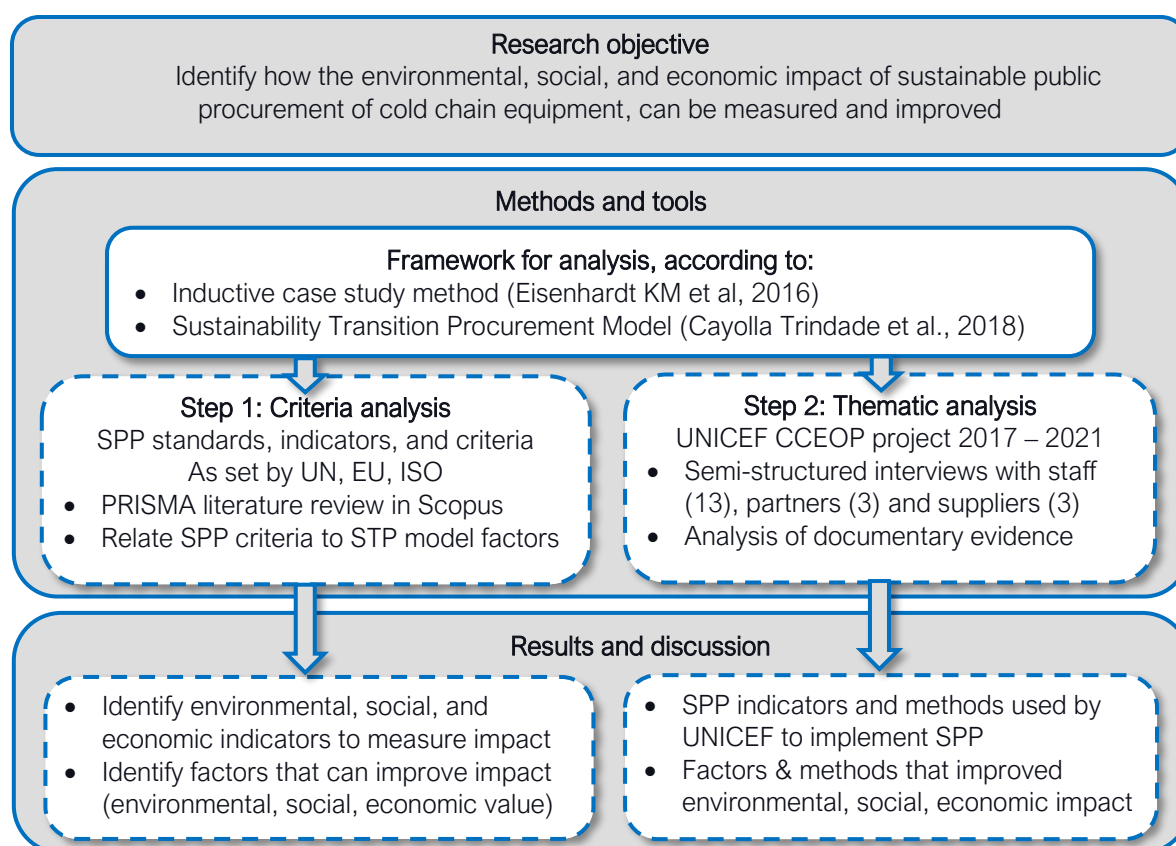
Figure 2. Research plan to measure and improve the impact of sustainable public procurement

1. **Criteria analysis**: A literature review to find recommended criteria to measure sustainable procurement impact for cold chain equipment and relate these to the relevant factors of the STP model. Interview tools were updated according to SPP criteria identified.

2. **Case analysis**:
   - Semi-structured interviews with (13) key stakeholders at UNICEF Supply Division, (3) partner organisations and (3) CCE manufacturers to collect information on SPP criteria and lessons learned, using questionnaires. For more information, refer to Annex IV.
   - Collect guidelines, tools, procurement strategies, contract, and monitoring & evaluation data of CCEOP project from 2017 to 2021, as evidence of relevant indicators used.
   - Collect procurement data on SPP indicators from suppliers (as indicated in interviews).

3.2   Data collection

Systematic data collection to find relevant articles for the literature review was conducted using the Scopus database of scientific publications, as per the flow diagram below *(Figure 3)*. This search focused on articles on sustainable, green public procurement, published from 2000 to 2021, as (Cheng et al., 2018) indicated that 2000 represents the start of SPP gaining prominence in literature. Records were screened for articles with (a) 'green', 'sustainable', or 'innovation' in the title, (b) focused on measuring the impact, or meta-research of sustainable procurement, and (c) a significant number of citations (25 or more). Additional relevant publications from reputable international organisations were found through the snowball method via references in studies, guidelines, and standards on professional websites.
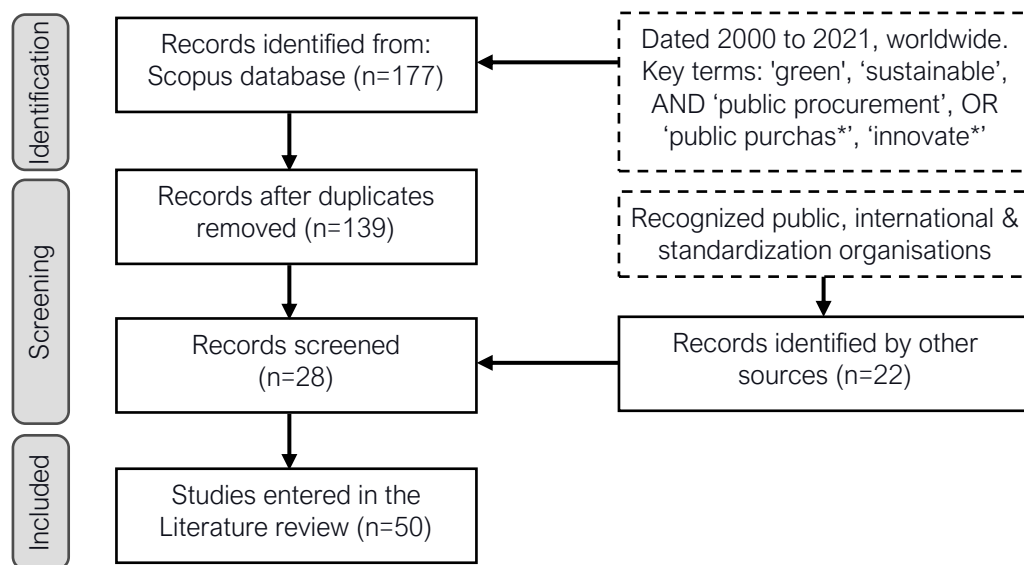
Figure 3. PRISMA diagram of the literature review

Data collection *(Figure 2, step 2)* was done through online semi-structured interviews with stakeholders who participated in the CCEOP procurement case. Initially with nine staff of UNICEF Supply Division: (1) Senior Contracts Manager, (2) Chief of Immunisation Technology centre, ITC, (3) Contracts Manager, ITC, (4,5) two Technical Officers, ITC, (6) Chief of Quality Assurance centre, (7) QA officer, and (8) Chief of Monitoring, Strategic data Evidence centre. Then, through snowball sampling, five additional UNICEF staff and three external organisations were interviewed, the chiefs of; (9) Strategy, Partnerships and Knowledge Centre (SPKC), (10) Product Innovation Centre (PIC), (11) Markets and Supplier Financing Centre (MSFC), (12)

Contracts Specialist, ITC (13) Climate, Energy, Environment and DRR (CEED) in UNICEF's programme group, and external organisations: (14) WHO PQS technical officer, (15) Programme manager, Bill, and Melinda Gates Foundation, and (16) Programme manager, Gavi. Finally, the three largest CCE suppliers of UNICEF were interviewed: B Medical Systems, Haier Biomedical Co., and Vestfrost Solutions. There were 19 interviews conducted, as listed in Annex IV. Interview data was verified by documentary evidence obtained from UNICEF's ITC team and CCE suppliers.

3.3   Data analysis

Step 1. Criteria analysis: The selection of publications through snowballing focused on standards, guidelines, and criteria frameworks issued by official, public authorities and international organisations, such as the UN, EU, and ISO. Because the aim was to find criteria that can be used within UNICEF, the focus was on (1) sustainability criteria being used by UN agencies and the UN Global Marketplace and (2) criteria that can measure & contribute to the impact on the Sustainable Development Goals. SDG indicator (12.7.1) directly applies to SPP by measuring a country's implementation level of sustainable procurement. This is a Tier 2 indicator, meaning it has an established methodology, but it is not yet regularly used by countries (UNDESA, 2022). In addition, because organisations focus on different aspects of SPP implementation based on their strategic priorities and competencies (UNEP, 2017), selection of sustainability criteria focused on sustainability issues prioritized by UNICEF, as stated in the UNICEF Strategic Plan and Integrated Results and Resources Framework (IRRF), 2022-2025) and UNICEF Supply Division Office Management Plan (OMP) and IRRF, 2022-2025 (UNICEF, 2021a, 2021b).

Step 2. Case analysis: The qualitative data from the interviews was analysed using thematic analysis in ATLAS.ti scientific software (Version 22.1) (ATLAS.ti, 2022). Content analysis examines qualitative data by grouping text with similar meanings in categories and counting how many times they occur (Kondracki et al., 2002). Thematic analysis identifies common patterns and themes across multiple interviews while guided by the background formed by the literature review. Both methods are a form of qualitative analysis, but thematic analysis uses a more explanatory approach than content analysis in interpreting themes by relating them to their context (Downe-Wamboldt, 1992). Atlas.ti was used to identify the key factors of the

STP Model and sustainability criteria in the interview data and ordered into categories and themes (Vaismoradi et al., 2013) to help explain relationships between factors, to understand and answer the main research question (Downe-Wamboldt, 1992).

3.4   Research limitations

This study may lack generalizability due to a small sample size focused on procurement of immunisation cold chain equipment by UNICEF. Nevertheless, it contains findings regarding the SPP process and strategy that may be applied organisation wide. Due to time limitations, only three (out of total seven) cold chain equipment suppliers could be interviewed. These three suppliers represent at least 80% of total CCEOP procurement and are ISO 14001 certified. This study does not represent CCE suppliers with less developed sustainability management systems. The review of the existing literature focused on online documents and hardcopy books and manuscripts were not included due to resource limitations. Also, SPP subcategories such as social return-on-investment procurement and innovation procurement were not explicitly included in the review. Because sustainable procurement is a field that is still in development, as evidenced by many new guidelines published online by international organisations, I believe that the scope and depth of the literature review were sufficient and includes the latest SPP developments.

4   Findings

4.1   Sustainability criteria analysis

This section describes the findings from the sustainability criteria analysis (step 1). First, the analysis of criteria and indicators used by UN, UNGM and UNICEF, followed by the analysis of the sustainability criteria used for CCE and finally, measurement of UNICEF's level of sustainable procurement using SDG indicator index 12.7.1.

4.1.1   Sustainability indicators used by UN and UNICEF

All UN entities have committed to follow the UN sustainability strategy, phase I and phase II, which aim for the UN to apply environmental and social sustainability criteria across its work (UN-CEB, 2019, 2021). In addition, UNICEF uses the framework of SP indicators developed by the UN High-Level Committee on Management Procurement Network (HLCM PN) for the UN Global Marketplace (UNGM, 2019). Furthermore, UNICEF is governed by the goals and indicators from its strategic plan and integrated results and resources framework (IRRF, 2022-2025) (UNICEF, 2021a), and Supply Division by its Office Management Plan (OMP, 2022-2025) (UNICEF, 2021b). However, analysis of all sustainability indicators listed in these strategic documents (Table 1) shows that UNICEF's IRRF and OMP have no environmental impact indicators, while UNGM has only generic category descriptions at level 1.

Table 1: Number of sustainability indicators by UN framework

No. of indicators by level and type	UNICEF Strategic Plan, IRRF 2022-2025	UNICEF SD OMP, IRRF 2022-2025	UN Sustainability Strategy 2020-2030 Phase I	UNGM SP indicators
Impact On environment, society, economy	31 indicators health, social, economic demographic data none environmental	*none*	Phase I, Environmental 5 GHG emissions 6 waste, 5 air pollution, 3 water, 1 biodiversity	Level 1: *generic* 4 environmental, 4 social, 3 economic
Outcome Policies and institutionalisation	5 strategic goal areas: 23 health, 8 education, 9 protection, 9 WASH, 5 social protection	2 IRRF outcomes A+B: 2 indicators; equitable supply access, cross-cutting support	8 governance (I)	
Output Process outputs	5 strategic goal areas: 36 health, 14 education, 20 protection, 16 WASH, 10 social protection 83 change strategies	8 strategic focus areas: 10 outputs, 14 indicators output 2: no SP indicator, *none environmental*	7 management (I)	Level 2; 9 environmental 16 social 8 economic 4 management

Source: (UN-CEB, 2021; UNGM, 2019; UNICEF, 2021a, 2021b)

UNICEF's IRRF impact indicators focus on strategic health, education, social and economic goals. Some of these could be applied to new SP criteria, depending on UNICEF's SP goals and prioritisation. Supply Division's OMP and results framework lists sustainable procurement under output 2 but without a target or indicator associated. All strategic documents have several indicators measuring process outputs and effects on policies or institutionalisation as outcomes. However, only the UN sustainability strategy has environmental indicators that measure impact on society (See: Annex I, Table 10). Those indicators are an excellent example of how CCE impact could be measured: In terms of GHG emission reduction, energy savings, waste reduction and resources saved.

4.1.2   Sustainability criteria used for Cold Chain Equipment

Through interviews and the review of procurement documents and technical specifications, at least 19 economic, 32 social and 25 environmental criteria for CCE equipment could be identified, as listed in the tables in Annex I.

4.1.2.1   Economic indicators

The 19 economic indicators identified (Annex I, Table 11) can be categorized under market shaping, durability and efficiency criteria. The market-shaping strategy of CCEOP included nine indicators aiming to achieve supply security and healthy markets. Supply security seeks to have a sufficient number of suppliers and market capacity to ensure supply can timely meet demand. Healthy markets aim to achieve better value for money by avoiding monopolies, promoting fair competition, geographic diversity of suppliers and production closer to customers. In addition, it was found that prices and risk for suppliers can be reduced to obtain fair and sustainable prices by aggregating demand, demand forecasting and establishing long-term agreements (JSI, 2019; UNICEF, 2022b).

At least seven PQS criteria affect durability, seeking to extend CCE lifetime by requiring a low-maintenance life of minimum ten years, extended 3-year warranties, requiring spare part-sets and introducing Equipment Monitoring Systems that can be linked to improved maintenance and long-term performance of the equipment. Equipment efficiency was increased by PQS design improvements that reduced vaccine wastage, such as by more stringent Grade A specifications (Table 2), (WHO, 2021a). Target Product profiles for SDDs propose new

measures to decrease wastage and increase efficiencies (WHO, 2021b). Total Cost of Ownership (TCO) criteria aim to decrease costs by calculating and comparing total costs over the equipment's lifetime, adding installation, operating and maintenance costs to the purchase price. Taking into account TCO, pushed the move to SDD equipment:

> Moving from solar-powered, battery-powered fridges to SDD, it was really the cost of ownership. When procurement wasn't an issue, but it was the cost of maintaining the batteries, the level of effort required, the skill set required [Gavi programme manager].

Table 2: Freeze protection classification

Grade	Definition
A	user-independent freeze protection (UIFP): "…there is no intervention required by the user to ensure that the vaccines will not be exposed to freezing temperatures outside of the acceptable temperature range…"
B	user-dependent freeze protection (UDFP): "…the user must comply with a procedure provided by the legal manufacturer and requiring one level of intervention…in order to ensure that the vaccines will not be exposed to freezing temperatures outside of the acceptable temperature range."
C	user-dependent freeze protection (UDFP): "…the user must comply with a procedure provided by the legal manufacturer requiring more than one level of intervention…in order to ensure that the vaccines will not be exposed to freezing temperatures outside of the acceptable temperature range."

Source: WHO PQS performance specification WHO/PQS/E003/RF05.6

4.1.2.2   Social indicators

The 32 social criteria identified (Annex I, Table 12) can be categorised under mandatory UN and PQS criteria, UN Global Compact and the CCEOP service bundle. UNICEF's standard terms and conditions have six, and the UN supplier code of conduct has 13 social criteria that are mandatory for all suppliers. The ITC centre is planning to strengthen adherence to the UN supplier code of conduct through supplier questionnaires. WHO PQS has mandatory criteria that seek to increase usability by the widest range of health workers, increase maintenance accessibility and increase solar harvesting capacity for the benefit of health workers (WHO, 2021a, 2021b). UN Global Compact has seven criteria, but its membership is voluntary, and although encouraged by UNICEF, not all suppliers are members. Of the three suppliers consulted, one was unaware of it, and one was an active member.

The CCEOP project required CCE manufacturers to have local agents to distribute, install, and train healthcare staff through a 'Service Bundle' (JSI, 2019). The idea of the service bundle was that the private sector could do this better than the public sector, resulting in faster service response and action. It had a significant impact on building local capacities, not only of healthcare staff but of SMEs and local agents as well. Since the service bundle was introduced, suppliers have received much more direct user feedback, enabling product improvements. The number of jobs created among local agents is currently not being tracked by the CCEOP project nor by CCE suppliers. However, UNICEF ITC estimated that approximately 1,260 jobs with 63 local service providers in 40 countries were created as part of the CCEOP service bundle (Source: UNICEF ITC communications, June-22). One supplier commented:

> It could be hundreds in this period. We are now doing a big project in Ethiopia, for example,
> I think maybe 50 people are employed in this project. [CCE supplier]

4.1.2.3   *Environmental indicators*

The 25 Environmental criteria identified can be categorized into mandatory criteria from PQS specifications, and the UN supplier code of conduct desired criteria and new developments. The code of conduct has five criteria: compliance with environmental laws, an environmental policy, and a waste management system (Annex I, Table 13).

PQS specifications have eight criteria mandated by the Montreal Protocol and EU's F-gas regulations to prevent the use of ozone-depleting substances and hazardous materials. Having an ISO 14001-certified environmental management system and membership in UN Global Compact are desired. WHO and GIZ are developing a new energy index to promote more energy-efficient equipment. In developing Grade-A equipment, there was a strong focus on energy efficiency. Countries that have frequent power interruptions demand excess power capacity and low power-consuming equipment to improve operation and benefit staff. Environmental sustainability has not been a priority of donors such as Gavi and BMGF. Their objective was to optimize performance and affordability, to safeguard the investment in vaccines and ensure vaccines reach everyone, even in remote locations (JSI, 2019). As confirmed by Gavi:

> If the sustainability agenda really picks up beyond what has already been included, then
> those discussions would happen and then there would be additional inclusion of new criteria.
> [Gavi programme manager]

Regarding adding new criteria, WHO commented:

"We don't limit ourselves on how far we can go when it comes to environmental criteria, but at the moment we are just trying to balance costs and benefits" [WHO technical officer]

Figure 4:UNICEF 2019 Vaccine industry baseline assessment (source: UNICEF document, Mar-2020)

A vaccine industry baseline assessment introduced six indicators to monitor environmental sustainability of suppliers (Figure 4). The same document reported UNICEF's WASH and education centres avoided nearly 6 million tonnes of CO_2 emissions annually by increased use of recycled materials, reduced packaging weight/volume and increased use of direct deliveries from suppliers (UNICEF document, Mar-2020). UNICEF encourages using suppliers located close to customers to reduce transport emissions and support local economies. However, measurement of CO_2 emissions for transport is not yet mandated by UNICEF, and local procurement will not reduce emissions if raw materials are still imported from far distances. Nevertheless, local production does offer an opportunity to introduce requirements to promote circularity and extended producer responsibility to promote equipment returns & recycling.
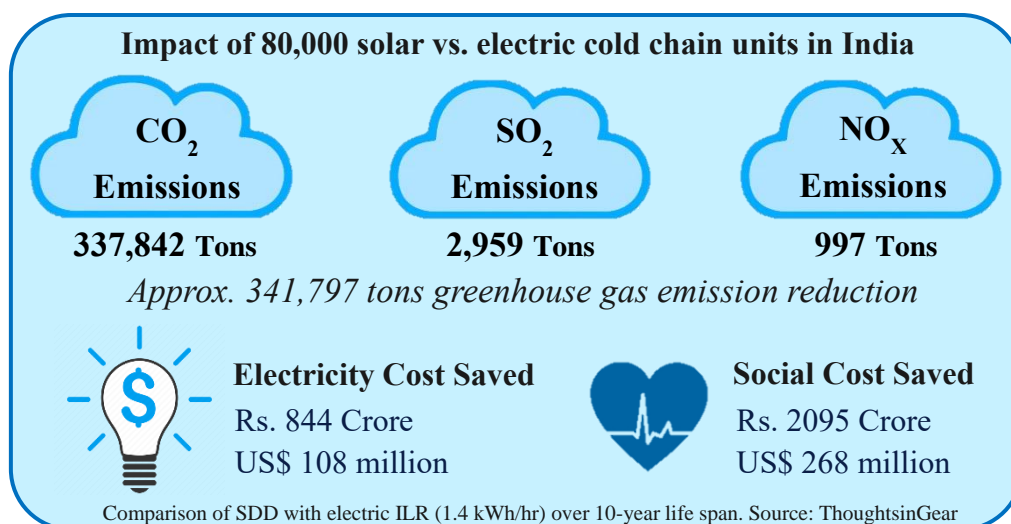
Impact of 80,000 solar vs. electric cold chain units in India

CO_2 Emissions	SO_2 Emissions	NO_X Emissions
337,842 Tons	**2,959** Tons	**997** Tons

Approx. 341,797 tons greenhouse gas emission reduction

Electricity Cost Saved
Rs. 844 Crore
US$ 108 million

Social Cost Saved
Rs. 2095 Crore
US$ 268 million

Comparison of SDD with electric ILR (1.4 kWh/hr) over 10-year life span. Source: ThoughtsinGear

Figure 5: Sustainability impact of solar SDD versus grid-electricity ILR refrigerators

Out of a total of seven refrigerator and freezer suppliers, 86%, six are ISO 14001 certified (environmental), four are ISO 13485 certified (medical devices), and one is ISO 45001 certified (occupational health and safety). Of the remaining 17 CCE suppliers (cold boxes, vaccine carriers and temperature monitors), 47%, eight are ISO 14001 certified, two have ISO 13485, and two are ISO 17025 certified (testing and calibration laboratories). All three suppliers consulted were ISO 14001 certified. One supplier aimed to become net carbon-neutral by 2030 and reduce carbon emissions product lifecycles by at least 15% by 2030. They applied the principle of "BATNEEC", Using Best Available Technology, Not Entailing Excessive Costs, per the EU industrial emissions directive (EU, 2011). An analysis shared by a supplier (Figure 5) estimated GHG emission reduction, electricity costs and social costs savings of replacing grid-connected refrigerators with SDD refrigerators.

This is an excellent example of environmental indicators that ITC could use to track the impact of CCE procured. If we apply the same methodology to estimate the environmental impact of all SDD's procured by CCEOP: Total 41,304 units, from 2017 to 2022. This would be approximately **176,470 Tons GHG emissions, $ 56 million USD electricity costs and $ 139 million USD social cost saved**. It should be noted that this is only a rough estimate, because the actual impact will vary depending on the type of CCE that was replaced, local electricity and social cost assumptions. (Source: UNICEF ITC communications, June-22)

4.1.3   Sustainability criteria related to STP model factors

Comparing the sustainability indicators identified through the criteria analysis (Table 1) with the STP model factors (Figure 1), the impact indicators can be related to 'landscape' level factors: All factors, except 'cultural and normative values' are covered by the UNICEF Strategic Plan, IRRF and UN Sustainability Strategy, Phase I. The context of 'landscape' level factors is slower and harder to change than 'regime' level factors (Geels, 2002). Since the social, environmental, and economic 'landscape' factors are covered, we argue that the omission of criteria for 'cultural and normative values' is not critical. Outcome indicators relate to the 'niche' – 'inter-organisational' and partially to the 'organisational' – 'management' component. Within the STP 'management' component: 'Strategy', 'internal collaboration' and 'internal change' are at outcome level, covered by the UNICEF SD, OMP and 'organisational culture' at output level is covered by the UNICEF Strategic Plan, IRRF. Factor 'responsibilities' at output level is not covered by current sustainability criteria. Nevertheless, this factor is well defined in UNICEF's sustainable procurement procedure and guide (UNICEF, 2018, 2021d).

Output indicators can be related to the STP model's individual and procurement factors. These factors are covered by the UNGM SP indicators, UNICEF SD, OMP and UNICEF Strategic Plan, IRRF. Only factors 'aggregate demand' and 'IPR management' are not covered by sustainability criteria. Still, the first is covered by UNICEF SD, OMP output 3, and UNICEF's market shaping guidance (UNICEF, 2021b, 2022b), and the second is by UNICEF's product innovation procedure. Therefore, we can conclude that all except four STP model factors are covered by sustainability criteria, but of those four factors, three are covered by requirements in UNICEF guidance, and one 'landscape' factor is not critical.

4.1.4   Sustainable procurement level at UNICEF, SDG 12.7.1

Sustainable Development Goal 12, for responsible consumption and production, has 11 targets, of which target 12.7 aims to "*Promote public procurement practices that are sustainable, in accordance with national policies and priorities*". UNEP as custodian of indicator 12.7.1, developed in consultation with stakeholders an index and methodology to measure the level of implementation of sustainable public procurement in a country (UNEP, 2021a). The methodology and index were updated in this study to measure this level for an organization. The

index was then applied and focused on the level of implementation by the ITC centre at UNICEF Supply Division. However, out of the 55 criteria of the index, 51 (93%) actually apply organisation wide. The index assesses six parameters of SPP. Parameter A is scored either 1 or 0, while categories B-E are measured by adding points awarded, and category F is a percentage. The total score, between 1-4, is calculated as follows:

SPP implementation score = A x ∑ { B . . F }. The score is divided into five levels:

< 1: Insufficient data or implementation.

1 – 2: Low level of implementation.

2 – 3: Medium-low level of implementation.

3 – 4: Medium-high level of implementation

> 4: High level of implementation.

UNICEF's score was **3.51**: a **medium-high** level of implementation (Table 3). All categories scored strong, except parameters D and E. D, because there is a lack of specific social and economic criteria and impact prioritization. E, because no SPP action plan and targets have been agreed upon, and SPP monitoring has been inconsistent. For detailed scores per criteria, excluding links to evidence, see Annex III.

Table 3: SDG 12.7.1 Sustainable public procurement level at UNICEF SD, ITC

	Parameter	Max.	Score
A	Existence of an SPP action plan/policy and/or SPP regulatory requirements	1	1
B	Public procurement regulatory framework conducive to sustainable public procurement	1	0.90
C	Practical support delivered to procurement practitioners in the implementation of SPP	1	0.95
D	SPP purchasing criteria/buying standards/requirements	1	0.41
E	Existence of an SPP monitoring system	0.4	0.25
F	Percentage of sustainable purchase of priority products/services	100%	100%
		Total	3.51

The percentage of sustainable procurement (F) is currently hard to measure within UNICEF because not all procurement can be marked as sustainable due to different systems used, and the UNGM indicators have been used inconsistently. UNICEF reported 100% sustainable procurement in 2021 to HLCM PN (UNICEF, 2022a). Therefore, it is important to

note that if the SP indicators were used and measured per the definition of the UNGM, and for example, only **50%** of all procurement would be sustainable, then the current score would only be **1.76**, indicating a low level of implementation.

4.2 Sustainability Transition Procurement analysis

The following paragraphs describe the findings of the thematic analysis of interviews with UNICEF staff, partners and CCE manufacturers using the Sustainability Transition Procurement (STP) Model as a framework. The purpose was to assess if all factors are addressed that are important for successful implementation of SPP and to start a large-scale system transformation towards sustainable development of suppliers, markets and normative values (Trindade et al., 2018). First, findings of organizational factors in UNICEF are described, followed by inter-organizational factors related to CCE suppliers and stakeholders. Lastly, regime factors and landscape factors that describe external factors influencing procurement, such as policies & regulations and normative values.

4.2.1 Organizational level

The organizational level describes the internal SP practices and is divided into the role of individuals within UNICEF; management factors, referring to UNICEF's strategies, culture and practices supporting SP; and procurement factors, focusing on specific practices supporting SP implementation. Key findings are summarized in tables per STP component.

Individual factors

Table 4: Individual factors

Factors	Findings
Change agents	• Two staff at the contracting centre act as change agents at SD • There are no SP focal points at procurement centres • The product innovation centre has no active role in supporting SP
Knowledge	• (9) SP training webinars were conducted from 2018-2022 • SP knowledge platform has case studies, products sheets & SP guidance • SP training is not mandatory • SP trainings are not available on e-learning platforms of UNICEF, UNGM

The contracting centre acts as a change agent promoting SP implementation. Although the product innovation centre provides technical assistance to country offices and was said to be a

thought-leader on TCO, it does not play an active role in supporting SP. Unclarity remains on SP with staff, as was evident from several statements, for example:

> What or where do we get this knowledge or who is the opinion leader, who is actually driving all this process and how is this going to link to innovation? [UNICEF staff]

Knowledge is a factor that could be improved, although there is a good SP knowledge platform. SP webinars were perceived as introductions to SP, and staff said to lack skills to apply SP to procurement strategies and specifications. Often technical sustainability knowledge is required, of which there is a gap within UNICEF and the wider UN. UN agencies agreed in 2022 at deputy executive director level that this expertise does not exist in UN agencies today and should be acquired. Most staff were also unaware of SP resources from other UN agencies. WHO PQS also lacks a permanent presence of staff with sustainability expertise, but they can contract experts for specific subjects as required to prepare technical specifications.

Management factors

Table 5: Management factors

Factors	Findings
Strategy	• UNICEF's IRRF and OMP has no specific SP targets and indicators
	• Market shaping priorities are quality, access, affordability, sustainability
	• SP is crosscutting, but OMPs strategic focus areas lack sustainability goals
	• Donors' priorities are to optimize CCE to protect vaccines
Organizational culture	• Senior management encourages innovation and sustainability
	• Internal debate on prioritization of access, affordability vs. sustainability
Internal change	• UNICEF and senior management are flexible to change, but this is complex
Internal collaboration	• SP cross-centre working group does not exist, but is planned to be revived
	• SPP efforts in several centres, coordinated by contracting centre
Responsibilities	• CRC to prevent lack of SP indicator use in procurement strategies

UNICEF uses a **market-shaping framework** for strategic, essential supplies that prioritizes: 1) access in terms of supply ability to meet demand, 2) affordability and accommodating user preferences, and; 3) Market sustainability in terms of competition, backup capacity and a geographic diverse supplier base (UNICEF, 2022b). UNICEF's market shaping guidance and product innovation strategy lack social and environmental sustainability goals, although SP is listed as a cross-cutting priority in the OMP (UNICEF, 2021b). UNICEF's

strategic plan and IRRF (UNICEF, 2021a) outline goals to help achieve the 2030 agenda for sustainable development, but as one staff stated:

> There is an opportunity to strengthen the targets in the strategic plan as regards sustainable procurement in the supply and procurement function to reflect UNICEF's progress in this area and our influence with having one of the largest procurement arms of the UN family. [UNICEF Global Lead of CEED]

There was **internal collaboration** on SP by a working group in 2016, but they coordinated cross-centre collaboration on SP is currently missing. Sustainability efforts are often conducted in isolated projects by subject and centre. Although UNICEF's organisational culture is flexible to change, the process can be complex and slow. The staff has a positive spirit of sustainability, but workload, emergencies, and a **debate on prioritisation of affordability versus sustainability** have slowed SP implementation. Staff perceive that sustainability criteria will have a cost, raise product prices, and could limit suppliers' participation from developing countries. Guidance is needed on what degree of flexibility in price and market diversification is acceptable, which could focus on strategic supplies with a high sustainability risk and potential impact, where UNICEF can influence the market. Senior management encourages justified improvements and risk-taking. However, no new standard sustainability criteria have been introduced since the SP procedure was issued, which would require agreement by senior management. Staff commented:

> I should not be deciding whether we should protect minorities, at my level...Some of these criteria are mandatory and that's why they are in our contractual provisions. [UNICEF staff]. We need to identify what the generic Environmental, Social and Governance criteria are for all our suppliers, and then some industry-specific criteria. [UNICEF, Chief of MFSC]

Procurement factors

Table 6: Procurement factors

Factors	Findings
Market research	• There is a lack of generic sustainability criteria and industry specific criteria
Aggregate demand	• Pooled demand provides strong leverage to demand sustainability criteria
Functional criteria	• TPP method has been effective to introduce CCE sustainability requirements • Weighted sustainability criteria are not being used in tender evaluations
Life Cycle Costs	• TCO tool exists but no clear way has been used to present it to buyers • Life Cycle Assessments (LCA) have not been used as a tool

Factors	Findings
	• Suppliers have "Energy star" certified CCE models, but this is not recognized
SME Participation	• CCEOP service bundle increased participation of SME's as local agents
Risk Management	• Lack of expertise to assess environmental and social risks per product
	• PIC has experience assessing and mitigating risk for product innovations
Monitoring	• No specific SP goals and targets have been agreed yet
	• SP indicators can't be used for all procurement and use can be inconsistent
	• CCEOP results framework does not measure service bundle jobs created
IPR Management	• Aim for suppliers to invest in product development and respect IPR

Of the seven procurement factors, life cycle costs, aggregate demand, functional criteria and SME participation are performing best. At the same time, monitoring, market research and risk management contain the most important elements that can be improved.

The **Total Cost of Ownership (TCO)** tool developed by PATH (PATH, 2019) enables buyers to compare total costs over the lifetime of CCE, also known as lifecycle costs (LCC). TCO includes purchase price, installation, spare parts, and operating and maintenance costs over 10 years. Although a valuable tool, TCO information has not been fully understood, nor has UNICEF agreed on how to present it to buyers. Usually, three equipment options are presented to buyers by UNICEF, with only price and delivery time. A table that lists the prices, TCO and TCO costs saved compared to the least efficient model proposed could enable customers to select the most energy efficient and durable option. TCO differs from a Life Cycle Assessment (LCA, ISO 14040), which quantifies a product's environmental -and optionally social- impact across its whole lifecycle, from raw material extraction, manufacturing, and usage until end-of-life disposal. Currently not used by UNICEF, LCA information can identify high-risk and high-impact processes and support decisions on CCE improvements. Other information missing is eco-label certification, such as "Energy Star", an energy efficiency label that is not registered in the catalogue, although suppliers offer models that are Energy Star certified.

In addition, **aggregated demand** is used by UNICEF to improve economies of scale, forecast accuracy and establish long-term agreements that enable suppliers to better plan capacity (UNICEF, 2022b). An interagency sustainability working group (with UNICEF, UNHCR, IOM, ICRC, IFRC) shares a supplier base to discuss sustainability requirements of standard emergency supplies. Pooled demand for these emergency supplies provides them strong leverage to demand

suppliers to meet sustainability standards, such as ISO 14001 and SA8000. This is an excellent example of how interagency cooperation is influencing markets:

> The suppliers see that all the major agencies are working together on this. So, there's strong leverage, and if they require it, they'll get it basically. [UNICEF QAC staff]

Furthermore, many CCE **functional criteria** that improved sustainability have been incorporated through the process of **Target Product Profiles (TPPs)**, which specify future improvements based on user needs, lessons learned and new regulations. TPPs are amended during an iterative cycle of consultations with industry and stakeholders to become mandatory PQS specifications in 2 to 4 years. For example, Grade A CCE is more sustainable than Grade B because it reduces vaccine wastage by preventing temperature excursions. However, the long cycle of TPPs could affect competition by allowing manufacturers to catch up on new developments (JSI, 2019). The majority of CCE is procured through Invitations to Bid (ITB) that uses compliance to functional criteria, as per PQS standard, as a pass/fail criterion. Some sustainability criteria that are desired, such as ISO 14001, are currently not used in ITB evaluation, while these could be weighted as a tool to incentivize and reward suppliers for sustainability improvements.

Although open to using **Small and medium enterprises** (SMEs), they are not specifically pursued as CCE suppliers by UNICEF because they do not have sufficient production capacity and flexibility to supply CCE, and ITC does not have enough workforce to manage several suppliers and handle emergencies as well. PQS prequalification can also act as a barrier for SMEs because it requires an investment to achieve prequalification plus annual maintenance costs, while it does not guarantee any product will be bought. However, the CCEOP service bundle significantly increased the participation of SMEs working as local representatives of CCE manufacturers. While the Gavi CCEOP results framework measured trained health workers as an output (JSI, 2019), the number of trained CCE supplier agents and jobs created was not tracked. CCE suppliers also did not monitor this.

This also highlights **SP Monitoring** as a key factor to be improved. Although UNICEF uses the UNGM SP indicators framework, no specific SP goals and targets have been agreed to monitor implementation. SP indicators can be marked only for tenders published on UNGM, which excludes a significant part of local procurement and procurement from shortlisted and

WHO prequalified suppliers. Not all staff were aware that at least three UNGM SP criteria, one per pillar (environmental, social, economic), should be selected for a tender to qualify as sustainable (UNGM, 2019). Furthermore, often staff entering tenders did not know what SP criteria to mark, contributing to inconsistent registration.

Another factor found lacking is **Risk Management.** UNICEF has a qualitative tool to assess and prioritize sustainability risk, and procurement strategies should include risk assessment and mitigation options for high risks. This risk analysis has not yet been done for CCE because staff lacks the expertise to know and rate all relevant environmental and socio-economic risks per product. For innovation projects, the PIC uses a "*risk impact need-to-engage-approach*" tool, which uses five parameters to estimate risk, need-to-engage, how deep an innovation could be impacting and how widely it could be applied. If an innovation has a high potential impact, the risk is accepted, and market guarantees can be used to help turn a business case into a positive for a manufacturer. The internal skills of using PIC's risk management tool could be used to train staff in sustainability risk assessments. To provide an indication of what CCE manufacturers consider to be highest environmental risks of CCE:

> In the production process of our cold chain units, the highest environmental risk consists in the process of roto-moulding. This process is only feasible by burning a certain amount of propane gas, thus creating air emissions. Concerning the life cycle of the products, probably the plastic cabinets and lids present the highest environmental risk. [CCE Supplier]

> Once the product is going to be scrapped, we could foresee that in rural areas, the various materials might not be reused sufficiently. [CCE Supplier]

> In the long run, batteries are one of the biggest risk for the environment. [CCE Supplier]

Market research was a recurring theme in interviews. Because many staff perceive that suppliers may not be ready to adopt stricter sustainability requirements (such as ISO 14001 certification) and market intelligence on sustainability was found lacking or collected but not always followed up on. Contract managers and technical specialists cooperate in sourcing and market research, supported by the Markets and Supplier Financing Centre (MSFC). The QAC is developing internal guidance on what sustainability standards can be applied by sector, such as ISO 14001 and SA8000. ITC started using a sustainability questionnaire for new tenders based on UNICEF's sample sustainability questionnaire and UNDP's environmental questionnaire

template, and the contracting centre is developing a standard sustainability questionnaire as a template to be tailored to the contexts under assessment.

Finally, **IPR Management** was found not to be a key factor for sustainability. UNICEF encourages using generic products to enable competition and achieve the best value for money. However, UNICEF supports IPR when the supplier is the investor, and if UNICEF is an investor, it can require the product to be non-proprietary. Both methods can be used, but the strategy is to make suppliers responsible to invest in product development and respect any resulting proprietary information and patents.

Inter-organisational factors

Table 7: Inter-organizational factors

Factors	Findings
Vision	• CCE suppliers share sustainability values and are ready to collaborate
Networking	• Wide network of stakeholders contributes expertise to develop CCE spec's
External stakeholders	• User feedback and field observations are the basis of CCE improvements
Suppliers' involvement	• Solarchill project demonstrated successful sustainable innovation & scaling

Inter-organisational factors relate to factors influencing interactions with suppliers and stakeholders. Having a common vision is crucial to changing an existing regime and aligning policies, which can be created through networking and collaboration by sharing knowledge to promote learning (Geels, 2002).

Regarding **vision,** UNICEF's strategic plan recognizes that climate change and environmental degradation are existential threats to a child's ability to survive, grow, and thrive and that all levels of the organization need to work together in a coordinated fashion to drive sustainability. Many suppliers share this vision: one CCE Supplier said that they became a UN Global Compact member because they felt its goals and values were a key part of their corporate values. In addition, during presentations by UN agencies on environmental strategy, the industry indicated that the UN should increase its requirements because they are ready to report. Finally, the SPKC centre indicated that sustainability is high on the agenda of many companies, and partners are very interested in collaborating and sharing expertise.

UNICEF is **networking** on CCE with a vast network of organisations**:** the WHO PQS working group, Gavi, BMGF, PATH, GIZ, MSF, and others to collect user feedback and

observations from CCE users and governments to improve PQS and TPP specifications. CCE improvements are discussed with country governments, partners, and industry. The quality assurance centre participates in a working group on sustainability with UNHCR, IOM, IFRC and ICRC to help standardize and share sustainability audit results. The contracting centre participates with the HLCM PN to discuss the SP indicator framework and product specifications. **Suppliers are involved** through collective consultations to collect feedback on specification changes before new tenders are issued. CCE suppliers also took part in innovation projects, such as the Solarchill project[2] that successfully developed and launched SDD in cooperation with government institutions, NGOs, the UN, and academia.

Regime factors

Table 8: Regime factors

Factors	Findings
Policies, regulations	• CCE Sustainability requirements are driven by international regulations
Policy guidance	• Procurement guidance to buyers does not include TCO/sustainability

The regime level consists of factors that influence the routine behaviour of organizations and other stakeholders, such as policies, international and national regulations.

ITC and WHO technical specialists ensure that CCE specifications comply with international **Policies and regulations**, such as EU WEEE, Montreal convention and other international standards (IEC, EN, ISO, REACH for safety and quality). Country-level regulations can influence requirements, for example, specifications for engines of refrigerated vehicles can vary per country. WHO argued that since CCE used for immunisation is only a fraction of all refrigeration equipment per country, sustainability requirements should be discussed and agreed upon for the whole cold storage sector in a country, compared to using stricter requirements only for CCE. However, this would disregard the potential impact of UNICEF's global procurement value of CCE. **Policy guidance** provided to countries buying CCE follows PQS standards but could be improved by highlighting TCO in addition to purchase price.

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[2] GEF Solarchill project (2012-2018): https://www.solarchill.org/

Landscape factors

Table 9: Landscape factors

Landscape Factors	Findings
Cultural, normative values	• Focus on protecting the investment in vaccines, less on sustainability
Socio-economic context	• Scarce resources require balancing the costs of sustainability criteria
Environmental context	• Environmental considerations are low priority in resource-poor settings

Landscape-level refers to the social, environmental, and economic context of societies that influence SPP. These factors include cultural, normative values, social, economic and environmental factors. Landscape-level can be influenced long term when pressures from all levels align: Organisational, inter-organizational, regime and landscape level (Geels, 2002). Landscape encompasses countless factors that are not accounted by the other levels. In this sense, it is impossible to account for all factors that would be placed in the landscape level for this study. Nevertheless, this study identified the main landscape factors that were found to be particularly relevant for the research question.

Organisations managing CCEOP all share **normative values**, balancing costs and benefits of CCE to safeguard vaccines and improve vaccination programme coverage. Environmental considerations have been a low priority until fairly recent introduction of guidance for decommissioning and safe disposal of CCE in 2018 and are also not a high priority in resource-scarce, developing countries. In most developing countries there is no culture of regular maintenance, which supports buying new and disposing old equipment as long as donors are willing to continue providing funds.

The socio-economic context of CCEOP countries influences their demand, which can change over time. Scarce resources and humanitarian emergencies influence procurement priorities. For example, during the COVID-19 response, any environmental concerns on energy efficiency were overridden by the immediate need for ultra-cold chain freezers. The service bundle was developed for CCEOP because often after CCE arrived in a country, it was not adequately installed or kept in storage for long periods due to a lack of capacity and resources. Lack of capacity and resources on the demand side has also been why many innovation projects have failed to scale. On how this affects sustainability, one interviewee said:

The ability to start looking at the costs is the key thing, to figure out what makes sense and what doesn't. [UNICEF Chief of PIC]

5   Discussion

5.1   Drivers, barriers, and lessons learned

The following aspects can be summarized as key drivers supporting implementation of sustainable procurement at UNICEF, as noted by interviewees: Good organisational leadership & commitment to sustainability, evidenced by the SP guideline and CEED strategic goals. Availability of SP procedures and tools such as guidelines, risk management tools and checklists. Good learning materials with webinars, case studies and reference materials. Mandatory SP rules to include UNGM SP indicators in procurement strategies. New sustainability questionnaires for CCE suppliers are being used to collect market intelligence. The TPP's and WHO PQS specifications that are continuously reviewed and updated, plus the highly developed mechanism to collect country, user experience, feedback, and needs. Furthermore, the drive to increase CCE equipment efficiency and durability, to reduce the total cost of ownership and to reduce vaccine wastage.

The key barriers to implementing sustainable procurement at UNICEF can be summarized as follows: Firstly, the COVID-19 pandemic and emergency response delayed initial SP implementation. Next, is a lack of specific SP goals and action plans and insufficient monitoring, evaluation, and enforcement of SP. Third, regarding systems, a gap in consistent (IT) systems to register SP indicators for all procurement, plus a lack of clear sustainability standards and criteria in general and for specific products. Finally, regarding knowledge and perception: A lack of expertise in SP implementation, a training gap for procurement practitioners, competing procurement priorities and the perception that SP will raise costs, and suppliers are not ready.

Most of these drivers and barriers are the same as those noted in literature, as were listed in §2.2 (Cheng et al., 2018; Grandia et al., 2015; Sönnichsen & Clement, 2020). It is important to note the final four drivers that are not mentioned in literature and are specific to CCE, to the process of developing WHO PQS and TPP specifications. These four drivers have a clear

relationship with the STP model at organisational level with STP factors 'functional criteria' and 'life cycle costs', and at inter-organisational level with STP factors 'vision', 'networking', 'suppliers' involvement' and 'external stakeholders', and even at regime level with STP factors 'Policies and regulations' and 'Policy guidance', by setting CCE standards and policies for governments. This process has proven to be effective at increasing equipment efficiency, durability, reducing costs and vaccine wastage through a consultative process with users, equipment manufacturers and stakeholders to agree on specifications and set standards. The WHO PQS and TPP process has been so effective, because it covers a wide range of STP factors that are crucial to interaction and coordination of actors, thus helping to create a common vision and enabling change. These drivers are therefore included as the first two lessons learned.

Lessons learned, contributing to SDGs 12, 7, 13:

1. The WHO PQS/TPP process, as a consultative process to develop equipment specifications, based on surveys, systematic collection of user experiences and needs, discussions with manufacturers to balance costs, giving them time to get ready. This process effectively incorporated at least (76) sustainability criteria in PQS prequalified CCE (WHO, 2021a).

2. A focus on durability and efficiency resulted in energy-efficient Grade A equipment for CCEOP, eliminating batteries, reducing vaccine wastage and increasing durability with a low-service 10-year life span and 3-year warranty. It led to developing a TCO tool that enabled customers to decide based on equipment durability and efficiency.

3. Development of Solar Direct Drive, although done before CCEOP (2012-2018). The Solarchill project is an excellent example of how a pilot project can bring UN, NGO, academia and industry together to produce a more sustainable, improved product that was successfully scaled and replaced the dominant design, resulting in 41,304 SDDs delivered and installed as part of CCEOP from 2017-April 2022 (UNICEF, 2022).

Lessons learned, contributing to SDGs 12, 17, 8:

4. The CCEOP service bundle that made manufacturers responsible for having local service providers that can distribute, install, and train at the local level, is now recognized as an essential component for the implementation and sustainability of CCE systems. It resulted in a record number of refrigerators deployed, creating approximately 1,260 jobs with 63 SMEs in 40 countries (Source: UNICEF ITC communication, June-22). It also resulted in much more direct feedback from users to manufacturers, enabling product improvements and was used in the COVAX project to enable rapid deployment of ultracold chain equipment.

5. The standard UNGM SP indicator framework was developed and agreed upon by all UN agencies for the UN Global Market place, promoting SP, facilitating transparency, monitoring, and reporting on SP. This framework includes tools, guidance, and examples for practitioners and presents a common sustainability standard to suppliers that can be used to build a community of SP practice, share case examples and aggregate UN sustainable procurement demand.

5.2   Recommendations

Sustainability criteria analysis showed that at least (76) sustainability criteria have been integrated into CCEOP procurement but that strategic result frameworks lack clear sustainability impact indicators, except the UN sustainability strategy. Therefore, the environmental, social, and economic impact of sustainable public procurement in UNICEF can be better measured by:

1. Specifying goals and targets using impact indicators modelled on the UN sustainability strategy to track GHG emission reduction, energy savings, waste reduction and resources saved as measurable contributions to achieving the SDGs.
2. Integrate these indicator calculations in the TCO tool to track the impact of CCE and improve use and communication on TCO to CCE buyers.
3. Use the SDG 12.7.1 index and UNGM SP indicators to measure the level of SP implementation and progress made and compare agencies (UNEP, 2017).
4. Use the indicators, as used by the vaccine industry assessment (Figure 4), to track supplier and market readiness for sustainability.
5. Track the number of jobs created with local service providers through the service bundle as a social impact indicator.

Analysis based on the Sustainability Transition Procurement (STP) model found that organisational-level strategic guidance is needed to clarify the prioritisation of affordability versus sustainability costs. Including what standard social and environmental sustainability criteria can be applied and product-specific sustainability criteria. SP knowledge and skills should be improved, and there are several opportunities to strengthen internal collaboration, for example, by using risk management skills from other centres. Market research that uses a sustainability lens could be strengthened because a lack of market intelligence slows down SP implementation. Many suppliers and industry share sustainability values and are ready to share expertise. At the regime level, we noted that international regulations have helped shape several environmental PQS criteria and that the socio-economic context of most CCE buyers, due to lack of resources, emphasises balancing costs with benefits. Therefore, to help advance sustainable procurement within UNICEF and consequently improve its environmental, social, and economic impact, it is recommended to:

6. Make SP training mandatory for staff, leveraging SP training from other UN agencies.
7. Promote internal collaboration on SP to create a community of practice. For example, use risk management know-how from PIC, industry expertise via SPKC, sustainability audits with QAC, and incorporate sustainability with MSFC in market shaping strategies.
8. Use the TPP process to raise awareness and improve external collaboration, networking and diffusion of sustainability criteria with CCE users, donors and WHO.
9. Consider using a sustainability pilot project for CCE with industry, academia and partners, using eco- and circular design principles for CCE as proof of concept.

Annex II lists several sustainable procurement opportunities resulting from interview analysis, which can also be considered to be used in addition to these recommendations. The Multi-Level Perspective framework and the STP model (Geels, 2002; Trindade, 2017; Trindade et al., 2018) conclude that crucial factors to ensure systemic change and enable diffusion of innovation are internal collaboration and inter-organizational networking to build social networks, exchange knowledge and build a shared vision (Trindade, 2017). This study found several opportunities to improve collaboration and networking on sustainability while continuing to use user feedback as a basis for improvements. The Solarchill project for SDD's and 2021

COVAX response that used the service bundle demonstrated how collaboration and networking enable system change and diffusion of innovations that successfully have improved the sustainability impact of CCE.

6   Conclusion

In this section, we answer the research question and provide recommendations as to: How can the environmental, social, and economic impact of sustainable public procurement of immunisation cold chain equipment be measured and improved? This section concludes by providing suggestions for future research, based on the findings from this study.

6.1   Summary

This study introduced the use of the SDG 12.7.1 index to measure the level of sustainable procurement in organizations instead of countries. It demonstrated that this index can be a practical tool to establish a baseline, indicate areas for improvement, measure progress and compare SP levels among organizations. Next, the STP model was used to analyse the SP mechanism and discover what organizational and inter-organisational factors influence SP implementation and impact. Following data analysis, this study found that the following factors could be changed to improve the STP model, as shown in Figure 6 below.
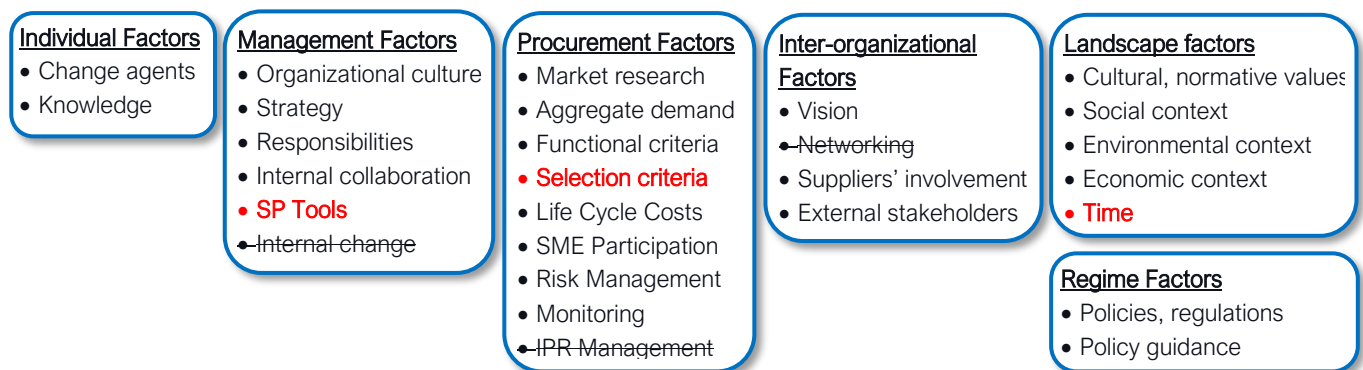

Figure 6: Modifications (in red, crossed) of the "Sustainability Transition Procurement" (STP) Model.

A management factor found missing in the model is the presence of SP tools such as action plans, a risk management framework, vendor questionnaires, and SPP purchasing criteria, which are also included as parameters A and D in the SDG 12.7.1 index (UNEP, 2021a). For procurement factors, in addition to functional criteria, selection criteria are also a key factor that affects SP application. For example, suppliers are selected based on location, delivery time,

supply capacity and compliance with specific social, environmental, or financial standards. Furthermore, removing factors 'internal change' and 'networking' is suggested to simplify the model. Although both are critical, 'internal change' can be considered an attribute of 'organisational culture' and 'networking' as an attribute of both 'external stakeholders' and 'suppliers' involvement'. It is also suggested to remove IPR management. Although IPR can influence suppliers, it was found not to be a key factor for sustainability. It requires a combination of more factors to become a driver, such as sufficient investment capital, supplier capacity and demand. Finally, at the landscape level, the STP model was found to lack the factor of time. Time is mentioned in the STP model only in that regime factors address short to medium-term policies. That landscape-level transformation is slow and influenced by long-term initiatives (Trindade, 2017). However, this study found that time is a crucial factor influencing procurement decisions, especially in the humanitarian sector. In case of emergencies, fast delivery overrules sustainability. Therefore, how an organization prioritizes and weighs selection criteria, including time, affects sustainability decisions.

6.2   Future research

A limitation of this study was that it is based on one case study, and therefore its conclusions cannot be generalized. Nevertheless, several findings and recommendations can have wider applicability within UNICEF because they concern the SPP strategy and mechanism at the organizational level. Due to the small sample size of this study, which focused on the procurement of cold chain equipment, a sample survey that is wider in scope and includes other UN agencies could validate and complement the data used for this study. In addition, most SPP research addresses environmental and economic criteria based on whole Life Cycle Costs (LCC) while giving little attention to social procurement criteria and impact. Future research could contribute to knowledge about SPP by further studying the use and impact of social sustainability goals and indicators in public procurement.

Furthermore, this study found a lack of Life Cycle Assessment data of immunisation cold chain equipment, with organisations that participated in this study focusing instead on Total Cost of Ownership. Research developing LCA's of CCE can contribute to prioritizing sustainability interventions and enable comparison of sustainability impact among CCE models from cradle-to-grave. Finally, many existing studies on SPP focus on countries in the global North, excluding

other regions of the world (UNEP, 2017), even though the potential impact and need for sustainable procurement are arguably higher in developing nations. Therefore, future research could focus on the effectiveness of SPP as a policy instrument in resource-poor, developing countries.

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Annex I. Sustainability Criteria analysis, of UN, UNGM and UNICEF

Table 10: UN Sustainability strategy 2020-2030, phase 1 indicators (CEB/2021/2/add.1)

Indicator	Description
% Reduction in electricity use	Optimize electricity consumption in facilities
% Of renewables	Switch to renewable energy sources
% Reduction of GHG emissions	Reduce and optimize commercial air travel for operations and programmes
% Reduction of GHG emissions	Minimize and optimize fuel consumption for ground travel for UN operations and programmes
% Of GHG emissions offset	UN entities maintain climate neutral status by offsetting unavoidable GHG emissions
% Of entities with waste management programs	Minimize hazardous and non-hazardous solid waste
% Of waste diverted to reuse or recycling	Ensure and optimize waste recycling, reuse, treatment, and disposal
% Of sites with water efficiency measures	Ensure sustainable extraction of water
% Of entities using refrigeration with low GWP	Optimize use of refrigeration equipment and air conditioning systems with low Global Warming Potential.
% Of wastewater untreated	Ensure no wastewater is discharged untreated unto soil or into water bodies
% Of reclaimed water	Ensure and optimize treatment of wastewater

Table 11: UNICEF CCE, Economic sustainable procurement indicators

Indicator, *(type)*	Description
Market shaping *(outcome)*	Fair and sustainable CCE prices. Stimulated supply. Continuously innovated CCE with optimal TCO. Information transparency regarding CCE supply and demand. (5)
Market shaping *(output)*	No. of suppliers per product segment. Targeted price reductions in weighted average price. Manufacturers adopt TPPs. Product improvements with optimal TCO achieved. (4)
Service bundle provision *(output)*	Cost of service bundle benchmarked and controlled. (1)
Total Cost of Ownership *(output)*	Total costs over the lifetime of the product, including purchase price, installation costs, spare parts, operating and maintenance costs over a 10-year period (2)
WHO PQS Durability *(output)*	The appliance must be covered by a replacement warranty of 3 years, instead of 2 years (WHO PQS E003, §4.8). Some suppliers offer 5-10 years, including service provision. Use of Equipment Monitoring Systems can be linked to improved maintenance and long-term performance of equipment (WHO/E003/TPP2.1, §14). (2)
WHO PQS Durability *(output)*	The appliance and solar power system must achieve a low-maintenance life not less than 10 years and must be supplied with a user maintenance kit with tools, spare parts and 10 spare fuses (WHO PQS E003, §4.9). Warranty for solar module power output must be 25 years and two years for all other solar power components. (3)

Indicator, *(type)*	Description
Durability *(output)*	The manufacturer must ensure supply of spare parts for min. 5 years from cessation of last production (WHO PQS E003, §4.9). UNICEF ITC agrees LTAs with suppliers that aim to ensure supply of spare parts for min.10 years from the last the purchase. (2)
Vaccine wastage *(output)*	Improved refrigerator design, through TPP's has reduced vaccine waste and better utilisation of resources. CCEOP requires CCE of "Grade A" freeze protection, which is user independent. CCE of Grade B and C freeze protection require respectively one user intervention, or more interventions to prevent freezing, increasing the risk of wastage. Improved design of SDD reduced maintenance by removing the batteries. Remote Temperature monitoring systems also help to prevent vaccine wastage. (1)

Table 12: UNICEF Social procurement indicators

Indicator, *(type)*	Description
UNICEF standard terms & conditions *(output)*	Adherence to Ethical standards (Annex A, §7), UN supplier code of conduct (§7.5), prevention of fraud and corruption (§7.4), child labour (§7.6), sexual abuse and exploitation (§7.7), protection & safeguarding of children (§11.4c). (6)
UN supplier code of conduct *(output)*	Adherence to 6 principles of labour as per ILO fundamental conventions, 3 human rights principles, 4 ethical conduct principles, (5 environmental). (13)
UN Global Compact *(output)*	Membership, adherence to the 10 principles of UN Global compact. 2 principles of Human rights, 4 labour principles, 1 anti-corruption, (3 environmental). (7)
Local service bundle provision *(output)*	Number of jobs created for the provision of the local service bundle (1 new)
Useability, WHO PQS *(output)*	• Useable by widest range of active health workers regardless of age gender, size, or minor disability as per ISO 20282-1:2006 (WHO PQS E003, §4.6). • Control panel and other visual displays positioned as close to eye level as possible. • Wheels on fridges, improved maintenance access for technicians (WHO E003.TPP2.1, §6 and §9) • Solar panels that are easier to clean (WHO E003.TPP2.1, §11) (4)
Extra solar power capacity, WHO TPP *(output)*	Extra solar power capacity to allow energy harvesting to power other devices, which could strengthen capacity and improve quality of life for healthcare workers in remote health centres (WHO E003.TPP2.1, §4). (1)

Table 13: UNICEF Environmentally sustainable procurement indicators

Indicator, *(type)*	Description
UN supplier code of conduct *(output)*	Adherence to 5 environmental principles: Presence of an environmental policy, comply with existing environmental legislation, Management of chemicals and hazardous materials, Control wastewater and solid waste, control air emissions, minimize waste and maximize recycling. (5)
UN Global Compact *(output)*	Adherence to 3 environmental principles: A precautionary approach to environmental challenges, initiatives to promote greater environmental responsibility, encourage development and diffusion of environmentally friendly technologies.
Materials, WHO PQS *(output)*	• Refrigerant, such as R600a, with global warming potential ≤ 11 and zero ozone-depletion potential (WHO PQS E003, §4.7). • Thermal insulation foaming agents complying with the limitations set by the Montreal protocol on elimination of ozone depleting chemicals. • No use of hazardous restricted materials as specified in §4.7.3. • Information on hazardous materials in the systems and suggestions for resource recovery/recycling and/or safe disposal. • User manual and manual for technical installation, maintenance, and repair • WEEE compliance for legal manufacturers from EU, as per EC 2002/96/EC. (7)
ISO 14001, WHO PQS *(output)*	• An environmental management system is not mandatory, but preference will be given to manufacturers able to demonstrate compliance with good environmental practice (WHO PQS E003, §7). (1)
UNICEF indicators for vaccine suppliers *(output)*	Presence of, and percentage of suppliers with a: • Corporate environmental policy • Certified environmental management system • Certified energy management system • Plan to convert to renewable energy • Monitoring CO2 emissions • Waste management recycle plan (UNICEF internal document, March 2020) (6)
Packaging, WHO PQS *(output)*	• Appliance packaging is free of ozone-depleting compounds (1)
Energy efficiency, WHO PQS *(output)*	• A new energy index is being developed by WHO to promote CCE that has more efficient energy use. The appliance must be directly powered by a solar power system, purpose-designed to match power consumption of the appliance (WHO PQS E003/RF05.6 §4) (1)
Solar power capacity WHO TPP *(output)*	Extra solar power capacity to allow energy harvesting to power other devices in remote health centres (WHO E003.TPP2.1 §4). (1)
Transport CO2 emissions *(output)*	Measured by UNICEF's logistics providers, but not systematically monitored. UNICEF aims to procure from local suppliers to reduce transport emissions. (1)

Annex II. Sustainable Procurement Opportunities

SDGs	SP Opportunities
12 RESPONSIBLE CONSUMPTION AND PRODUCTION / **17** PARTNERSHIPS FOR THE GOALS	**Partnerships:** UNICEF plans to grow partnerships with private sector on sharing expertise, and sustainability is high on their agenda, but there has been no dialogue with them yet on sustainable procurement specifically. The contracting centre could cooperate with the supply chain strengthening centre to ensure SP is included in sustainable supply chain projects.
	Sustainability questionnaire: A supplier sustainability questionnaire offers the opportunity to fill the gap in market intelligence. However, supplier profiles should be updated as well. A standard UNGM sustainability questionnaire could be agreed upon among UN agencies, with modular add-ons per product category. Standardization provides substantial leverage for the UN and incentivizes suppliers to participate.
	UN supplier code of conduct requirements: The mandatory UN supplier code of conduct already has 13 specific social sustainability requirements and five environmental requirements. New systematic checks could be introduced to ensure suppliers provide evidence that they adhere to these specific requirements.
	Product innovation centre: UNICEF has a strong product innovation team and process, which can provide guidance and help build the capacity of procurement centres on risk evaluation and introduction of iterative product improvements in public procurement. They may also be able to advise on optimizing the use of Total Cost of Ownership data.
12 RESPONSIBLE CONSUMPTION AND PRODUCTION / **13** CLIMATE ACTION	**Criteria of HSS grant:** Gavi is trying to align CCE equipment criteria between CCEOP, requiring Grade A, and the Health System Strengthening (HSS) grant, allowing Grade B equipment. This is an opportunity to make a business case that compares Grade A and Grade B equipment based on TCO, energy efficiency and vaccine wastage rates to phase out less efficient, less sustainable equipment.
	CCE Sustainability: To increase environmental sustainability, there is an opportunity to require the use of packaging with cardboard that consists of a minimum percentage of recycled material, zero polystyrene and components that can be easily separable by hand. Eco-design of CCE can facilitate recycling by enabling easy disassembly of components and marking all plastic parts to identify the material (conforming with ISO 11469). For additional criteria, see the European Eco-label[3] for refrigerators (EC, 2007).
	Reuse and recycling: UNICEF and developing countries have no strategy to recycle or dispose of old refrigerators that were replaced by new CCEOP equipment, some of which may contain ozone-depleting refrigerants. The CCEOP service network presents an opportunity to ask manufacturers and users to propose ideas for the reuse and recycling of old equipment.

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[3] EU Eco-label https://ec.europa.eu/environment/archives/ecolabel/product/pg_refrigerators_en.htm

SDGs	SP Opportunities
7 AFFORDABLE AND CLEAN ENERGY	**CCE Energy Label**: WHO is preparing a new CCE energy efficiency label. This provides an opportunity to update the UNICEF supply and PQS devices catalogue by adding these labels, plus any Energy Star certification data and presenting this with a clear TCO cost comparison when providing the three recommended equipment options to the countries. **Solarization of health facilities**: The example of the CCEOP service bundle could be used as a model to make manufacturers responsible for the service, replacement and recycling of the batteries required for the new solar systems planned for health facilities.

Annex III. SDG 12.7.1 Sustainable Public Procurement Index

SDG 12.7.1 INDEX CALCULATION: Sustainable Public Procurement		

Parameters and sub-indicators	Score	Evidence
A. Existence of a SPP action plan/policy and/or SPP regulatory requirements		
0 = No SPP action plan, policy, or similar document has been developed		(Yellow highlighted are the 4 criteria specific to ITC, CCE)
1 = An (organisational level) SPP action plan, policy and/or SPP regulatory requirements has/have been developed and approved by the senior management. Action plan, policy-related documents and relevant regulatory requirements should be accessible online	1.00	SPP procedure and guideline have been developed and approved by senior management. Action plan with priorities, actions, responsibilities & budget has not yet been formulated: to be specified in ITC annual work plan
B. Public procurement regulatory framework conducive to sustainable public procurement		
B(a) Provisions in the procurement regulatory framework allow for sustainability considerations to be incorporated at the following stages of the procurement process (0.70 pts):		
1/ Defining technical specifications (0.30 pts)	0.30	WHO PQS standard for cold chain equipment includes restrictions on use of fluorinated refrigerant gases and output-based requirements for solar power systems and guarantee of availability of spare parts. Packaging free of ozone-depleting compounds.
2/ Sourcing of suppliers (0.10 pts)	0.10	Supplier prequalification includes Ethical standard (#7), UN supplier code of conduct (#7.5), prevention of: fraud and corruption (#7.4), child labour (#7.6), SAE (#7.7) as mandatory criteria. Presence of an EMS certified to ISO14001 is being listed as desirable in tenders for LTAs. CCE products must be prequalified to WHO PQS.
3/ Award criteria (0.20 pts) allow sustainability criteria other than price	0.20	A total cost of ownership (TCO) tool, developed by PATH, has been used mainly at the CCEOP application stage by the countries. However, TCO approach is not used in practice for regular Program or Procurement Services orders.

5/ Contract performance (0.10 pts) allows monitoring sustainability criteria	0.10	Is allowed, but not yet practiced
B(b) Provisions in the procurement framework mandate the procurement of sustainable alternatives (0.30 pts) (possible, voluntary, or mandatory)	0.20	WHO PQS standard mandates procurement of non-fluorinated refrigerants. - Absorption refrigerators and freezers were delisted and made non-eligible for procurement (using kerosene), agreed in consensus with all stakeholders incl. UNICEF PD, WHO-PQS. -Solar battery-driven refrigerator and freezer models were delisted (non-eligible for procurement). Only solar direct drive models (without batteries) are included in the LTA tenders (from 2017). - Compliance with Montreal Protocol on Ozone Depleting chemicals is mandatory for all CCE equipment categories and a mandatory requirement in all technical questionnaires. - Compliance with EU's F-gas regulation (for low GWP refrigerants and insulation foam agents) is mandatory for WICs/WIFs, refrigerated vehicles, UCC freezers, FFVC/FFCBs (For WICs/WIFs LTAs were revised in 2020 & 2021, - Compliance with EU's WEEE directive for Temperature Monitoring Devices is mandatory for TMD LTA holders (ITB 503417). - RoHS compliance is mandatory for TMD manufacturers; The product and its constituent components, including batteries, must not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated biphenyl ethers (PBDE). (ITB 503417) -A supplier sustainability questionnaire is developed based on UNDP's sustainability questionnaire, UN Code of Conduct, and special notes from previous bids for the FFVC/FFCB tender ITB 19794). This will be used to collect information on the sustainability profile of all bidders and encourage sustainability efforts. Future steps to introduce KPIs on sustainability targets may be considered, which would be elaborated in the procurement strategy.

C. Practical support delivered to procurement practitioners in the implementation of SPP		
• Guidelines and tools, or an official catalogue of eco-labelled products, have been developed and are periodically revised (0.20 pts)	0.15	A SPP procedure and guideline have been developed and approved by senior management. A catalogue of eco-labelled products has not been developed. WHO-PQS is working with GIZ on developing electric consumption of refrigerators & freezers, which will be adopted by UNICEF-SD accordingly.
• Specific communication channels (newsletter, website, intranet, social media, etc.) are used to provide information or tools to procurement practitioners, at least twice a year (0.20 pts).	0.20	A web- and intranet site is being used for the supply community. Information/tools are provided and updated at least twice a year. Comms to Yammer Supply Community group "#sustainableprocurement". No newsletter, no links to: "Eco-efficient and Inclusive UNICEF" campaign and "Cross Cutting Themes"
• Training sessions are organised at least once a year to build the capacity of public procurement practitioners in the implementation of SPP/GPP (0.20 pts).	0.20	Webinar sessions were provided once/year 2020-2022 for supply community on specific SP phases. From 2019-2021 824 staff trained in procurement e-learning course.
• Best practice or (at least 3) case studies are shared with procurement practitioners (please only take account of studies developed in the last 3 years), which may include the translation of relevant documents developed by other countries (0.20 pts)	0.20	Case studies shared: Medium solar Yemen, TBC: biodegradable sanitary pads, use of repurposed materials for construction of semi-permanent buildings, promotion of carton-less ARV products
• A helpdesk is available for procurement practitioners (0.20 pts).	0.20	SD Contracting centre (4 staff, Helene Moller)

D. SPP purchasing criteria / buying standards / requirements		

D(a): Environmental criteria (max 0.40 pts for up to 20 product categories):

0.02 points per category for which **environmental criteria or ecolabels/sustainability standards** have been set or recommended

1	Appliances	0.02	WHO PQS standard for cold chain equipment includes environmental and social requirements, such as avoidance of ozone depleting refrigerants & foaming agents, a min. 10-year low maintenance life span, usability by widest range of health workers regardless of age, sex, or minor disability. Refer to D14 for more details.
2	Building interior products (carpeting, wallboards, paint, and stains, etc.)		
3	Building management and maintenance		

4	Cleaning products, janitorial and laundry services	0.02	UNGM SP product sheet: cleaning products region 1, region 2
5	Construction materials and services (including concrete, insulation materials, etc.)	0.02	EDGE green building certification for new UNICEF office facilities
6	Doors and windows		
7	Electricity acquisition and Renewable energy	0.02	Guidance on procurement of solar PV systems
8	Food, catering services and vending machines		
9	Furniture	0.02	UNGM SP product sheet: Furniture
10	Healthcare, biomedical equipment and supplies		
11	Heating, venting, and cooling products		
12	Landscaping and park services		
13	Lighting products and equipment (incl. lamp bulbs, indoor and outdoor lighting).	0.02	United for Efficiency SPP tools for lighting, appliances
14	Meeting and conference services		
15	Office electronics (incl. computers, monitors, and imaging equipment) and electronic	0.02	UNGM SP product sheet: Computers & monitors / imaging equipment
16	equipment leasing (Non-paper) Office supplies		
17	Paper and paper products	0.02	UNGM SP product sheet: Stationary paper consumables. Recycled/reused packaging material options: Adopted in the sustainability questionnaire prepared for FFVC/FFCB tender ITB 19794.
18	Road Design, Construction and Maintenance		
19	Shipping, Packaging & Packing Supplies	0.01	UNGM SP product sheet: Freight forwarding (excl. packaging)
20	Textiles (including workwear)		
21	Transportation services and vehicles (including fleet maintenance)	0.02	UNGM SP product sheet: Freight forwarding / Vehicles
22	Urban Waste collection		
23	Wastewater infrastructure		
24	Water-using products/ plumbing systems		

D(b): Consideration of social, economic, and governance-related issues (0.40 pts):

Up to 10 considerations may be selected, among which one 'blank' item in the case when one of the focus areas does not fall into listed considerations. 0.04 pts per selected focus area listed below

#			
1	Protecting against human rights abuses (for example, discrimination, unsafe working conditions, child labour, forced labour, and human trafficking). It is advised to refer to the UN Guiding Principles for Business and Human Rights in the definition of such considerations.	0.04	UN supplier code of conduct (#7.5), prevention of child labour (#7.6), SAE (#7.7) are mandatory criteria
2	Protecting and promoting groups at risk (for example, minorities, indigenous people, persons with disabilities, migrant workers) through social inclusion, which may include employment opportunities.		Non-discrimination (#7 UN code of conduct), but no active social inclusion criteria
3	Promoting compliance with ILO standards and decent work	0.04	UN supplier code of conduct complies to ILO labour standards & principles
4	Promoting transparency and accountability and combatting corruption	0.04	Prevention of fraud and corruption (#7.4) is mandatory
5	Promoting SMEs	0.04	For the CCEOP project, WIC/F projects and RTMD services, local service providers were preferred, and suppliers were required to use a network of local agents for installation and commissioning of the equipment and training of healthcare staff.
6	Promoting fair trade (for example, by ensuring fair living wages for those along the supply chain)	0.04	Fair wages (#8 UN code of conduct) as per collective agreements & local law
7	Promoting gender equality (for example, through the promotion of women-led businesses, or requiring a certain percentage of women in the workplace)		Non-discrimination (#7 UN code of conduct), but no active gender-equality criteria
8	Promoting opportunities for social economy enterprises (NGOs, etc.)		No criteria to promote social enterprises for CCE (ITC)
9	Promoting Responsible Business Conduct among suppliers. Organisations may refer to the OECD Guidelines for Multinational Enterprises when defining these.	0.02	Due diligence criteria focus on financial and ethical evaluation. No criteria for stakeholder engagement, fostering trust, capacity building, corporate governance
10	Promoting inclusive and equitable quality education, and lifelong learning opportunities for all (such as apprenticeship or training opportunities)		No specific criteria. However, the CCEOP project included training of local agents by CCE suppliers and training of healthcare staff and technicians by supplier agents.
11	*(To be specified)*		

D(c): Risk-assessment and impact prioritization (0.20 points)

If a risk-assessment analysis has been conducted to identify which product or services would show the highest potential environmental or social impact, and priority has been given to dealing with those categories first. (Needs evidence)		A risk assessment tool is available, and it is planned to be used in SP procedure, but has not yet been implemented by ITC

E. Existence of a SPP monitoring system

E (a) Monitoring of SPP action plan / policy implementation (0.40 pts)

• Progress of the SPP action plan/policy implementation is monitored (0.20 pts).		No SPP action plan, nor ITC 2022 AWP SPP activities
• A target been set for sustainable procurement implementation (0.10 pts).		No SPP targets have been set
• Progress towards the achievement of this target is monitored (for example, a specific percentage of "green", or socially responsible contracts) (0.10 pts).		Not yet being monitored
• The **number and/or value of contracts** which included sustainability requirements is (are) monitored (0.30 pts).	0.15	Being monitored on UNGM, but incomplete excluding local procurement and it is sometimes inconsistent.
• The monitoring aspects also entail the **measurement of sustainability outcome(s)** (such as the monitoring of reduction in CO2 emissions, or the creation of green jobs) (0.10 pts).		Not yet being monitored
• The monitoring of SPP-related data is carried out **by the means of** (from 0.10 to 0.20 pts):		
a. Surveys, self-assessment, or traditional reporting to management, or internal/external audit, or (0.10 pts)		Not in use
b. An information system, or (0.15 pts)		Not in use
c. An elaborate e-procurement platform (0.20 pts).	0.10	Being monitored on UNGM, but incomplete: does not include national procurement

F. Percentage of sustainable purchase of priority products/services

To assess the actual percentage of "sustainable" purchasing in the total value of the considered organisation's procurement spend. Organizations to provide: - The total value of contracts which included sustainability requirements, - The total value of the considered organisation's public procurement (i.e., the value of concluded contracts).	100%	UNICEF's global procurement in 2021 $7.181 billion, 100% sustainable

Total score, A*(sum of B to F)	3.51

Level 0: Insufficient data or implementation (Score below 1)

Level 1: Low level of implementation (Score: 1 to 2).

Level 2: Medium-low level of implementation (Score: 2 to 3).

Level 3: Medium-high level of implementation (Score: 3 to 4).

Level 4: High level of implementation (Score: > 4).

Annex IV. Sustainable Public Procurement (SPP) Questionnaires

Stakeholders interviewed:

No.	Date	Organisation, function
1	5-May-22	UNICEF, Senior Contracts manager, Contracting Centre (CC)
2	9-May-22	UNICEF, Chief of Immunisation Technology Centre (ITC)
3	9-May-22	UNICEF, Contracts manager (ITC)
4,5	6-May-22	UNICEF, Technical Officers (2) (ITC)
6	11-May-22	UNICEF, Chief of Quality Assurance Centre (QAC)
7	24-May-22	UNICEF, Quality Assurance Officer (QAC)
8	10-May-22	UNICEF, Chief of Monitoring, Strategic Data Evidence Centre (MSDEC)
9	11-May-22	UNICEF, Chief of Partnerships and Knowledge Centre (SPKC)
10	12-May-22	UNICEF, Chief of Product Innovation Centre (PIC)
11	24-May-22	UNICEF, Chief of Markets and Supplier Financing Centre (MSFC)
12	17-May-22	UNICEF, Contracts Specialist (CC)
13	10-June-22	UNICEF, Global Lead of Climate, Energy, Environment and DRR (CEED)
14	23-May-22	WHO, Technical officer, Immunisation Devices, PQS Prequalification Unit
15	26-May-22	Bill and Melinda Gates Foundation (BMGF), Programme manager
16	27-May-22	Gavi, the Vaccine Alliance, Programme manager
17	8-June-22	Vestfrost Solutions, Sales Manager (CCE supplier)
18	16-June-22	Haier Biomedical Co., Project Director (CCE supplier)
19	14-June-22	B Medical Systems, Head of customer support, Head of marketing, Chief legal & compliance officer, Head of purchasing and planning, HSE Manager

The following questionnaires contain titles, criteria and indicators copied literally from existing standards for the purpose of this research, to check if the elements have been addressed and to what extent. Copied as fair use for purpose of data collection and research, from:

- SPP Index Methodology: SDG indicator 12.7.1, version 5 (UNEP, 2021a)**,**
- ISO 20400:2017 Sustainable procurement – Guidance (ISO-20400, 2017),
- ISO 26000:2010 Guidance on social responsibility (ISO-26000, 2010).

SDG 12.7.1 Index Calculation Paragraph titles copied from: (UNEP, 2021a)

A. Existence of a SPP action plan/policy, and/or SPP regulatory requirements
B. Public procurement regulatory framework conducive to sustainable public procurement
C. Practical support delivered to public procurement practitioners in the implementation of SPP
D. SPP purchasing criteria/ buying standards / requirements
E. Existence of a SPP monitoring system
F. Percentage of sustainable purchase of priority products/services

1. UNICEF Senior management (Senior contracts manager, Global lead of CEED and MSFC)

(A). Existence of a SPP action plan/policy, and/or SPP regulatory requirements
1. Is there an SPP action plan, with a task force to manage and support implementation and a specific budget allocated? (Evidence of responsibilities, TOR, budget)
2. Are there SPP capacity building measures (training module for procurement staff, training of trainers) (evidence of training records, budget)

3. Is there a communication plan for SPP?
4. How is SPP implementation being monitored?
5. What type of dialogue & interaction is there with other UN agencies and with suppliers on SPP?

Strategy:
6. Is there a shared vision for sustainable procurement among UN agencies? Who is taking the lead in this? And who in UNICEF management takes part in these discussions?
7. How is the sustainable procurement guideline & procedure aligned with UNICEF's corporate strategy & policy?
8. Are there any specific social or sustainable policy goals which translate into sustainable procurement goals and targets? (What goals, targets)
9. Who in senior management is responsible to handle SPP challenges?
   a. Who can decide which social or environmental sustainability risks to focus on?
   b. Who can decide what SPP criteria and weighting is allowed?

Organisational culture:
10. What is your opinion of UNICEF's organisation learning capacity? Regarding:
   a. Is there flexibility to allow experimentation, risk taking in procurement? How?
   b. interaction with the external environment, dialogue with suppliers? How?
   c. Participative decision making, is your input valued?
11. Is the organisation structure flexible to adapt to changing conditions? How, give SPP example.

2. UNICEF Chief of Immunisation Technology Centre (ITC)

(C). Practical support delivered to public procurement practitioners in the implementation of SPP
1. Have SPP Guidelines and tools, or an official catalogue of eco-labelled products been developed and are periodically revised?
2. Are specific communication channels (newsletter, website, intranet, social media, etc.) used to provide information or tools to procurement practitioners, at least twice a year?
3. Are training sessions organised at least once a year to build the capacity of public procurement practitioners in the implementation of Sustainable/Green Public Procurement?
4. Are Best practices or (at least 3) case studies shared with procurement practitioners (studies developed in the last 3 years)?
5. Is a helpdesk on SPP practices available for procurement practitioners?
6. D(c): Has a risk assessment been conducted to identify which product or services would have the highest potential environmental or social impact and priority is given to focus SPP on those categories first?

Strategy:
7. Are there any specific social or sustainable policy goals which translate into sustainable procurement goals and targets? (What goals, targets)
8. Who in senior management is responsible to handle SPP challenges?
   a. Who can decide which social or environmental sustainability risks to focus on?
   b. Who can decide what SPP criteria and weighting is allowed?

Knowledge:
9. What training regarding SPP is being provided to staff (requesting units+ procurement officers)?
10. What information resources are available to staff regarding SPP?
11. Are there any training or information gaps regarding use of social, environmental, and economic sustainability criteria & standards for procurement?

12. Do you believe requesting units and country offices have enough know-how and skills to select social, environmental, and economic sustainability criteria & standards?

Collaboration:
13. Can you describe what kind of collaboration there is to implement SPP?
    a. Is there a specific internal taskforce?
    b. Which departments does procurement collaborate with regarding SPP?
    c. What type of external networks does UNICEF work with regarding SPP?
       (such as UNOPS DRiVE programme Delivering Responsibility in Vendor Engagement)
    d. How does UNICEF cooperate with suppliers regarding SPP?
    e. How is diversity of stakeholders ensured in collaboration?
    f. How are country offices and end-users involved in translating needs to technical and sustainability considerations?

Organisational culture:
14. What is your opinion of UNICEF's organisation learning capacity? Regarding:
    a. Is there flexibility to allow experimentation, risk taking in procurement? How?
    b. interaction with the external environment, dialogue with suppliers? How?
    c. Participative decision making, is your input valued?
15. Is the organisation structure flexible to adapt to changing conditions? How, give SPP example.
16. Change agents: Do you know examples of key persons who are promoting and assisting with implementation of SPP? (Name, function).
17. How does senior management support procurement officers in implementing SPP?

3. UNICEF Contracts Manager (ITC) & Contracts Specialist (CC)

(B). Public procurement regulatory framework conducive to sustainable public procurement
1. Can sustainability criteria be specified in technical specifications?
2. Can sustainability criteria be specified in sourcing / selection of suppliers?
3. Can sustainability criteria be specified in award criteria?
4. If so, what weightage (% point) can SPP criteria get in awards?
5. Can sustainability requirements be specified in contract performance clauses?
6. Do the procurement rules have any mandatory rules for sustainable procurement of some categories of products or services?
7. During planning: How do you include sustainability considerations & alternatives?
8. In defining requirements: How do you identify and prioritize sustainability risks?
9. How do you select relevant sustainability criteria and (eco) certifications?
10. How do you calculate Total cost of ownership (which sources do you use)?
11. Do you participate in sourcing & market research?
    a. If yes, how do you encourage participation of SME's & sustainable suppliers?
    b. How do you encourage participation of companies with a social objective?
       (Women-led, target vulnerable groups, disabled, minorities).
(D). SPP purchasing criteria/ buying standards / requirements
12. D(a) Have environmental purchasing criteria been defined, or specific sustainability standards or ecolabels recommended for (up to 20) specific "*priority*" product categories?
13. Are these sustainability criteria standards/ecolabels periodically revised at least every 5 years?
14. If yes, specify for which product categories (products or services that belong in one larger family) sustainability criteria have been defined: *(list)*

15. D(b): Are social, economic, or governance-related criteria are considered in procurement? (Provide specific examples from contracts). Criteria that fall in one of the 10 focus areas as listed below:

	Social, economic, and governance-related focus areas
1	Protecting against human rights abuses (for example, discrimination, unsafe working conditions child labour, forced labour, and human trafficking). It is advised to refer to the UN Guiding Principles for Business and Human Rights in the definition of such considerations.
2	Protecting and promoting groups at risk (for example, minorities, indigenous people, persons with disabilities, migrant workers) through social inclusion, which may include employment opportunities.
3	Promoting compliance with ILO standards and decent work
4	Promoting transparency and accountability and combatting corruption
5	Promoting SMEs
6	Promoting fair trade (for example, by ensuring fair living wages for those along the supply chain)
7	Promoting gender equality (for example, through the promotion of women-led businesses, or requiring a certain percentage of women in the workplace)
8	Promoting opportunities for social economy enterprises (NGOs, etc.)
9	Promoting Responsible Business Conduct among suppliers. Organisations may refer to the OECD Guidelines for Multinational Enterprises when defining these.
10	Promoting inclusive and equitable quality education, and lifelong learning opportunities for all (such as apprenticeship or training opportunities)

16. Change agents: Do you know examples of key persons who are promoting and assisting with implementation of SPP? (Name, function).
17. How does senior management support procurement officers in implementing SPP?

Knowledge:
18. What training have you done in SPP?
19. What information resources are available to you for SPP?
20. Are there any training or information gaps regarding use of social, environmental, and economic sustainability criteria & standards for procurement?
21. Do you believe requesting units and procurement officers have enough know-how and skills to select social, environmental, and economic sustainability criteria & standards?

Collaboration:
22. Can you describe what kind of collaboration there is to implement SPP?
    a. Is there a specific internal taskforce?
    b. Which departments do you collaborate with regarding SPP?
    c. What type of external networks do you work with regarding SPP?
       (such as UNOPS DRiVE programme Delivering Responsibility in Vendor Engagement)
    d. How do you cooperate with suppliers regarding SPP?
    e. How is diversity of stakeholders ensured in collaboration?
    f. How are country offices and end-users involved in translating needs to technical and sustainability considerations?

Organisational culture:
23. What is your opinion of UNICEF's organisation learning capacity? Regarding:
    a. Is there flexibility to allow experimentation, risk taking in procurement? How?
    b. interaction with the external environment, dialogue with suppliers? How?
    c. Participative decision making, is your input valued?
24. Is the organisation structure flexible to adapt to changing conditions? How, give SPP example.
25. What flexibility is there to allow alternative solutions to the specifications as provided? (How is this accommodated in tenders)
26. How are intellectual property rights (IPR) allocated for new products and is there flexibility?

Specific Successful SPP Case example:
27. Can you provide any example of successful sustainable procurement of cold chain equipment?
28. What aspects made this example successful?
29. What could have been done differently to further improve it?
30. How was each stage of the process handled?
    (Identify roles, responsibilities per stage: Procurement, requesting unit, QA-QC, management)
    a. Planning, Market research: What information sources, what type of cooperation, with whom
    b. Identify sustainability risks & interventions: What sources, standards used
    c. For new SPP procurement, how is demand aggregated?
    d. Identify sustainability (SPP) criteria: Which ones used, why?
    e. Total cost of ownership: What calculation used, source?
    f. Sourcing suppliers: How, from where, which pass/fail criteria used?
    g. Solicitation: How SMEs encouraged to apply, small lots, were alternative offers accepted?
    h. Award SPP Criteria used: What weighting for SPP criteria?
    i. Contract finalization: Which SPP criteria, clauses included?
    j. M&E contract performance: Actual outcome per SPP criteria, what was the impact?

4.   UNICEF Technical officers, ITC (2)

Knowledge:
1. What training have you done in SPP?
2. What information resources are available to you for SPP?
3. Are there any training or information gaps regarding use of social, environmental, and economic sustainability criteria & standards for procurement?
4. Do you believe requesting units have enough know-how and skills to select social, environmental, and economic sustainability criteria & standards?
5. During planning: How do you include sustainability considerations & alternatives?
6. In defining requirements: How do you identify and prioritize sustainability risks?
7. How do you select relevant sustainability criteria and (eco) certifications?
8. How do you calculate Total cost of ownership (which sources do you use)?
9. Do you participate in sourcing & market research?
    a. If yes, how do you encourage participation of SME's & sustainable suppliers?
    b. How do you encourage participation of companies with a social objective?
       (Women-led, target vulnerable groups, disabled, minorities).

Collaboration:
10. Can you describe what kind of collaboration there is to implement SPP?
    a. Is there a specific internal taskforce?
    b. Which departments do you collaborate with regarding SPP?

   c. What type of external networks do you work with regarding SPP?
       (such as UNOPS DRiVE programme Delivering Responsibility in Vendor Engagement)
   d. How do you cooperate with suppliers regarding SPP?
   e. How is diversity of stakeholders ensured in collaboration?
   f. How are country offices and end-users involved in translating needs to technical and
       sustainability considerations?

Organisational culture:
11. What is your opinion of UNICEF's organisation learning capacity? Regarding:
    a. Is there flexibility to allow experimentation, risk taking in procurement? How?
    b. interaction with the external environment, dialogue with suppliers? How?
    c. Participative decision making, is your input valued?
12. Is the organisation structure flexible to adapt to changing conditions? How, give SPP example.
13. What flexibility is there to allow alternative solutions to the specifications as provided? (How is this
    accommodated in tenders)
14. How are intellectual property rights (IPR) allocated for new products and is there flexibility?

5.   UNICEF Chief of Quality Assurance Centre, Quality Assurance Officer

1. What type of audits does UNICEF QA conduct at suppliers of cold chain equipment?
2. What type of supplier audits are done by third party auditors contracted by UNICEF?
3. What percentage of (active) cold chain suppliers get a management systems audit by UNICEF (or a
    third party contracted by UNICEF)?
4. Are any of the following types of audits conducted? compliance audit, social and environmental
    management systems audit, due diligence audit, pollution prevention audit, product audit, GMP audit,
    sustainability audit.
5. Which social and environmental audit standards and criteria are used for cold chain equipment?
6. How is follow up and advice provided to suppliers to:
    a. Address Corrective and Preventive action (CAPA)? and.
    b. Establish improvements?
    c. Is the output monitored and reported as part of contract performance review?

Knowledge:
7. What training in sustainable Procurement criteria & standards do quality assurance officers get?
8. What information resources are available to you for SPP criteria & standards?
9. Are there any training or information gaps regarding use of social, environmental, and economic
    sustainability criteria & standards for quality assurance & control?
10. Do QA officers and third-party auditors have enough know-how and skills to audit suppliers on
    sustainability criteria & standards?

6.   UNICEF Chief of Monitoring, Strategic Data Evidence Centre (MSDEC)

(E). Existence of a SPP monitoring system
1. Is progress of the SPP action plan / policy implementation monitored, how?
2. Have specific targets been set for SPP implementation, which ones?
3. Is progress toward achievement of the SPP targets monitored?
4. Is number and/or value of contracts which included SPP requirements monitored?
5. Are sustainability outcomes (such as CO2 emission reduction, creation of green jobs) monitored?

6. Is monitoring of SPP data carried out through:
    (a) surveys,
    (b) an information system,
    (c) an e-procurement platform?
(F). Percentage of sustainable purchase of priority products/services
7. Can UNICEF provide for the category of cold chain equipment: the total value of contracts which included sustainability requirements, plus the total value of all public procurement, concluded contracts? (To calculate the % sustainable procurement).

7. UNICEF Chief of Partnerships and Knowledge Centre (SPKC)

1. What kind of dialogue & interaction do you have with other humanitarian agencies, with donors and private sector on sustainable procurement? Dialogue with: Humanitarian/UN agencies, Donors, Private sector.
2. Which donors provide sustainability or environmental requirements to UNICEF?
3. What do they require and how is it monitored?
4. Does UNICEF report on implementation of the climate neutral strategy to donors?
5. UNICEF signed the "Climate and Environment Charter for Humanitarian Organisations" in Dec 2021, which was started by ICRC & IFRC. This means that organizations are expected to target and measure progress for the six commitments. Do you know who will be doing this in UNICEF?
6. Do you know if donors have any coordinated effort to address climate change & sustainability, similar to the charter for humanitarian organisations? (For example, like the Grand Bargain).

8. UNICEF Chief of Product Innovation Centre (PIC)

1. Could you please describe how the innovation process in UNICEF Supply Division currently works?
2. Public sector and EU have special procedures for innovation procurement that allow iterative processes that include more dialogue with suppliers, such as: pre-commercial procurement, procurement of research & development, and competitive dialogue. (ref: EU guidance 2021)
    Are these (or other) options available within UNICEF SD?
3. What type of interaction is there between the Innovation centre and the Immunization Technology centre regarding innovations?
4. Does UNICEF SD have an innovation policy framework and/or action plan? (If so, please share).
5. Does the innovation centre have any sustainability or environmental targets? (If so, what?)
6. What criteria do you use to decide if innovation proposals are worthwhile to develop?
    (e.g., quality, efficiency improvements, cost reductions over life cycle, use of Total Costs of Ownership, life cycle assessments).
7. How does UNICEF's process allow flexibility to include start-ups and innovative SME's?
8. What kind of dialogue is there with suppliers of cold chain equipment to stimulate innovation?
    (e.g., do you participate in market research, initial market consultations, negotiations)
9. How do you manage risk and overcome risk aversion in procurement of innovation?
10. How are intellectual property rights (IPR) allocated for new products and is there flexibility?
    We are the investor and IP are not our business.

9. WHO Technical officer (WHO PQS prequalification unit)

Knowledge:

1. What information do you collect to develop PQS Target Product Profiles for CCE?
2. Do PQS Target Product Profiles include sustainability criteria? If yes, which criteria? (Environmental, social, and economic criteria as used on UNGM).
3. Is there room to include sustainability indicators that go beyond prevention of harm (i.e., prevent use of ozone depleting refrigerants) but that aim to establish improvements (i.e., reduce energy consumption, eco-design, reduce Total Cost of Ownership)?
4. Is normally a risk assessment done to develop PQS Target Product Profiles for CCE? If yes, does this cover sustainability risks? If so, what risks? (*Please share the framework*)
5. In the working group that develops PQS Target Product Profiles, is there anyone with knowledge of environmental-, social- and economic-sustainability technical standards and criteria?
6. Do you believe there are any training or information gaps regarding use of social, environmental, and economic sustainability criteria & standards in the working group that develops PQS Target Product Profiles?
7. Has WHO-PQS used Life Cycle Analysis or Total cost of ownership to analyze and compare cold chain equipment? If so, could you please share any recent examples?
8. Can you please share TPP's of solar-powered ice-lined refrigerators, freezers, and cold boxes?

Quality assurance:

9. I understood all (100%) WHO-PQS prequalified equipment and devices have passed laboratory testing and the lab reports and product specifications were assessed by WHO staff.
   Does the WHO-PQS prequalification process include any audit(s) of the supplier?
   - If so, to what standard (GMP/ ISO13485/ Due Diligence/ other) and.
   - What % of WHO-PQS prequalified suppliers are audited?
10. Does WHO-PQS supplier prequalification include any social/environment/economic criteria? If so, what criteria?
   - Environmental: ☐ ISO 14001, ☐ EMAS (?), ☐ ISO 50001 Energy man., ☐ ISO 14040 LCA
   - Social: ☐ UN Global Compact ☐ ISO 45001 Health & safety /OHSAS 18001 ☐ SA8000, ☐ GRI, ☐ Eco Vadis, Others:

Collaboration:

11. Can you describe what kind of collaboration there is to develop PQS Target Product Profiles for CCE?
   a. With UN organizations, donors, and partners?
   b. With external networks of private sector and suppliers?
   c. How are end-users involved in translating needs to technical and sustainability considerations?

10. Donors to CCEOP: Gavi and Bill and Melinda Gates Foundation

1. How does your organisation support development of WHO-PQS Target Product Profiles for Cold Chain Equipment (CCE)?
2. Does your organization use sustainability criteria to include in PQS Target Product Profiles and in CCEOP project? If yes, which criteria?
3. Is there room to include sustainability indicators that go beyond prevention of harm (i.e., prevent use of ozone depleting refrigerants) but that aim to establish improvements (i.e., reduce energy consumption, eco-design, reduce Total Cost of Ownership)?
4. Does your organization have any special demands regarding environmental or social issues related to CCE?

5. Is normally a risk assessment done to develop PQS Target Product Profiles for CCE? If yes, does this cover sustainability risks? If so, what risks? (Please share the framework)
6. In the working group that develops PQS Target Product Profiles, is there anyone with knowledge of environmental-, social- and economic-sustainability technical standards and criteria?
7. Do you believe there are any training or information gaps regarding use of social, environmental, and economic sustainability criteria & standards in the working group that develops PQS Target Product Profiles?
8. Has your organization used Life Cycle Analysis or Total cost of ownership to analyze and compare cold chain equipment? If so, can you please share any recent examples?
   Collaboration:

9. Can you describe what kind of collaboration there is to develop PQS Target Product Profiles for CCE?
   a. With UN organizations, donors, and partners?
   b. With external networks of private sector and suppliers?
   c. How are end-users involved in translating needs to technical and sustainability considerations?

11. Cold Chain Equipment Manufacturers / Suppliers

1. What type of supplier are you regarding supply of cold chain equipment to UNICEF?
   ☐ Manufacturer of equipment, processing raw materials & components.

   ☐ Distributor of equipment, buying equipment from multiply manufacturers and selling it.

   ☐ Consolidator, buying equipment & components, assembling/grouping them, and selling it.
2. How to you ensure adherence of your company and your tier-1 suppliers, to the specific clauses of the UN Code of conduct?

Inter-organisational factors, Suppliers' involvement:
3. How have you been involved in cold chain procurement by UNICEF, what type of collaboration and interaction was there?
4. Was there any discussion during the procurement phase about alternative solutions to the specifications as provided?

Networking & External stakeholders:
5. Are you part of any networks regarding cold chain technology, development of equipment or innovation?
6. Are you a member of UN global Compact, disability inclusive, women/youth owned networks?
7. Who is part of these networks?
8. Did UNICEF, non-profit organisations or end-users take part in these networks, how?
9. How to you get information from end-users of the cold chain equipment,
10. How do you interact with them? With whom, how frequently?

Vision:
11. Does your organisation have a corporate social responsibility policy?
12. Do you have a formal environmental policy and/or environmental management system?
13. Is your management system currently certified to any of the quality, environmental or social standards listed below? Check which ones are applicable:
   Quality assurance: ☐ ISO 9001, ☐ ISO 13485 Medical devices ☐ ISO 17025 Laboratory
   Environmental: ☐ ISO 14001, ☐ EMAS, ☐ ISO 50001 Energy man., ☐ ISO 14040 LCA
   Social: ☐ UN Global Compact ☐ ISO 45001 Health & safety ☐ SA8000, ☐ GRI ☐ Eco Vadis.
   Any others, specify:
14. What goals and targets do you have for social, environmental, and economic sustainability?

15. How do you measure and monitor these? (Which KPI's are used, reporting)
16. Which of these KPI's are outcome indicators? (Measuring impact on society).

(ISO 20400 – Sustainable Procurement) 6.4.2.3 Using a supplier approach:
17. Where are your most significant raw materials, good or services come from (tier 2 suppliers)?
18. Where is the labour sourced from?
19. How and by whom are goods transported (downstream, upstream)
20. What social, environmental, and economic sustainability requirements do you ask from your suppliers?

Policies and regulation:
21. Which mandatory (inter-)/national environmental regulations are applicable to production of the cold chain equipment that you supply to UNICEF?
22. Below are the core subjects of procurement sustainability from (ISO 20400, Annex A, table A.1). Please check which components are currently addressed by documented policies and procedures in your management system:

Core subjects and procurement sustainability issues (ISO 20400, Annex A, table A.1)

Core subjects	(ISO 26000) Related expectations
1. Organisation	
Decision-making processes and structures	☐ Sustainability procurement policy ☐ Sustainability procurement goals and targets
2. Human rights	
Due diligence	☐ Due diligence process to identify adverse human rights impacts ☐ Human rights risks identified
Avoidance of complicity	☐ Process to avoid complicity in human rights violations by suppliers
Resolving grievances	☐ Transparent grievance mechanism for human rights
Discrimination	☐ Avoidance of discrimination workers & vulnerable groups
Civil rights	☐ Respect freedom of association & opinion, political rights
Economic, social, cultural rights	☐ Right to work in just & favourable conditions, adequate standard of health, adequate food, clothing, housing.
3. Labour practices	
Employment	☐ Legal recognition of contractors & workers, equal opportunities
Work conditions	☐ Fair wages, rest periods, limits to work time, holidays, safe drink water, sanitation, canteens, access to medical services
Social dialogue	☐ Social dialogue with suppliers, workers, collective bargaining
Health & safety at work	☐ Occupational health & safety system, prevention of harm
Development, training	☐ Access to skills development & training for workers
4. Environment	**(ISO 14001) Related expectations**
Pollution prevention	Pollution prevention & waste management targets & activities
Sustainable resource use	☐ Environmental Impact assessment, LCA/LCC, eco-design ☐ Water conservation targets & activities ☐ Energy conservation targets & activities ☐ Re-use and recycling of critical materials
Climate change mitigation and adaption	☐ Reduce carbon emissions ☐ Mitigate effects of carbon emissions ☐ Prevent, mitigate flood, drought, water scarcity

Protect environment, biodiversity	☐ Protect land, water & natural resources, sustainable urban development. Protect welfare of animals
5. Fair operating practices	
Anti-corruption	☐ Reporting system and training, raise awareness of staff
Political involvement	☐ Avoidance of influence by political stakeholders
Fair competition	☐ Avoidance of price fixing, predatory bidding, treat SME's fairly
Social responsibilities	☐ Support, assist SME suppliers where appropriate
Property rights	☐ Respect property rights, avoid misuse
6. Consumer issues	
Fair marketing	☐ Promote consumer rights principles, providing clear information
Protect consumer health	☐ Protect consumer health & safety
Sustainable consumption	☐ Eco/circular-design products for 6 R's ☐ Inform consumers; labels for recycle, eco-labels, energy efficiency
Consumer service	☐ Adequate consumer service and support, complaint mechanism
Consumer data protection	☐ System to ensure consumer data protection & privacy
Access to essential services	☐ Stimulate supply chains to provide access to essential services
Education & awareness	☐ Educate consumers on responsible consumption
7.Community involvement	
Community involvement	☐ Process to consult local communities, representatives ☐ CSR contribution to development programmes
Education & culture	☐ Support education local communities, women, vulnerable groups
Employment creation, skills development	☐ Process to assess impact of investment on employment creation ☐ Process to encourage use of local suppliers, SME's ☐ Process to encourage use women-led, SMEs by vulnerable groups
Technology development and access	☐ Process to innovate, develop technology help solve societal issues ☐ Partnerships with suppliers, academia, community
Wealth & income creation	☐ Possible preference to local suppliers, local supplier development ☐ Fulfilling tax obligations by suppliers
Health	☐ Eliminate negative health impacts of production processes ☐ Support health services, participate in public health campaigns
Social investment	☐ Social investments that promote community development ☐ CSR contribution to programmes for women & vulnerable groups

23. Please clarify **of any the seven** core subjects of Sustainable Procurement & Social Responsibility (above), which areas are especially well-covered, or are current gaps:
   - What is your companies' positive or negative impact in society related to these subjects?
   - What value does your company create for sustainability?